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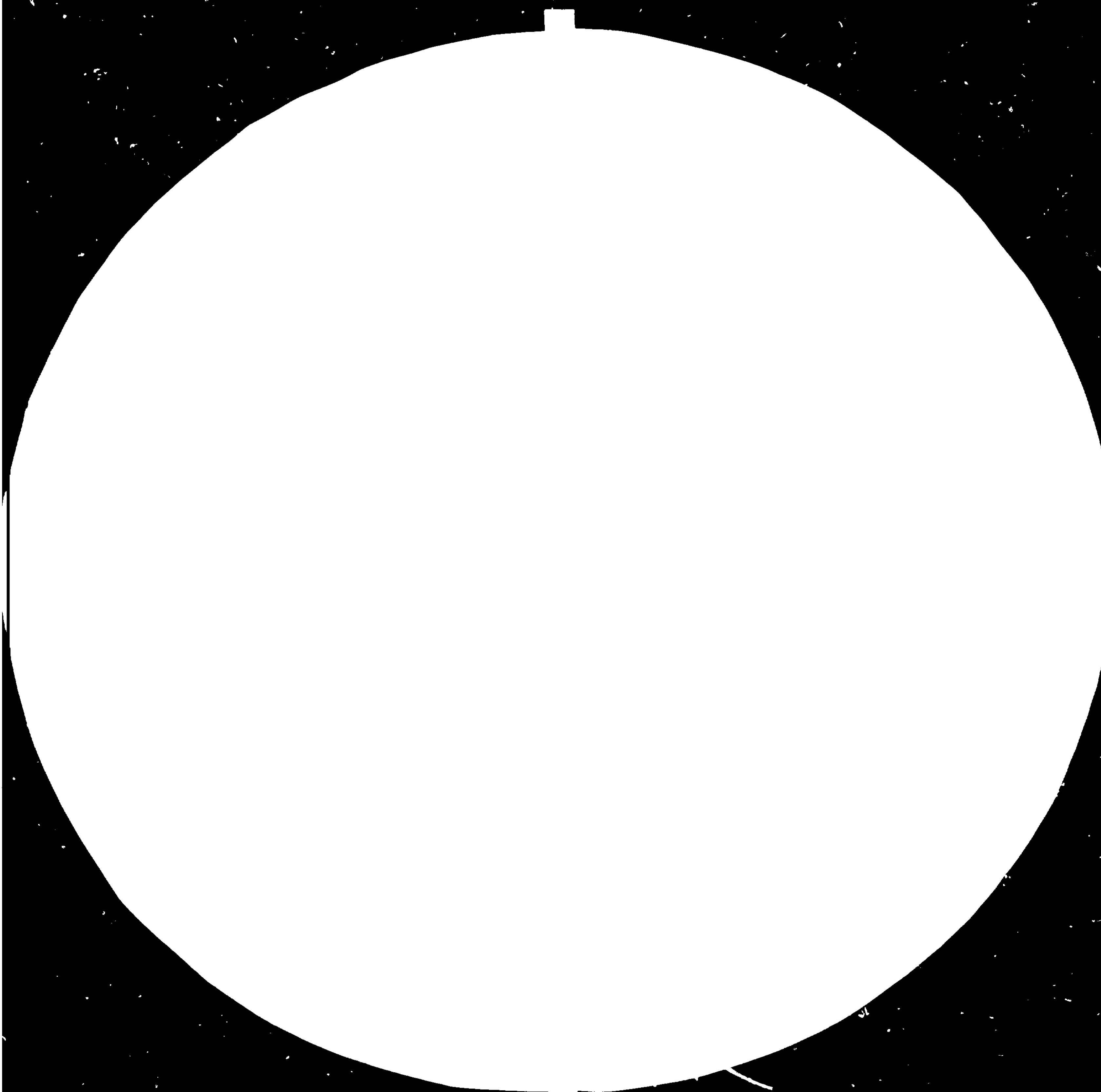
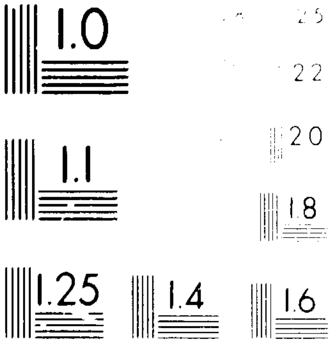
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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FEDERAL REPUBLIO OF NIGERIA
RIVERS STATE

13233
(1 of 3)

Nigeria.

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

EXECUTIVE SUMMARY

1591

December 1983

IFAGRARIA s.p.a.
ROMA

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

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I N D E X

Page

ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C. : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

INTRODUCTION

The Federal Government of Nigeria has requested UNIDO assistance to prepare a project for establishing an Integrated Food Industry Complex.

UNIDO Project US/NIR/80/069 was decided by the Federal Ministry of Industry and the Federal Ministry of Plan to be implemented in Rivers State.

The UNIDO H.C. in Vienna has selected the IFAGRARIA S.p.A. - Rome (Italy) to carry out the feasibility study.

The field survey was conducted by the IFAGRARIA team in January, February and March and for some particular aspects in April and May; the survey has been conducted prominently in Rivers State with some specific investigations in the surrounding States, such as Imo and Anambra.

In April 1983, the IFAGRARIA team produced an Interim Report which was submitted and approved by the UNIDO.

A draft final report, based on the above-mentioned Interim Report, was submitted to UNIDO in August 1983.

This FINAL REPORT has been prepared taking the UNIDO and the UNDP Lagos (Nigeria) recommendations into account.

The Final Report consists of :

- Executive summary which gives a summary of the contents of the project
- General Report which gives a summary of the contents of the various annexes and provides the answers to the Project objectives with the subsequent explanations. A description of the agro-industrial plant selected as a nucleus for agro-industrial development in Rivers State according to basic criteria is also given
- Annex 1 which gives a detailed panorama of the existing agriculture, its development programmes, the implementing agencies and the co-operative societies in Rivers State
- Annex 2 which is completely devoted to the palm oil industry due to the specific importance of this industry in Rivers State

. Annex 3 which gives a Rivers State market analysis of the major agricultural and food products. Emphasis is given to the in-out products of the selected agro-industrial plant

. Annex 4 which gives the functional description of the selected agro-industrial plant and its economic, organizational and management aspects

. Annex 5 which describes the technological process, prefabricated buildings, equipments and civil works of the selected agro-industrial plant

. Annex 6 which contains the drawings of the civil works and equipments of the selected agro-industrial plant.

1. THE FIELD SURVEY RESULTS

1.1 AGRICULTURE

1.1.1 The magnitude of the existing area under cultivation according to the R.S.M.A.N.R.(*) can be estimated at 27,000 ha under cassava; 10,100 ha under maize; 5,800 ha under yams; 1,900 ha under rice; and 3,400 ha under plantains (Annex 1 - table 6). The other major crops are palm oil, of which 9,800 ha in estate and 5,770 ha at smallholder level (Annex 2 - table 1, 2); 2,300 ha under vegetables and fruit (Annex 1 - table 10); 6,000 ha under cocoyams (Annex 1 - para.8.3.3); 2,000 ha under coconuts (Annex 1 - para. 8.4.1); and 2,000 ha under cocoa (Annex 1 - para. 8.4.2). Rubber trees are also cultivated, but figures are not available.

1.1.2 It is estimated that about 300-350,000 ha are covered by raffia palm which grows spontaneously in the central part of the Riverine area of Rivers State (Annex 1 - para. 8.4.5).

1.1.3 The livestock population has been evaluated by the Federal Department of Livestock at 4,500,000 local-type poultry; 800,000 exotic-type poultry; 4,000 pigs; 46,000 sheep; 112,000 goats; and 500 cattle.

1.1.4 Except for some palm oil, coconut, and rubber plantations, most of the farming in Rivers State is of smallholder subsistence type with communally-owned bush fallow-land. The average total area is about 1,5 ha per farm family and consists of several plots often smaller than 0,5 ha each.

1.1.5 It is estimated that 147,000 farm families are settled in the upland cropped area of Rivers State.

(*) Rivers State Ministry of Agriculture and Natural Resources

1.1.6 There are a total of about 1,730 registered and unregistered agric - ultural co-operatives societies plus 2,000 group-farmers operating in Rivers State (Annex 1 - para. 2.3.1 and Chapters 9 and 10).

1.1.7 The Fourth National Development Plan (1981-85), and its specific Green Revolution Programme in Rivers State, envisages a wide range of programmes directly aimed toward increasing food production, mainly at smallholder level. Emphasis is given to the development of maize, cassava and rice and in the livestock sector to poultry and pigs.

1.1.8 Some of the programmes are on-going projects, while others are new projects only launched at the end of this year. They are implemented by Federal and State Agencies. The programmes although well conceived, are in general behind schedule, with regard to the fixed objectives; most of them are at present in the starting phase. It is estimated that the delay is generally about 2-3 years.

1.1.9 Development programmes for maize are aimed at expanding the area under cultivation by about 12,500-20,000 ha with an expected increase in production of 38-60,000 tonnes (see Annex 1 - table 18) over the next five years.

1.1.10 Development programmes for rice are expected to expand the area under cultivation by about 12,000 ha with an additional production of 20,000 tonnes of paddy over the next five years (Annex 1 - table 21).

1.1.11 Development programmes for cassava are expected to expand the area under cultivation by about 14,000-22,000 ha with an additional production of 114-174,000 tonnes over the next five years (Annex 1 - table 25).

1.1.12 Development programmes for palm oil envisage an expansion of the area under cultivation by about 3,300 ha at state level while another 7,300 ha will be devoted to this purpose in the future. At smallholder level the programmes envisage, at the moment, only some replanting (Annex 2 - Chapter 2).

1.1.13 For other crops no specific development programmes are to be undertaken at present. The fruit and vegetable area under cultivation will surely expand but not to a significant amount.

1.1.14 Other programmes such as the seed multiplication programme (Annex 1 para. 4.1.7), the development of warehouses, agro-services centres, fertilizer stores (Annex 1 - para 4.1.9), credit schemes (Annex 1 Chapter 11) aim at increasing agricultural productivity in general.

1.1.15 Development programmes for livestock are mainly undertaken by the N.D.B.D.A.(*) and R.S.M.A.N.R. (Annex 1 - para. 5.8 and 8.5), especially for poultry and pigs.
Except for the pig project - already in a satisfactorily advanced stage - the other poultry projects are far from contributing to solve the serious poultry-meat storage.
Beef development projects are underway, but their weight does not affect the cronic deficit in these sectors.

1.2 EXISTING AGRO-INDUSTRY

1.2.1 Port Harcourt Flour Mill, mills imported wheat for the Rivers State needs and also for the neighbouring States and is producing, as its most important by-product, about 800 tonnes of wheat offals, almost entirely exported so far. However the E.S.M.(2) have recently prohibited its exportation (Annex 4 - para. 4.5.1).

(*) Niger Delta Basin Development Authority

(2) Economic Stabilization Measures

1.2.2 R.I.V.O.C. (Rivers State Vegetable Oil Company) Palm Kernel mill has a rated capacity of 180 tonnes/kernel/24 hours. The direct-solvent extraction process is used. The mill has not been working since January 1982 owing to the lack of funds to purchase spare parts. The State Government intends to re-start the mill in April-May 1983 and will lease the mill for commercial management.
Efficient extraction is unlikely without modification to some processing phases. Properly activated, and with good management, the mill will have a capacity considerably in excess of the requirements, even on long term (Annex 2 - Chapter 15).

1.2.3 Risonpalm Limited (Palm Oil Development and Production Company) is a Government-owned company operating in the palm oil sector at agricultural, processing and marketing levels. The Company owns the only palm oil mill operating in Rivers State (rated capacity 1,5 FFB/tonn/hour). Much more important is its development programme at agricultural level (the UBIMA estate will be of about 9,600 ha in 1985) and processing level (the initial capacity of 20 tonnes FFB/hour of the existing mill will be increased to 40 tonnes FFB/hour in 1985).
The Company has planned the installation of a second mill in 1985 with an initial capacity of 10 tonnes/hour, building up to 40 tonnes/hour by 1989 (Annex 2 - para. 4.1).

1.2.4 Pabod Breweries Ltd. is a partially Government-owned Company recently established with success in Port Harcourt. While its beer production is not yet known, it is estimated that the factory will produce about 60 tonnes/month of dried spent brewery grains which is a raw material used for feedstuff preparation (Annex 4 - para. 4.3.4.). The E.S.M. have recently prohibited the exportation of this by- product (General Report - para 4.2.4).

1.2.5 Amalgamated Distilleries of Nigeria Limited is a partially Govern - ment-owned Company. Local gin is distilled and, with the addition of specific flavours, transformed into local brandy, whisky and gin. Established since 1976 it has not experienced a proper take-off due to the great quantity of smuggled spirits on the market (General Report - para. 8.2.4).

1.2.6 The feed-mill industry consists of 5 industrial-artisanal units: NAFCO (National Animal Feed Co. Ltd. a Federal Agency for feed stuff production),Desba Feeds Pita Feedmill, Feedmill International, Amba Feedmill. The feedmill industry is - to be precise - an industry which mixes imported raw material. The operations, all located in Port Harcourt, are based on the proximity of the port. Since they do not use local raw materials they are affected by the E.S.M. (General Report - para. 4.2.3) and the scarcety of foreign currency experienced by the Federation of Nigeria at the moment.

1.2.7 The one-day-old chicks industry in Rivers State consists of the small operations (Desba and Nwokolo) in the layer sector only. Most of the requirements are imported from other States of the Federation or from abroad (Annex 3 - Chapter 3).

1.3 MARKET

1.3.1 The market research has been particularly directed towards poultry products because of the lack of other food products processed and produced in Rivers State or of an already established occupancy by the existing agro-industries.

1.3.2 The other major processed food in Rivers State is garri, whose production is still at artisanal-family level. Industrial production of garri is not at present recommended in the Nigerian cassava belt because, in comparison with the artisanal one, it is difficult because of high prices to acquire land to establish cassava plantations, whilst there is also an absence of marketing facilities for fresh cassava tubers (Annex 1 - para. 8.3.1).

1.3.3 The almost inexistant palm oil production of Rivers State, at present obtained from a single small mill with a minimal capacity of 1.5 tonnes FFB/hour (Annex 2 - para. 4.1), has excluded further investigation on this matter. The present high price and the great demand for palm oil in Rivers State, as throughout Nigeria, does not require supplementary investigations.

1.3.4 The palm kernel oil market is at present supplied by imported products from the neighbouring State. The palm kernel mill belonging to the Rivers State Vegetable Oil Company (R.I.V.O.C.) has not been working since January 1982 (Annex 2 - Chapter 5).

1.3.5 The local gin processing (distillery) market in Rivers State is badly affected by the smuggling of foreign spirits into the country. The existing distillery covers - according to its managers - the present and future needs for this kind of product (Annex 1 - para. 8.4.5 and General Report - para 8.2.4).

1.3.6 The feedstuff market is supplied by 5 artisanal units which mix raw material coming from abroad. The inadequate equipment to process raw material, the complete divorce from the local agricultural world for the provision of raw materials, the high cost of the imported material and its scarcety due to the effects of the E.S.M., are having a negative effect also on this industry. Mainly oriented towards layers poultry formula, the feedstuff industry had prospered because the large benefits still obtainable from the poultry sector (Annex 3 - Chapter 2).

1.3.7 The poultry products market (Annex 3 - Chapter 1) is a booming market throughout Nigeria in general and also in Rivers State because poultry is the cheapest source of protein for the Nigeria population. This is due to the high conversion rate of feedstuffs into poultry meat and eggs, the high reproduction rate, and the high resistance of the birds to the climate.

Estimates by the Federal Department of Livestock reported a supply deficit in Rivers State of 6.1 million kilos of poultry meat and 10.0 million eggs in 1980, while for 1985 the deficit is estimated at 6.9 million kilos of poultry meat and 11.6 million eggs. At 1985 the total demand is estimated in 8 million kilos of poultry meat and 14 million eggs. This estimate has considered an annual pro-capita consuption of 2.2 kg./habitant, for poultry meat, and 3.75/eggs/habitant (Annex 3 - para 1.2). Prices are very attactive and scarcety especially for poultry meat, whas observed in various points of the market chain. Total eggs production has expanded more than poultry meat production due to the small initial investment and faster return. Among the other constraints, the development of poultry meat production is held back by the absence of slaughterhouse facilities.

1.4 INFRASTRUCTURES

1.4.1 Roads and road transport facilities are fairly extensive in the upland part of Rivers State, while in the riverine zone there are, in fact, hardly any roads at all. The main line of communication is constituted, from north-west to south-east, by the stretch of expressway - partly in construction and partly in the design stage - that will link Rivers State with the bordering Bernhel and Rivers State.

The expressway to Port Harcourt-ABA links Rivers State with the north-east States, such as Imo and Anambra (General Report - Road Map).

1.4.2 Railway network is very limited in Rivers State because the line runs from Port Harcourt to Aba and then covers no more than 20 km. The railway has a great importance for the north-east State for providing a connection with Port Harcourt Port (General Report - Road Map).

1.4.3 Port Harcourt Port is considered the second largest commercial port of Nigeria. Its greatly expanded facilities allow to handle all kinds of exported and imported goods (Annex 3 - Chapter 7).

1.4.4 Port Harcourt International Airport, located about 20 km north-west of Port Harcourt, has daily flights to the major European cities and fairly large cargo facilities (General Report - Road Map).

1.4.5 The electric power development programme is implemented by the NEPA. To show this development throughout Rivers State, a power development map has been compiled (General Report - Power Development Programme in Rivers State and para. 4.7.3). The present and future programmes implemented by the NEPA do not assure a regular supply of electric power. In fact all the high power consuming industries in Rivers State have installed their own electric generators.

1.4.6 Water supply is not - according to the Ministry of Energy and Water Supplies and private operators - a problem in Rivers State. Because of the density of the hydrographic network and the very abundant rainfall in the region, surface water supplies are virtually unlimited (General Report - para. 4.7.4).

2. THE RIVERS STATE POTENTIAL AGRO-INDUSTRIAL DEVELOPMENT IN THE SHORT, MEDIUM AND LONG TERM

2.1 The field survey results have been taken into consideration to endeavour to ascertain the Rivers State potential for agro-industrial development in the short, medium and long term.

2.2 In the short term, the agro-industrial development can be pursued considering the utilization of agricultural raw material to be produced by the existing development programmes: maize and cassava. In fact, all the other sectors have shown that :

- for rice, the existing rice mills are at present working far below their processing capacity and the razionalization of the sector is already under way by the development Agencies or Institutions (R.S.M.A.N.R. and N.D.B.D.A.) (Annex 1 - para. 5.1.1. and 8.2.2.);
- for palm oil the agro-industrial development is already undertaken by the Risonpalm Limited;
- for palm kernel processing the present working capacity of the R.I.V.O.C. factory will be - when opened and modernized - amply sufficient for long time;
- distilling local gin - using the present distillery - is of no interest due to market problems.

2.2.1 Because of the unattractive market prospects for cassava industrially processed into garri or starch, and the limited quantity of maize for setting up a sophisticated industry (oil extraction) the above products can be used as raw materials for the feedstuff industry.

2.2.2 The E.S.M. have drastically reduced the importation of maize, so that in the short term a scarcety of this product will occur.

2.2.3 On taking into consideration the utilization of maize and cassava as components of the feedstuff, it was necessary to establish which livestock species to develop.

2.2.4 The poultry industry has encountered favourable consideration for its low conversion rate of feedstuff into meat and eggs, and the high demand of the poultry products, among the owners of this type of industry in the State.
The pig and beef industry have been excluded, the first because the N.D.B.D.A. has a project of a certain consistency already under way (6,000 pigs - Annex 1 - para. 5.8.2.b) , the second for its high feedstuff conversion rate, disease problems and scarcety of land.

2.2.5 The surveys have shown that other raw materials for poultry feedstuff are present today in Rivers State such as wheat offals (Port Harcourt Flour Mill), dried brewery spent grains (Pabod Breweries) or will be soon produced in Rivers State, such as palm oil (Risonpalm Limited) and palm kernel oil by-products (R.I.V.O.C.) - Mineral salts and additives are commonly found on the Rivers State market (Annex 3 - Chapter 2).

2.3 In the middle-term, the agro-industrial development is supposed to be directed towards the processing of the increasing agricultural raw material production.
That means, again, the processing of maize, cassava, rice and palm oil.

2.3.1 For maize, first of all, drying units are supposed to be planned in such a way as to serve the network of various grain depots already existing or under construction in Rivers State (Annex 1 - Table 15). Because the bulk of the maize diverted from human consumption will follow the natural channel as feed stuff ingredients, no other processing activities can be foreseen in the middle-term. To increase the nutrient value, processing activity, such as extrusion treatment, will be possible as a component of the feedmill industry.

2.3.2 For cassava, the agro-industrial development should be directed towards garri and chips production. Starch production seems rather unattractive, according to the results of producing factories located in other States.

2.3.3 For rice, beside the development and modernization of the existing rice mills, further processing activities, such as food preparation, can be planned. This is related to the fact that consumers' preference towards imported rice depreciates the local product.

2.3.4 For palm oil sector, the industrial development can be based on the establishment of 2 palm oil mills (1.5 tonnes FFB / hour and 5.0 tonnes FFB/hour respectively) in the N.D.B.D.A. estate (Annex 2 para - 4.2).

2.4 In the long-term, due to the incertitude of assessing the agricultural development programmes for all the crops, with the exception of palm oil, the potential agro-industrial development will be conditioned by the results achieved during the previous phase. For palm oil, instead, the reinforcement of the processing activity can be foreseen in the following way :

- at palm oil level :
  - .. establishment of a 5 tonnes FFB/hour palm oil mill;
  - .. enlargement of 2 palm oil mills from 5 to 10tonnes FFB/hour;

- at fractionation and refining level: the estimated increased palm oil production, but more than this the predisposition of new market conditions, can suggest the planning for a palm oil refinery of 100 tonnes/24 hours and a palm oil fractionation factory of 25-75 tonnes/24 hours.

3. THE MOST PROMISING AGRO-INDUSTRIAL OPPORTUNITIES IN RIVERS STATE

The most promising agro-industrial opportunities in Rivers State, listed below, are based on the various aspects of the field survey conducted by the IFAGRARIA team. These concerned :

. the existing and potential agricultural raw material production;
. the market research;
. the existing agro-industries and their potential capacity to meet the demand requirements in terms of quantity and quality, both at final (consumer) and intermediate (semi-processed) levels.

This is the priority list of the suggested opportunities in the agro-industries :

(a) feed-mill industry;
(b) slaughterhouse industry;
(c) hatchery industry;
(d) cassava-processing industry;
(e) maize-processing industry;
(f) rice-processing industry;
(g) palm oil milling industry;
(h) palm oil fractionation and refinery industry;
(i) raphia palm alcohol refinery industry.

In compiling the above list the effects and the causes of balanced development of the whole agro-industrial sector have been taken into consideration.

The listed agro-industries are the concrete opportunities of agro-industrial development in the short-, medium- and long-term in Rivers State: some of them are primary processing activities, while others are the immediate needs of a further agro-industrial development.

If there is a surplus availability of processed or semi-processed products, such as cassava, maize, rice and palm oil, space is immediately created for the feed mill industry; the latter will require an extensive livestock development which, in the case of poultry breeding, will need in general an advanced hatchery industry and, in the case of broilers, a slaughtering facility. This explains why the listed opportunities should be seen is an overall plan where all the human and financial resources are finalized to the integrated development of the agro-industrial sector.

For the opportunities listed in point h), there is first of all the necessity to increase palm oil production and then, later, to create the market conditions for the local processing activity (e.g. revising of import policy).

For the opportunities listed in point i), the problem should be solved of how to protect the internal market from external interference,e.g. the smuggling.

While for the feed mill, slaughtering and hatchery industries,as the most topical concrete opportunities, feasibility studies have been prepared in the context of the selected agro-industrial plant (Annex 4), for each of the other opportunities chronogrammes have been made for the further studies to be conducted,and relative terms of reference drawn up (General Report - para. 8.3).

In any case, outside of the agro-industrial poultry sector, the perspectives of development for the other agro-industrial sectors are not constitent at short term. According to the possibilities to achieve the agro-based raw material development program, perspectives exist mostly at medium-long term.

4. THE SELECTED AGRO-INDUSTRIAL COMPLEX

4.1 The selected agro-industrial complex is a poultry farm for the production of poultry meat and table eggs sited in Omoko, in Ahoada L.G.A., about 100 km north-west of Port Harcourt (Fig. 1).

4.2 The results of the field surveys have shown that in the short time available there is no nother choice able to meet the basic criteria in selecting an agro-industrial complex (General Report - Chapter 3).

4.3 The type of poultry fam suggested is an integrated operation both at external level and internal level.

4.3.1 The integration at external level is assured by the involvement of the surrounding agricultural world under the form of Farmers' Co-operatives and Poultry Farmers' Co-operative, in the existing agro-industries and the market situation(Fig. 2).

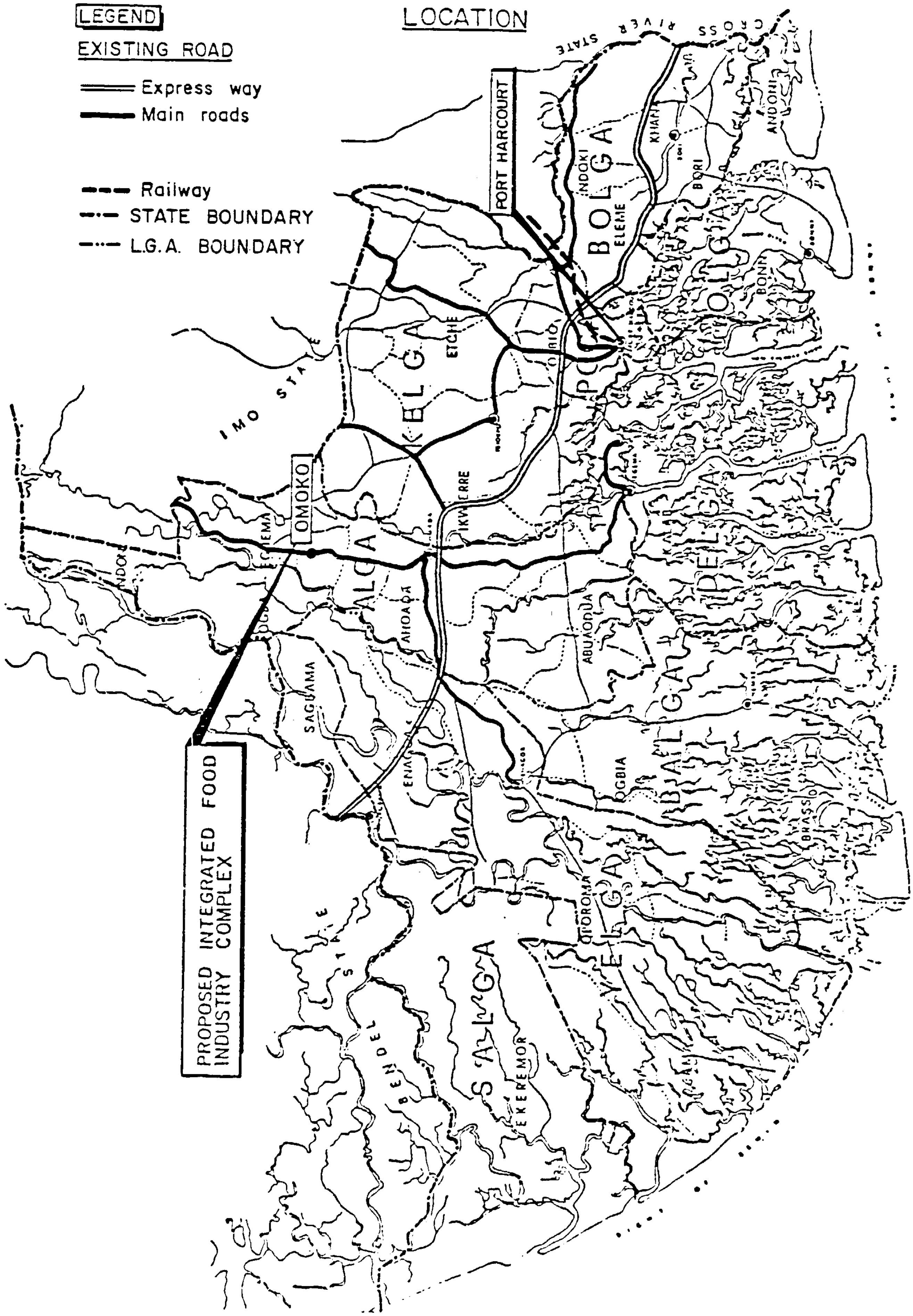
The Farmers' Co-operatives will supply a part of the maize and cassava requirement for the feed-mill. It is planned to involve the existing Farmers' Agricultural Co-operative in Ahoada L.G.A., with an average membership of 44 (Annex 4 - para. 4.1.1), in this operation.

4.3.2 The integration at internal level is assured by the follow - ing operations (Fig. 2) :

- feed mill
- parent stock installation
- hatchery plant
- broilers installations
- layers rearing sector
- layers production sector

RIVER STATE
PROPOSED INTEGRATED FOOD INDUSTRY COMPLEX
(INTEGRATED POULTRY PROJECT)

FIG. 1



PROCESSING SCHEME AND EXTERNAL RELATIONS OF POULTRY FARMS

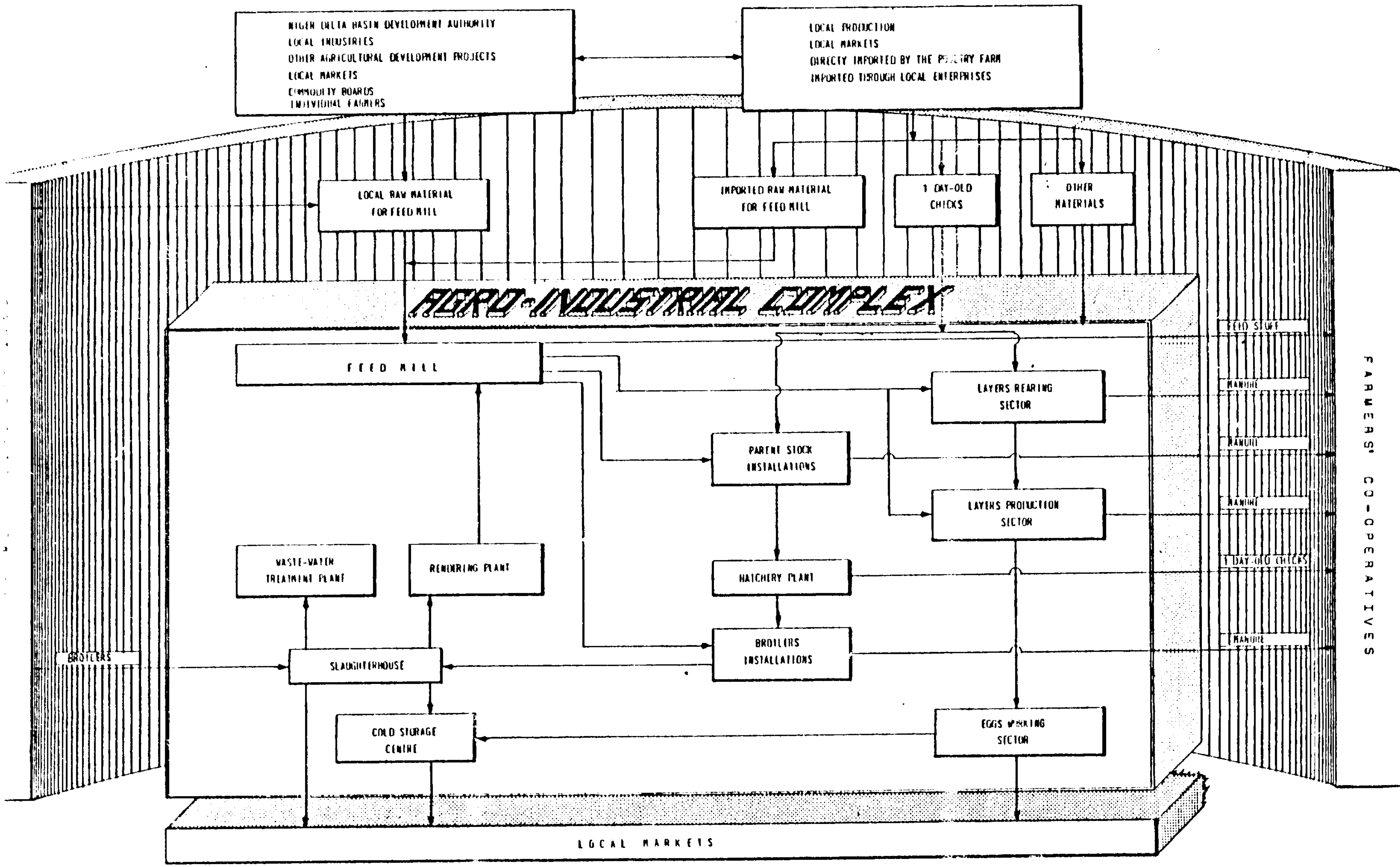


FIG. 2

- slaughterhouse
- egg-working sector
- cold-storage centre
- rendering plant
- waste-water treatment plant
- stand-by generator sector
- general services

4.4 The dimension of the poultry farm has been decides upon by taking into consideration the following elements:

- at market level the supply deficit in Rivers State of 6.9 million kg of poultry meat and 11.6 million eggs according to the Federal Livestock Department while a survey has evaluated the broiler demand at 190-220,000 birds/week and the eggs demand at 300- 350,000 eggs/week (equal to an yearly demand lf 9.88 - 11.44 million broilers and 15.6 - 18.2 million eggs).
- the maximum involvement of the co-operative movement both for agricultural raw material purchase and for breeding activity;
- the bottleneck for expanding the broilers industry consists of the absence of slaughterhousing facilities;
- the need to process the slaughterhouse by-products with the aim to produce valuable meat meal;
- the necessity to set up a "clean industry" and by consequence to envisage a waste-water treatment plant in accordance with the Rivers State industrial policy objectives.

4.5 To accomplish the above targets and in the meantime to solve the economic aspects of the poultry farm the following are the main design dimensions (Annex 4 - Chapter 1):

- a slaughterhouse with a rated working capacity of 2,000 birds/hour
- a rendering plant with a rated working capacity of 900 kg/hour
- a waste-water treatment plant with a rated working capacity of 25 m^3/hour
- a hatchery plant with a rated working capacity of 83,000/1-day-old broiler chicks/week
- a feed mill with a rated working capacity of 10 tonnes/hour.

4.6 The broilers production is planned to be accomplished for 19% in the poultry farm (about 750,000 broilers) and for 81% (about 3,250,000 broilers) at the farmers' co-operative breeding installations (Annex 4 - para. 1.3.1.1.).
This means an involvement of at least 10 farmers co-operatives and 233 members (Annex 4 - para. 4.1.1.).

4.7 The egg production is foreseen to be wholly concentrated in the poultry farm (about 11,000,000 table eggs) because it will require only 4 layers installations (1 for rearing and 3 for production) while the production transferred to farmers' co-operative will produce great problems regarding egg purchases. The production sectors will involve a population of about 17,280 pullets for installation and in total about 52,000 birds (Annex 4 - table 14).

4.8 To feed all the birds in the poultry farm and in the farmers' co-operative installations ,(at full production) an amount of 24,700 tonnes of feedstuff is necessary. This will require the same amount of raw material to be processed (Annex 4 - para. 1.3.1.3).

4.9 It is expected that 78% of the above amount of raw material can be produced locally and 22% imported (Annex 4 - para. 1.3.1.3).

4.10 To avoid problems occurring to the existing feed mills(para 1.3.6)the involvement of the surrounding agricultural world has been foreseen, after discussions have been held with its representatives (Annex 4 - para. 4.1).
In this respect, the farmers' co-operatives are expected to contribute 30% of the maize and cassava requirements (Annex 4 - para.4.1.2).

4.11 The after locally produced raw material will be supplied by Agricultural Development Projects (Annex 4 - para. 4.2), existing agro-industries (Annex 4 - para. 4.3) and the local market.

4.12 The imported raw material will be soya meal, the meat meal requirement not satisfied by the poultry farm rendering plant (Annex 4 - para. 1.3.1.3), additives, coccidiostats and antibiotics.

4.13 The estimated poultry-meat production of the poultry farm - 6,000 tonnes equivalent to a weekly production of about 80,000 broilers of 2.0 kg l.w. - will cover 35 - 41% of the total evalueted demand (17.2 - 14.7 million kilos) according the market survey in Rivers State (Annex 3 - para. 1.4.7.).

4.14 The estimated 11,000,000 table eggs produced yearly by the poultry farm - equivalent to about 211,000 eggs per week - will cover about the 60-70% of the total demand estimated by the market survey made in Rivers State (Annex 3 - para. 1.4.7.).

4.15 The following is a short profile of the poultry farm and agro-industrial complex :

A. Technical description

- Main data

  . Total surface : about 298,500 sq.mts
  . Cleared and levelled area : about 231,000 sq.mts
  . Covered area : about 35,000 sq.mts
  . Fencing : about 4,200 mts
  . Sewage : about 1,500 mts
  . Internal road system : about 2,600 mts
  . Internal power transmission line : about 2,550 mts
  . Internal water supply network : about 2,500 mts

- General services

  . Offices
  . Staff housing
  . Stand-by generators
  . Water collection and storage
  . Fuel distribution point
  . Workshop

. Shed "as garages"

. Incinerators

. Weighing point

- Feed mill (prefabricated metal panels)

  . Working capacity 10 tonnes/hour

  . Silos for raw material

  . Silos for finished products

  . Production cycle : computerized quantity of raw material ingredients; almost 95% of production pelleted

- Parents stock sector (prefabricated buildings)

  no. 12 parent stock installations with automatic feed system (capacity: no. 4,000 birds/each)

- Hatchery plant (prefabricated building)

  . no. 6 incubators (working capacity : 50,400 eggs/each)

  . no. 3 hatchers (working capacity : 16,800 eggs/each)

- Broilers sector (prefabricated buildings)

  no. 10 broiler installations with automatic feed system (capacity : no. 15,000 birds each)

- Layers rearing sector (prefabricated building)

  no. 1 layer-rearing installation with automatic feed system(capacity : no. 17,280 birds)

- Layer production sector (prefabricated building)

  no. 3 layer production installations with automatic feed system and automatic manure removing system (capacity : no. 15,360 birds/each)

- Egg working building (prefabricated building)

  egg centralization and egg packing machine : working capacity : no. 21,000 eggs/hour

- Processing plants (prefabricated buildings)
  - .. Slaughterhouse
    - . working capacity : no. 2,000 birds/hour
  - .. Cold storage rooms
    - . low temperature rooms and tunnels
    - . 0°C/+2°C rooms, tunnels and anterooms
  - .. By-product plant
    - . working capacity : 900 Kg/hour
  - .. Waste water treatment plant
    - . physico-chemical waste-water treatment for high rate purification of the slaughterhouse effluent. Rated working capacity : 25 m^3/hour.

- Vehicles
  - . no. 33,including cars, trucks, tractors, trailers.

B. Poultry farm production (in full operation)

- . no. 4,265,000 1-day-old broiler chicks
- . no. 750,000 broilers of about 2.0 Kg l.w./each
- . no. 11,000,000 table eggs
- . no. 24,700 tonnes of poultry feedstuffs of which 8,500 tonnes as internal requirement;
- . no. 750 tonnes of poultry meat meal

C. Poultry farm processing (in full operation)

- . no. 24,700 tonnes of feed-mill raw material
- . no. 4,000,000 broilers of about 2.0 Kg. l.w./each plus culling layers and parent stocks
- . no. 2,400 tonnes of slaughterhouse by-products

D. Poultry farm sales (in full operation)

- . no. 3,515,000 1-day-old broiler chicks

- no. 16,250 tonnes of feed stuff
- no. 11,000,000 packed table eggs
- no. 6,000 tonnes of poultry meat

E. <u>Inputs bought by the poultry farm</u> (in full operation)

- no. 24,700 tonnes of feed-mill raw material
- no. 58,800 1-day-old broiler parent-stock chicks
- no. 54,000 1-day-old layer chicks
- no. 3,250,000 broilers of about 2.0 Kg. l.w./each from Farmers' Co-operatives
- no. 600 tonnes of rice straw
- other various consumable materials (vaccines, drugs, fuel, gasoil, lubricants, chemicals, etc.)

F. <u>Personnel</u>

1. Nigerian personnel (in full operation)
   - 124 units
2. Expatriate technical assistance
   - no. 5 technicians over 3 years

G. <u>Economic data</u>

- Investment costs : ₦ 15.2 million
- Operating costs : ₦ 33.9 million (at full operation)
- Sales' receipts : ₦ 37.5 million (at full operation)
- Financial internal rate of return : 25.2%
- Cumulative cash flow before taxation : ₦ 41.3 million
- Value added : ₦ 10.9 million per year (at full operation)

H. <u>Social data</u>

- Poultry Farmers' Co-operatives : no. 10
- Poultry Farmers' Co-operatives Members : no. 233
- Estimated Gross revenue for each farming family: ₦ 81;000/year
- Estimated Net revenue for each farming family : ₦ 22,200/year
- Farmer Agricultural Co-operatives : no. 59
- Farmer Agricultural Co-operatives Members : no. 2,750
- Estimated incremental occupancy : no. 50-60 labourers

SUGGESTED ORGANIZATIONAL SCHEME OF THE INTEGRATED FOOD INDUSTRY COMPLEX IN RIVERS STATE

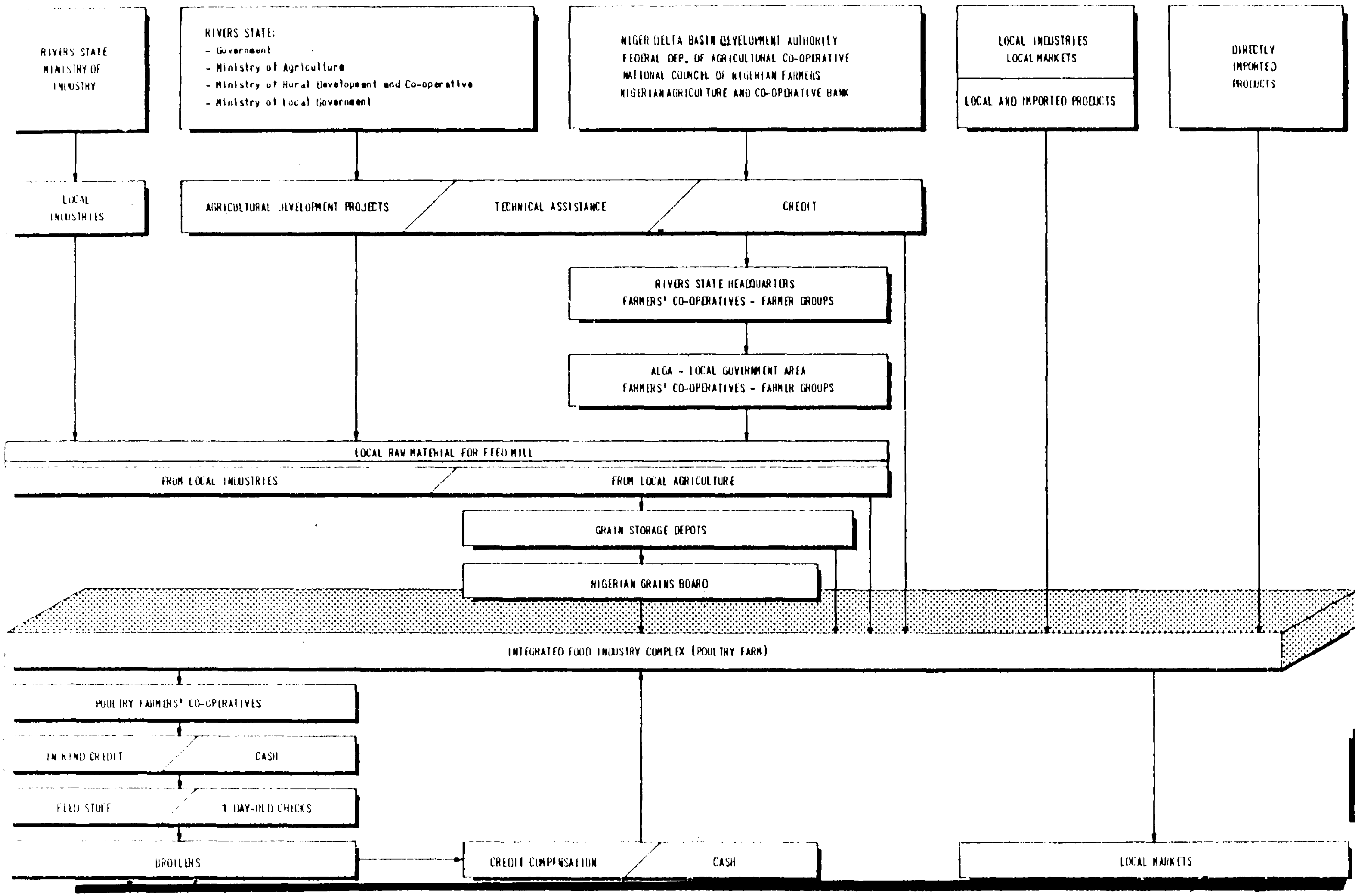


FIG. 5

FIG. 4

MANAGEMENT SCHEME OF THE INTEGRATED FOOD INDUSTRY COMPLEX (POULTRY FARM) - RIVERS STATE

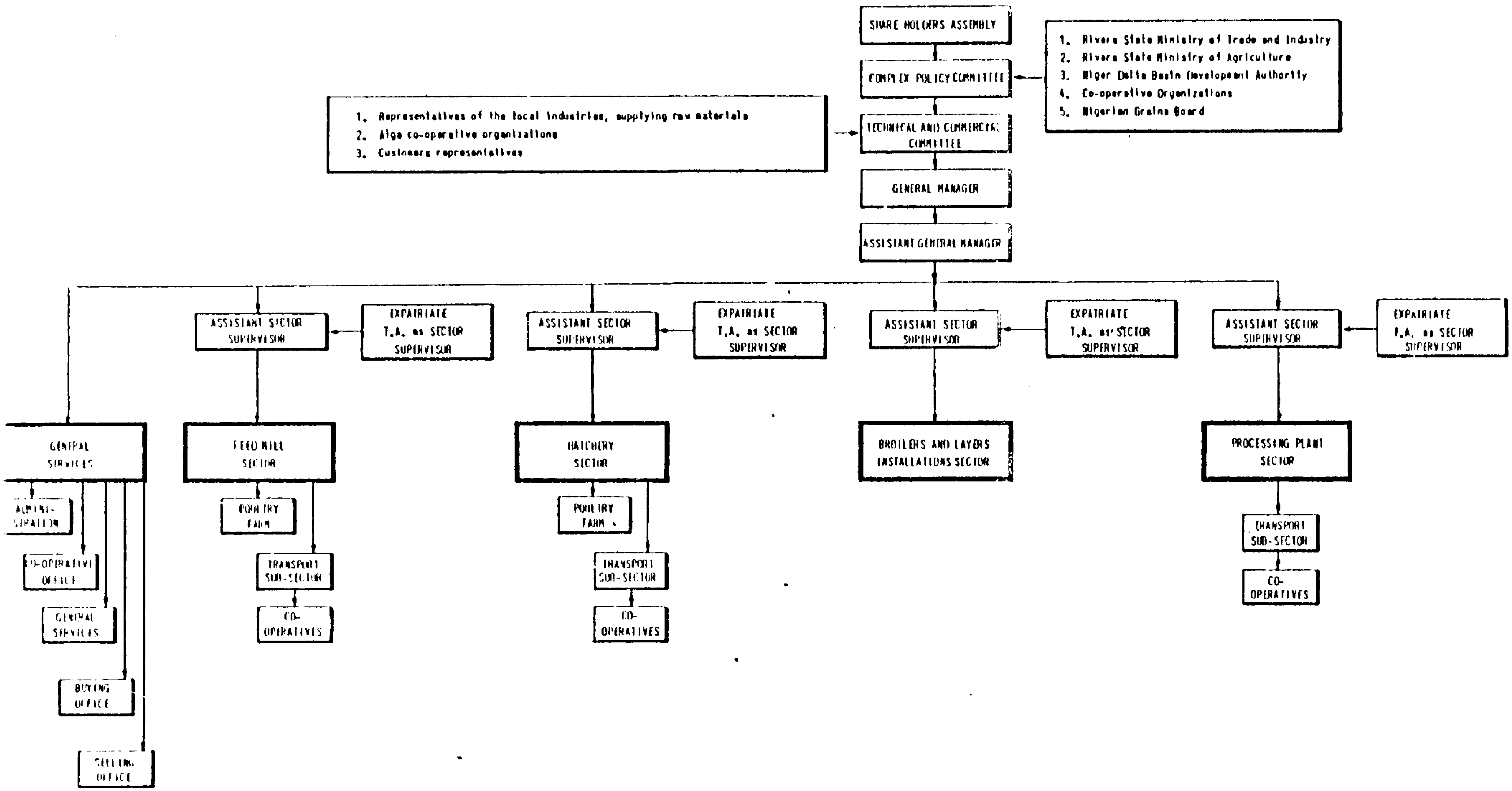
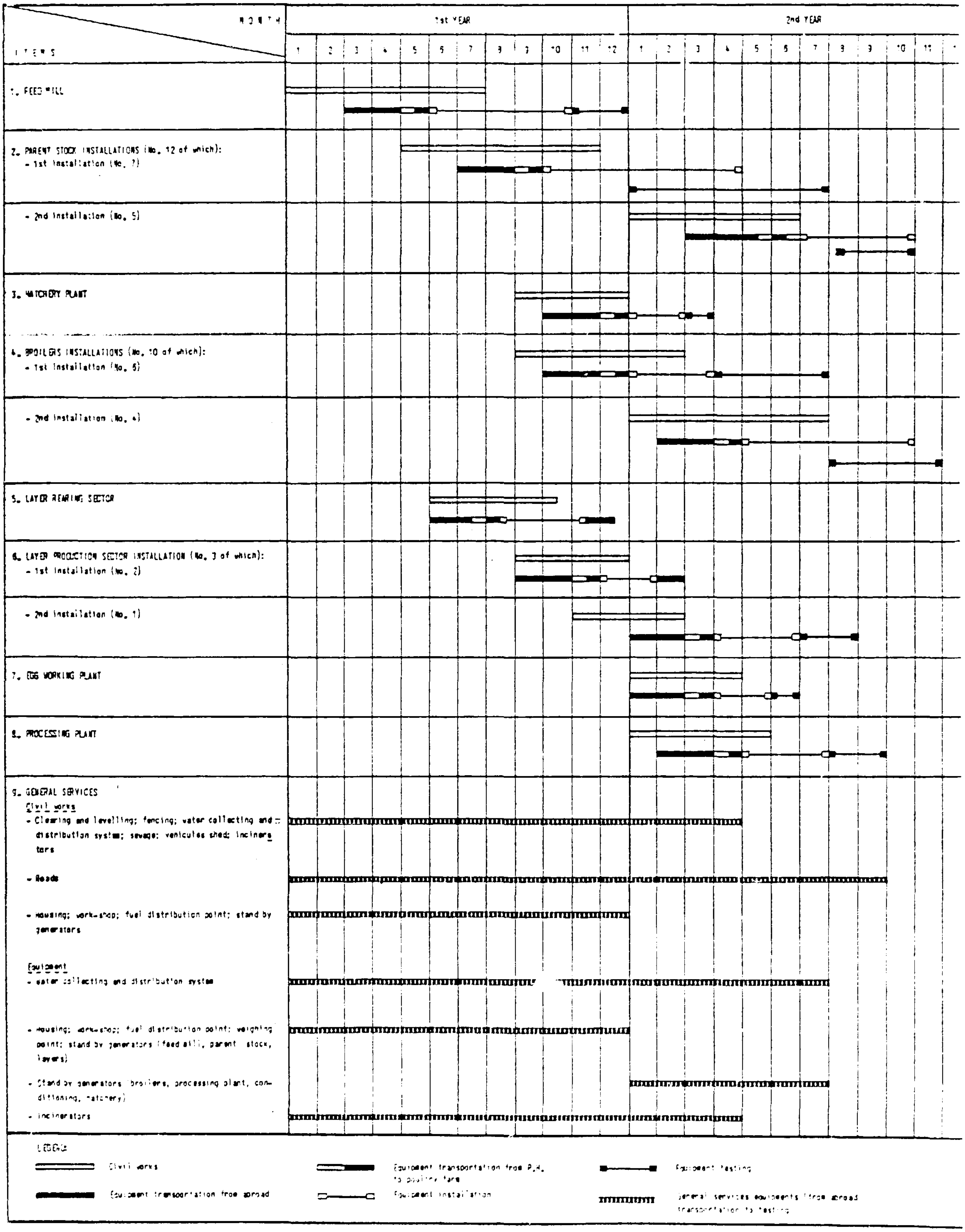


FIG. 5

TIMING SCHEDULE FOR THE ESTABLISHMENT OF THE POULTRY FARM



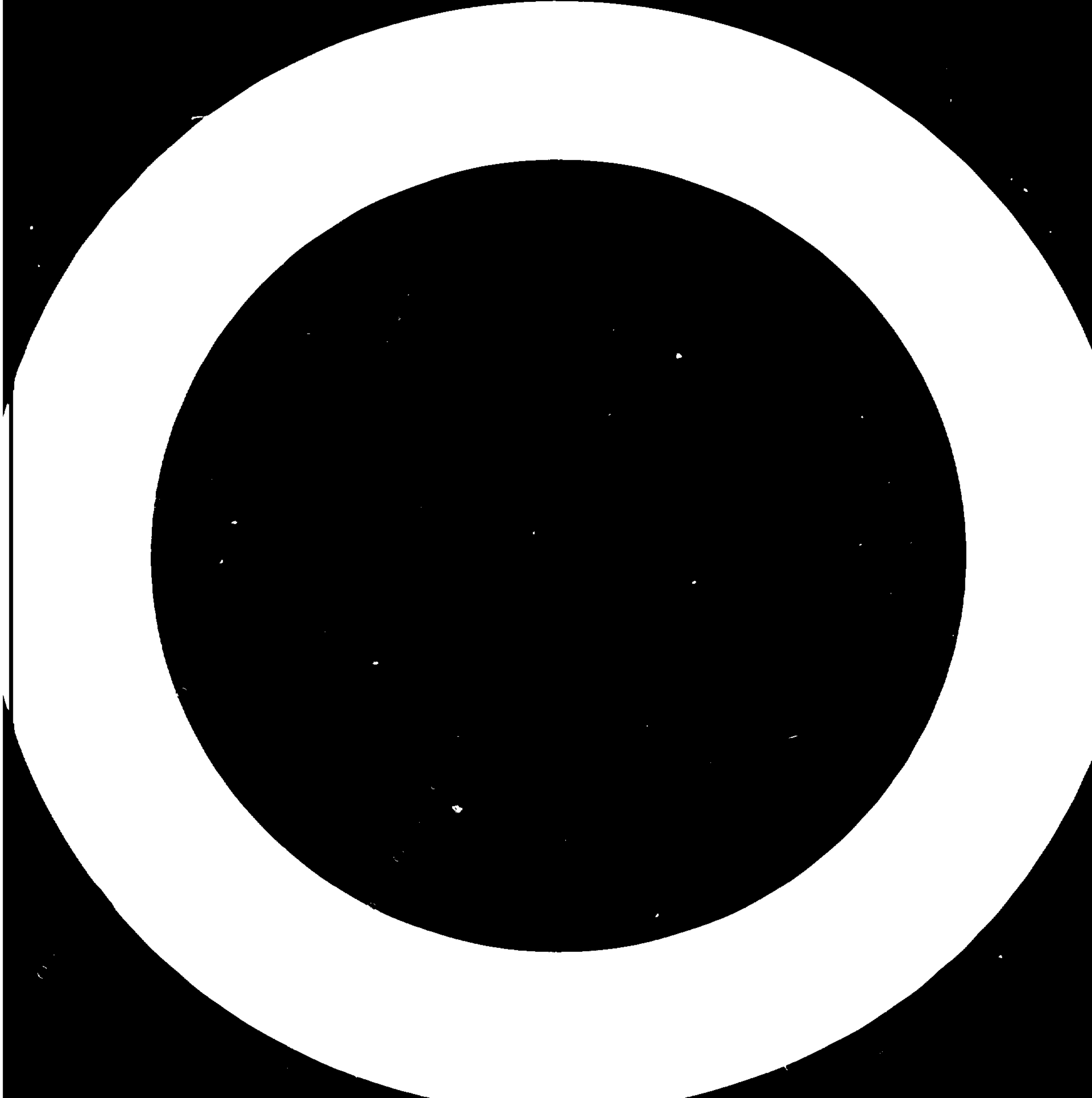
4.16 The feasibility study of the selected complex, in which various and different operations take place, as shown in Fig. 2, and the above profile should be considered as a number of feasibility studies, concerning single operations, taken as a whole (e.g. feed mill, slaughterhouse, hatchery plant, rendering plant, etc.)

4.17 The suggested organisational scheme of the selected integrated food industry complex (poultry farm) is set out in Fig. 3 (Annex 4 Ch.4)

4.18 The management scheme of the selected integrated food industry complex (poultry farm) is shown in Fig. 4 (Annex 4 para. 4.5)

4.19 As to investors to fund the selected integrated food industry complex (poultry farm), we suggest a direct involvement of the Niger Delta Basin Development Authority linked eventually to private investors able not only to partly finance the operation but also to play a large part in the management of the poultry farm. The preference is finally a Joint-Venture between the N.D.B.D.A. and private investors (General Report para. 4.12)

4.20 The selected integrated food industry complex (poultry farm) can be established in 2 years, as shown in Fig. 5. The actions to be taken before and during implementation are described in the General Report (Chapter 4).



5. MODEL FOR THE WHOLE AGRO-INDUSTRY COMPLEX IN RIVERS STATE

Fig. 6 shows a integrated model compiled for the whole agro-industry in Rivers State.

The model has been made by taking into account the existing agricultural production and the guidelines of agricultural development according to the present programmes and the programmes to be implemented in line with the objectives of the Federal and Rivers State policies.

The other products e.g. vegetables, cocoa, sugar cane, coconut, tree fruits, etc. have now, and will have in the future, only a limited development due to the agricultural and climate conditions of Rivers State (*).

On observing Fig. 6, it will be noticed that there are 6 main agro-industrial sectors that can be developed at present or in the medium-long term or are already developed, namely : the palm oil, cassava, maize, rice, plantain and raphia palm sectors. The flour milling, brewery and hatchery industries are related totally or partially to imports.

The agro-industry situation of Rivers State is summed up with the help of the legend: existing and considered sufficient (working capacity) in the short-medium terms; existing but to be further developed or improved at medium-long term; to be implemented at medium-long term.

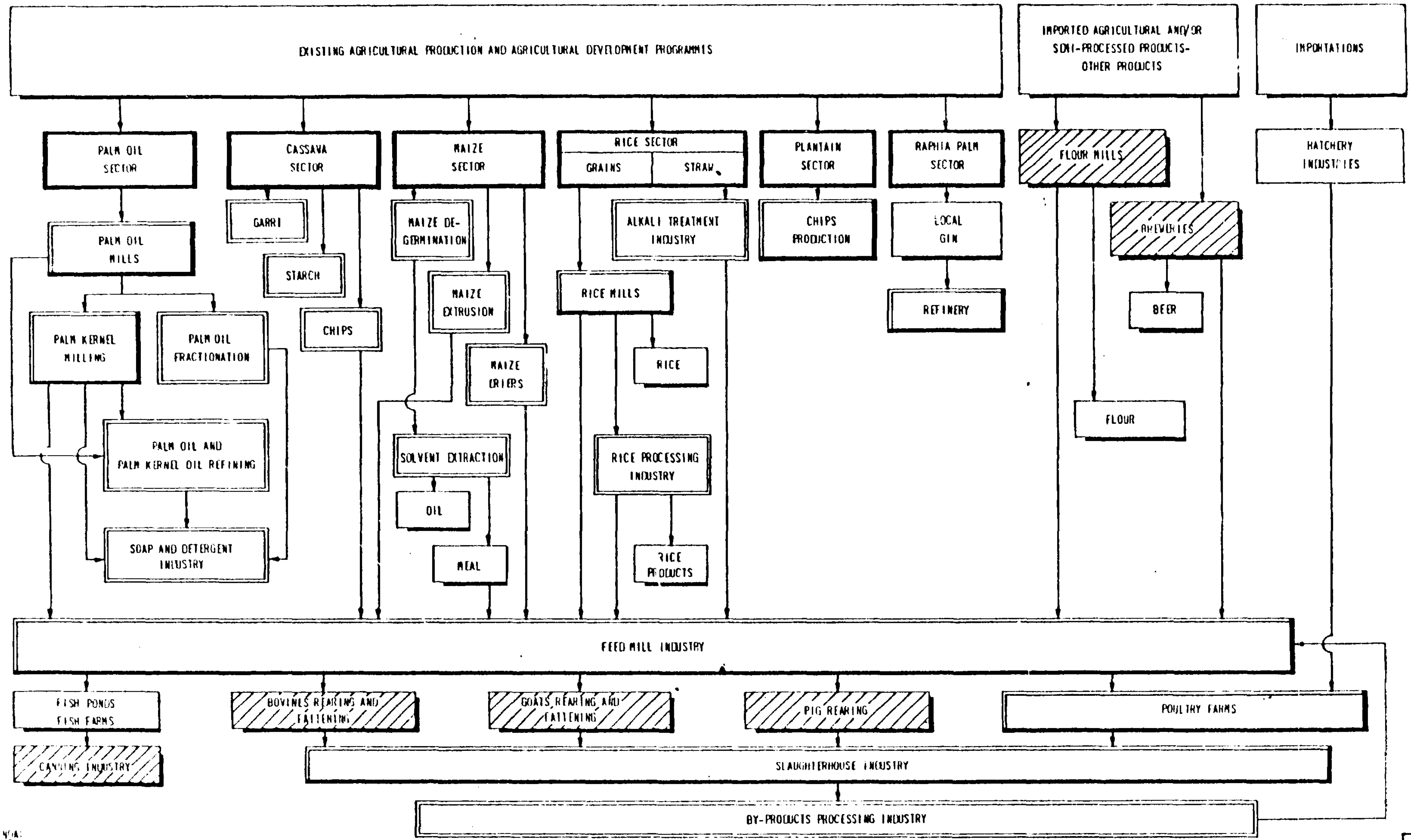
All the above agro-industrial sectors require the strengthening of the raw material production. From this raw material, through specific working processes, it will be obtained finished products and different by-products that, after all, will constitute the raw material for feedstuff productions for zootechnical purposes.

These feedstuff products are the basis for new agro-industrial activities linked with the zootechnical breeding activities, with the valorization of the related productions and with the recovery of the by-products (skins, blood, bones, etc.) for different purposes.

Therefore, the feedstuff production constitutes the barycentre of the inter-sectorial integrations.

(*) See Annex 1 - paras 1.3; 8.3.5; 8.3.6; 8.3.7; 8.4.

MODEL FOR THE WHOLE AGRO-INDUSTRY COMPLEX IN RIVERS STATE



Existing and considered sufficient (working capacity) in the short-medium term.

Existing but to be further developed or improved.

To be implemented at medium-long term.

FIG. 6

That is why the feed-mill industry occupies the central part of the model in Fig. 6.

Some combined factors present in Rivers State can sustain the proposed model :

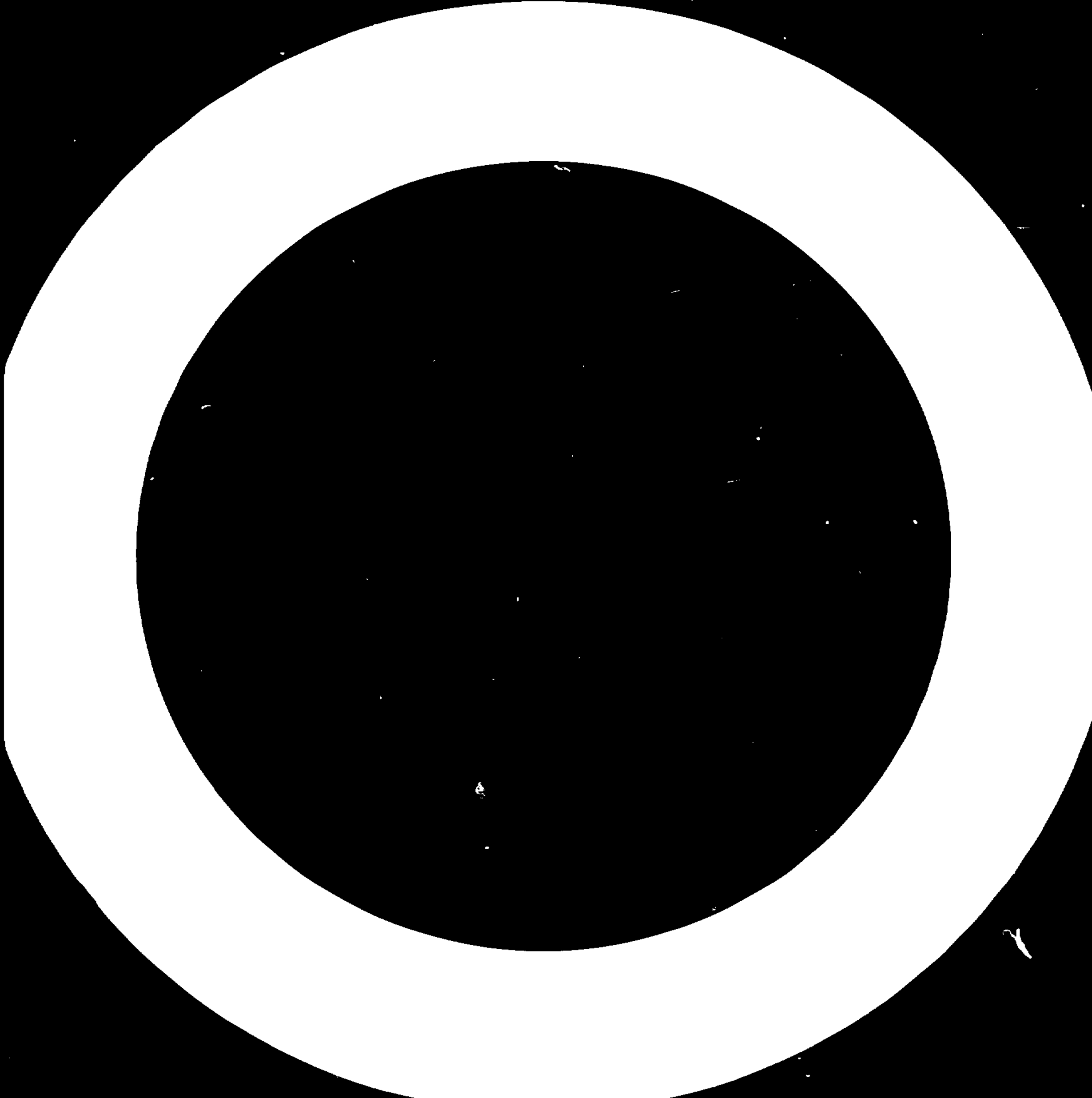
- existing palm-kernel milling industry
- existing palm-oil milling industry
- existing maize-cassava-rice production belt and important development programmes
- flour milling industry
- the presence of the port for importing products

The need of proteins for the Nigerian population can be satisfied - except for a few existing situations in the country - with intensive breeding systems applied to all the species; so far the growth of the feed mill industry has become a strategic point for the whole agro-industry development.

Programmes regarding the development of the bovine, goat, pig and fishery sectors, without counting poultry, are already being studied or implemented in Rivers State (Annex 1 - para 5.8); their viability depends only on providing the most economic feed formula.

The selected agro-industry complex (poultry farm) has been chosen within the context of this model : it is a nucleus in which the guide-lines of the present model have already been applied.

The above model implies, in short, a kind of specialization of the agro-industry : Rivers State can become a supplier of feedstuffs to the neighbouring States utilizing its own agricultural production and the favourable position conferred on it by the port.



6. CONCLUSIONS

The "Integrated Food Industry Complex" study in Rivers State has high lighted the following :

- one of the basic efforts to be made for the agro-industry development should be devoted to the production of the agro-basis raw material, be - cause the raw material presently available are, more or less, already fully exploited;
- the raw material production development postpones the opportunities for urgent investments, except those for the eggs and poultry meat production sector where the demand is still largely unsatisfied, while market prices are profitable and attractive also for the future;
- the setting up of an integrated agro-industrial complex in the above sec - tor can be started immediately, so that it allows the full exploitation of existing sufficient by-products in the various local food industries (flour mill, rice mill, palm oil, breweries, cassava, etc.); at the same fine it will require the expansion, over small areas, of yearly productions (mais and cassava) easily obtainable on short term not least because these are already included in expansion programmes;
- the integrated complex will become a full part of the context of the agro-industrial development and food self-supplying objectives in the country with the resulting valorization of the local by-products for which export is rightly prohibited by the E.S.M.;
- the agro-industrial complex deeply involves the agricultural productive tissue and particularly that of the farm co-operatives; these take advantage of the value-added deriving from the processing of the raw materials partly produced by themselves, in terms of productions for the feedstuff industry and of broilers breeding for slaughtering and selling within the framework or fhe integrated agro-industrial complex organized system;
- the economic results that can rise from the integrated agro-industrial complex (poultry farm) activities are very favourable and the project assures that the whole of the required investments will have a 25.2% internal rate of return;

. in the social frame, the project creates new integration conceptions between agriculture and industry with positive effects as regards the techno logical and socio cultural innovations to be applied;

. in conclusion, the project creates new sources of employment (124 new working places in the integrated complex), promotes new labour demand in the annexed sectors and stabilizes the employment in the agricultural sector (raw materials production for feedstuff and broilers breeding).

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RIVERS STATE

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INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

GENERAL REPORT

December 1983

IFAGRARIA s.p.a.
ROMA

UNIDO
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ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C. : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

GOVERNMENTAL PARASTATAL AND PRIVATE INSTITUTIONS CONTACTED BY THE IFAGRARIA TEAM DURING THE FIELD SURVEY

- Federal Ministry of Industry
- Rivers State Ministry of Trade and Industry
- Rivers State Ministry of Agriculture and Natural Resources
- Rivers State Ministry of Rural Development and Co-operatives
- Rivers State Ministry of Local Governments
- Rivers State Ministry of Economic Development and Planning
- Rivers State Ministry of Electricity and Water Supply
- Rivers State Ministry of Works
- Federal Ministry of Agriculture - Department of Agriculture, Rivers State, Port-Harcourt
- Federal Ministry of Agriculture - Department of Livestock, Rivers State, Port-Harcourt
- Rivers State University of Science and Technology - Port-Harcourt
- Federal University - Port-Harcourt
- UNESCO Programme - Port-Harcourt
- UNITED NATIONS Development Programme - Lagos
- Rivers State Agricultural Development Agency
- Niger Delta Basin Development Authority
- Central Bank of Nigeria - Port-Harcourt
- Risonpalm Limited - Port- Harcourt
- National Animal Feeds Company Ltd. - Port-Harcourt
- National Root Crops Production Co. Ltd. - Enugu
- Pabod Supplies Limited - Port-Harcourt
- Pabod Finance and Investment Co. Ltd. - Port-Harcourt
- Pabod Breweries Limited - Port-Harcourt
- Nigerian Grains Board - Port Harcourt
- Nigerian Cotton Board - Port-Harcourt
- Nigerian Groundnut Board - Port-Harcourt
- Nigerian Palm Produce Board -Port-Harcourt
- Nigerian Cocoa Board - Board - Port-Harcourt
- Rivers State Vegetable Oil Company - Port-Harcourt

- Amalgamated Distilleries of Nigeria Lted. - Port-Harcourt

IFAGRARIA wishes to thank all the persons contacted for their help and active collaboration, and in particular:

- Mr L.R. UKU - Permanent Secretary - Rivers State Ministry of Trade and Industry
- Mr C.S. AMADI - Chief Industrial Promotion Officer - Rivers State Ministry of Trade and Industry

INTRODUCTION

The Federal Government of Nigeria has requested UNIDO assistance to prepare a project for establishing an Integrated Food Industry Complex.

UNIDO project US/NIR/80/069 was decided by the Federal Ministry of Industry and the Federal Ministry of Plan to be implemented in Rivers State.

The UNIDO H.Q. in Vienna has selected the IFAGRARIA S.p.A. - Rome (Italy) to carry out the feasibility study with these main following objectives :

(1) to ascertain the Rivers State's potential for agro-industrial development in the short - medium and long term;
(2) to draw up pre-investment studies for the most promising agro-industries opportunities;
(3) to select an agro-industrial plant to be established as a nucleus for the agro-industrial development, and to elaborate detailed feasibility studies for such plant;
(4) to draw up a model for the whole agro-industry complex.

The field survey was conducted by the IFAGRARIA team in January, February and March and for some particular aspects in April and May; the survey has been conducted preminently in Rivers State with some specific investigations in the surrounding states, such as Imo and Anambra.

In April 1983, the IFAGRARIA team produced an Interim Report which was submitted and approved by the UNIDO.

A draft final report, based on the above mentioned Interim Report, was submitted to UNIDO in August 1983.

This FINAL REPORT has been prepared taking UNIDO and the UNDP Lagos (Nigeria) observations into account.

The Final Report consists of :

. Executive summary which gives a summary of the contents of the various components of the project and the results that can be achieved;

- General Report which gives the answers to the Project objectives with the subsequent explanations. A description of the agro-industrial plant selected as a nucleus for agro-industrial development in Rivers State according to basic criteria is also given;
- Annex 1 which gives a detailed panorama of the existing agriculture, its development programmes, the implementing agencies and the co-operative societies in Rivers State;
- Annex 2 which is completely devoted to the palm oil industry due to the specific importance of this industry in Rivers State;
- Annex 3 which gives a Rivers State market analysis of the major agricultural and food products. Emphasis is given to the in-out products of the selected agro-industrial plant;
- Annex 4 which gives the functional description of the selected agro-industrial plant and its economic, organizational and management aspects;
- Annex 5 which describes the technological process, prefabricated buildings, equipments and civil works of the selected agro-industrial plant;
- Annex 6 which contains the drawings of the civil works and equipments of the selected agro-industrial plant.

1. THE FIELD SURVEY RESULTS

1.1 AGRICULTURE

1.1.1 Present situation

The magnitude of the existing areas under cultivation in the Rivers State, according to the data of the Rivers State Ministry of Agriculture and Natural Resources (R.S.M.A.N.R.) can be estimated at : 27,000 ha under cassava; 10,100 ha under maize; 5,800 ha under yams; 1,900 ha under rice and 3,400 ha under plantains (Annex 1 - Table 6). The other major crops are : palm oil, of which 9,800 ha in estate and 5,770 ha at smallholder level (Annex 2 - Table 1, 2); 2,300 ha under vegetables and fruit (Annex 1 - Table 10); 6,000 ha under cocoyams (Annex 1 - para. 8.3.3.); 2,000 ha under coconuts (Annex 1 - para. 8.4.1) and 2,000 ha under cocoa (Annex 1 - para 8.4.2). Rubber trees are also cultivated, but figures are not available.

It is estimated that about 300-350,000 ha are covered by raffia palm which grows spontaneously in the central part of the Riverine area of Rivers State (Annex 1 - para 8.4.5.).

The livestock population has been evaluated by the Federal Department of Livestock at 4,500,000 local-type poultry; 800,000 exotic-type poultry; 4,000 pigs; 46,000 sheep; 112,000 goats and 500 cattle.

Except for some palm oil, coconut, and rubber plantations, most of the farming in Rivers State is of smallholder subsistence type with communally-owned bush fallow-land. The average total area is about 1.5 ha per farm family and consists of several plots often smaller than 0.5 ha each.

It is estimated that 147,000 farm families are settled in the upland cropped area of Rivers State.

There are a total of about 1,730 registered and unregistered agricultural co-operatives societies plus 2,000 group-farmers operating in Rivers State (Annex 1 - para. 2.3.1).

1.1.2 Development Programs

The Fourth National Development Plan (1981-85) and its specific Green Revolution Programme in Rivers State, envisages a wide range of programmes directly aimed toward increasing food production, mainly at small-holder level. Emphasis is given to the development of maize, cassava and rice and in the livestock sector to poultry and pigs.

Some of the programmes are on-going projects, while others are new projects only launched at the end of this year. They are implemented by Federal and State Agencies. The programmes although well conceived, are in general behind schedule, with regard to the fixed objectives; most of them are at present in the starting phase. It is estimated that the delay is generally about 2-3 years.

Development programmes for maize are aimed at expanding the area under cultivation by about 12,500-20,000 ha with an expected increase in production of 38-60,000 tonnes (Annex 1 - Table 18) over the next five years.

Development programmes for rice are expected to expand the area under cultivation by about 12,000 ha with an additional production of 20,000 tonnes of paddy over the next five years (Annex 1 - Table 21).

Development programmes for cassava are expected to expand the area under cultivation by about 14,000-22,000 ha with an additional production of 114-174,000 tonnes over the next five years (Annex 1 - Table 25).

Development programmes for palm oil envisage an expansion of the area under cultivation by about 3,300 ha at state level while another 7,300 ha will be devoted to this purpose in the future. At smallholder level the programmes envisage, at the moment, only some replanting (Annex 2 - Chapter 2).

For other crops no specific development programmes are to be undertaken at present. The fruit and vegetable area under cultivation will surely expand but not to a significant amount.

Other programmes, such as the seed multiplication programme (Annex 1 - para. 4.1.7), the development of warehouses, agro-service centres, fertilizer stores (Annex 1 - para. 4.1.9), credit schemes (Annex 1 - Chapter 11) aim at increasing agricultural productivity in general.

Development programmes for livestock are mainly undertaken by the Niger Delta Basin Development Authority (N.D.B.D.A.) and R.S.M.A.N.R. (Annex 1 - para. 5.8 and 8.5) especially for poultry and pigs. Except for the pig project - already in a satisfactorily advanced stage - the other poultry projects are **far** from contributing to solve the serious poultry - meat storage. Beef development projects are underway, but their weight does not affect the cronic deficit in these sectors.

1.2 EXISTING AGRO-INDUSTRY IN RIVERS STATE

Port Harcourt Flour Mill, mills imported wheat for the Rivers State needs and also needs and also for the neighbouring States, and is producing, as its most important by-product, about 800 tonnes of wheat offals, almost entirely exported so far. However the Economic Stabilization Measures (E.S.M.) have recently prohibited its exportation (Annex 4 - para.4.3.1).

R.I.V.O.C. (Rivers State Vegetable Oil Company) Palm Kernel mill has a rated capacity of 180 tonnes/kernels/24 hours. The direct-solvent extraction process is used. The mill has not been working since January 1982 owing to the lack of funds to purchase spare parts. The State Government intends to re-start the mill in April-May 1983 and will lease the mill for commercial management. Efficient extraction is unlikely without modification to some processing phases. Properly activated, and with good management the mill will have a capacity considerably in excess of the requirements, even on long term (Annex 2 - Chapter 15).

RISONPALM LIMITED (Palm Oil Development and Production Company) is a Government-owned company operating in the palm oil sector at agricultural, processing and marketing levels. The Company owns the only palm oil mill operating in Rivers State (rated capacity 1.5 FFB/tonn/hour).

Much more important is its development programme at agricultural level (the UBIMA estate will be of about 9,600 ha in 1985) and processing level (the initial capacity of 20 tonnes FFB/hour of the existing mill will be increased to 40 tonnes FFB/hour in 1985).

The Company has planned the installation of a second mill in 1985 with an initial capacity of 10 tonnes/hour, building up to 40 tonnes/hour by 1989 (Annex 2 - para. 4.1).

Pabod Breweries Ltd. is a partially Government-owned company recently established with success in Port Harcourt. While its beer production is not yet known, it is estimated that the factory will produce about 60 tonnes/month of dried spent brewery grains which is a raw material used for feed-stuff preparation (Annex 4 - para. 4.3.4). The E.S.M. have recently prohibited the exportation of this by-product (para 4.2.4).

Amalgamated Distilleries of Nigeria Ltd. is a partially Government-owned company. Local gin is distilled and, with the addition of specific flavours, transformed into local brandy, whisky and gin. Established since 1976 it has not experienced a proper take-off due to the great quantity of smuggled spirits on the market (para. 8.2.4.).

The feed-mill industry consists of 5 industrial-artisanal units: NAFCO (National Animal Feed Co. Ltd. a Federal Agency for feed-stuff production), Desba Feeds, Pita Feedmill, Feedmill International and Amba Feedmill. The feedmill industry is - to be precise - an industry which mixes imported raw material. The operations, all located in Port Harcourt, are based on the proximity of the port. Since they do not use local raw materials they are affected by the E.S.M. (para 4.2.4.) and the scarcety of foreign currency experienced by the Federation of Nigeria at the moment.

The one-day-old chicks industry in Rivers State consists of the small operations (Desba and Nwokolo) in the layer sector only.

Most of the requirements are imported from other States of the Federation or from abroad (Annex 3 - Chapter 3).

1.3 MARKET FOR RIVERS STATE AGRO-INDUSTRY PRODUCTION

The market analysis of the agro-industrial products has been given in Annex 3. The market research has been particularly directed towards poultry products because of the lack of other food products processed and produced in Rivers State or of an already established occupancy by the existing agro-industries.

The other major processed food in Rivers State is garri, whose production is still at artisanal-family level. Industrial production of garri is not at present recommended in the Nigerian cassava belt because, in comparison with the artisanal one, it is difficult because of high prices to acquire land to establish cassava plantations, whilst there is also an absence of marketing facilities for fresh cassava tubers (Annex 1 - para.8.3.1).

The almost inexistant palm oil production of Rivers State, at present obtained from a single small mill with a minimal capacity of 1.5 tonnes FFB/hour (Annex 2 - para. 4.1), has excluded further investigation on this matter. The present high price and the great demand for palm oil in Rivers State, as throughout Nigeria, does not require supplementary investigations.

The palm kernel oil market is at present supplied by imported products from the neighbouring State. The palm kernel mill belonging to the Rivers State Vegetable Oil Company (RIVOC) has not been working since January 1982 (Annex 2 - Chapter 5).

The local gin processing (distillery) market in Rivers State is badly affected by the smuggling of foreign spirits into the country. The existing distillery covers - according to its managers - the present and future needs for this kind of product (Annex 1 - para. 8.4.5 and later para. 8.2.4).

The feedstuff market is supplied by 5 artisanal units which mix raw material coming from abroad. The inadequate equipment to process raw material, the complete divorce from the local agricultural world for the provision of raw materials, the high cost of the imported material and its scarcety due to the effects of the E.S.M., are having a negative effect also on this industry. Mainly oriented towards layers poultry formula, the feedstuff industry had prospered because the large benefits still obtainable from the poultry sector (Annex 3 - Chapter 2).

The poultry products market (Annex 3 - Chapter 1) is a booming market throughout Nigeria in general and also in Rivers State because poultry is the cheapest source of protein for the Nigeria population. This is due to the high conversion rate of feedstuffs into poultry meat and eggs, the high reproduction rate, and the high resistance of the birds to the climate.

Estimates by the Federal Department of Livestock reported a supply deficit in Rivers State of 6.1 million kilos of poultry meat and 10.0 million eggs in 1980, while for 1985 the deficit is estimated at 6.9 million kilos of poultry meat and 11.6 million eggs. At 1985 the total demand is estimated at 8 millions kg of poultry meat and 14 million eggs considering an annual pro-capite consumption of 2.2 kg/habitant for poultry meat and 3.75 eggs/habitant (Annex 3 - para 1.2).

Prices are very attractive and scarcety, especially for poultry meat, was observed in various points of the market chain. Total eggs production has expanded more than poultry meat production due to the small initial investment and faster return.

Among the other constraints, the development of poultry meat production is held back by the absence of slaughterhouse facilities.

1.4 THE INFRASTRUCTURE SITUATION IN RIVERS STATE

Roads and road transport facilities are fairly extensive in the upland part of Rivers State, while in the riverine zone there are, in fact , hardly any roads at all. The main line of communication is constituted, from north-west to south-east, by the stretch of expressway - partly in construction and partly in the design stage - that will link Rivers State with the bordering Berndel and Rivers State.

The expressway to Port Harcourt-Aba links Rivers State with the north-east States, such as Imo and Anambra (see attached Road Map).

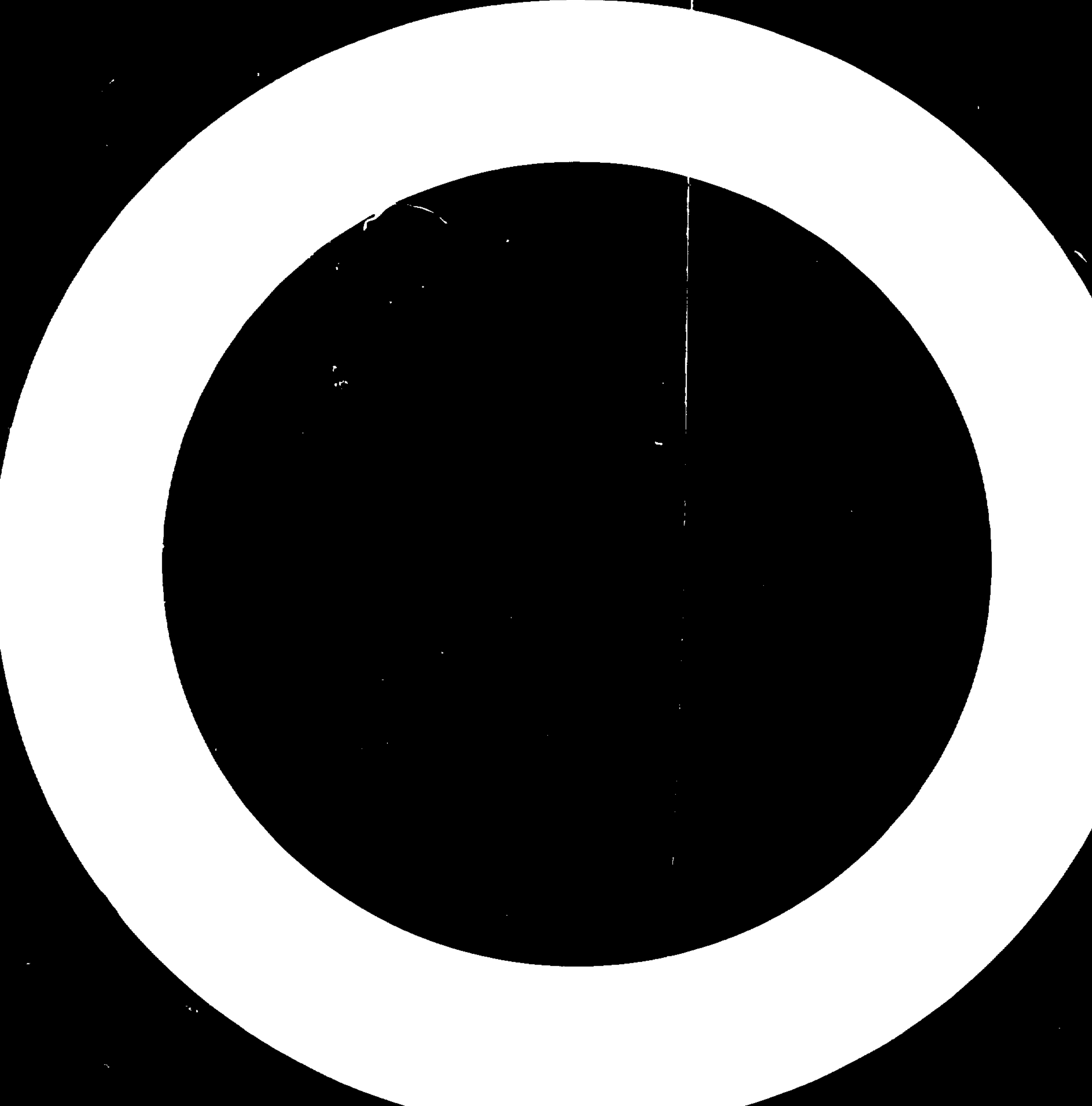
Railway network is very limited in Rivers State because the line runs from Port Harcourt to Aba and then covers no more than 20 km. The railway has a great importance for the north-east State for providing a connection with Port Harcourt Port (see Road Map).

Port Harcourt Port is considered the second largest commercial port of Nigeria. Its greatly expanded facilities allow to handle all kinds of exported and imported goods (Annex 3 - Chapter 7).

Port Harcourt International Airport, located about 20 km north - west of Port Harcourt, has daily flights to the major European cities and fairly large cargo facilities (see Road Map).

The electric power development programme is implemented by the NEPA. To show this development throughout Rivers State, a power develop - ment map has been compiled (see attached map on Power Development Programme in Rivers State and para. 4.7.3). The present and future programmes implem- ented by the NEPA do not assure a regular supply of electric power. In fact all the high power consuming industries in Rivers State have installed their own electric generators.

Water supply is not - according to the Ministry of Energy and Water Supplies and private operators - a problem in Rivers State. Because of the density of the hydrographic network and the very abundant rainfall in the region, surface water supplies are virtually unlimited (para 4.7.4).



2. POTENTIAL AGRO-INDUSTRIAL DEVELOPMENT IN RIVERS STATE

2.1 THE DEVELOPMENT POSSIBILITIES IN THE SHORT, MEDIUM, AND LONG TERM

The findings of the field survey have been taken into consideration in an endeavour to ascertain potential for agro-industrial development in Rivers State in the short, medium and long term.

a) In the short-term

The agro-industrial development can be pursued considering the utilization of agricultural raw material that will be produced by the existing development programmes : maize and cassava.

In fact, all the other sectors have shown that :

- for rice, the existing rice mills are at present working far below their processing capacity and the rationalization of the sector by the development Agencies or Institutions (R.S.M.A.N.R. and N.D.B.D.A.) is already under way (Annex 1 - para 5.1.1 and 8.2.2.);
- for palm oil the agro-industrial development is already undertaken by the Risonpalm Limited;
- for palm kernel processing the present working capacity of the RIVOC factory - when opened and modernized - will be sufficient for a long time;
- distillery of local gin - from the present factory - does not arouse any interest due to marketing problems.

Because of the unattractive market prospects for cassava industrially processed into garri or starch, and the limited quantity of maize for setting up a sophisticated industry (extraction of oil), these products are available as raw materials for the feedstuff industry.

The E.S.M. have drastically reduced the importation of maize, so that in the short-term there will be a scarcety of this product.

Taking the utilization of maize and cassava as a feedstuff component it was necessary to decide which livestock species should be developed on this basis.

The poultry industry has been favourably considered in this respect on account of its low conversion rate of feedstuff into meat and eggs, the high demand for poultry products, the owners of this type of industry in the State.

Pig and beef industry have been excluded, the first because the N.D.B.D.A. has already under way a project of a certain consistency (6,000 pigs - Annex 1 - para 5.8.2.b), the second for its high feedstuff conversion rate disease problems and scarcety of land.

The survey has shown that other raw materials for poultry feedstuff are actually present in Rivers State as the wheat offals (Port Harcourt Flour Mill), dried bowery spent grains (Pabod Breweries) or they will be soon produced in Rivers State as palm oil (Risonpalm Limited) and palm kernel oil by products (R.I.V.O.C.) - Mineral salts and additives are commonly found on the Rivers State market (Annex 3 - Chapter 2).

b) <u>In the middle-term</u>

The agro-industrial development is supposed to be directed towards the processing of the increasing agricultural raw material production.

That means, again, the processing of maize, cassava, rice and palm oil.

For maize, first of all, drying units are supposed to be planned in such a way as to serve the network of various grain depots already existing or under construction in Rivers State (Annex 1 - Table 15). Because the bulk of the maize diverted from human consumption will follow the natural channel as feed stuff ingredients, no other processing activities can be foreseen in the middle-term. To increase the nutrient value, processing activity, such as extrusion treatment, will be possible as a component of the feedmill industry.

For cassava, the agro-industrial development should be directed towards garri and chips production. Starch production seems rather unattractive, according to the results of producing factories located in other States.

For rice, beside the development and modernization of the existing rice mills, further processing activities, such as food preparation, can be planned. This is related to the fact that consumers' preference towards imported rice depreciates the local product.

For palm oil sector, the industrial development can be based on the establishment of 2 palm oil mills (1.5 tonnes FFB/hour and 5.0 tonnes FFB /hour respectively) in the N.D.B.D.A. estate (Annex 2 para 4.2).

c) In the long-term

Due to the incertitude of assessing the agricultural development programmes for all the crops, with the exception of palm oil, the potential agro industrial development will be conditioned by the results achieved during the previous phase. For palm oil, instead, the reinforcement of the processing activity can be foreseen in the following way :

- at palm oil level :
  .. establishment of a 5 tonnes FF/hour palm oil mill;
  .. enlargement of 2 palm oil mills from 5 to 10 FFB/hour;
- at fractionation and refining level : the estimated increased palm oil production, but more than this the predisposition of new market conditions, can suggest the planning for a palm oil refinery of 100 tonnes/24 hours and a palm oil fractionation factory of 25-75 tonnes/24 hours.

2.2 THE MOST PROMISING AGRO-INDUSTRIES OPPORTUNITIES IN RIVERS STATE

The most promising agro-industries opportunities in Rivers State listed below are based on the various aspects of the field survey conducted by the IFAGRARIA team. Those have been :

. the existing and potential agricultural raw material production;
. the market research;
. the existing agro-industries and their potential capacity to meet the demand requirements in terms of quantity and quality both at the final (consumers) and intermediate (semi-processed) levels.

This is the priority list of the suggested opportunities in the agro-industries :

(a) feed-mill industry;
(b) slaughterhouse industry (poultry sector);

(c) hatchery industry;

(d) cassava processing industry;

(e) maize processing industry;

(f) rice processing industry;

(g) palm oil mill industry;

(h) palm oil fractionation and refinery industry;

(i) raphia palm alcohol refinery industry.

In compiling the above list, the effects and the causes of balanced development of the whole agro-industrial sector have been taken into consideration.

The listed agro-industries are the concrete opportunities of agro-industrial development in the short-, medium- and long-term in Rivers State: some of them are primary processing activities, while others are the immediate needs of a further agro-industrial development.

If there is a surplus availability of processed or semi-processed products, such as cassava, maize, rice and palm oil, space is immediately created for the feed mill industry; the latter will require an extensive livestock development which, in the case of poultry breeding, will need in general an advanced hatchery industry and, in the case of broilers, a slaughtering facility. This explains why the listed opportunities should be seen in an overall plan where all the human and financial resources are finalized to the integrated development of the agro-industrial sector.

For the opportunities listed in point h), there is first of all the necessity to increase palm oil production and then, later, to create the market conditions for the local processing activity (e.g. revising of import policy).

For the opportunities listed in point i), the problem should be solved of how to protect the internal market from external interference e.g. smuggling.

While for the feed mill, slaughtering and hatchery industries, as the most topical concrete opportunities, feasibility studies have been prepared in the context of the selected agro-industrial plant (Annex 4), for each of the other opportunities chronogrammes have been made for the further studies to be conducted, and relative terms of reference drawn up (para.8.2).

In any case, outside of the agro-industry poultry sector, the perspectives of development for the other agro-industrial sectors are not consistent at short term. According to the possibilities to achieve the agro-based raw material development programme, perspectives exist mostly at medium-long term.

3. THE SELECTED AGRO-INDUSTRIAL COMPLEX

3.1 GENERAL

The basic criteria adopted to select the agro-industrial complex are indicated in the chapter 4 (particularly in para 4.1).

The selected agro-industrial complex is a poultry farm in which all the components regarding the poultry meat and table egg production are included such as feed mill, hatchery plant, slaughterhouse, cold storage, by-products processing, waste water treatment sectors and stand-by generators sector.

This, according to the objectives of the Project, can be considered, for many reasons, as a nucleus for the agro-industrial development of Rivers State.

The agro-based industries survey has shown that :

- the industries in the palm oil sector cover the present processing requirements;
- industrial processing of cassava into garri has not at the moment satisfactoring marketing prospects;
- rice processing industries should be considered in the near future when an agricultural development programme will enter into medium-full operation;
- other agricultural products are not at the moment available in sufficient quantities for processing purposes.

Bearing these considerations and the basic criteria for the choice of an agro-industrial complex in mind, the IFAGRARIA team has reached this conclusion : the above-mentioned selected agro-industrial complex meets the maximum number of requirements to satisfy a choice based on the most reasonable and important technical, marketing and economic criteria.

The function of its nucleus, which has been fully described in the Annexes 4 and 5 and summarized in the following pages, is the following:

a) high utilization of by-products from local agro-based industries for the production of poultry-feedstuff formula;
b) requirement of new agro-industrial and/or artisanal products such as cassava chips;
c) partially covering the existing gap between the demand and supply in poultry meat and eggs (its foreseen a total yearly production of about 6 mill -

ions kilos of poultry meat and about 11 millions of eggs); the market share for poultry meat is estimated to be 36-42% while that for table eggs is 60-70% (Annex 3 - para 1.4.7);

d) requirement of a large quantity of 1-day-old chicks able to boost the present small-scale enterprises to industrial level;

e) production of poultry-meat meal;

f) training centre - both at management and workers' level - for further industrial development in the hatchery, slaughterhouse and feed-mill sectors;

g) utilization of the existing network of grain depots in Rivers State.

3.2 DESCRIPTION OF THE AGRO-INDUSTRIAL COMPLEX

The selected agro-industrial complex should be located in Omoko, in the Ahoada (ALGA) Local Government Area, about 100 km north-west of Port Harcourt (Fig. 1).

The complex consists of a poultry farmdirectly integrated with farmers producing maize-cassava, and poultry farmers grouped in Co-operatives.

Fig. 2 shows the entire processing scheme of the selected agro-industrial plant and the integration with the farmers Co-operatives.

The process can be divided into two main production lines. The first line is for table eggs production while the second one is for poultry meat production. The two lines are supported by the feedstuff production line.

a) Table eggs production line

The 1-day-old chicks are sent to the rearing sector (see Annex 5 - para 3.1) where they will be kept for 16-18 weeks of life in special cages.

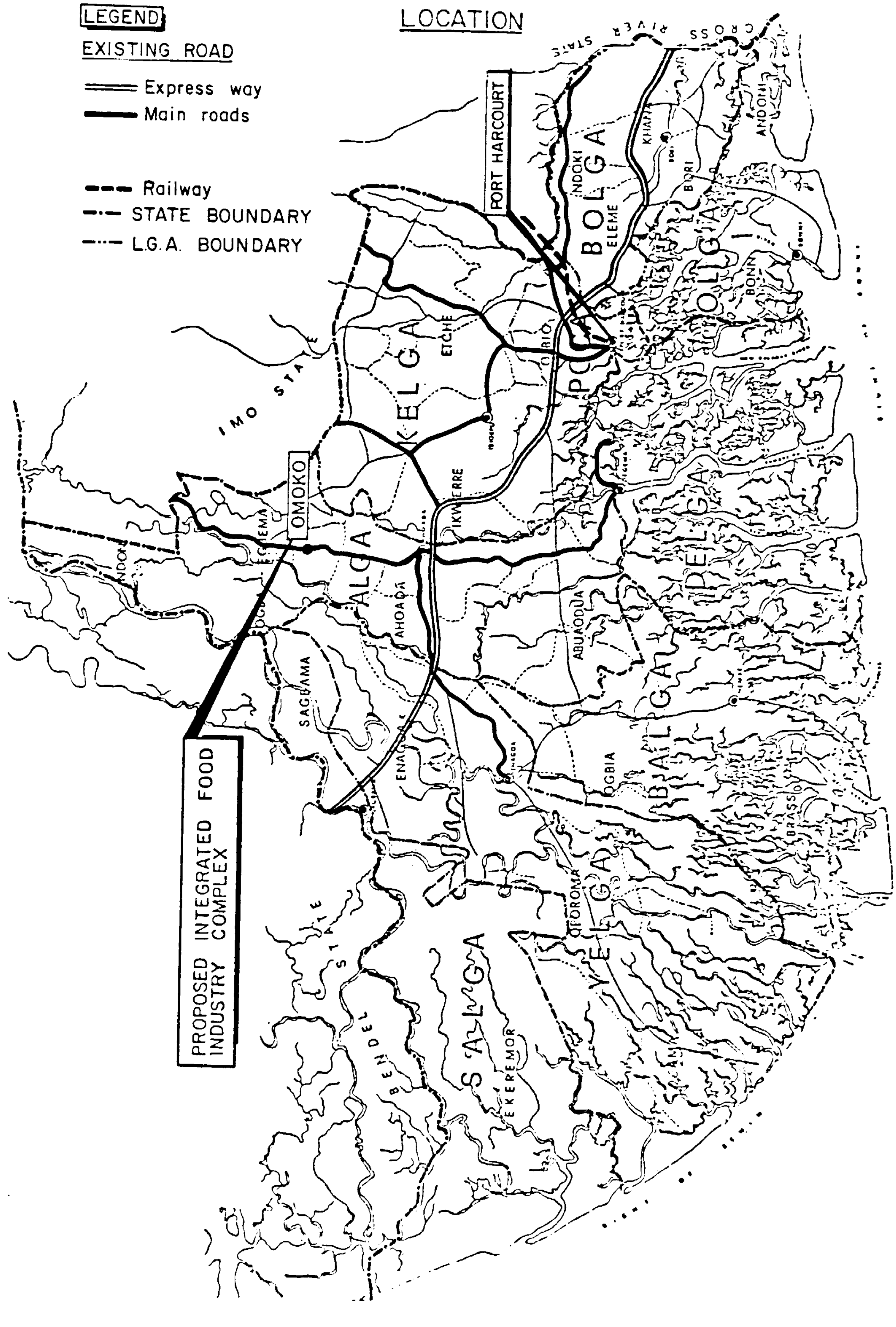
From the rearing sector the pullets are transferred to the layers production sector (see Annex 5 - para 3.2), where they will be kept for a period of approximately one year.

During this period the average layer production is assumed to be 250-260 eggs/cycle.

RIVER STATE
PROPOSED INTEGRATED FOOD INDUSTRY COMPLEX
(INTEGRATED POULTRY PROJECT)

FIG. 1

LOCATION



PROCESSING SCHEME AND EXTERNAL REPORTS OF POULTRY FARMS

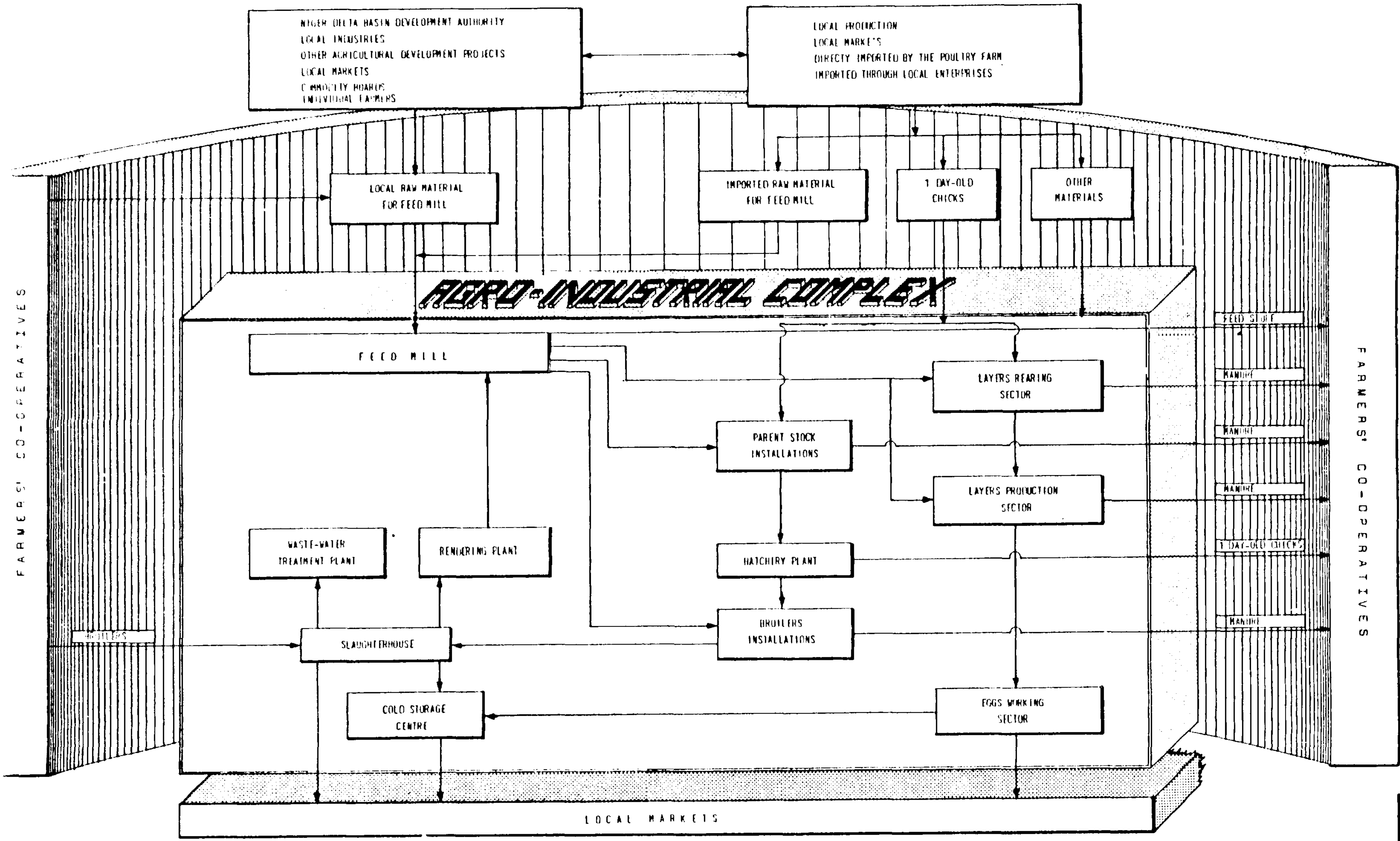


FIG. 2

The eggs are then sent to the egg working building (see Annex 5 para 3.3) where they are packed and immediately conveyed to the market or to the cold storage centre.

The equipment is foreseen to assure the best living condition for the layers and all the main important operations are automatic (feeding and manure-removing systems). This kind of technology has been chosen to avoid health problems for the birds, to save feedstuffs, and to ensure the success of the whole operation.

b) Poultry meat production line

The parent 1-day-old chicks (females and males) are sent to the parent stock installation (see Annex 5 - para 4.1) where they will be kept throughout their life.

The eggs production is duly conveyed to the hatchery plant (see Annex 5 - para 4.2) where the setting and hatchery equipment are installed.

The produced and selected 1-day-old chicks are then sent to the broilers installation (see Annex 5 - para 4.3) where, after an average cycle of 60 days, they will reach a live weight of approximately 2.0 kg.

The broilers are then sent to the slaughterhouse (see Annex 5 - para 4.4) where - after a serials of different phases - a dressed broiler of approximately 1.5 kg of meat/each will be the finished product. In accordance with the market situation, the poultry meat is immediately sold or stored in the cold storage centre.

A rendering plant, which, at full operation, is expected to produce about 750 t of poultry meat meal, is connected to the slaughterhouse.

A waste-water treatment plant is provided to process the affluent coming from both the slaughterhouse and the rendering plant.

The chapters 4.1, 4.2, 4.3 and 4.4 of the Annex 5 give further details of the 1-day-old chicks, the broiler production, the slaughtering, the by-product and the water treatment process.

For broiler production, the applied technology meets two main requirements of the operation : to ensure the best health conditions and to ensure an appropriate and economical distribution of the feedstuffs.

The slaughterhouse, the rendering plant and the waste-water treatment plant equipment has been chosen not least on the basis of its reliability. It has given satisfactoring results in other states of the Federation and in other countries with similar conditions to those in Nigeria.

c) Feedstuff production line

A 10 t/h feed mill is scheduled to provide feedstuffs for the two above production lines and for the poultry farmers.

Chapter 5 of the Annex 5 is devoted exclusively to the feedstuff production process.

The applied technology - besides its reliability already proved in similar Nigerian conditions - is designed for the production of pelletted feedstuff. We do indeed give the utmost importance to this processing phase for the success of the poultry operation (see Annex 4 - para 1.2.1.6), to justify the increase of the investment cost.

In the following pages are summarized the technical components of the poultry farm agro-industrial complex; its production, processing, sales, inputs bought, personnel required and its economic data and social effects.

A - Technical components of the agro-industrial complex

1. Main data

. Total surface : about 298,500 sq.mts
. Clearing and levelling area : about 231,000 sq.mts
. Covered area : about 35,000 sq.mts
. Fencing : about 4,200 mts
. Sewage : about 1,500 mts
. Internal road system : about 2,600 mts
. Internal electricity line : about 2,550 mts
. Internal water supply network : about 2,500 mts

2. General services

. Offices
. Staff housing
. Stand-by generators
. Water collecting and storage

. Fuel distribution point

. Workshop

. Shed "as garages"

. Incinerators

. Weighing point

3. Feed mill

. Prefabricated metal panels

. Working capacity 10 tonnes/hour

. Silos for raw material

. Silos for finished product

. Production cycle : computerized quantity of raw material ingre - dients; almost 95% of production pelletted

4. Parent stock sector

. Prefabricated buildings

. no. 12 parent stock installations with automatic feed system (capacity: no. 4,000 birds)

5. Hatchery plant

. Prefabricated building

. no. 6 incubators (working capacity : 50,400 eggs/each)

. no. 3 hatchers (working capacity : 16,800 eggs/each)

6. Broilers sector

. Prefabricated buildings

. no. 10 broilers installations with automatic feed system (capacity : no. 15,000 birds each)

7. Layer rearing sector

. Prefabricated building

. no. 1 layers rearing installation with automatic feed system (capacity : no. 17,280 birds)

8. Layer production sector

. Prefabricated building

. no. 3 layer production installations with automatic feed system and automatic manure removing system (capacity: no.15,360 birds/each)

9. Egg working building

. Prefabricated building

. egg centralization and egg packing machine : working capacity: no. 21,000 eggs/hour.

10. Processing plants

   . Prefabricated buildings
   . Slaughterhouse
   Working capacity : no. 2,000 birds/hour
   . Cold storage rooms
      . low temperature rooms and tunnels
      . 0°C/+2°C rooms, tunnels and anterooms
   . By-product plant
      . working capacity : 900 kg/hour
   . Waste-water treatment plant
      . physico-chemical waste-water treatment for high rate purification of the slaughterhouse effluent. Rated working capacity : 25 m^3/hour.

11. Vehicles

   . no. 33 including cars, trucks, tractors, and trailers.

B. Poultry farm production (in full production)

   . no. 4,265,000 1-day-old broiler chicks
   . no. 750,000 broilers of about 2.0 kg l.w./each
   . no. 11,000,000 table eggs
   . no. 24,700 t of poultry feedstuffs of which 8,500 t as internal production
   . no. 750 tonnes of poultry meat meal

C. Poultry farm processing (in full production)

   . no. 24,700 tonnes of feed-mill raw material
   . no. 4,000,000 broilers of about 2.0 kg l.w./each plus culling layers and parent stock
   . no. 2,400 tonnes of slaughterhouse by-products

D. Poultry farm sales (in full production)

   . no. 3,515,000 1-day-old broiler chicks

. no. 16,250 tonnes of feedstuff

. no. 11,000,000 packed table eggs

. no. 6,000 tonnes of poultry meat

E. Input bought by the poultry farm (at full operation)

. no. 24,700 tonnes of feed-mill raw material

. no. 58,800 1-day-old broiler parent stock chicks

. no. 54,000 1-day-old layer chicks

. no. 3,250,000 broilers of about 2.0 kg l.w./each

. no. 600 tonnes of rice straw

. other various consumable materials (vaccines, drugs, fuel, gasoil, lubricants, chemicals, etc.)

F. Personnel

. Nigerian personnel (at full operation)

. 124 units

. Expatriate technical assistance

. no. 5 technicians over 3 years

G. Economic data

. Investment costs : ₦ 15.2 million

. Operating costs : ₦ 33.9 million (at full production)

. Sales' receipts : ₦ 37.5 million (at full production)

. Financial internal rate of return : 25.2%

. Cumulative cash flow before taxation : ₦ 41.3 million

. Value added : ₦ 10.9 million per year (at full production)

H. Social data

. Poultry Farmers'Co-operatives : n°10

. Poultry Farmers'Co-operative Members : n° 233

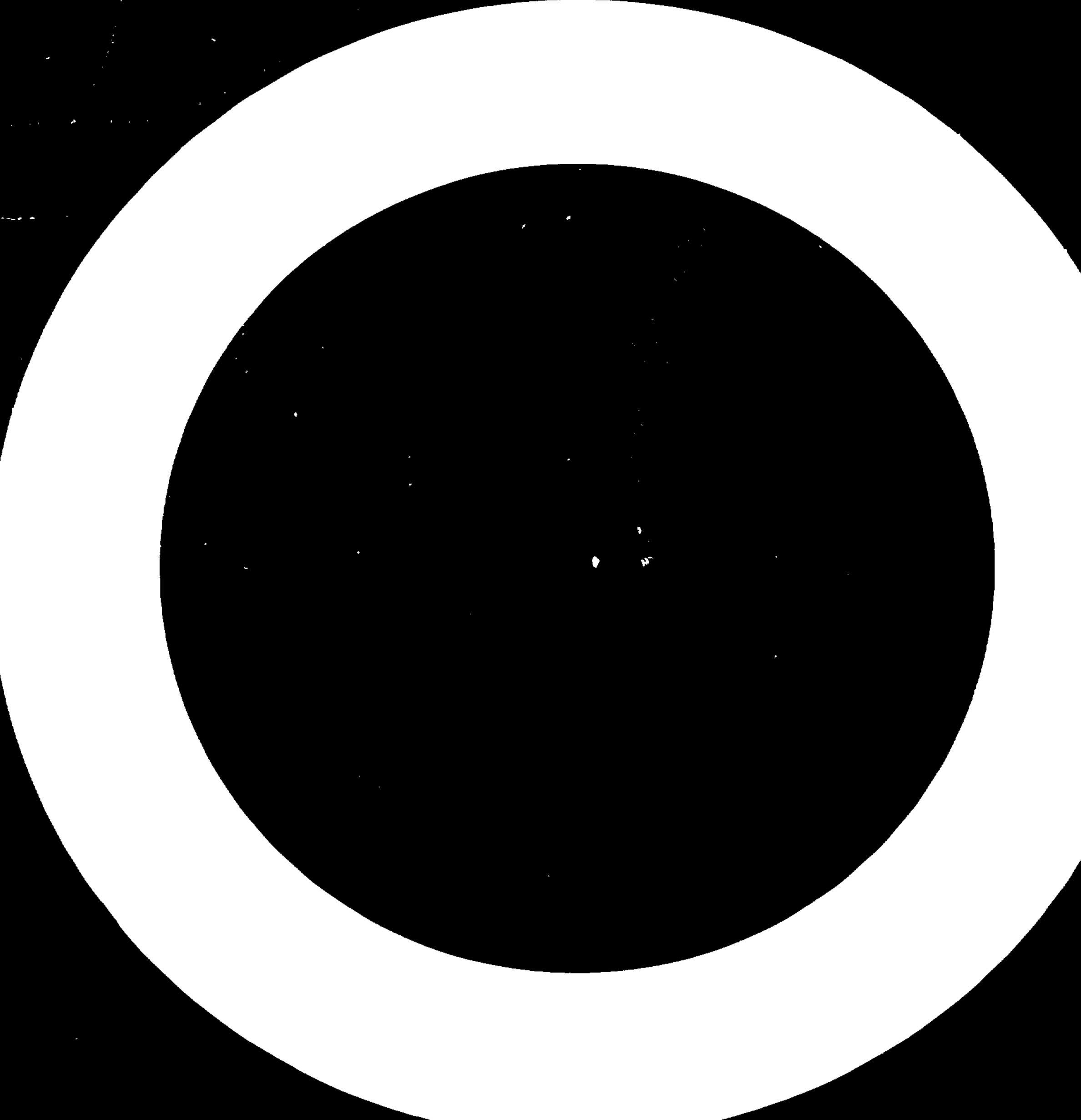
. Estimated gross revenue for each farmer family : ₦ 81.000/year

. Estimated net revenue for each farmer family : ₦ 22.200/year

. Farmer Agricultural Co-operatives: n° 59

. Farmer Agricultural Co-operatives Members : n° 2,750

. Estimated Incremental Occupancy : n° 50-60 labourers



4. HOW THE SELECTED AGRO-INDUSTRIAL COMPLEX MEETS THE BASIC CRITERIA

4.1 GENERAL

The following have been the basic criteria adopted to select the agro-industrial complex :

a) compatibility with Nigerian economic development policies
b) employement generation
c) labour intensity
d) local availability of raw materials
e) availability of qualified labour
f) availability of infrastructures
g) the market situation
h) the availability of supporting industry
i) potential import substitution
l) pollution characteristics and effects on ecology
m) potential profitability to investors

As already mentioned, according to a survey made the selected agro-industrial complex is at the moment the only one capable of meeting satisfactorily the above basic criteria.

4.2 COMPATIBILITY WITH THE DEVELOPMENT PLAN OF NIGERIA, THE NIGERIAN INDUSTRIAL POLICY AND THE STRATEGY AND THE ECONOMIC STABILIZATION MEASURES (1982-1983)

4.2.1 Generalities

For a better understanding of the criteria employed in selecting the agro-industrial complex and to verify whether it is in line with the Nigeria policy and strategy in the sector, a review of the basic guidelines has been made. In the following pages a very synthetic outline will be given of the Fourth National Development Plan 1981-85, the Nigerian Industrial Policy and Strategy and the recent Economic Stabilization Measures (1982-1983).

4.2.2 Fourth National Development Plan 1981-85

Among the specific objectives set for the Fourth National Development Plan (F.N.D.P.), agricultural and food processing will have the highest priority. This is necessary if Nigeria intends to be able to feed its large and rapidly growing population: otherwise, the alternative is to have recourse to a massive importation of food. By developing agriculture a flow of raw material will be ensured to the processing industries.

The annual growth of the Agriculture, Livestock, Forestry and Fishery sectors is estimated to be about 4% in the Plan period. The planned public capital investment of 8.8 billion Naira will be subdivided as following: ₦ 5.4 billion for crops; ₦ 2.3 billion for irrigation and water resource development; ₦ 0.7 billion for livestock; ₦ 0.3 billion for forestry and ₦ 0.2 billion for fishery.

During the F.N.D.P.,the Green Revolution programme has been launched. The basic objective of this programme is to ensure self-sufficiency in food by the end of the Plan period,and also to ensure the food is delivered to the people at reasonable prices.

The other important sector underlined by the F.N.D.P. is to foster the development of the co-operative movement.

4.2.3 Nigeria's industrial policy and strategy (*)

a) Introduction

Planned industrial development in Nigeria did not really commence until after independence. Economic activity before independence was almost entirely commercial, and this should not be found surprising when one considers that the role envisaged for the colonies was that of producers of raw materials and consumers of finished products. Naturally, therefore, early efforts at industrialisation were geared towards substituting imported industrial goods by locally produced ones. This import-substitution strategy has up to now been a dominant feature of industrialisation efforts, although it has

(*) Extract and summary of Nigerian Industrial Policy and Strategy Guidelines to Investors. Federal Ministry of Industry-Federal Republic of Nigeria.

since been advanced to include production of some intermediate goods. For these reasons and until recently, the major preoccupation has been a progressive reduction of the import bills in respect of consumer items which require only low level technology and the production of which could therefore be undertaken in Nigeria. An appraisal of the situation has revealed that the benefits of this strategy to the national economy have been minimal, principally because of the invariably low level of local value-added.

An urgent need is now felt, therefore, for a comprehensive review of industrial objectives and policy, and a re-orientation of industrialisation strategy to bring it into line with the new set of objectives. As stated earlier too little attention has been given in the past to the need to maximise the benefits that would accrue to the national economy from a fuller exploitation of the resources with which the nation is abundantly endowed : there has been an unfortunate complacency and undue satisfaction with the mere physical establishment of industries, regardless of the source of raw materials and other inputs, and without any noticeable efforts to increase local value-added. In order to ensure that the industrial sector contributes its quota to the evolution of a self-reliant and resilient Nigerian national economy capable of generating an internally self-sustaining growth, a thorough re-appraisal and a necessary overhaul of the present situation are called for. Moreover, to make the whole concept of demand management a practical proposition in this country, there is a compelling need to lay greater emphasis on local resource-based industries which, apart from minimising dependence on others for Nigerian basic needs, should also help to make the involvement in international trade more meaningful and balanced.

b) Industrial policy objectives and strategy regarding agro-based industries

The direction of governmental action in the industrial sector shall be to encourage and promote directly and indirectly rapid development of manufacturing and allied activities as a major factor in the overall economic prosperity of the nation and as a positive contribution towards the attainment of vital social goals.

In order to ensure that industrialisation brings in its wake truly beneficial economic and social development, the growth of industries has to be regulated and guided along definite channels so as to achieve certain set objectives.

In the following pages the role of agro-based industries in the Nigerian path to industrialisation is emphasized.

The aims to attain self-sufficiency in food requirements for the growing population of Nigeria cannot be obtained without a linkage between agro-based and food processing industries.

Agro-based industries are the type of industries in which the first objective of Nigeria's industrialisation can be realized : the maximization of local value-added through the utilisation of local raw material.

In fact, agro-based industries must explore all possible avenues for the local production of the agricultural raw materials they require.

Through them it is possible to attain another objective, that is the linkages between local industries (Palm kernel cake, wheat offals , dried brewery grains, etc.).

Agro-based industries, finally, are the pre-eminent industries through which it is possible to reach the other important objective of Nigeria industrialization: the dispersal of industries throughout the country. Being close to the producing areas of agricultural raw materials, they will avoid excessive concentration of industries in a few areas and thus they will develop rural areas and stop the rural exodus to the towns.

Agro-based industries are then at the top of the priority industries determined by the Nigerian Government with a wide range of industries covering all aspects of agricultural, livestock and forestry activities as shown in the following paragraph :

- Agro-based and Food Processing Industries, e.g. cattle ranching and meat processing; dairy industries; fruit growing and fruit juice production; rice plantation and milling; sugar complexes; forest plantations and wood - work complexes; plantation and processing of cocoa, groundnuts, coffee and cotton; etc.
- Agro-based industries will be, under this top priority system, encouraged by all the incentives foreseen by the Nigerian laws:

. Pioneer Status
. Approved users' scheme
. Accelerated Depreciation of Capital Investment
. Customs (draw-back) regulation
. Graduated excise-tax reduction for local value-added
. Expenses for research and development
. Infrastructural facilities

4.2.4 The Economic Stabilisation Measures (E.S.M.)

a) Introduction (^)

As is known, Nigeria depends on oil revenues for over 90% of its foreign exchange and over 85% of its government revenues. The changes in the world oil market must therefore affect the Nigerian Economy. In fact, in the wake of the worsening of the world-wide recession, especially in the first two quarters of 1981, Nigeria's oil production declined sharply from an average of 2 million barrels per day in the first quarter of 1981 to only 843,000 barrels per day in the third quarter of the same year. In the fourth quarter, a 10% discount in the official selling price of our crude oil stimulated the demand for our oil, leading to a resurgence of production to an average of 1.3 million barrels per day in the last quarter of 1981. This was however short-lived, as the second round of shocks occurred in the first quarter of 1982 and production decline again to less than 700,000 barrels a day in March, 1982. These combined declines in both demand and price of our crude oil have had grave implications for the Nigerian economy.

Antithetically Nigeria's import propensities continued unabated as the import bills remained insensitive to the sharply declining trends in export earnings. Thus, at a time when export earnings had dropped sharply by about 26% from ₦ 14.199 billion in 1980 to ₦ 10.53 billion in 1981, the import bill rose by more than 45% from ₦ 9.096 billion to ₦ 13.16 billion over the same period. To some extent, this simultaneous decline in export revenue and rapid growth in the import bill was unavoidable, given

(^) Resumé of the speech given by Prof. E.C. Edorien, Special Adviser to the President of the Federal Republic of Nigeria on Economic Affairs, to the Nigerian Stock Exchange Council on 10th March 1983.

Nigeria's production structure which was highly import-dependent and the import addiction that has become characteristic of the country.

In its reaction to the earliest manifestations of these trends, the Nigeria government introduced some mild-contractionary measures in the belief that the observed developments were in the nature of short-term variations in the level of world-wide economic activity. However, the second round of the oil crisis in early 1982 proved otherwise and confirmed that the successive oil crises had not only assumed a pattern but were increasingly severe in their impact.

It was clear that the circumstances the country faced at that time required Nigeria to find ways of either increasing the nation's foreign exchange resources or reducing government expenditure, the level of imports and the rate of foreign exchange disbursement, in the short-term, and embarking on a programme for the structural re-adjustment of the economy in the longer term. The only real choice that was open to Nigeria, in the short-term, was to introduce the necessary fiscal and monetary policy changes that would reduce both the level of imports and the level of public expenditure with the urgency that the situation demanded. This was the essence of the package of economic stabilisation measures that were introduced in April, 1982.

The Economic Stabilisation measures have been designed to :

a) stem the massive outflow of foreign exchange and reduce the import bill through the use of selective import controls and other tariff measures;
b) mop up excess liquidity in the system, thereby slowing down the growth of prices; and, in the longer-term;
c) provide adequate encouragement and protection to our local industries as part of the nation's continuing efforts to attain self-sufficiency and self-reliance.

The measures, which must not be confused as austerity measures, are not, in fact, of such temporary nature as the tag austerity measures would tend to convey, but must be seen as a long term measure for a structural re-adjustement of the Nigeria economy. In this respect, compared with a monthly import bill of over ₦ 1.26 billion in the first four months of 1982, the monthly import bill declined to ₦ 969.6 million in the first four months that followed the measures and declined further to about ₦ 800 million in the last four months of 1982. Government has also continued to re-align its priorities with the stark realities of the continuing world-wide recession and has accordingly re-phased its capital programme to match the changing resource picture.

While the 1982 measures still offer the importers wide possibilities to avoid the government aims, in 1983 other measures where established to clarify the extent of the restrictions introduced in 1982.

With a premise that the Nigerian economy is basically dynamic and resilient, the economic stabilisation measures, seen in their proper perspectives, should offer to Nigeria in general and the industrial sector in particular, new opportunities which must be taken advantage of.

For Nigeria, the economic stabilisation measures offer a unique opportunity for the internalisation of the benefits of economic activity and their associated multiplier effects. Through those measures that are designed to diversify the nation's economy and promote the expansion of domestic productive capacity, Nigeria should, in time, be able to reduce its dependence on and vulnerability to developments in the international economy which have often had destabilising influences on the Nigerian economy. The vagaries of the international oil market and the economic stabilisation measures which they have engendered have created a psychological atmosphere appropriate for a realistic and sober assessment of the nation's wealth and its utilisation.

The government has already taken necessary steps to rationalise the content and quality of government expenditure with a view to ensuring optimal use of the limited financial resources. Also the economic stabilisation measures have been used to optimise the use of the increasingly scarce foreign exchange, directing what is available to the priority areas of the economy and blocking all those avenues through which this scarce resource has been frivolously and selfishly frittered away. The foreign exchange allocation mechanism will continue to be used to discourage the unbridled importation of non essential goods and to encourage those sectors which have the strongest linkages with the domestic economy in furtherance of the objectives of back-ward integration and domestic self-reliance. In this connection,the cut back in the foreign exchange allocation to items under import licence averaging about 40% of the average levels of the past three years must not be seen as something temporary but rather as providing a compelling need for adjustment along the direction of increased local substitution for imported items.

These are some of the possibilities which the measures afford society in general.As to the industrial sector, the economic stabilisation measures provide a great opportunity for the expansion of domestic production capacity by offering to the industrialists a wider and more stable market. Through the increased protection offered by the recent changes in the tariffs and the import control measures, domestic manufacturers are offered an opportunity to provide a major share of the over ₦ 1.4 billion imported food and the ₦ 1.2 billion imported consumer goods markets in Nigeria. In addition to the protection offered those manufacturers that have already become established in Nigeria, it is expected that the measures will engender new investment in the production of various food and consumer goods as well as in medium to heavy industry.

For industry, this will imply a greater use of local raw materials, where these are available, and further research into local substitutes for those currently being imported. The industrialists must now channel their investible funds into those industries that have low imported raw materials content.

b) The Economic Stabilisation measures in respect of the establishment of a Poultry Project

Reference regarding the Economic Stabilisation measures could be found in :

a) Economic Stabilisation Order 1982 (20th April 1982)
b) Economic Stabilisation Order 1982 (12th August 1982)
c) Economic Stabilisation Order 1982 (9th September 1982)
d) Economic Stabilisation Order 1983 (1st January 1983)
e) Economic Stabilisation Order 1983 (24th January 1983)

The goods directly or indirectly linked to the establishment and the economic life of a poultry project are at present liable to the following import-export regulations:

- Import

. Rice

Rice can be imported by import licence awarded only to Federal State and Local Government Agencies. The rate of duty has been increased to 15 k/kg or 30% ad valorem.

. Maize

Maize for feed-stuff preparation can be imported by import licence and is free of duty for Federal State and Local Government Agencies. For others the rate of duty is 55% ad valorem.

. Wheat, Rye, Barley, Oats.

Wheat, rye, barley and oats can be imported by import licence. The rate of duty is respectively free, 40%, 20%, 40% ad valorem.

. Chilled or frozen meat of all kinds

These kinds of meat can be imported by import licence. The rate of duty varies from 25% to 50% ad valorem.

. Concentrates, premixes, feed additives and fish meal

All these products have exemption from import duty

. Day-old Chicks

Day-old Chicks can be imported by import licence, free of duty.

. Flours or meals of non-defatted oil seeds

The duty is 40% ad valorem.

. Oil cake and other residues resulting from the extraction of vegetable oil.

The duty is 33 1/3% ad valorem.

. Flours and meals of meat, offals and fish unfit for human consumption

The duty is 10% ad valorem.

. Equipments and machinery for agricultural and poultry projects

Free of duty; electrical motors are under import licence.

- Exports

All the most important Nigerian agricultural products and processed by-products are under export licence.
Recently export prohibition has included wheat offals and dried brewers grain.
In the export field, the different Commodity Boards monopolize the sectors.

4.2.5 The main point showing the compatibility of the selected agro-industry food complex and the Nigerian economic objectives

The following are the main points showing the effects and the results of the selected agro-industry food complex in comparison with the general and specific objectives set by the Nigerian Government for the development of the agricultural and agro-based sectors:

a) development of agricultural production; the complex will require an additional production of about 10,000 tonnes of maize and 1,850 tonnes of cassava chips (see Annex 4 - para 4.1.2);

b) reinforcement of the agricultural co-operative movement; the complex should activate the local agricultural co-operative movement involving the participation of about 2,800 members in the agricultural production side and 233 members in the poultry-breeding side;

c) drawing into the activities the most important development institutions and agencies of Rivers State. The various institutions, from the Rivers State Government to the Federal and State Ministries and Agencies, have their part in influencing the implementation and the success of the selected complex. This will give an opportunity to all the institutions to participate in an activity in which, all together, they will attain the objectives of the Green Revolution;

d) high utilization of local raw material, both technically and economically; the proposed feed formula for poultry will use local agricultural raw material and local agro-based by products. This will give a 78% participation of local material against the 22% imported (see Annex 4 - para 1.3.1.3);

e) high involvement of local industries in the various aspects of the economic life of the complex. Involvement in productions from plastic bags to cardboard boxes, from special clothes to chemical products, from maintenance to the provision of spare parts, will give a great number of the industrial structures of Rivers State an additional boost. The induced employement yearly generated by the complex has been estimated at 50-60 workers;

f) the location in Omoko (ALGA - Local Government Area) meets, first of all the objective of industrial dispersal throughout the territory and then is near the most important producing area of Rivers State in terms of maize and cassava; it would reduce the rural exodus by creating local job opportunities and since it is distant from the present concentration of poultry activities (Port Harcourt) it would avoid risks of disease;

g) maximum results in terms of conversion ratio of raw material into feed and protein in particular; the scarcity of raw material and the need for food for human consumption highlights poultry breeding since poultry is, together with fish, the highest and fastest transformer of raw material (2.5 kg for 1 kg of l.w. poultry);

h) high contribution to solve the food shortage; the complex, producing about 4 million birds and 11 million eggs will contribute towards meeting 36-42% of the present poultry meat demand and towards satisfying 60-70% of the egg demand in Rivers State. This is at a time when the Economic Stabilization Measures indicate self-production as the way to meet Nigerian food demand. The contribution at present made to satisfy the demand for poultry meat and eggs is very small not only in Rivers State but also in the neighbouring State. Even taking the Rivers State alone, the demand level is calculated on very low yearly consumption (2.2 kg/inhabitant for poultry meat and 3.75 eggs per inhabitant) (see Annex 3 - para 1.2);

i) holding down poultry meat and egg prices; in accordance with the objective of the Green Revolution only large scale production will prevent the price from jumping to higher levels. This will be the case when the import restriction measures start to have more and more effect on the Nigerian domestic market;

l) utilisation of raw materials affected by the export restriction measures; this is the case of the maximum utilization foreseen for wheat offals and dried brewery spents (see para 4.2.3);

m) creating an additional demand for an agricultural by-product; this is the case of rice straw (^) at present not properly utilized or abandoned in the field. This will contribute - even if only in a small way - towards developing rice cultivation (see Annex 4 - Table 20);

n) production of a very large quantity of poultry manure (^) which indirectly will be a means to boost production of some high value agricultural produce, such as vegetables and fruit, at the moment very scarce in Rivers State;

o) utilization of the complex by-products, with the slaughterhouse by-products, some 750 tonnes (^^) of poultry meat meal will be produced and utilized as a precious component of the feedstuff formula;

p) anti-pollution equipment; all the waste water from the processing plant and other sectors of the complex will be treated in a waste water treatement plant to avoid pollution in the area.

4.3 EMPLOYMENT GENERATION

Employment generation, in the Local Government Area and in the industrial and commercial network of Port Harcourt, can be estimated at :

- no. 233 poultry farmer families (Annex 4 - para 4.1.1.)
- no. 2,750 maize-cassava producing farmer families (Annex 4 - para 4.1.2)
- no. 50-60 labourers as incremental occupancy in the industrial, commercial and transportation enterprises of Port Harcourt.

Considering family composition to be no. 6-8 persons an employment opportunity for 18-24,000 inhabitants in the ALGA Local Government Area

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(^) for the birds' litter

(^) delivered free to the Farmers Co-operative (see Annex 4 - Table 23)

(^^) at full production (see Annex 4 - Table 17) will result (2,983 families). While the present population is estimated to be about 290,000 inhabitants (^) the social impact can be measured by the involvement of 6-8% of the whole population.

4.4 LABOUR INTENSITY

According to the evaluation contained in Annex 4, the total personnel employed by the selected complex amounts to 129 persons (Annex 4 - para 1.3.2.1 - 1.3.2.2.) whilst the investment costs are ₦ 15.2 million (Annex 4 - Table 9).

This means that each new job will require an investment of ₦ 118,000. We believe that this is at present time a medium-low investment cost per labourer. The number of workers could obviously be increased by using less advanced technological equipment; this will have an effect only on the broiler and layer production installations (Annexes 5 and 6). In this case the proposed choice has been based more on the aim to save precious feed stuffs than on the kind of technology applied.

4.5 LOCAL AVAILABILITY OF RAW MATERIALS

The local raw material needed by the selected agro-industry food complex is :

a) agricultural products such as maize and cassava,
b) agro-based industry by-products such as wheat offals, palm kernel cake, dried brewery spents,
c) agro-based industry products such as palm oil and/or palm kernel oil, especially for feedstuff pelletting,
d) other products such as limestone or oyster shell,
e) agricultural by-products, such as rice straw,
f) 1-day-old chicks.

(^) Rivers State-Ministry of Economic Development and Planning - Statistic Division - Port Harcourt - Population (2nd edition)

Raw materials from a) to b) are necessary to produce the poultry feed-stuffs together with other imported ingredients. As described in Annex 4 - para.1.3.1.3, 78% of the raw material employed in the feed formula, totalling about 19,400 tonnes, can be purchased in the ALGA Local Government Area or in Port Harcourt.

Rice straw even, since the L.G.A. is a rice producing area, can be locally purchased.

Regarding 1-day-old chicks, as stated in Annex 3 - para 3 and Annex 4 - Table 20, the parent broiler 1-day-old chicks are, for the moment, supposed to be imported, whereas the layer 1-day-old chicks are regularly produced in Rivers State or in the neighbouring States.

The kind of complex suggested will itself produce - as a by-product - raw material for feedstuffs, such as poultry meat meal (Annex 4 - Table 17).

According to our survey, there is not, at the moment, in Rivers State, any kind of agro-industry that can find such a large amount of available raw material locally.

4.6 AVAILABILITY OF QUALIFIED LABOUR

Annex 3, paragraphs 1 and 2, which describes the present poultry and feed mill industries in Rivers State, indicates that a large amount of semi-skilled labour is available. From the personnel in charge of the producing installations to the managers, the presence of highly skilled personnel was noted during our survey. In Rivers State, after years of familiarity with poultry and feed-mill industries, there is a widespread competence and awareness of the major problems of poultry breeding. The presence of 2 1-day-old-chick producing factories is proof of the advanced technology that can be found in Rivers State. A thorough knowledge of the disease aspects has been noticed and especially of the care necessary to avoid great harm befalling on the poultry breeding units. The availability also of the most modern inputs of a poultry industry has helped to reach up-to-date skills at all levels.

Qualified labour for the slaughterhouse, by-product processing and waste water treatment plants is not available as above, or, indeed, completly lacking. For this reason and for the fact that the suggested complex has a much greater dimension than the existing one, expatriate technical assistance has been planned over a 3-year period. In addition, it is suggested that the management personnel of the complex - and this has been economically accounted - be hired for an average of 6 months before production starts to allow them to follow the erection of the various installations and equipment, and to be trained both by the erection workers and the expatriate groups (Annex 4 - Table 19).

4.7 CURRENT AVAILABILITY OF ADEQUATE INFRASTRUCTURE TO SUPPORT THE SELECTED AGRO-INDUSTRIAL COMPLEX

4.7.1 Background

Before expressing the opinion regarding such a vital aspect of the selected agro-industrial complex, a very synthetic outline of the existing and planned infrastructure will be given. To facilitate readers the location of the complex (Fig. 1 at page 19) and maps of the infrastructure are attached (see Rivers State road map).

4.7.2 Roads and road transport facilities

The geological characteristics of River State exert an appreciable influence on the density and size of the road network.

There are, in fact, hardly any roads at present in the provinces of Salga, Yelga, Balga, Delga and Olga (Salga is mostly marshy whilst the others are considerably affected by the ramifications of the Niger Delta). In these provinces, the villages are small and far from one another, and the technical and economic problems connected with crossing the water courses are considerable.

On the contrary, the road network is fairly extensive in the Local Government Areas of Alga, Kelga and Bolga. The main line of communication is constituted from northwest to southeast by the stretch of express way, partly in construction and partly in the design stage, that will link River State with the bordering Bendel and Cross River States.

Other important stretches connect the administrative centres of the L.G.A. with the more important towns and villages and, crossing the frontier, reach Agata, Owerri, Okpuale, and Aba and the other important towns of the Imu and Anambra States.

The overall length of the existing main roads, excluding the expressway, is around 350 km.

The typical section of the main roads has a 7.20-m metalled carriageway, bordered by two 2.70-3.00-m wide kerbs. They are usually constructed of compacted soil (laterite + 5% cement) not less than 150 mm thick, a 60 mm thick asphalt or concrete layer, and a 40 mm thick wearing course.

The curves are of ample radius. Crossings with other roads are generally well designed and equipped with adequate protection and road signs.

Nevertheless, road accidents show that the width of these roads is now insufficient for the traffic on the Port Harcourt - Elele - Owerri and Port Harcourt - Alba routes and on the Port Harcourt ring roads.

The construction of the roads may be within the sphere of competence of both federal and local governments.

The attached map (Rivers State road map), shows the situation of the main roads under construction or in contract or design stages, on the basis of information from the Ministry of Works, and for an overall length of about 900 km. The present state of progress of the works, which mostly involves improving minor and bad roads or tracks, seems fairly modest, probably for difficulties of funding. Further roads, for an expenditure of ₦ 27,000,000, are scheduled in the Fourth National Development Plan (1981-85).

The road communications system is supplemented by a single-track, narrow-gauge railway, which runs north towards Maiduguri and which, at Raduna, links up with the railway from Lagos.

The traffic in the provinces lying to the south is mainly on water through the Delta branches or along the coast.

At present, there are few passenger craft and barges for goods transport, but the local and federal governments expect to improve considerably the efficiency of these services, which appear essential for the development of zones that are practically beyond the reach of road communications.

The Fourth Development Plan foresees the expenditure of ₦ 100 M for canal and water-way construction, passenger services (ferries), construction of jetties, construction of dockyards and ship repair facilities.

4.7.3 Electric power

The N.E.P.A. programme plans to connect up all the administrative centres to the national grid within two years, even if insufficient funds might delay connecting up the provinces of Bolga and Kelga. The national grid is standardized and unified at 33-kV.

The attached map (Power Development Programme in Rivers State), shows the stretches of the existing P.Harcourt-Isiokpo-Elele-Ahoada power transmission line, and of the others under construction, for an overall length of about 350 km. Rivers State, instead, is concerned with distribution to the smaller towns and villages and to individual consumers at 400 V and 230 V. This State is also examining the possibility of utilizing the natural gas unused in the oil fields for the generation of electricity.

At present, the following power stations have been programmed:

- EKENFA, 12 MW, to serve 40-50 towns and villages (within 2 years)
- BRIGUMA, 12 MW, to serve 15 towns and villages (within 2 years)
- ROLO CREEK, 40 MW, to serve 60-90 towns and villages (within 2-5 years).

At present, diesel-electric generating sets are installed in all towns and villages of any importance for local service. The standard powers are 35, 90, 250 and 600 kVA.

In addition, some base camps belonging to the oil companies operating in the State supply the nearby inhabitants, using their own generating sets.

4.7.4 Water supply

Because of the density of the hydrographic network and the very abundant rainfall in the region, surface water supplies are virtually unlimited.

As to the availability of groundwaters, information obtained from the Ministry of Energy and Water Supplies, and from enterprises operating in the State, indicate that water tables are present throughout the area.

In particular, water with good potability at origin can be tapped at 60 m down in the northern strip and at 300 m in the southern strip. The water table has often artesian characteristics and rises in the wells up to about 30 m from ground level. In the southern strip, a more shallow water table is present at a depth of 30 m, but the water is not potable and is, at times, more or less salty.

The wells are drilled, have a diameter of about 250 mm, and are equipped with submerged electrically-driven pumps.

Piped water is only available in the larger centres. Elsewhere water is distributed from a few fountains.

4.7.5 Availability of infrastructures

The conclusions regarding the availability of infrastructures in the proposed site of the selected agro-industrial complex are satisfactory, with the exception of power supply.

In fact, even if the programmes will be 100% implemented, the power supply in Rivers State as in other States of the Federation is one of the biggest problems for the industrialization of the country. At present any industrial unit with high electricity demand needs, to ensure its operations, to install its own electricity generators.

The selected complex is in this respect a high consuming unit, its installed power is 3,355 kVA while the simultaneously absorbed power can be estimated at 2,500-2,600 kVA.

This is due to the co-presence of various electricity consuming sectors at the same time, and to some working continuosly (e.g. hatchery plant).

So far, the installation of 7 generators has been planned to meet the above-mentioned needs; their maintenance and repairs require additional installed power to ensure the working capacity of the complex.

It must be pointed out that the installation of the generators will increase the investment costs by ₦ 930,000 (about 10% of the total equipment cost - Annex 4 - Table 4) and thus also the operating costs (Annex 4 Table 20).

4.8 THE MARKET SITUATION

The market situation for the products of the selected agro-industrial complex is extremely favourable both at Rivers State level and at National level. This judgement is not confined only to the short -- medium term, but covers also the long term. In other words, the situation created by the Economic Stabilisation Measures (1982-83) seems a long-term approach to the Nigerian economy. The detailed market situation for poultry meat and eggs contained in Annex 3, and the E.S.M. reported in paragraph 4.2.4, of this Report show a very favourable situation towards local production. Poultry meat and eggs are either forbidden to be imported or imported under licence with a high rate of duty. The slow, difficult and costly concession of import licences gives to the local production a protection that is even more effective than simple economic convenience versus internal production. In fact, once the import licence has been released, the very difficult operation starts of covering of the foreign currency that the imports involve. The operators dealing with Nigeria are aware of this difficulty which arises from the Nigerian financial situation related to the oil market.

This situation, which it is hoped will be solved as soon as possible, will not change - it seems - the Government's attitude regarding consumer goods imports, as stated in the above-mentioned paragraph. So there is a great economic and market opportunity to produce poultry meat and eggs locally.

Poultry meat imports which in 1979 (^) could be estimated at about ₦ 10 million, 1982 were estimated at 10-12 times more.

While growing in economic development, the Nigerian market is increasing the demand for food products with higher value added; this is the case of the poultry meat market, where an increasing demand for poultry meat instead of live birds has been observed.

Even in the local markets, the demand for live birds is continuously decreasing, showing by this the usual demand trend experienced by economically growing countries where women are involved more and more with jobs outside the family.

In Rivers State the demand for poultry meat (preferably fresh rather than chilled or frozen) has been evaluated at about 190-220,000 broilers / week (Annex 3 - 1.4.7.); so that the selected agro-industrial complex (producing an average of 80,000 broilers/week) will enjoy a sure market of about 36-42%.

This is why one of most important choices was the slaughterhouse installation in the selected complex; this will be the only one existing in Rivers State and will be the means to enter into the modern poultry meat market sector.

The very favourable acceptance, by the commercial officers of the most important department stores of Port Harcourt, of the selected agro industrial complex project will ensure the right channels for marketing the production. If the above market situation is extended to the neighbouring States, that will mean more favourable conditions in terms of demand; it must be pointed out that at the moment there is not any project similar to the selected one in the other States (Imo, Bendel, Cross River), especially with regard to the processing plant installation.

Last, but no less important, is the price factor of the poultry meat. While poultry meat is the cheapest meat on the Nigerian market, it should be considered that the E.S.M. will - on the other hand - lead to an increase of the import price and consequently of the consumers' price.

(^) Nigeria Trade Summary - December 1979 - Federal Office of Statistics Lagos Nigeria.

The suggested price for the economic evaluation of the selected complex (Annex 4 - Table 23) has been chosen as the same practised today, in line with the objective of the Green Revolution.

This can be done only if an increasing production can be supplied to the market, thus avoiding speculative operations.

The market share of the selected complex of egg production is estimated to be about 60-70% of the existing demand (weekly production of 210,000 eggs against a weekly demand of 300-350,000 eggs - Annex 3 para 1.4.7). This market share is very consistent with the present demand estimate (3.75 eggs/inhabitant/year); but since eggs are the cheapest, and thus the most readily available protein source, for the Rivers State population, the demand is expected to expand greatly.

4.9 AVAILABILITY OF SUPPORTING INDUSTRIES

Annex 3-paras.4.1,4.2,4.3, gives a picture of the availability of supporting industries for the selected agro-industrial complex. The support consists both in goods and services; among the first can be mentioned chemicals, plastic products, cardboard products, fuels and lubricants, spare parts, clothes, shoes, etc., while among the second the maintenance of civil works and equipments.

As is well known, Port Harcourt and its hinterland can be considered one of the most industrially and commercially developed areas of Nigeria. In this respect, a supporting industry producing entirely local products, assembling or utilizing semi-processed imported products is already available. The presence of the great commercial port and the various products unloaded, transported, processed, and stored can give a direct picture of the potential capacity of the local industries.

4.10 IMPORT SUBSTITUTION POTENTIAL

The import substitution potential of the selected agro-industrial complex can be measured by its annual production of about 6,000 ton -

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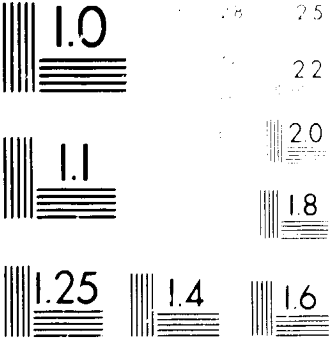
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nes of poultry meat and 11 million eggs (^). In terms of value the above production is worth about ₦ 30 million (Annex 4 - Table 23). From this gross value is subtracted the annual import expenditure of the 1-day-old chick broiler parents (Annex 4 - Table 20); 28% of the imported ingredients of the poultry feedstuffs (Annex 4 - Tab.16 and para 1.3.1.3); vehicles (Annex 4 - Table 8); maintenance (Annex 4 - Table 21) other consumable materials (Annex 4 - Table 20).

The estimated net import substitution potential is about ₦ 26 million, of which the significance is very marked.

4.11 POLLUTION CHARACTERISTICS AND EFFECT ON ECOLOGY

The selected agro-industry complex is, in this respect a veritable model. In fact a waste-water treatment plant has been designed to process the various liquid effluents coming from the broiler and layer installations, the slaughterhouse and the by-product processing plant (Annex 5 - para. 4.4.2.4 and Annex 6).

The treated water can be considered, after passing through the processing system suggested, completely unpolluted.

Solid waste, in this case poultry manure, is delivered free to the farmers as an excellent fertilizer to grow fruit and vegetables.

4.12 POTENTIAL PROFITABILITY TO INVESTORS

The potential profitability of the selected agro-industrial complex to the investors derives from the economic and financial analysis set forth in Annex 4.

(^) Table eggs are not at present imported; they are included in the calculation as a substitute protein source for that currently imported.

The selected complex will have a financial internal rate of re - turn of 25.2% and a cumulative cash flow before taxation of ₦ 41.3 million.

The analysis has been conducted according to the present Niger - ian legal regulation regarding encouragement (^) of agro-based enterprises and to market conditions.

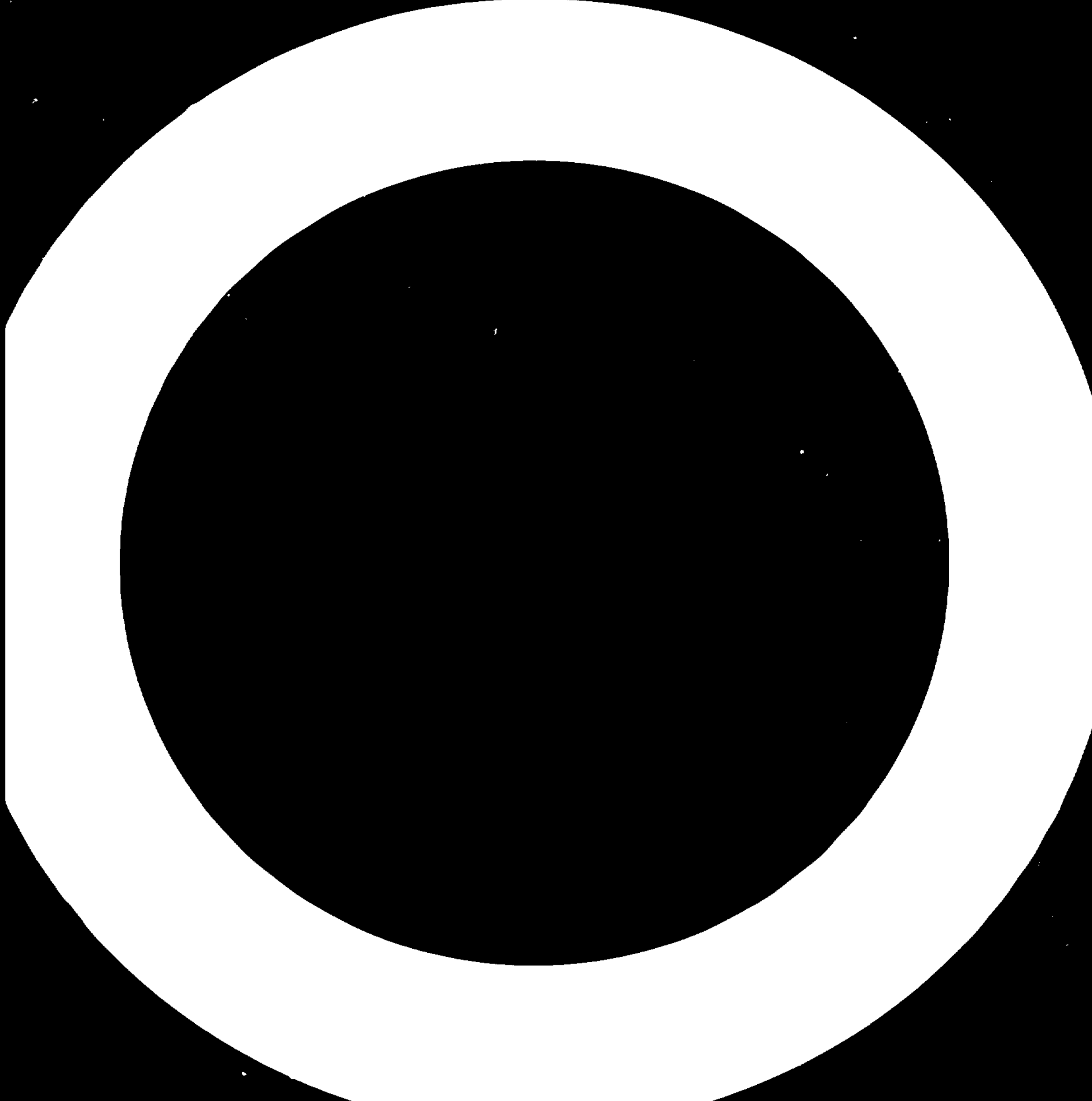
The project has shown an attractive potential profitability to investors.

Investors could be either para-state organizations, development agencies or private individuals.

During our survey in Rivers State, it was pointed out that there would be a certain difficulty in acquiring enough land for this kind of project. The present land-tenure system and communal regulations have proved in some case to be an obstacle to obtaining the land for establishing an agro-based industrial project. In the case of the selected complex, an area of about 30 ha is required to fully satisfy the desease-control requirements of the birds. It is for this reason that implementation by a Government Agency has been emphasized and, in particular, by the Niger Delta Basin Development Authority. This Agency (Annex 1 -Chap.5) has already acquired enough land in Omoko to cater for a poultry development project.

If this option could be taken up, further implications can be studied. In other words, while the major objective of the complex will be the maximization of supply rather than profit, a new, different approach towards its partners (local industries, maize - cassava producing farmers, poultry farmers) can be adopted. To sum up, one of the most important could be extra money as an incentive price per unit of product to be given to the maize-cassava producing farmers to increase their interest to supply the complex.

(^) see 2.1.2 of this Report.



5. EXISTING AGRO-INDUSTRIES INTEGRATED WITH THE SELECTED AGRO-INDUSTRIAL COMPLEX

The existing agro-industries in Rivers State integrated with the selected agro-industrial complex are as follows :

a) RIVOC - Rivers State Vegetable Oil Company

b) RISONPALM - Rivers State Oil Palm Development Company

c) Port Harcourt Flour Mill

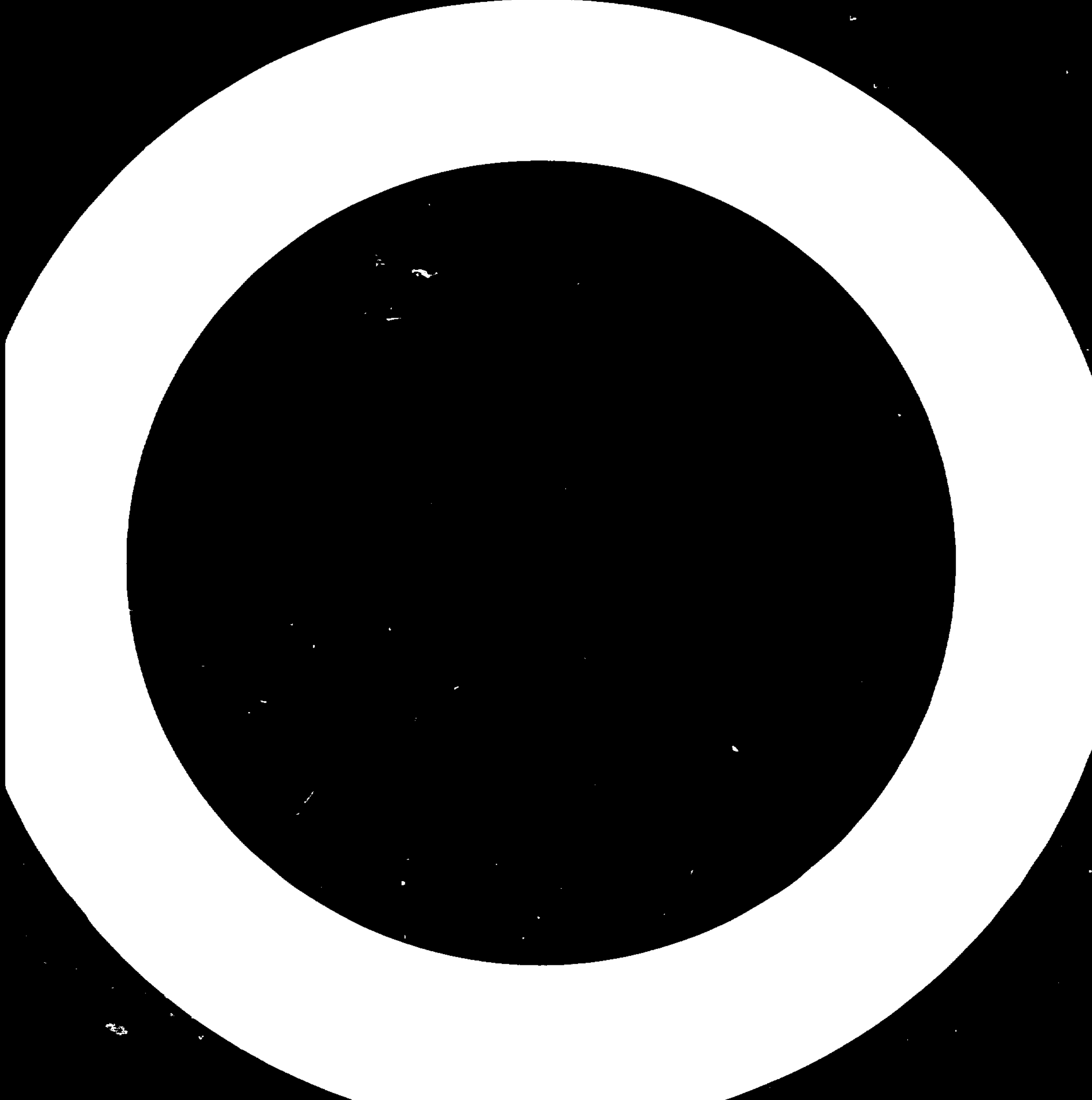
d) Pabod Brewery

The main purpose of their integration with the selected complex is the supply they can provide of raw material for the preparation of the poultry feedstuff formula.

As to RIVOC and RISONPALM, references regarding their location, production and suggested integrations with the complex can be found in Annex 2 Ch.1, 2 and para 4.1, and Annex 4 para 4.3.2, 4.3.3. The two industries are supposed to supply palm oil, palm kernel oil, and pelletted palm kernel cake to the complex on an average yearly basis of about 2,800 tonnes.

Port Harcourt Flour Mill (Annex 4 - 4.3.1) is supposed to supply the complex with about 2,500 tonnes per year. Pabod Brewery (Annex 4 - para 4.3.4) is expected to supply the complex with an average yearly quantity of 200-300 tonnes.

All the above mentioned industries are totally or partially owned by Rivers State Government; their representatives in the suggested management organization of the complex (Annex 4 -para 4.5) will ensure the necessary integration between the complex and the existing agro-industries of Rivers State.



6. RECOMMENDATION FOR PROJECT IMPLEMENTATION

6.1 THE GLOBAL APPROACH AND ACTIONS

Taken as a whole, the information and technical and economic data on the selected agro-industrial complex highlight the fact that its implementation will be beneficial at all levels. Nevertheless, like other similar projects in Nigeria and in other countries, when it has been effectively completed it might not give the hoped-for results. Reflections on this subject bring to light that in the approach to implementation, an over estimate is often made of the technical aspects, together with an under-estimate of the importance of having a proper strategy to ensure the success of the projects themselves.

Such an approach should be revised, or at least modified, in the sense of working a priori on the lines of a strategy likely to ensure the best and most rational conditions for the development of the projects. In Nigeria, in general, and in Rivers State in particular, there is a clear feeling that the technical problems are and can be easily solved, whereas the organizational problems are more complicated. Their complex nature does not stem so much from the nature of the problems as from the type of approach with which they are tackled. In fact, in a society in rapid growth, emphasis should be laid on the attitude of resolving the problems case by case as and when they arise.

A global strategic approach is necessary that, although with possible omissions, will tackle the problems upstream and before they arise.

To turn back to the main concept, it is thought advisable to indicate the following actions :

a) Land availability : This is one of the main problems existing in Nigeria today for the implementation of projects. It must, then, be faced together with the local populations, the immediate and future advantages of the implementation of the project being pointed out and stressed to them. The NDBDA has the necessary area for setting up the poultry farm available; however, an action to involve the local populations would facilitate both the clearing operations and the erection of the complex.

b) Infrastructures: The enclosed map show the present and programmed road network, the electricity supply network, the natural gas distribution network, etc. It is considered indispensable that parts of these programmes should be implemented as soon as possible in the Project Area. Some services, such as, for example, the telephone system, the main sewage network, etc. should be applied for long in advance to the competent organizations (L.G.A., the Nigerian Telephone Company, etc.) so that they may have time to programme their own operations.

c) Informing and involving the specific institutions at Federal and State levels together with the relative agencies: The implementation of the selected agro-industrial complex directly involves most of the administrative institutions at Federal and State levels and within the Local Government Area. To these must be added the Federal and State Agencies competent for specific sectors such as, for example, the poultry sector, the animal feeds sector, the cassava production sector, etc.

d) Involvement of the local industries : The need to programme the purchases leads to the involvement of the local industries as suppliers of raw materials for the selected complex. In view of the purchase, for example, of day-old chicks, it is necessary to provide the producers with detailed plans so that they can programme production. The same should apply also for the purchases of palm kernel cake, wheat offals, etc.

e) Contacts with and selecting of farmers' co-operatives and/or farmers' councils: Contacts to be made in the approach and implementation phases of the complex with the co-operative organizations seem indispensable. Naturally, priority should be given to the organizations geographically near the centre but sufficiently distant to ensure a barrier exists against the spreading of poultry deseases. In this case, also, programming at Centre level (day-old chick distribution circuits, feedstuffs , collection of broilers, and technical assistance) and at Co-operative level (selection of members, construction and adaptation of breeding structures, etc.) would bring certain benefits.

f) Contacts with and selection of farmers' co-operatives for the supply of agricultural raw material - feed-mills : The predetermination of purchase contracts with the co-operatives for the production of maize, cassava, rice straw, rice bran, etc. will constitute one of the strong points in the management of the Centre.

g) Contacts with the local industries for the production of various materials for the complex : Since the quantities and the quality of the various materials, such as, for example, chemicals, packing materials, gas oil, petrol, overalls, shoes, etc., are known, many and often long term contacts are necessary to draw up programmed purchase contracts with the local factories and/or traders. Some materials are often unobtainable on the local market, so that it is necessary to plan for their programmed introduction from other States in Nigeria or from abroad. In the event of these not being obtainable at all, it will be necessary to arrange, in the complex implementation phase, for appropriate variations in the plants or of specific cycles. For still others (plastic containers, packing material in cardboard or similar), the factories will have to be provided long in advance with detailed characteristics so as to plan production.

h) Contacts with banks and credit institutions of promotional type in favour of the farmers and co-operatives : All the possibilities should be explored to ensure that the Centre mav receive directly - with suitable controls by the banks and other credit institutions - the advances foreseen for the farmers by the legislation in force. This possibility, to be carried out with the control of the co-operative organizations, could solve both the access to credit by the farmers and the more rapid expansion of the activities of the complex.

i) Activate the suitable channels to obtain the import licences for the materials required by the Complex : So that the Centre can depend for its operation - even if in minimum part - on materials coming from abroad, it is considered necessary to go ahead with contacts with the administrative institutions responsible to facilitate the granting of the necessary licences and the rapid clearing of the goods through customs (both at the port and airport of Port Harcourt).

j) Contacts with Community Boards : These contacts may prove essential for the supply of raw material and, in particular, products for the feed - mill. Among the Community Boards is the Nigerian Grains Board whose policy of developing cereal production could have a favourable effect on the supply of maize for the Complex (Annex 3. 5.1).

k) Contacts with clients : The temporal programming of the sales and the advanced choice of clients will permit a correct approach to be made to marketing the products (packing, brand names, etc.). Whenever possible, the importance is stressed on marketing the product under its own registered brand name.

6.2 THE STRUCTURE TO CARRY OUT PROJECT IMPLEMENTATION

The long, but, however, incomplete, list of points set out above has one principle in common, namely, that of programming well in advance all the actions that will directly or indirectly influence the implementation and management of the complex.

Some of these actions should be conducted in advance of the time of implementation with the aim of avoiding additional costs for plant and /or management. The early programmed setting up of the NEPA electricity supply network in the Project Area could reduce the number and power of the generators provided for in the project.

The programming operations envisaged, taken as a whole, naturally require an operational structure. It is for this reason that, within the context of the operating costs of the project, the personnel engaged on general services have been included from the first year (seen Annex 4).

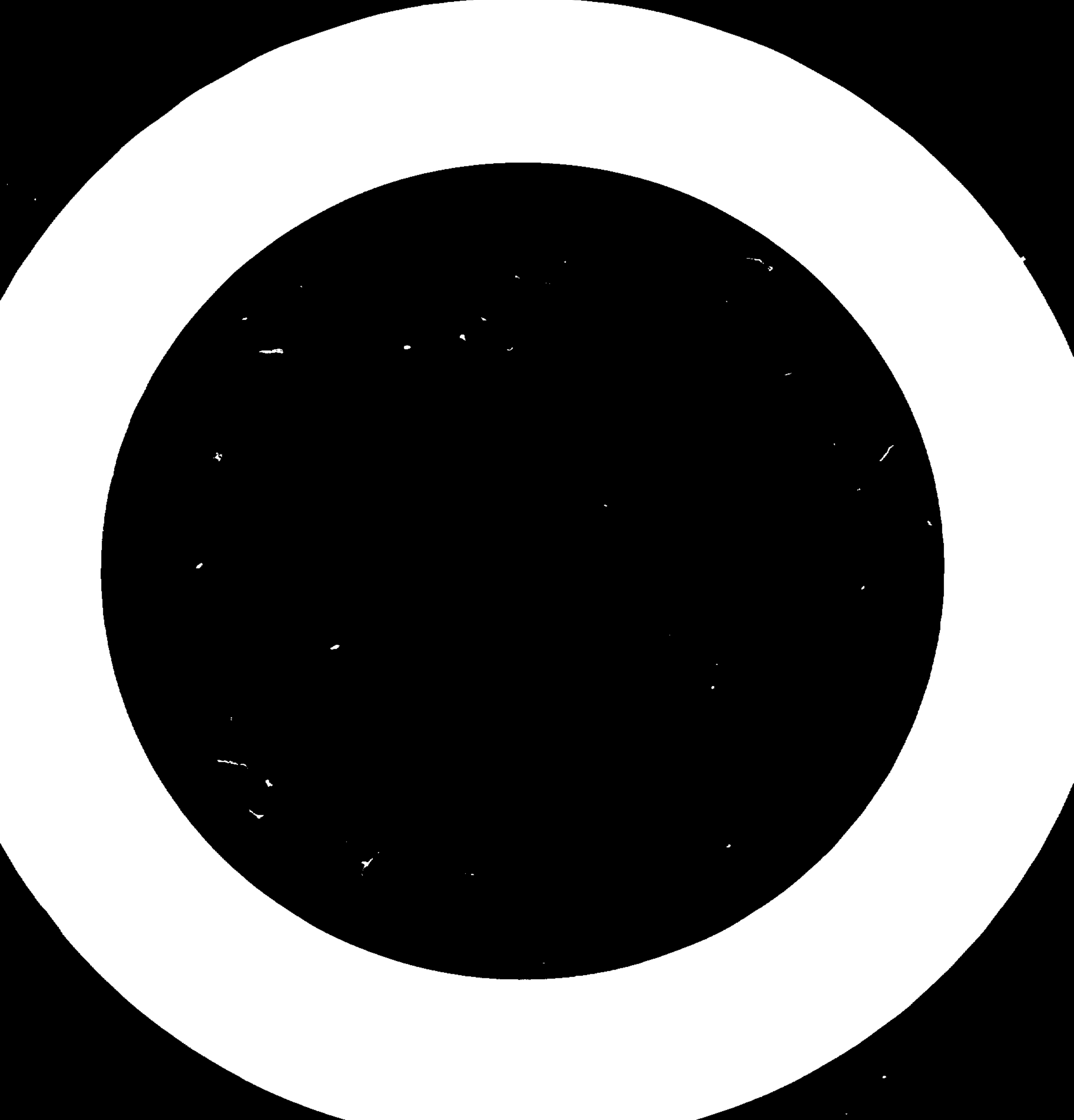
Since it is a question of personnel who will have to work in contact with institutions, industries, co-operative organizations, super - markets, etc., it is considered that the offices of the Complex could be provisionally located at Port Harcourt (Ministry of Trade and Industry - N.D.B.D.A.).

7. SUGGESTION FOR THE APPLICATION OF GOVERNMENT POLICIES, LEGISLATION, TAXATION AND INFRASTRUCTURE ON FOOD PROCESSING INDUSTRIES

The review of Nigerian industrial policy and specifically the incentives for agro-based industries contained in paragraph 4.2.4 are very well formulated and cover the most important field of industrial activity (e.g. accelerated depreciation of Capital Investment, infrastructural facilities, taxation relief, etc.). Foreign investors, in the specific sector of agro-based industries, are openly attracted : the agro-based industries sector has been transferred from Schedule II to III of the Nigerian Enterprises Promotion Act, which means that foreigners can now own up to 60 per cent of the equity. The recent Economic Stabilization Measures give in addition a kind of protection to local industries whereas in the past they suffered unlimited keen competition from similar imported products. In other words, all the legal instruments to incentivate the establishment of agro-based industries have been put in place; industrial development agencies have been organized; credit facilities and specific credit institutions established.

The Nigerian policy toward the establishment of agro-industries is one of must advanced and comprehensive in Africa.

The suggestions are, then, more practical then conceptual : the rapid release of import licences, the effective realization of infrastructures, the improvement of power distribution and its regular supply. What is needed is a punctual application of the existing regulations.



8. SELECTION OF AGRO-BASED INDUSTRIES TO BE IMPLEMENTED AT MEDIUM-LONG TERM AND RELATED STUDY ACTIVITIES

8.1 INTRODUCTION

Annex 1 (Agricultural Industry in Rivers State) and Annex 2(Palm Oil Industry in Rivers State) give an exhaustive review of the whole of the present agricultural situation according to the programmes implemented or to be implemented by the various Institutions and Agencies operating in Rivers State presumably in the short -medium- and long-term .

The selection of agro-based industries for further studies in Rivers State has been based on this review,which will be summarized below.

a) Maize : Over the next five years the cultivation of an additional 12,500-20,000 hectares have been planned. Evaluated in terms of grains (part will be allocated to human consumption at the green stage) this means some 38,000-60,000 tonnes. The selected agro-industrial complex and the existing Rivers State feed-mill industry will absorb all the surplus production left by human consumption.

b) Cassava :An additional 14-22,000hectares in the next five years have been foreseen - in relation to the peculiar agricultural specialization in Rivers State.
In terms of production, an additional 114,000-174,000 tonnes of tubers is foreseen.

c) Rice : Programmes for expansion of rice cultivation are of the order of 12,000 hectares in the next five years. Paddy production will be in the order of 30,000 tonnes.

d) Palm Oil : Planting and replanting programmes up to 1985 foresee 4,000 hectares in Ubima, and almost 10,000 hectares in the next ten years.

e) Raphia Palm : Is is estimated that the Raphia Palm grows wild in an area of about 350,000 hectares in the riverine zone of Rivers State.

f) Cocoa : Production has declined considerably in this last decade. At the moment production can be considered negligible. Existing programmes will not reverse the situation.

g) Coconuts : The area under plantation has shrunk down to only a few hectares in the Bonni area. The present programmes will not have any significant impact on production.

h) Other crops : Citrus fruit, avocado, mango, paw paw, sugar cane, guava, egg-plants and vegetable are of a little importance in Rivers State. Production is negligible; expansion programmes will keep production at fresh consumption level.

8.2 THE SELECTED AGRO-BASED INDUSTRIES

The following are, according to the survey conducted in Rivers State, the priority industries in which further investigations can be conducted, especially with regard to their feasibility. In general it is suggested to orient the studies in the direction of medium-small scale plants with an intermediate technology, and preferably located in rural areas. The Centre for Industrial Development of the Federal Ministry of Industry, recently established in Port Harcourt, can give, at full operational activity, great support for the following suggested studies.

Valuable help can be also given by the small scale industry development programme drawn up in co-operation between UNESCO and Rivers State University of Science and Technology.

The studies, will help to co-ordinate the various programmes and initiatives taken by the different developing institutions and agencies.

8.2.1 Cassava processing plants

At present there is no cassava processing plant in Rivers State. Garry production is enterely obtained by artisanal methods. All processing operations are done by hand with some exceptions regarding the phase when the tubers are grated into a pulp with a motor-driven rasping drum.

Programmes regarding garri production are included in the developing functions of the N.D.B.D.A. (Annex 1 - 5.2.2.), whilst the L.G.A. programmes foresee the installation of motor-driven rapsing drums in some villages (^).

Before entering into the subject of further studies regarding cassava processing, we believe it is very important to write some lines about the National Root Crops Production Co. Ltd. (N.R.C.C.), a Federal Agency which was visited by the IFAGRARIA team at its headquarters in Enugu.

The N.R.C.C. owns factories of which 4 in operation and 5 under construction. The former are located in Anambra, Imo, Cross River, Bendel States, the latter in Benue, Imo, Cross River and Oyo States. All the factories have their own farm ranging from 100-1,000 hectares.

The equipments installed in the factories are of two types : I.T.F. (Improved Traditional Factory) or I.B.F. (Industrial Brasilian Factory).

The I.T.F. has a working capacity of 1.2 tonnes/day/8 hours/single shift while the I.B.F. has a working capacity of 3.0 tonnes/day/8 hours /single shift. The I.T.F. equipment is locally made.

Their products range from the standard garri to cassavita (^^) and vitafufu (^^). The average rate of convertion of cassava into garri is 4 to 1. According to the N.R.C.C. officer the main constraint to the development of the company's activity is the difficulty of acquiring sufficient land for cassava cultivation; this is why at the moment N.R.C.C. officer is not present in Rivers State.

The further studies in this field have to start by ensuring the raw material to the factories. The following is a suggested chronogram of activities (Fig. 4) for a feasibility study for cassava processing both for garri or chips production in Rivers State.

(^) Local Government Programme - Allocation 1981-85 : ₦ 700,000.
Rivers State Programme for the F.N.D.P. 1981-85 - Ministry of Economic Development and Planning - Rivers State - Port Harcourt.

(^^) blended with cereals

CHRONOGRAM OF STUDY ACTIVITY ON CASSAVA PROCESSING

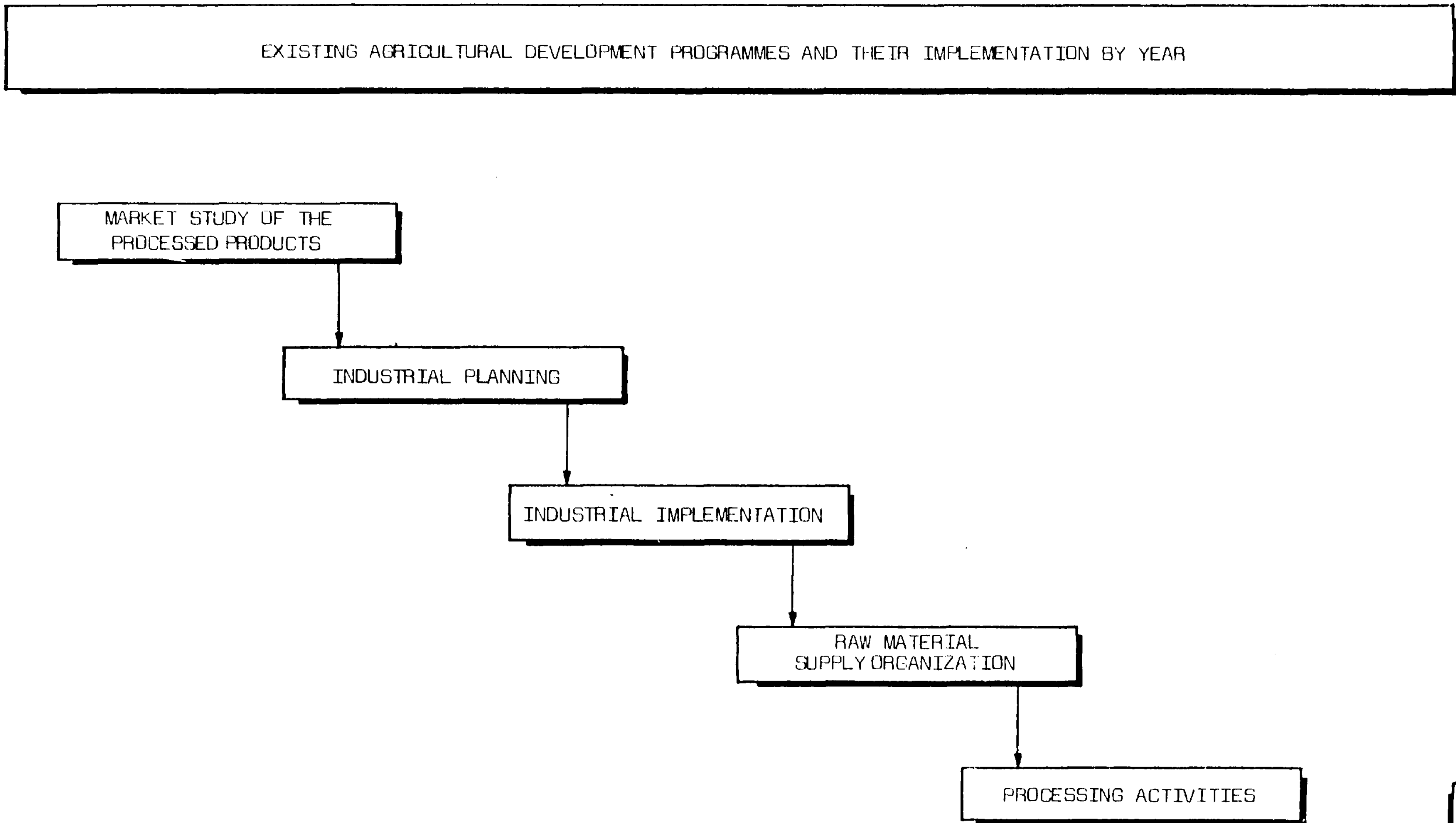


Fig. 3

8.2.2 Paddy and rice processing

The expected additional paddy production of about 30,000(Annex 1 - Table 21) tonne will require an exhaustive feasibility study to give to the Rivers State rice mill industry an economic and viable asset.

In fact,not only is it necessary to adopt a State strategy regarding the rice mill industry but ,it is also, necessary to investigate the new rice processing systems able to give a larger value added to the local production.

This consideration is linked with the present market situation, where the imported rice is gaining the consumers' preference and with the necessity to utilize the "by-products" of the rice mill and especially the broken rice.

The feasibility study chronogram illustrated for cassava is pratically the same for rice: more emphasis should be given to the choice of location of rice mills and to alternative rice processing systems and technological aspects, as regards quality standardization and storage and packing.

8.2.3 Palm oil industry

Annex 2,and in particular Chapter 7 gives a complete picture of the further activities that should be taken in the palm oil industry in Rivers State. Indications are given even with two hypothesis (present and accelerated) of the implementation of palm oil plantation programmes.

In other words, a palm oil industry projection covering the various processing aspects has been made from the year 1985 to the year 1994.

The final recommendations can be summarized as following :

a) Palm oil mills (^)

- . 1.5 tonnes F.F.B./hour in 1985 (at Korokorosei)
- . 5.0 tonnes F.F.B/hour in 1987 (at Yenagoa)
- . extension of the above mills to 10.0 tonnes F.F.B./hour in 1991
- . 5.0 tonnes F.F.B./hour in 1989 (at Toru-Ebeni)
- . extension of the above mills to 10.0 tonnes F.F.B./hour in 1994.

(^) According to the present palm oil planting programmes (Annex 2 Ch.2)

b) Palm kernel milling

. palm kernel low-pressure expeller with cooker to be installed in RIVOC factory in 1985. Throughout capacity 100-150 tonnes of kernels/24 hours

c) Fractionation and refining

. refinery (100 tonnes/24 hours) in 1988/1993

. fractionation (25-75 tonnes/24 hours) 1988/1993

The above 3 points have been based on certain hyposeses and especially point c), assuming the production of palm oil surpluses and a radical change in the relative prices of locally produced palm oil and of imported palm stearine.

From this a chronogram further study activities as shown in Fig. 4. Because of the present oil palm scarcety and its high ex-factory price, the palm oil industry is very attractive. But, according to the time required by the foreseen new plantation to achieve the raw material production, the implementation activities must be foreseen at medium-long term.

8.2.4 Raphia Palm alcohol refinery

From the riverine zone of Rivers State - considered one of the largest alcohol reservoirs in the world - palm wine and "local gin" are marketed through the State and the neighbouring States. The quantity produced is unknown but it is very large and represents the veritable "cash money" of the local population.

Local gin (average prices range from ₦ 1.50 - ₦ 2.00 per liter) as raw material is delivered in Port Harcourt to a factory of the Amalgamated Distilleries of Nigeria L.T.D. partially owned by the Rivers State Government. The refining process - apart from providing a guarantee to local consumers - could be an attractive industry if the massive smuggling of imported spirits could be prevented or reduced.

In fact, the refined alcohol is blended with brandy, whisky and gin flavours and marketed as local brandy, whisky and gin.

Consumer prices (^) range between ₦ 4.50 - ₦ 6.0 a bottle containing usually 0.75 liter against an average of ₦ 11.00 for similar impor-

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(^) Departmental stores of Port Harcourt - January-February-March 1983.

CHRONOGRAM OF STUDY ACTIVITIES ON PALM OIL INDUSTRY

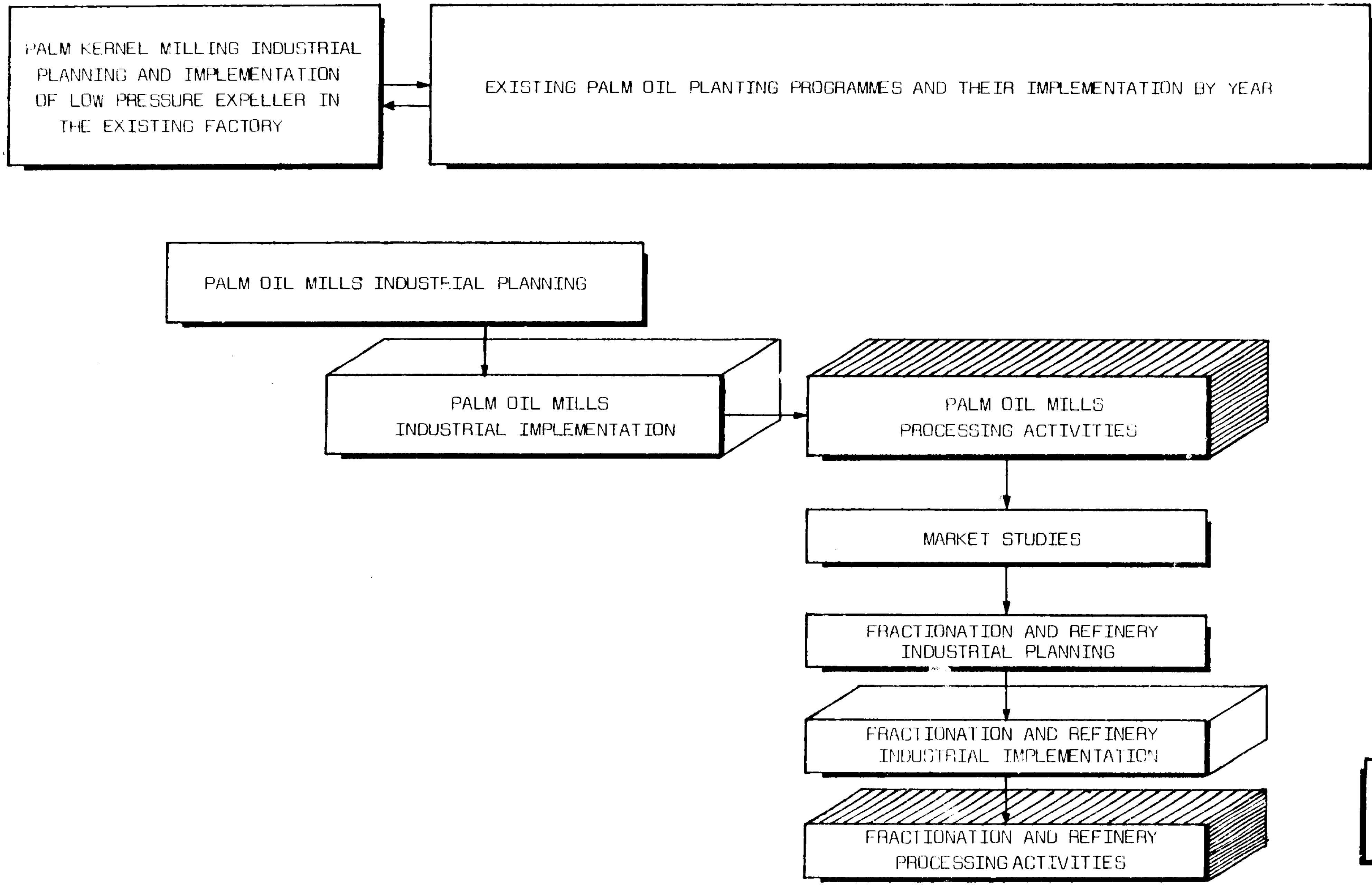

Fig. 4

ted spirits. Smuggled spirits instead can be bought in Port Harcourt from ₦ 5.0 - ₦ 7.0 the bottle of 0.75 liter.

In conclusion local gin refineries could be greatly expanded ; the regular supply (^) of local gin can be attained both with better organization or with storage facilities. The Fig. 5 gives the chronogram of the further study activities on raphia palm alcohol refining.

8.3 TERMS OF REFERENCE FOR FURTHER STUDIES

The following are the terms of reference regarding the feasibility studies to be carried out in the suggested agro-industry sector described in paras 8.2.1, 8.2.2, 8.2.3 and 8.2.4.

(1) Existing agricultural development programmes

- . location
- . type of project
- . number of hectares
- . number of farmers involved
- . annual implementation
- . human and financial resources
- . estimated output of annual products

(2) Organizational aspects

- . production collecting systems
- . proposed collecting system
- . cost of collecting systems (unit costs)

(3) Marketing and transportation

- . marketing study of the raw materials
- . marketing study of the possible finished products
- . price evaluation for the raw material
- . price evaluation of finished products
- . evaluation of the potential market of finished products
- . evaluation of the most convenient store market for the proposed factory

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(^) Scarcety occurs prior to festival days.

CHRONOGRAM OF STUDY ACTIVITIES ON RAPHIA PALM ALCOHOL REFINERY

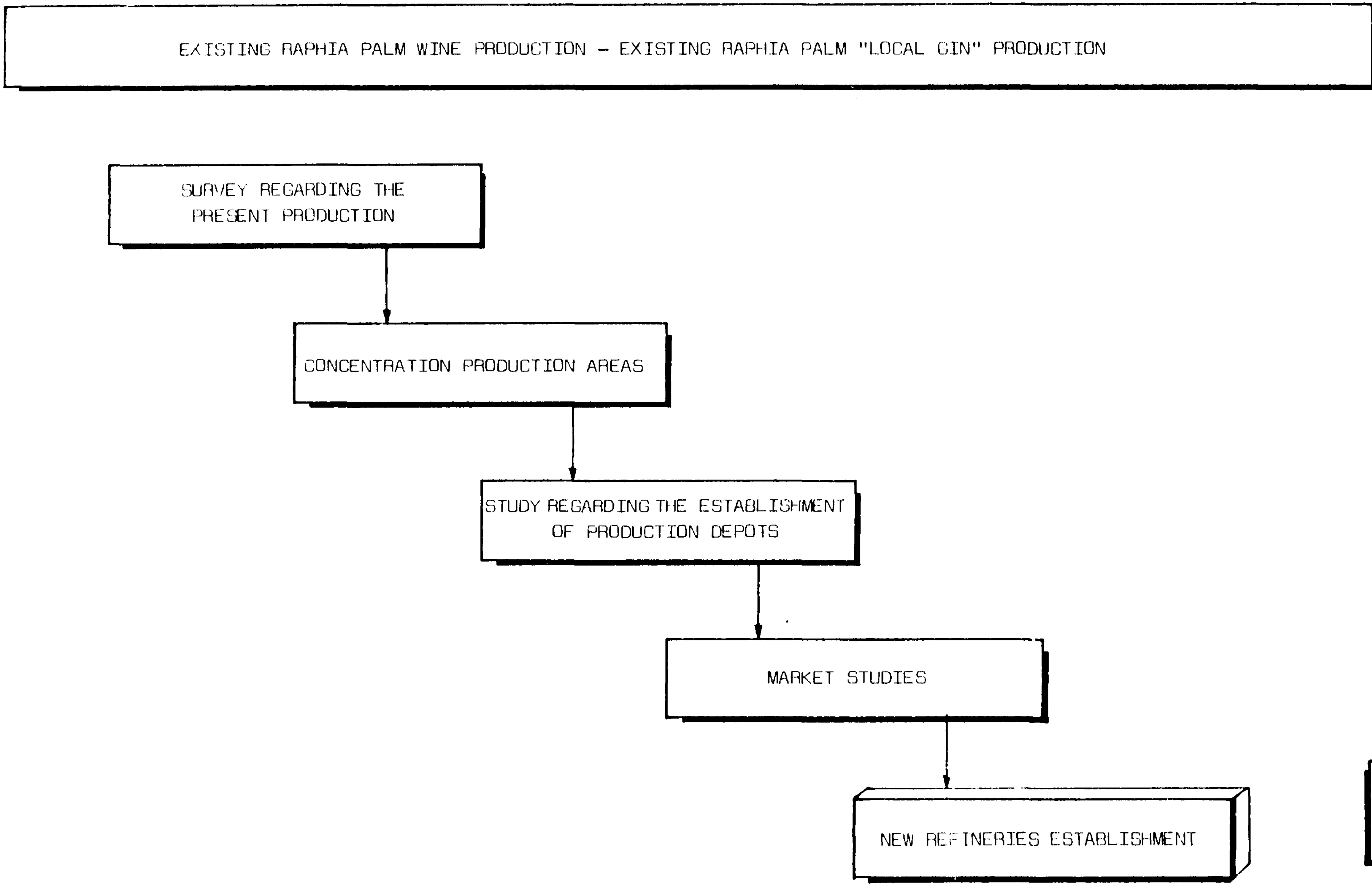


Fig. 5

. packaging of finished products
. evaluation of the major consumer centres
. suggestion regarding alternative location of the factory (distance from agricultural projects; existing infrastructures; etc.)
. transportation costs of raw material to the alternative locations
. transportation cost of finished products to the consumer centres

(4) Plant equipments

. choice of the type of technology in accordance with :
- the available raw material
- the storage capacity of raw material
- the quantity of finished products according to the target market share
- the quality of finished products according to the various consumer categories to be reached
- the availability of labour force
- the availability of supporting industries
- the reliability of the proposed equipment
- the training requirements
- the management requirements

(5) Economic evaluation of the proposed processing plant

. the economic and financial analysis will provide a final verification of the various choices and/or will determine a new agro-industrial integrated system for the selected processing plants.

9. MODEL FOR THE WHOLE AGRO-INDUSTRY COMPLEX IN RIVERS STATE

Fig. 6 shows a integrated model compiled for the whole agro-industry in Rivers State.

The model has been made by taking into account the existing agricultural production and the guidelines of agricultural development according to the present programmes and the programmes to be implemented in line with the objectives of the Federal and Rivers State policies.

The other products e.g. vegetables, cocoa, sugar cane, coconut, tree fruits, etc. have now, and will have in the future, only a limited development due to the agricultural and climate conditions of Rivers State (^).

On observing Fig. 6, it will be noticed that there are 6 main agro-industrial sectors that can be developed at present or in the medium - long term or are already developed, namely : the palm oil, cassava, maize, rice, plantain and raphia palm sectors. The flour milling, brewery and hatchery industries are related totally or partially to imports.

The agro-industry situation of Rivers State is summed up with the help of the legend: existing and considered sufficient (working capacity) in the short-medium terms; existing but to be further developed or improved at medium-long term; to be implemented at medium-long term.

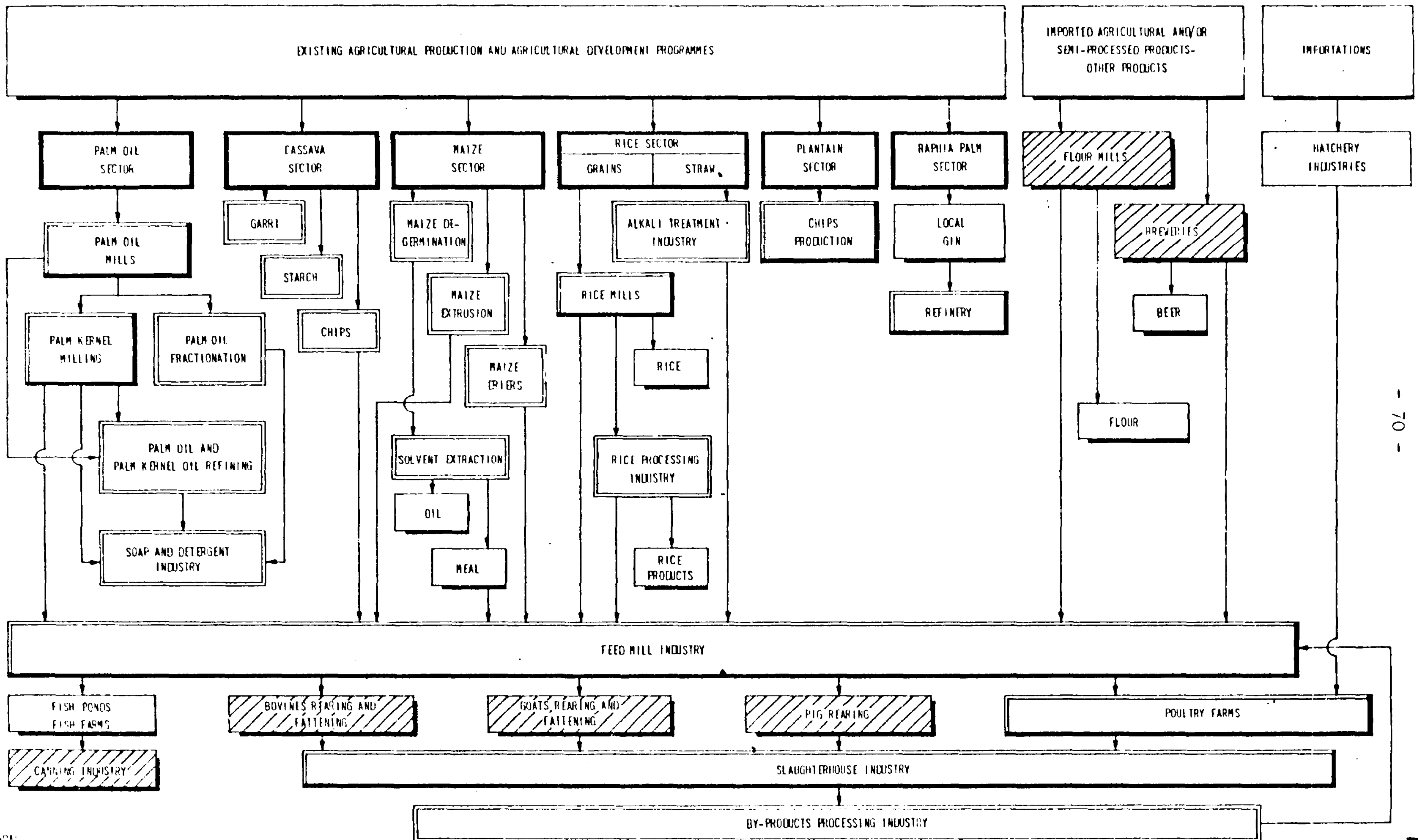
All the above agro-industrial sectors require the strengthening of the raw material production. From this raw material, through specific working processes, it will be obtained finished products and different by-products that, after all, will constitute the raw material for feedstuff productions for zootechnical purposes.

These feedstuff products are the basis for new agro-industrial activities linked with the zootechnical breeding activities, with the valorization of the related productions and with the recovery of the by-products (skins, blood, bones, etc.) for different purposes.

Therefore, the feedstuff production constitutes the barycentre of the inter-sectorial integrations.

(^) See Annex 1 - paras 1.3; 8.3.5; 8.3.6; 8.3.7; 8.4.

MODEL FOR THE WHOLE AGRO-INDUSTRY COMPLEX IN RIVERS STATE



LEGENDA:

Existing and considered sufficient (working capacity) in the short-medium term.

Existing but to be further developed or improved.

To be implemented at medium-long term.

FIG. 6

That is why the feed-mill industry occupies the central part of the model in Fig. 6.

Some combined factors present in Rivers State can sustain the proposed model :

- existing palm-kernel milling industry
- existing palm-oil milling industry
- existing maize-cassava-rice production belt and important development programmes
- flour milling industry
- the presence of the port for importing products

The need of proteins for the Nigerian population can be satisfied - except for a few existing situations in the country - with intensive breeding systems applied to all the species; so far the growth of the feed mill industry has become a strategic point for the whole agro-industry development.

Programmes regarding the development of the bovine, goat, pig and fishery sectors, without counting poultry, are already being studied or implemented in Rivers State (Annex 1 - para 5.8); their viability depends only on providing the most economic feed formula.

The selected agro-industry complex (poultry farm) has been chosen within the context of this model : it is a nucleus in which the guidelines of the present model have already been applied.

The above model implies, in short, a kind of specialization of the agro-industry : Rivers State can become a supplier of feedstuffs to the neighbouring States utilizing its own agricultural production and the favourable position conferred on it by the port.

10. CONCLUSIONS

The "Integrated Food Industry Complex" study in Rivers State has high lighted the following :

- one of the basic efforts to be made for the agro-industry development should be devoted to the production of the agro-basis raw material, be - cause the raw material presently available are, more or less, already fully exploited;
- the raw material production development postpones the opportunities for urgent investments, except those for the eggs and poultry meat production sector where the demand is still largely unsatisfied, while market prices are profitable and attractive also for the future;
- the setting up of an integrated agro-industrial complex in the above sec - tor can be started immediately, so that it allows the full exploitation of existing sufficient by-products in the various local food industries (flour mill, rice mill, palm oil, breweries, cassava, etc.); at the same fine it will require the expansion, over small areas, of yearly productions (mais and cassava) easily obtainable on short term not least because these are already included in expansion programmes;
- the integrated complex will become a full part of the context of the agro-industrial development and food self-supplying objectives in the country with the resulting valorization of the local by-products for which export is rightly prohibited by the E.S.M.;
- the agro-industrial complex deeply involves the agricultural productive tissue and particularly that of the farm co-operatives; these take advantage of the value-added deriving from the processing of the raw materials partly produced by themselves, in terms of productions for the feedstuff industry and of broilers breeding for slaughtering and selling within the framework or fhe integrated agro-industrial complex organized system;
- the economic results that can rise from the integrated agro-industrial com plex (poultry farm) activities are very favourable and the project assures that the whole of the required investments will have a 25.2% internal rate of return;

. in the social frame, the project creates new integration conceptions between agriculture and industry with positive effects as regards the technological and socio cultural innovations to be applied;

. in conclusion, the project creates new sources of employment (124 new working places in the integrated complex), promotes new labour demand in the annexed sectors and stabilizes the employment in the agricultural sector (raw materials production for feedstuff and broilers breeding).

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

SECTION 1

GENERAL REPORT

RIVERS STATE - ROAD MAP

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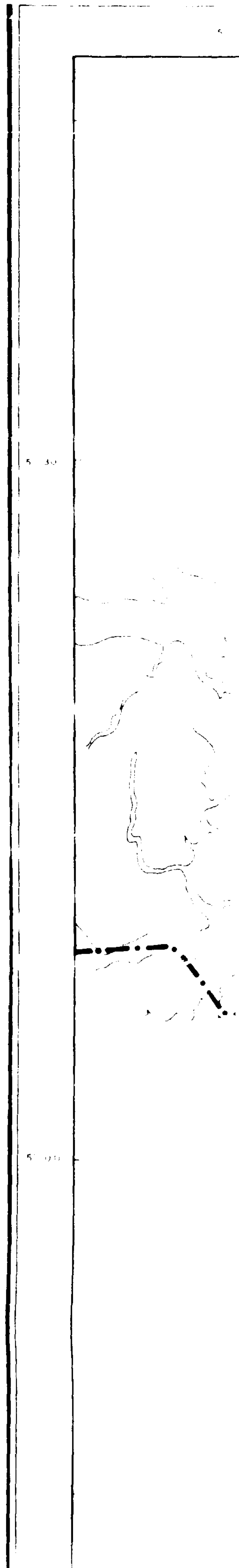
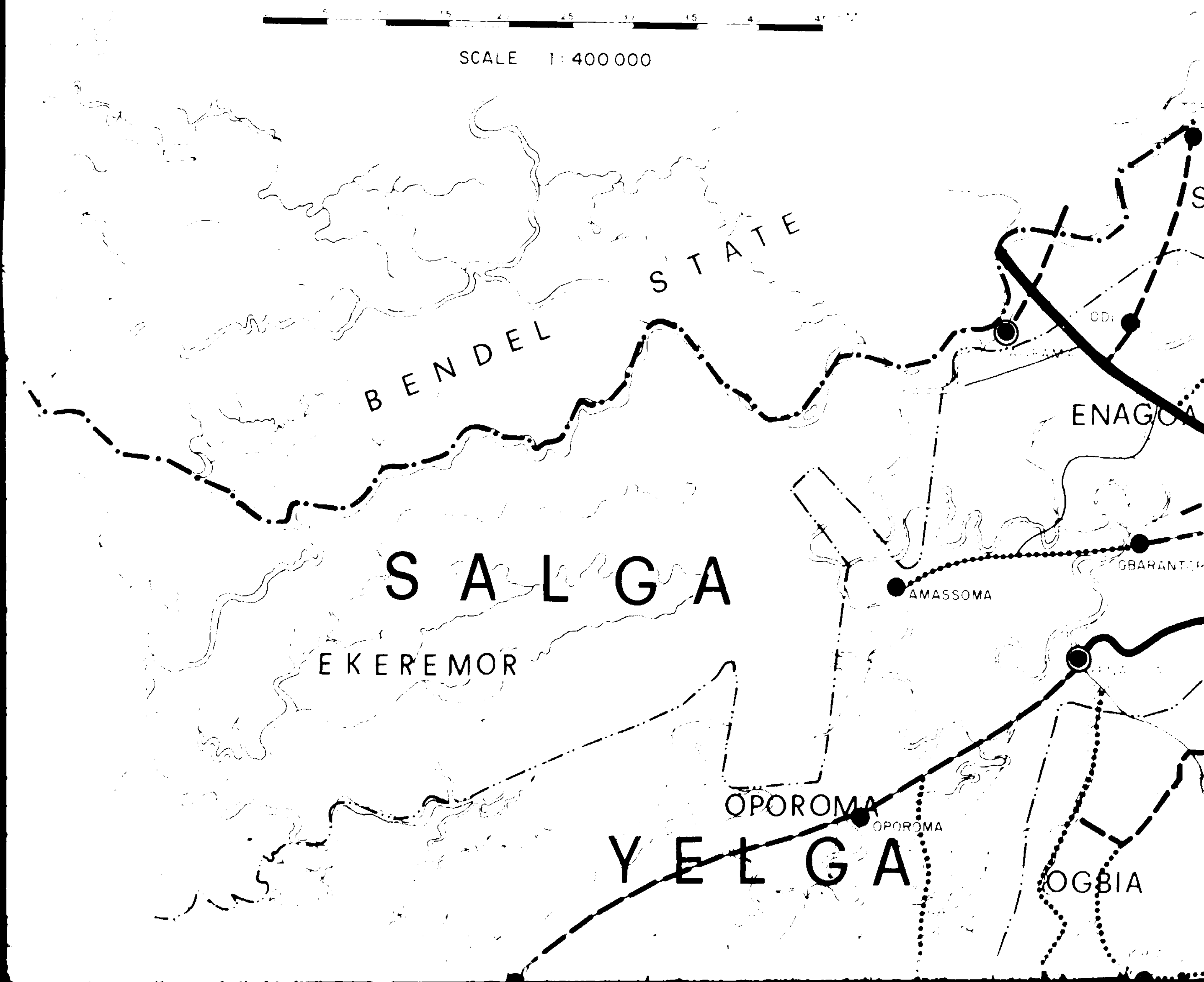
December 1983

IFAGRARIA s.p.a.
ROMA



SECTION 2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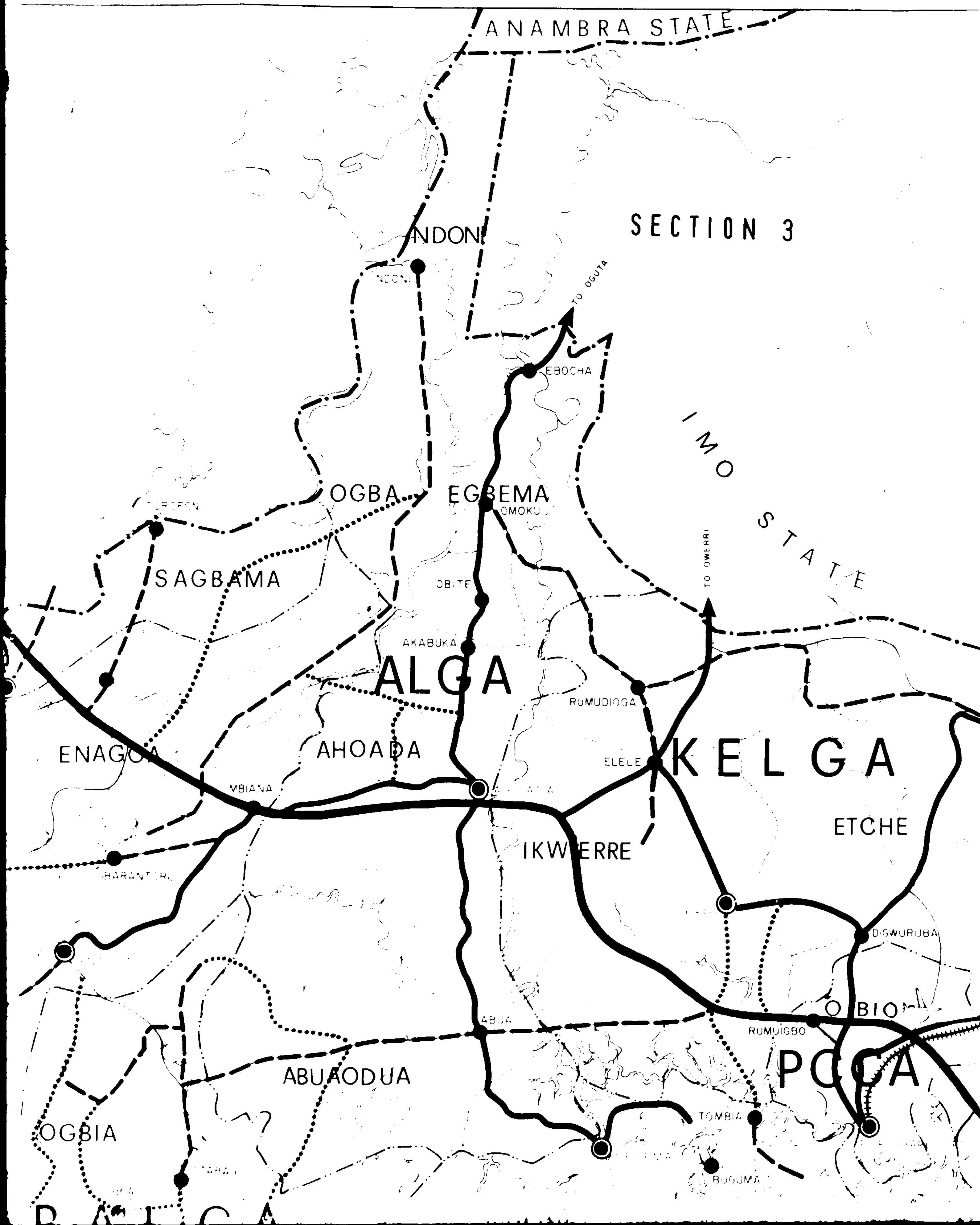
ANAMBRA STATE
SECTION 3
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IMO STATE
OGBA
EGBEMA
OMOKU
SAGBAMA
TO OWERRI
OBITE
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ALGA
RUMUDIOGA
ENAGOA
AHOADA
ELELE
KELGA
MBIANA
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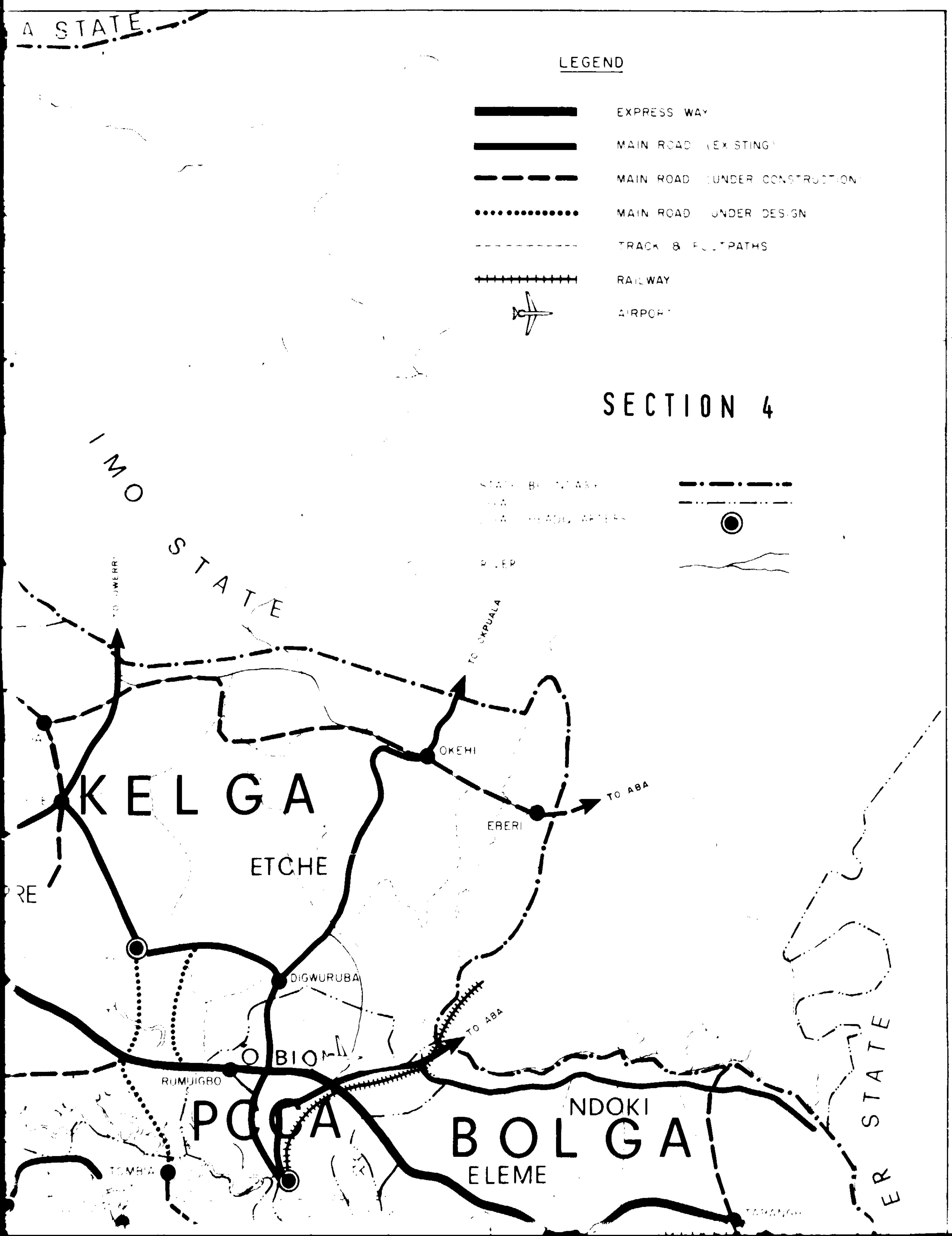
LEGEND
EXPRESS WAY
MAIN ROAD (EXISTING)
MAIN ROAD (UNDER CONSTRUCTION)
MAIN ROAD (UNDER DESIGN)
TRACK & FOOTPATHS
RAILWAY
AIRPORT
SECTION 4
A STATE
IMO STATE
TO OWERRI
TO OKPUALA
OKEHI
TO ABA
EBERI
KELGA
ETCHE
RE
DIGWURUBA
OBIO
RUMUIGBO
TO ABA
POCA
NDOKI
BOLGA
ELEME
ER STATE

GENERAL REPORT

RIVERS STATE - ROAD MAP

SCALE 1:400'000

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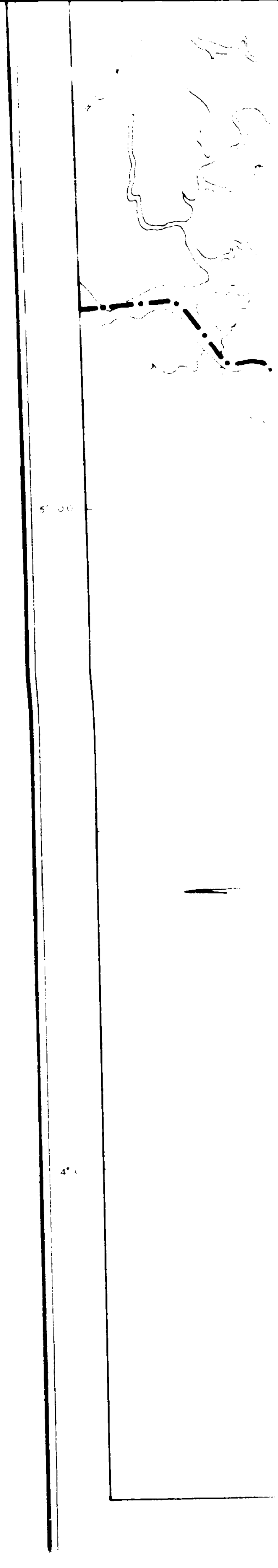
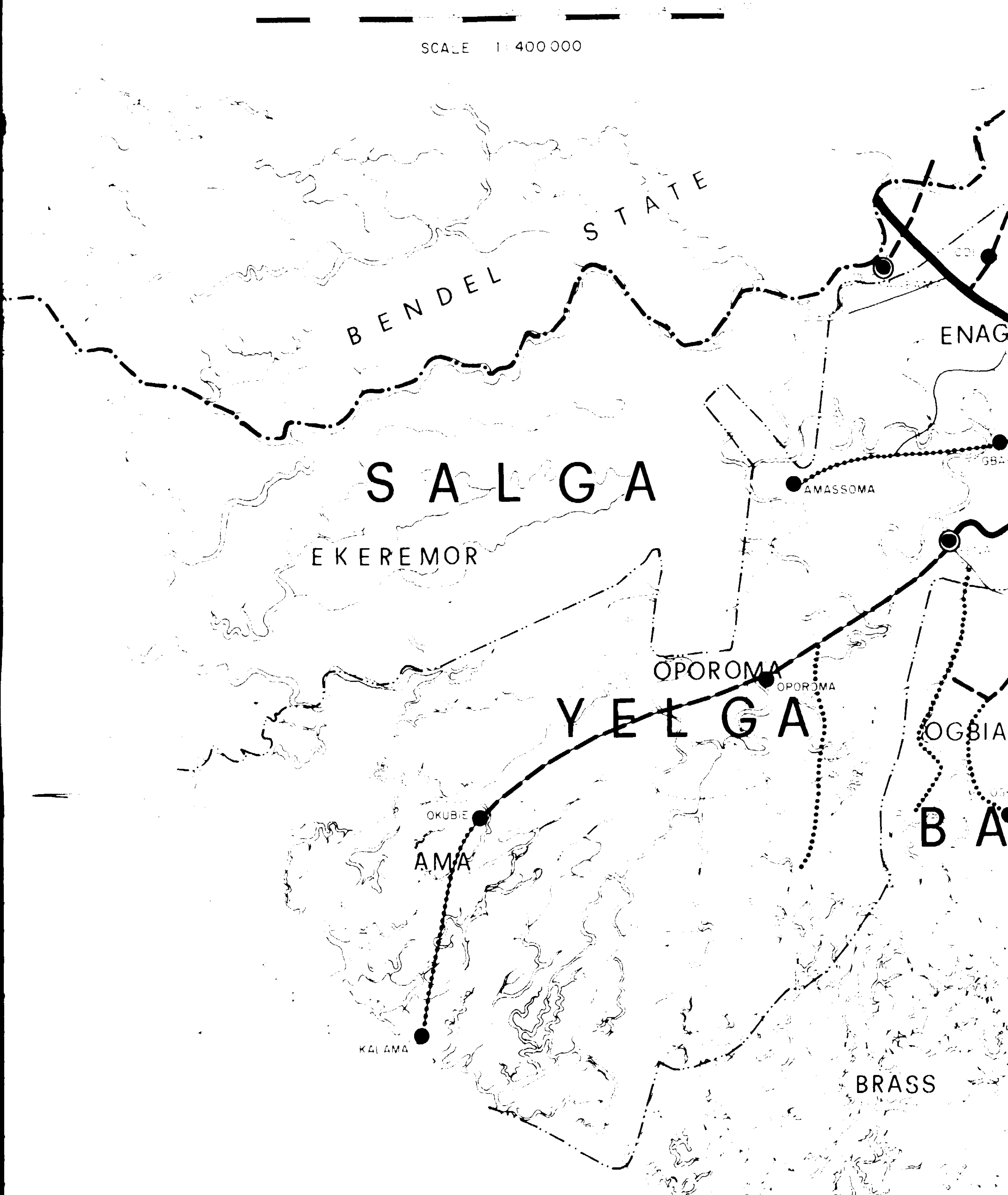
IFAGRARIA s.p.a.
ROMA

SECTION 5

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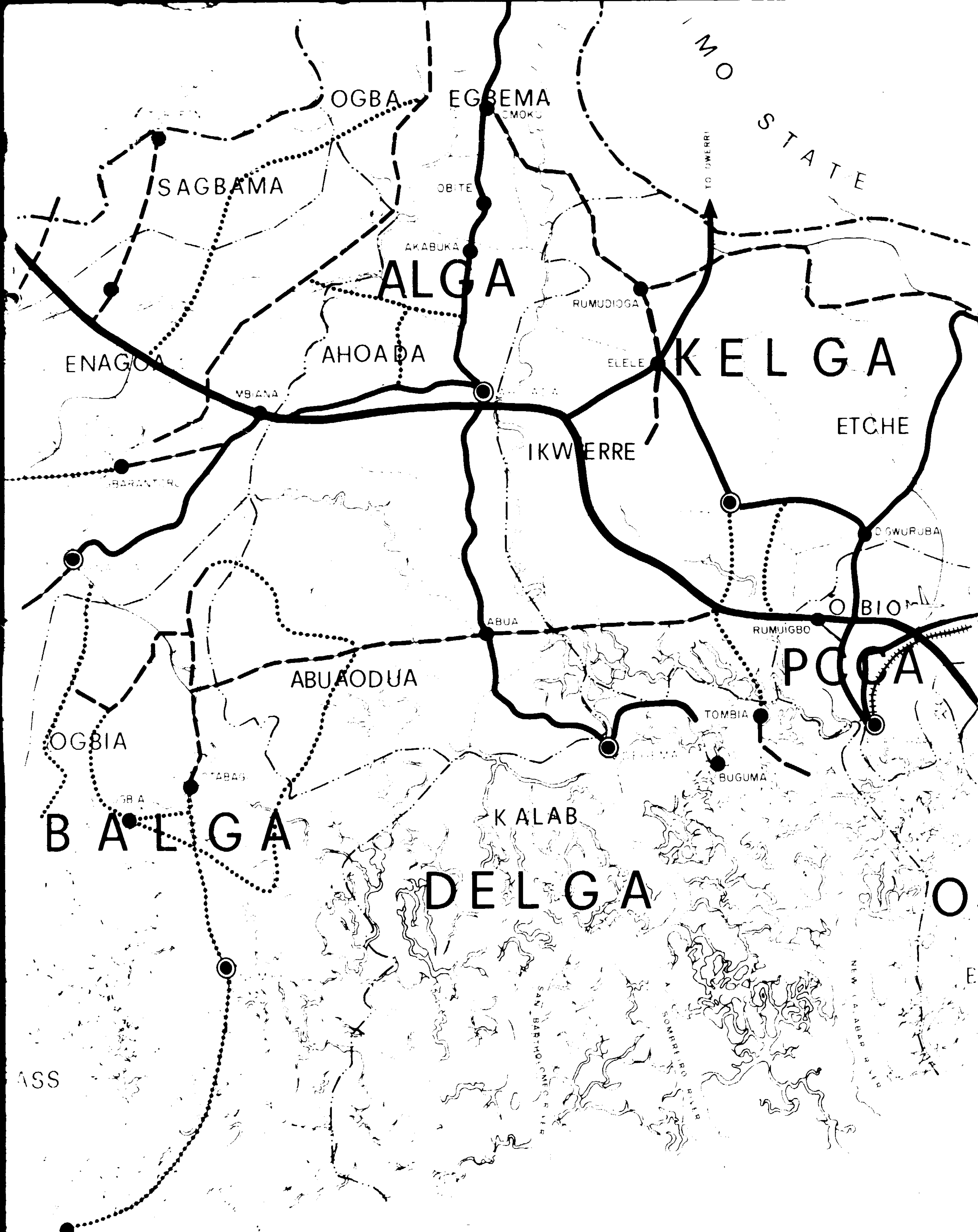
SECTION 6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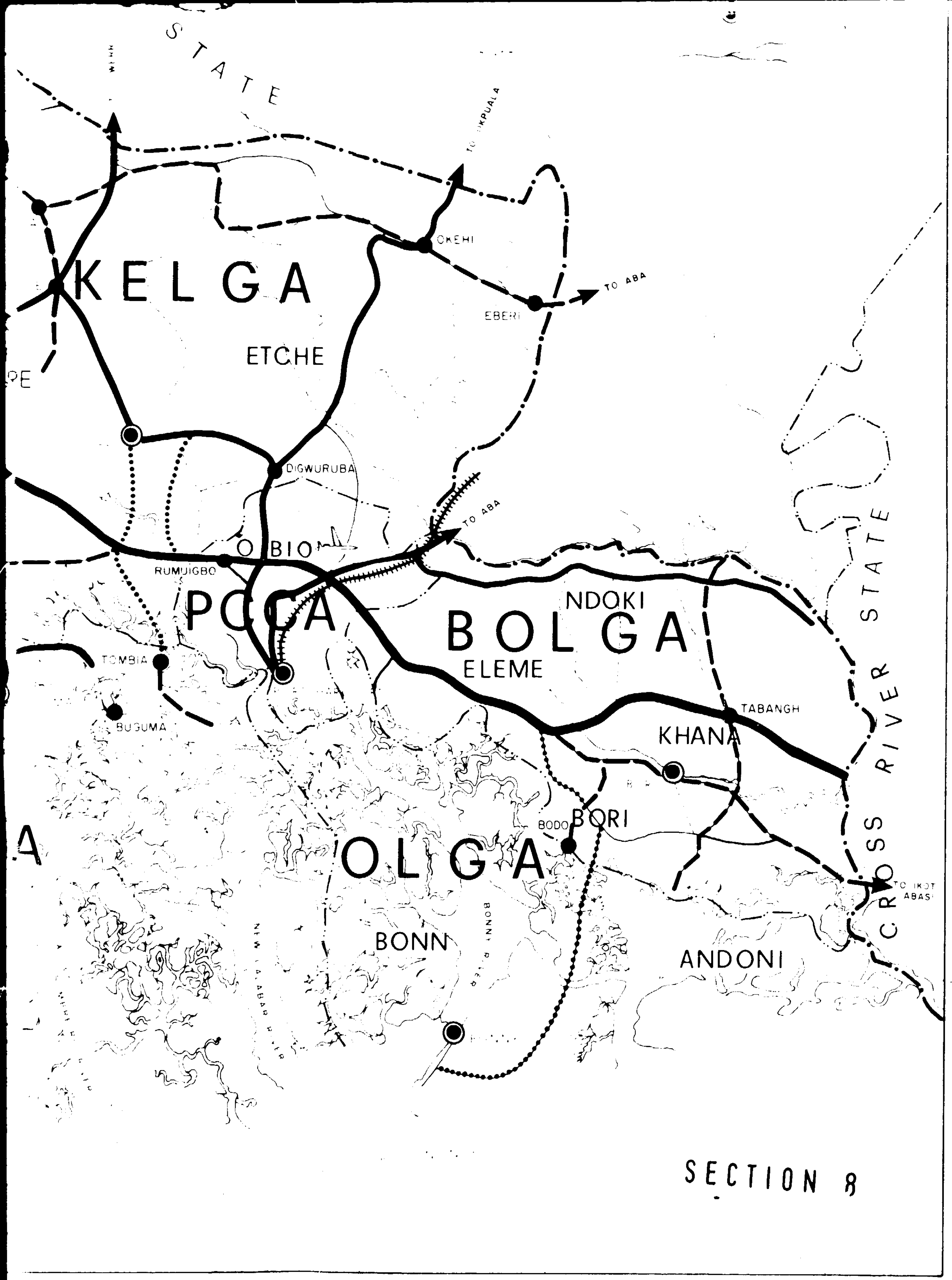
DELGA

SECTION 7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TOMBIA
BUGUMA
TABANGH
KHANA
BODO
BORI
OLGA
BONN
ANDONI
TO IKOT ABASI
CROSS RIVER STATE

SECTION 8

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

GENERAL REPORT

POWER DEVELOPMENT PROGRAMME IN RIVERS STATE

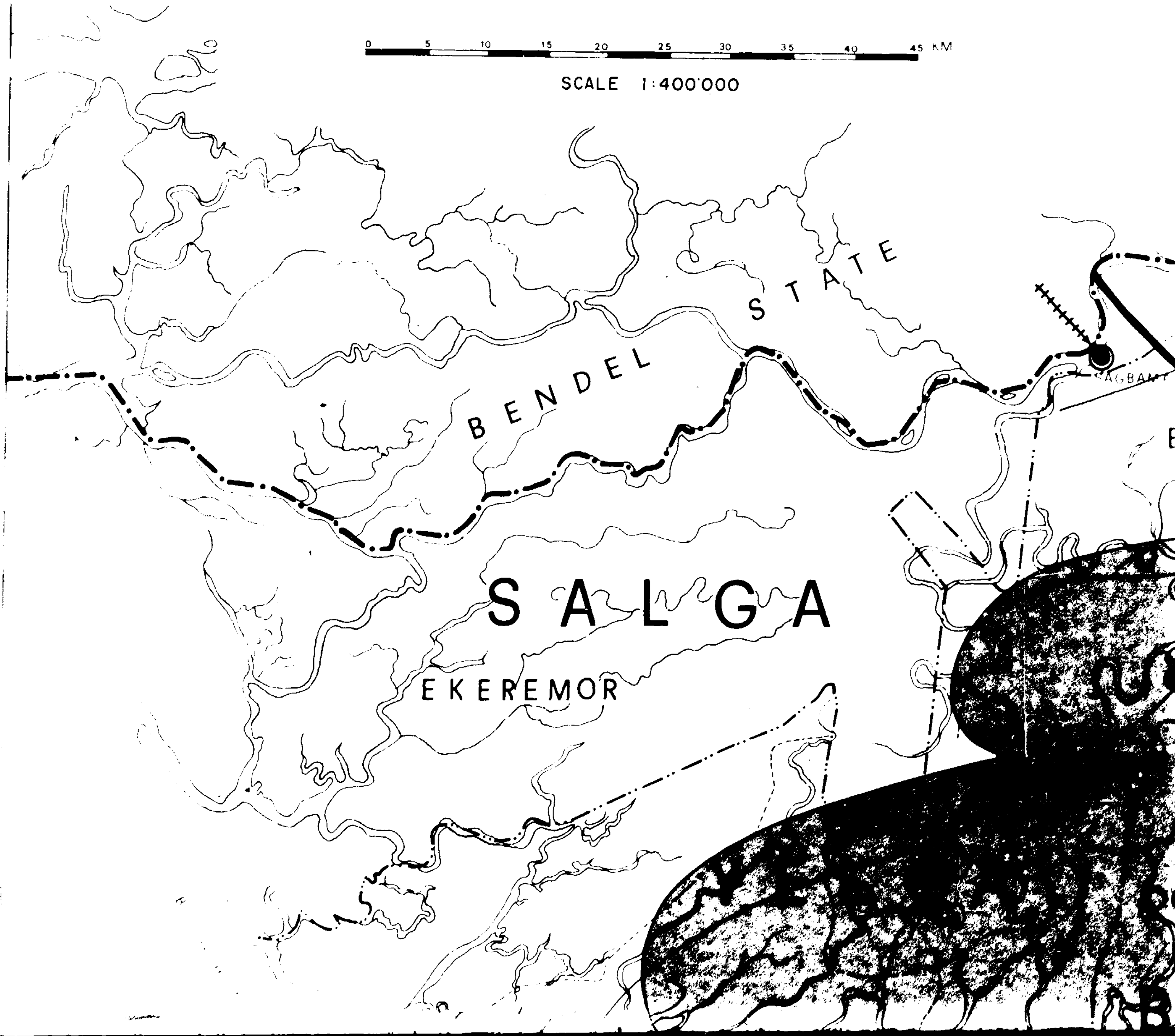
SCALE 1:400 000

SECTION 1

ecember 1983

IFAGRARIA s.p.a.
ROMA

SECTION 2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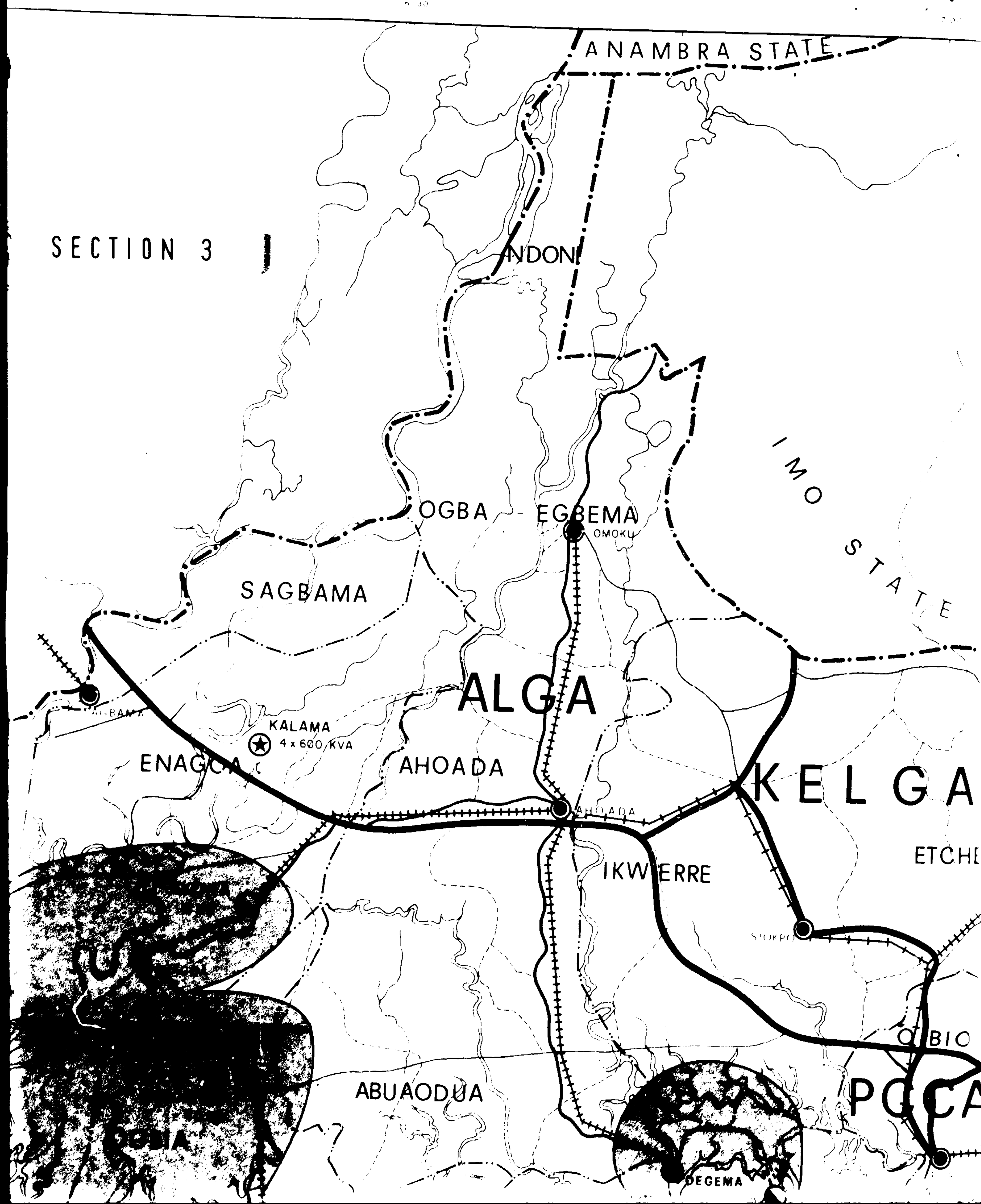
SECTION 3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ABUAODUA
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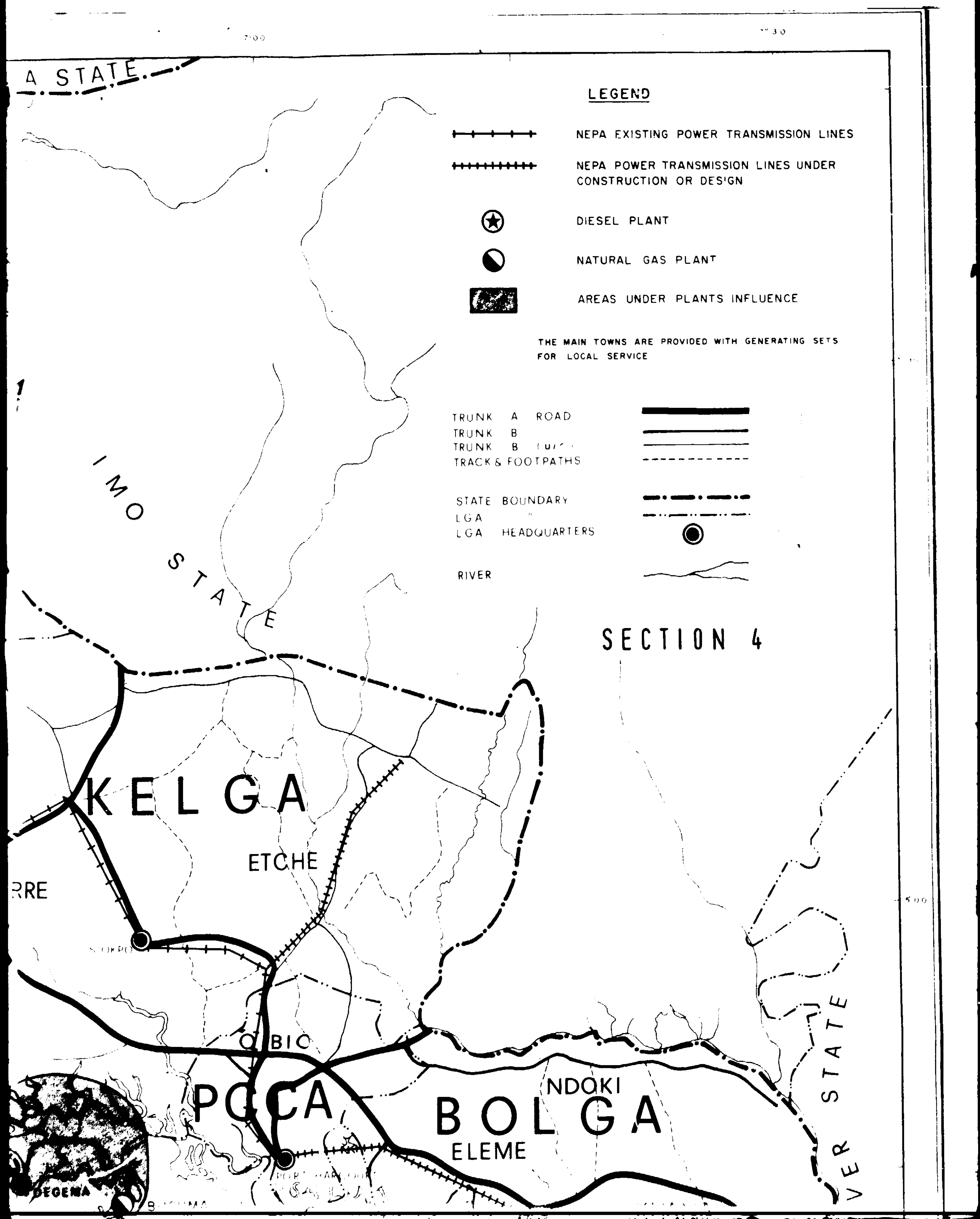

LEGEND
NEPA EXISTING POWER TRANSMISSION LINES
NEPA POWER TRANSMISSION LINES UNDER CONSTRUCTION OR DESIGN
DIESEL PLANT
NATURAL GAS PLANT
AREAS UNDER PLANTS INFLUENCE
THE MAIN TOWNS ARE PROVIDED WITH GENERATING SETS FOR LOCAL SERVICE
TRUNK A ROAD
TRUNK B
TRUNK B
TRACK & FOOTPATHS
STATE BOUNDARY
LGA
LGA HEADQUARTERS
RIVER
SECTION 4
A STATE
IMO STATE
KELGA
ETCHE
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POCA
NDOKI
BOLGA
ELEME
DEGEMA
STATE
VER

GENERAL REPORT

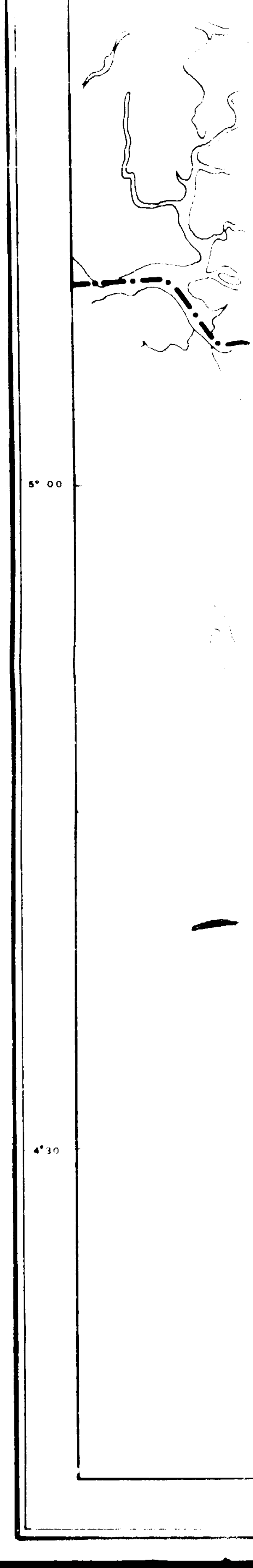
POWER DEVELOPMENT PROGRAMME IN RIVERS STATE

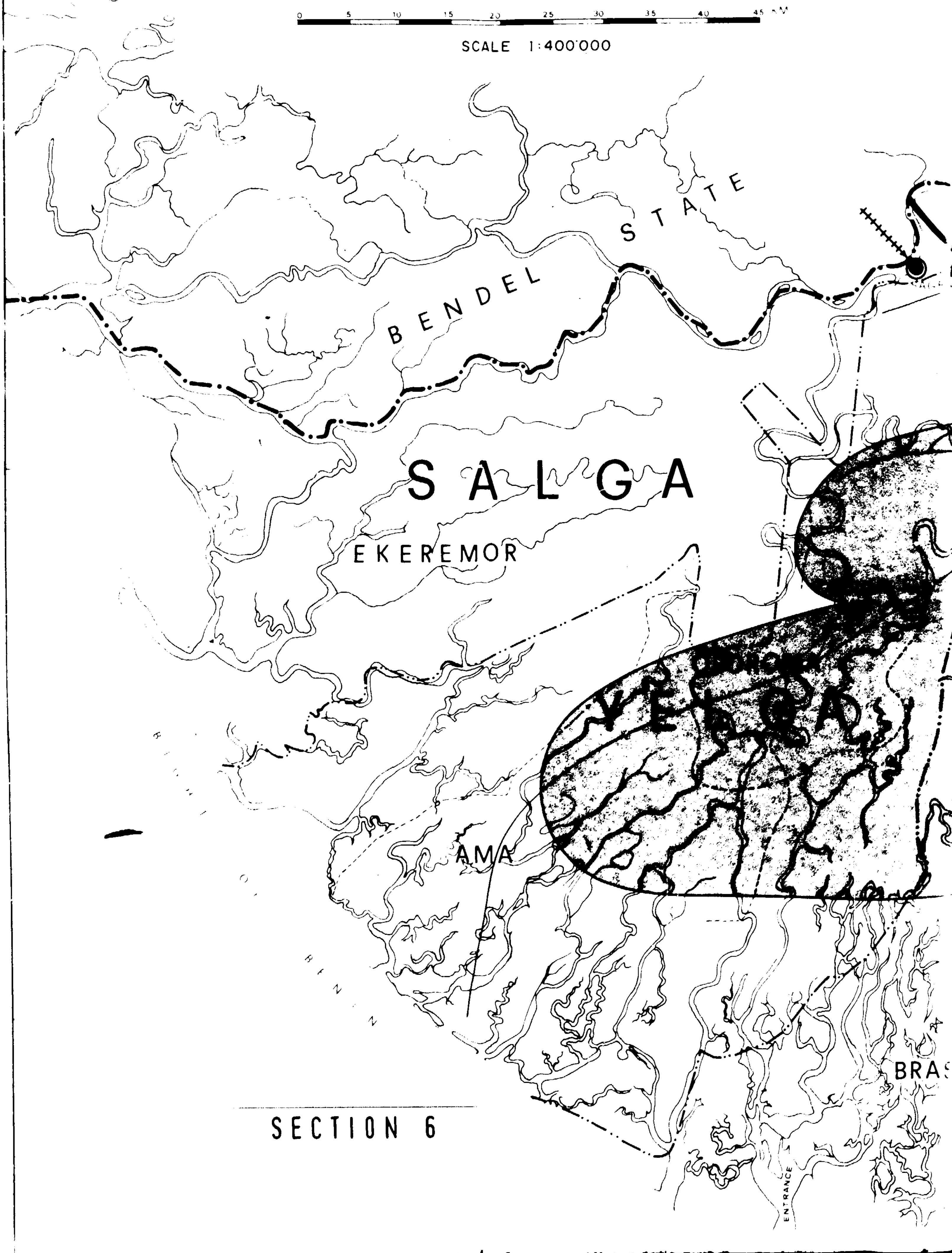
SCALE 1:400'000

ecember 1983

IFAGRARIA s.p.a.
ROMA

SECTION 5





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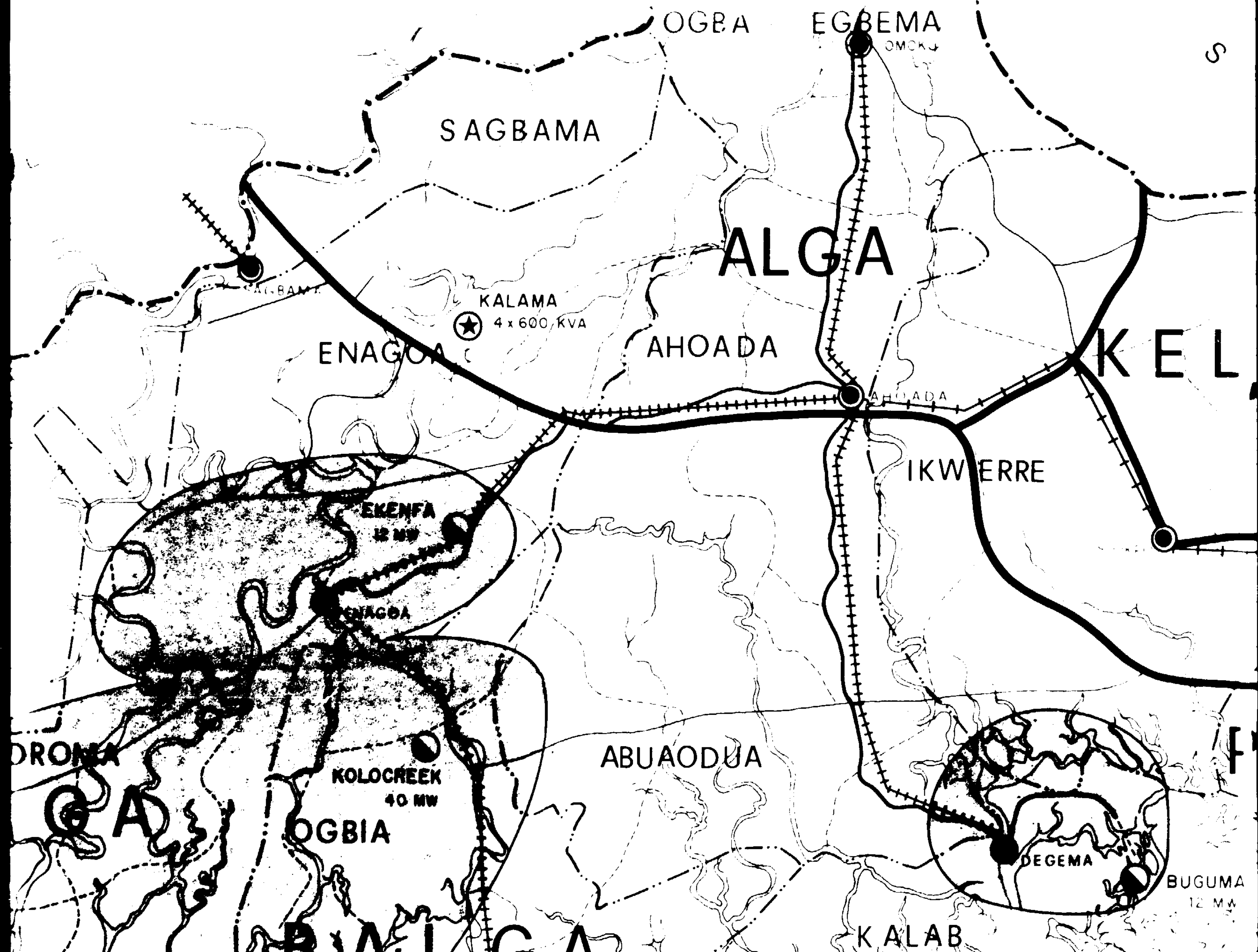
ENTRANCE

SECTION 6



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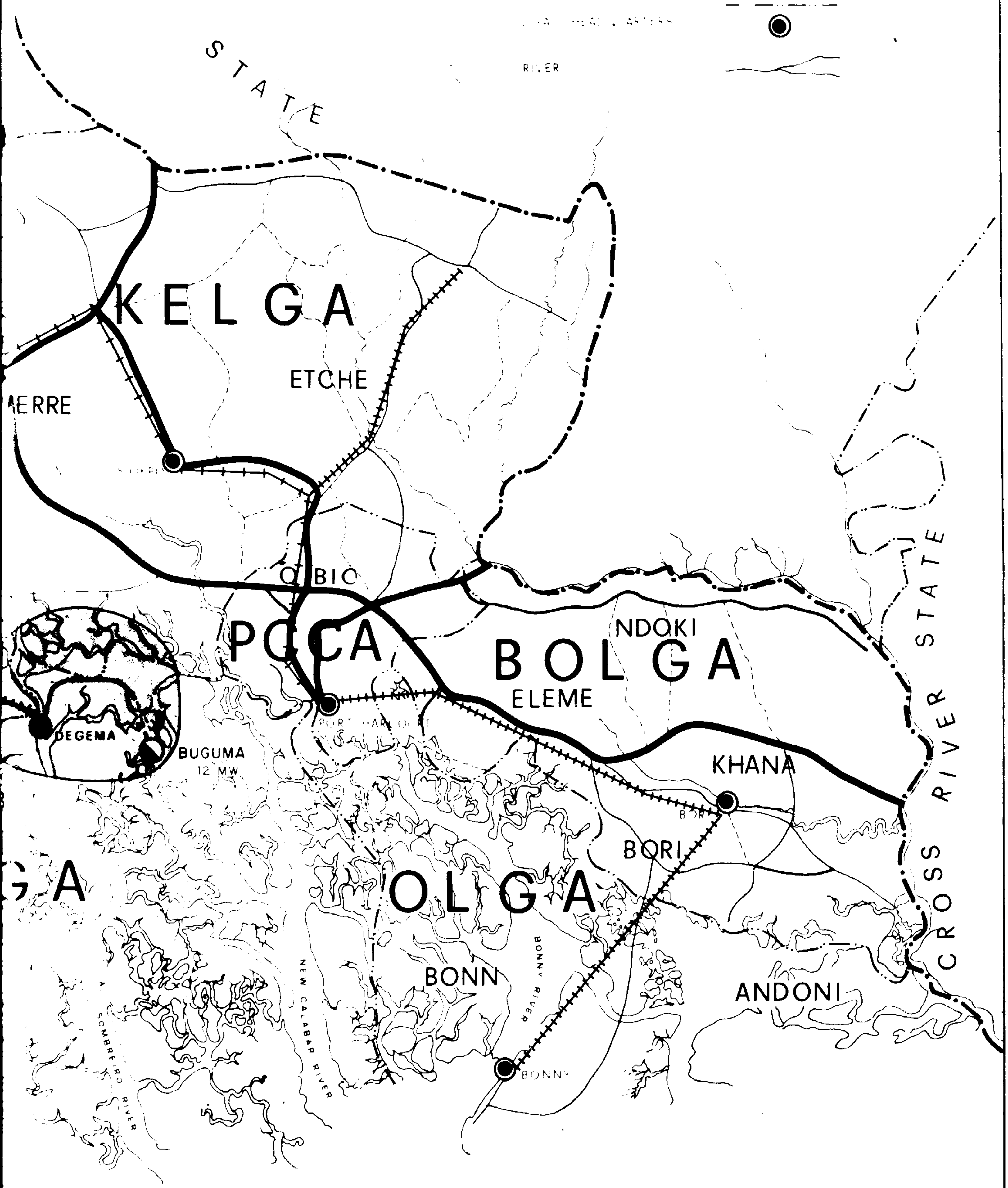
ALGA
KALAMA
4 x 600 KVA
ENAGOA
AHOADA
KEL
AHOADA
IKWERRE
EKENFA
12 MW
OPOKUMA
KOLOCREEK
40 MW
ABUAODUA
OGBIA
DEGEMA
BUGUMA
12 MW
BALGA
KALAB
DELGA
BRASS
SAN BARTHOLOMEO RIVER
SOMBREIRO RIVER
BRASS RIVER
RIVER ST NICHOLAS

SECTION 7



STATE
RIVER
KELGA
ETCHE
ERRE
OBIO
POCA
BOLGA
NDOKI
ELEME
DEGEMA
BUGUMA
12 MW
KHANA
BORI
GA
OLGA
BONN
ANDONI
BONNY
NEW CALABAR RIVER
SOMBREIRO RIVER
BONNY RIVER
CROSS RIVER STATE

SECTION 8

ANNEX 1

UNIDO
UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIO OF NIGERIA
RIVERS STATE

13233

(3 of 8)

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

INSTITUTIONS INVOLVED IN AGRICULTURE AND THEIR DEVELOPMENT PROGRAMMES AND THE CO-OPERATIVE SOCIETIES IN RIVER STATE

December 1983

IFAGRARIA s.p.a.
ROMA

ANNEX 1

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIO OF NIGERIA
RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

INSTITUTIONS INVOLVED IN AGRICULTURE AND THEIR DEVELOPMENT PROGRAMMES AND THE CO-OPERATIVE SOCIETIES IN RIVER STATE

December 1983

IFAGRARIA s.p.a.
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LIST OF THE VOLUMES CONSTITUING THE STUDY

. EXECUTIVE SUMMARY

. GENERAL REPORT

. ANNEX 1 - Institutions involved in agriculture and their development programmes and the Co-operative Societies in Rivers State

. ANNEX 2 - The palm oil industry in Rivers State

. ANNEX 3 - Rivers State market analysis of the in-out products of the selected agro-industrial plant

. ANNEX 4 - Functional description of the selected agro-industrial plant and its economic evaluation and organizational aspects

. ANNEX 5 - Description of processes, prefabricated buildings, equipment and civil works of the selected agro-industrial plant

. ANNEX 6 - Drawings of civil works, prefabricated buildings and installed equipments of the selected agro-industrial plant

ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

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INTRODUCTION

The following Annex 1 deals with the agricultural situation in Rivers State.

The IFAGRARIA mission has carried out a field survey aiming to the following :

a) to examine and describe the agricultural conditions;
b) to locate the areas of plentiful crops production;
c) to carry out surveys upon the unit-yields of the major crops;
d) to analyse costs and profits of the major crops;
e) to locate the areas of possible crops expansion;
f) to analyse the on-going programs and to check their implementation by the various agencies operating in the agricultural field;
g) to study the present co-operative organizations;
h) to come to evaluations concerning the present crops production and those foreseen with the implementation of the development programs.

1. BACKGROUND

1.1 PHYSICAL SITUATION

Rivers State comprises most of the great River Niger Delta. Half of the State is characterized by mangrove while the remaining half is natural rain forest.

Artisanal fishing predominates in the estuarine and coastal areas, while farmers subsist elsewhere by intercropping cassava, yam, and plantain with a variety of crops.

1.2 LOCATION AND SIZE

Rivers State lies between latitudes 4°17 and 5°45 N and longitudes 5°22 and 7°35 E.

It occupies about 21,850 km^2 (2.4% of Nigeria), of which 80% lies in the Niger River delta, whilst the remaining 20% to the east falls within the Imo River Basin.

Rivers State is bounded by Bendel State on the west, Imo State to the north and north-east, Cross River State in the south-east and, to the south and south-west, by the Atlantic Ocean.

The State is divided into 10 Local Government Areas (see list in the following page).

1.3 AGRO-CLIMATE

Rivers State is generally hot and humid, with two seasons: a short dry season and a long rainy period. Rainfall is bimodal, occurring mainly between March and November with a peak in June and a slight depression in August. Precipitation increases towards the coastline from 1,700 mm at the northern boundary to 4,500 mm (the highest in Nigeria) along the south east coast. Dry season rainfall is low and approximates 20-100 mm.

RIVERS STATE LOCAL GOVERNMENT AREAS

ALGA	=	Ahoada Local Government Area
BALGA	=	Brass Local Government Area
BOLGA	=	Bori Local Government Area
DELGA	=	Degema Local Government Area
KELGA	=	Ikwerre/Etche Local Government Area
OLGA	=	Bonny Local Government Area
OTELGA	=	Okrika/Obigbo/Tai/Eleme Local Government Area
PHALGA	=	Port Harcourt Local Government Area
SALGA	=	Sagbama Local Government Area
YELGA	=	Yenagoa Local Government Area

Mean daily maximum and minimum temperatures are regular, about 26-33° C and 21-23° C respectively, and the average relative humidity is 50-70% during the dry season and 60-90% in the rainy season. For most of the year, precipitation far exceeds evapo-transpiration.

Cloud cover is high resulting in very low sunshine hours of 1.5 - 6.1 hours, or 12-51% of daytime, with an annual mean of 1,550 - 1,780 hours.

It should be noted that the agro-climate of Rivers State favours the rapid growth of soil microbes, crop pathogens and pests, and that the low sunshine hours makes crop drying difficult (see tables 1, 2, 3, 4, 5).

1.4 VEGETATION AND LAND-USE

Rivers State has two main vegetation zones: the fresh-water rain forest and the mangrove swamp. Each covers roughly half of the State area.

The forest is dominated by oil palms and raffia palms, whilst the swamp is covered by mangrove trees with Pandanus and Nippah palm predominant in transitional areas.

Land use is mainly for subsistence agriculture and artisanal fishing, both of which occur concurrently, with fishing predominating towards the estuarine and coastal areas.

Industries are largely confined to Port Harcourt and environs.

1.5 DEMOGRAPHY: POPULATION AND LABOUR FORCE

According to the 1963 census, Rivers State had 1.54 million inhabitants with a 2.5% projected annual growth rate to 2.58 million in 1979.

Taking boundary adjustements into consideration, the present population is estimated at around 3.5 million. Of these about 42% are thought to live in farming areas, 33% in fishing areas and 25% in the towns. Allowing 8 persons per average rural family, and assuming 20% are not full-time food producers, there may be about 147,000 farm families in the upland cropped area and about 115,000 fishing families in the riverine area.

TABLE 1 - AVERAGE MONTHLY AT WEATHER-OBSERVATION STATIONS IN RIVERS STATE (1973-1979)

OBSERVATION STATIONS	MONTHS/RAINFALL (MM)													
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	AVERAGE
ABOBIRI	39	60	101	225	248	357	346	352	367	399	161	107	2.762	230
AHOADA	14	93	100	197	182	242	355	325	317	243	72	12	2.152	179
BORI	36	85	120	186	168	348	329	372	357	287	157	42	2.487	207
CHOBA	33	93	137	225	205	275	273	298	347	285	108	29	2.308	192
DEGEMA	19	62	118	195	153	230	219	224	233	232	123	29	1.837	153
PEREMABIRI	52	132	165	344	285	403	304	378	444	379	237	66	3.189	266
PORT HARCOURT	32	102	160	284	224	292	313	399	445	338	153	30	2.772	231
RUMUO DOMANYA	37	121	163	257	184	312	330	399	429	367	116	49	2.769	230
YANAGOA	52	140	132	218	240	391	219	273	396	320	107	52	2.590	212

SOURCE: Climate statistics 1973-1979 - Volume 1.
Ministry of Economic Development and planning (Statistics Division), Port Harcourt - Rivers State.

Table 2 - AVERAGE MONTHLY WET DAYS AT WEATHER-OBSERVATION STATIONS IN RIVERS STATE (1973-1979)

OBSERVATION STATIONS	MONTHS/NUMBER OF WET DAYS													
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	AVERAGE
ABOBIRI	3	6	7	8	13	18	14	19	20	20	8	4	199	17
AHOADA	2	7	9	12	12	17	20	23	22	17	6	1	148	12
BORI	3	7	10	13	15	21	21	24	21	17	12	4	172	14
CHOBA	3	7	9	15	14	20	21	25	24	20	9	4	184	15
DEGEMA	1	4	7	11	9	14	12	13	14	13	6	2	114	10
PEREMABIRI	3	10	12	18	19	23	19	21	25	23	14	5	197	16
PORT HARCOURT	2	7	7	13	14	19	19	21	21	15	9	2	151	13
RUMUO DOMANYA	2	5	8	13	11	19	19	22	21	17	7	2	148	12
YANAGOA	3	8	10	14	15	19	19	21	23	20	9	3	167	14

SOURCE: Climate Statistics 1973-1979 - Volume 1.
Ministry of Economic development and planning.(Statistic Division). Port Harcourt. Rivers State.

Table 3 - MONTHLY MEAN TEMPERATURE AT WEATHER-OBSERVATION STATIONS IN RIVERS STATE

STATION	MONTHS/MEAN TEMPERATURE (C°)																									
	JANUARY		FEBRUARY		MARCH		APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER		OCTOBER		NOVEMBER		DECEMBER		AVERAGE	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
[illegible]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
[illegible]	32.0	20.9	33.4	20.9	33.3	21.2	32.0	21.3	32.0	21.8	30.4	21.2	28.5	20.9	29.1	21.2	29.8	21.2	30.3	21.2	31.8	21.0	32.0	20.1	31.3	20.9
[illegible]	[illegible]	[illegible]	[illegible]	22.3	32.3	22.0	[illegible]	21.7	[illegible]	22.6	29.2	[illegible]	[illegible]	[illegible]	[illegible]	21.5	29.0	22.1	29.3	21.9	30.7	21.9	31.2	20.7	30.4	21.3
[illegible]	31.5	20.7	32.9	22.1	32.1	22.5	31.8	22.5	31.5	22.3	29.5	21.9	28.6	21.9	28.4	22.1	29.1	22.0	30.0	22.1	31.0	21.7	31.1	20.7	30.5	21.8
[illegible]	31.5	22.0	32.3	22.8	32.1	23.1	31.9	23.2	31.5	22.8	30.2	22.5	29.5	22.2	28.5	22.5	29.2	22.3	29.3	22.5	31.1	22.7	31.5	22.1	30.6	22.5
[illegible]	30.2	21.2	30.8	22.7	31.1	23.1	30.0	23.2	30.7	22.8	28.7	22.7	28.0	22.1	27.2	22.0	-	22.2	29.7	22.8	30.2	22.7	30.2	21.3	29.7	22.4
[illegible]	32.0	21.7	32.3	22.7	32.2	23.3	32.0	23.4	31.7	23.0	30.0	22.9	28.4	22.6	29.5	22.5	28.8	22.7	30.1	22.5	30.3	22.5	31.4	22.4	30.5	22.6
[illegible]	31.4	21.0	31.1	22.3	32.3	22.7	31.9	22.8	31.2	22.5	29.5	22.5	28.6	22.0	28.4	22.1	29.1	22.2	29.7	22.3	30.7	21.9	30.9	20.9	30.3	22.1
[illegible]	31.2	21.7	31.0	22.0	31.0	23.3	31.7	23.2	31.2	22.7	29.1	22.3	29.1	22.3	28.3	22.3	28.9	22.1	29.8	22.5	31.1	21.9	30.9	21.6	30.4	22.4

Source: Climate Statistics 1973-1979 - Volume 1.
Ministry of Economic Development and Planning (Statistics Division), Port Harcourt - Rivers State.

Table 4 - MONTHLY MEAN PERCENTAGES OF RELATIVE HUMIDITY AT WEATHER-OBSERVATION STATIONS IN RIVERS STATE (1973-1979)

OBSERVATION STATIONS	MONTHS/MEAN RELATIVE HUMIDITY (%)												
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	AVERAGE
ABOBIRI	-	-	-	-	-	-	-	-	-	-	-	-	-
AHOADA	68	66	77	78	80	81	81	82	82	80	79	75	77
BORI	76	81	79	80	81	86	85	86	86	85	82	78	82
CHOBA	80	83	81	82	82	85	85	86	86	85	82	80	83
DEGEMA	82	82	83	83	83	84	84	85	85	83	82	83	83
PEREMABIRI	88	84	87	84	83	87	86	87	88	84	81	81	85
PORT HARCOURT	73	79	75	77	79	83	83	84	82	79	78	74	79
RUMUO DOMANYA	82	83	82	83	83	87	87	87	87	85	83	81	84
YENAGOA	85	83	81	83	83	86	85	87	85	83	81	81	84

SOURCE: Climate Statistics, 1973-1979 - Volume 1.
Ministry of Economic development and planning (Statistics Division), Port Harcourt, Rivers State.

Table 5 - MONTHLY MEAN HOURS OF DAILY BRIGHT SUNSHINE AT THE OLD PORT HARCOURT AIRPORT (1973-1979)

YEAR	MONTHS/MEAN HOURS OF DAILY BRIGHT SUNTHINE												
	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	AVERAGE
1973	4.8	4.7	4.0	4.8	4.8	3.2	2.8	2.9	2.5	3.4	5.4	4.2	4.0
1974	1.5	2.4	2.5	4.7	4.4	2.6	3.0	2.3	1.7	3.3	5.3	6.0	3.3
1975	4.6	4.7	4.1	5.4	5.0	3.8	2.7	2.9	1.8	3.1	3.3	6.2	4.0
1976	4.0	4.0	3.4	3.3	5.3	2.5	1.6	1.4	2.8	3.1	4.3	5.2	3.4
1977	4.2	3.8	2.4	2.9	5.1	2.3	1.5	2.7	1.7	2.9	4.1	4.6	3.2
1978	5.9	5.2	3.4	3.2	4.5	3.2	3.5	2.7	2.3	3.1	5.4	5.0	4.0
1979	5.7	4.7	4.2	4.9	4.8	2.7	2.1	1.3	3.1	3.2	4.0	6.2	3.9

SOURCE: Climate Statistics 1973-1979 - Volume 1.
Ministry of Economic Development and planning, (Statistics Division), Port Harcourt - Rivers State.

Population density, which is closely related to ecological factors and agriculture capability, is generally low in the riverine area and much higher in the upland areas.

Density per square kilometre ranges from 60 persons in the Brass Local Government Area (BALGA), to 260 in the intensively cropped areas of the Bori Local Government Area (BOLGA), to 760 in the more industrial and commercial areas of the Port Harcourt Local Government Area (PHALGA).

The labour force in Rivers State is estimated at about 1.3million, or one third of the total population.

The potential economically active population is estimated at about 55% of the total (1.9 million). This percentage includes rural petty traders, rural housewives and underemployed.

A breakdown of the rural population by sex and age classes in 1979 shows that 24.56% of the males are under the age of 15 and 22.13% are over the age of 15; 23.61% of the females are under the age of 15 and 29.70% are over the age of 15. The total rural population is thus made up of 46.69% males and 53.31% females.

2. AGRICULTURE

2.1 LAND OWNERSHIP

Generally, land in Rivers State is communally owned. A community as a whole, through its chief, allocates portions to its members for temporary use. In some cases, however, families or individuals possess exclusive right to occupancy and use of land.

2.2 FARM HOLDINGS

Fragmentation of land results from this pattern of land ownership, with very small farm holdings.

The average total area is about 1.5 ha per farm family and consists of several separate plots often less than 0.5 ha each.

2.3 FARMING

In Rivers State most farming is of smallholder subsistence type with bush fallow. The length of time the land is left depends on the soil regeneration rate and population pressure. Intercropping of a number of crops with cassava is a common practice. Other food crops are yams, plantains, bananas, cocoyams, maize and swamp rice. But cassava, yams, plantains and maize are the most important.

The majority of farmers grow a host of horticultural crops, but mainly for home consumption. Local vegetables are rarely planted alone and do not determine the cropping sequence. They play an important role in the nutritional balance of the rural diet.

2.3.1 Farming organization

Two principal forms of farm organization may be recognized in Rivers State: individual farms and co-operative farms.

a) Individual farms

Most of these are small-scale enterprises.

Production is mainly for family consumption and surpluses are marketed near the area of production. Reliance is placed on household labour.

All farm activities (cultivation, harvesting, processing and marketing) are carried out along traditional lines, modern agriculture techniques being limited to few cases only.

b) Co-operative farms

There are a total of about 1,730 registered and unregistered co-operative societies, plus 2,000 group-farmers operating in Rivers State. The active population involved makes a total of 95,000 members.

The average members per co-operative society is 40, whilst that for the group farmers is 15.

A good number of the co-operative societies are commercially oriented, have reasonable access to facilities such as capital credit, farm inputs and marketing services.

3. INSTITUTIONS INVOLVED IN AGRICULTURE

The Institutions involved in agriculture in Rivers State are listed below:

1. State Ministry of Agriculture and Natural Resources (MANR)
   This Ministry encourages private farming with technical recommendations, inputs and rural demonstration centres for crop production, livestock and fisheries. It also co-ordinates extension activities.

2. State Ministry of Economic Development and Planning (MEDP)
   This Ministry plans, co-ordinates and monitors State Programmes of the National Development Plan. It also compiles statistical data on Government Programmes relating to all State production activities in industry, agriculture, commerce, education, etc.

3. State Ministry of Rural Development Co-operative and Technical Education (MRDCTE)
   This Ministry stimulates rural development through communal self-help schemes, and assists with financial, technical and advisory support in the formation of co-operative societies.

4. State Ministry of Local Government (MLG)
   This Ministry is responsible for overall operations of the State programmes at local Government level.
   It supervises agriculture, livestock, fisheries, control of Government land tenure, as well as crop, animal and human health facilities.
   It acts through Local Government Units (LGU) at District level using a series of Functional Committees.

5. Niger Delta Basin Development Authority (NDBDA)
   This Authority engages in actual production of crops and livestock, with no private smallholder participation.
   Its general object is large-scale production of rice, livestock, fruit and vegetables, oil palm and fish.
   Is has also, recently, started credit services to smallholders.

6. Shell Community Development Project (SCDP)
   The immediate objective of this Project is to establish a Rural Development Project primarily concerned with agriculture extension work in animal and crop production.
   The ultimate objective is to develop the communities and build the necessary framework for them to operate on their own and provide their own services in the future.
   The Project also undertakes seed production and materially supports farmers in operational areas of the Shell Petroleum Company in various rural community development projects. These projects include food crop production and livestock husbandry as well as roads , clinics etc. The SCDP also operates credit services (in kind) to some farmers. These projects are specifically limited to the communities the company operates.

7. Federal Department of Fisheries (FDF)
   This Department operates in the State through the Fisheries Division of the State MANR.

8. University of Science and Technology (UST)
   The faculty of agriculture conducts studies on aspects of Rivers State agriculture as well as running a fruit and vegetable farm which produces some seeds.

9. International Institute for Tropical Agriculture (IITA/Onne)
   This institute, started in 1978, has the sole responsibility for IITA plantain research. In addition, IITA also conducts cassava, rice, cowpea, cocoyam and farming system research.

10. Rivers Institute of Agriculture Research and Training (RIART)
    This institute carries out research in agriculture, fisheries and forestry, trains farm workers, farmers and intermediate level agriculture and fisheries manpower, and assists the State in implementing food production programmes.

11. The Agriculture Development Agency (ADA)
    This agency concentrates on the development of community farms.

4. AGRICULTURAL PROJECTS OF THE RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES AND FEDERAL DEPARTMENT OF AGRICULTURE FIELD OFFICE - PORT HARCOURT

4.1 PROJECT DETAILS AND DESCRIPTION

4.1.1 Smallholders Food Crop Scheme

The project is designed to increase food production by extending the area under each crop through bush clearing and land development, by increasing crop yields per hectare and by an integrated use of improved agronomic practices. Special emphasis is given to the production of rice, yams, cassava, maize and plantains (see table 7).

Increased production will be achieved by:

a) supply of production inputs (high-quality seeds, fertilizers, chemicals);
b) provision of easy cash credits;
c) creation of infrastructures for food drying, preservation, processing and storage (see table 8);
d) encouraging suitable marketing schemes;
e) encouraging rural producer-co-operatives (see Ch. 9 tables 33 and 34).

The Project is being carried out in all the L.G.A. of the State.

The status of the Project is : on-going project (see Tables 6,7,8)

The estimated cost of the Project is 7,019,500 Naira and it is financed by Federal and State Governments.

4.1.2 Integrated Agricultural Development Project

The scope of the project is to establish 5 Integrated Agriculture Development Projects in Rivers State, each project covering a minimum of 1,000 ÷ 2,000 hectares.

Three of the Projects will involve the production of maize (estimated 3,000 ha), cassava (estimated 3,000 ha), vegetables and livestock, while the remaining two will involve upland rice (estimated 2,000 ha), plantain and timber production and fish culture.

Table 6 - SMALLHOLDER FOOD CROP SCHEME-ESTIMATED TARGETS FOR FOOD PRODUCTION (HA)

CROPS	TOTAL AREA UNDER CULTIVATION IN RIVERS STATE 1975-1980	TARGET 1981-1985	ADDITIONAL AREA	ADDITIONAL PRODUCTION (in Tonnes)
CASSAVA	27,000	33,000	6,000	67,700
MAIZE	10,100	13,100	3,000	9,000
YAMS	5,800	6,800	1,000	7,500
RICE	1,900	3,000	1,100	1,400
PLANTAINS	3,400	5,000	1,600	50,000
TOTAL	48,200	60,900	12,700	135,600

SOURCE : Ministry of Agriculture and Natural Resources - Rivers State

Table 7 - SMALLHOLDER FOOD CROP SCHEME - BREAKDOWN BY CROP AND YEAR OF AREAS (IN HECTARES) SOWN WITH IMPROVED SEEDS

CROPS	1981	1982	1983	1984	1985	TOTAL
CASSAVA	6,200	6,500	6,600	6,800	6,900	33,000
MAIZE	2,400	2,550	2,680	2,700	2,770	13,100
YAMS	1,620	1,330	1,360	1,400	1,450	7,160
RICE	530	550	610	630	680	3,000
PLANTAINS	880	920	990	1,060	1,150	5,000
TOTAL	11,630	11,850	12,240	12,590	12,950	61,260

SOURCE: Ministry of Agriculture and Natural Resources - Rivers State

The aim is to provide improved services in the form of an integrated package to the farming communities, to increase productivity and to raise farmers' income.

Proposed location of the Projects:

. maize, cassava, yams, vegetables, livestock	Eleme Urban, Tai/Asa/Ndoki; Nyo-Rhana Districts; Etche Area, Abua/Odual, Ekpeye, Ikwerre Districts;
. rice, plantains, fish culture, timber	Ogbia and Yenagoa Engenni Districts Sagbama, Apoi/Bassan, Koluama Districts.

The status of the Project is: new project.

The estimated cost of the Project is 50,000,000 Naira.

Source of finance: Federal Government.

4.1.3 Rice and maize production Project

This Project is implemented by the Agricultural Development Agency, Governor's Office.

The aim of the project is to produce rice and maize on an owner-occupier basis: a new concept in Farm Settlement, in which only the residents within a geographical community constitute the farm families, each owning/occupying 2 - 4 hectares of rice or maize growing farm land.

The minimum hectarage for each nucleus of rice/maize estate is about 100 hectares, owned and operated by at least 25 -50 farmers, who will be paid a subsidy of 60 - 100 Naira in the first six months of the operation.

This Project will also ensure:

a) social and economic development of the Community;
b) the checking of rural - urban migration;
c) the guarantee of any assistance/loan in cash or kind made available to any farmer.

The project targets are:

a) establishment of 5 rice projects (estimated 500 ha) and 5 maize projects (estimated 500 ha) during the period 1981-1985;

b) involvement of about 250 - 500 farm families.

Proposed locations of the projects:-

. maize	Kpaa, Etche, Omoku, Nyo-Rhana, Bangoi Districts;
. rice	Abdure (40 ha), Alagba-Efeu (40 ha), Sangama (60 ha), Ikebiri (40 ha), Angala-Biri (40 ha), Eniwari (60 ha).

The status of the Project is: new project.

The achievements are: pre-feasibility studies are available for all the locations proposed. 100 hectares have already been surveyed, cleared and demarcated at Ibeibiri.

The estimated cost of the Project is 1,106,450 Naira.

Source of finance envisaged: State Government, International Cooperation, Agriculture Credit Bank.

4.1.4 Vegetable and Fruit Production Project

The aim is to carry out trials on local and exotic vegetables, to produce, process, package, store and distribute seeds. To produce and sell vegetables. To develop fruit tree seedlings for budding and distribution to farmers. To establish orchards from improved fruit trees (see Table 9).

The project is being carried out in all the Local Government Areas. The project has started with the State Horticultural Centre as the Nucleus.

Physical achievements: (see Table 10).

The status of the project is: on-going project.

The estimated cost of the project is 1,068,700 Naira.

Source of finance envisaged: Federal and State Governments.

Table 8 - SMALLHOLDERS FOOD CROP SCHEME - CONSTRUCTION OF GRAIN STORAGE AND DRYING DEPOTS

BUILDINGS	1981	1982	1983	1984	1985	TOTAL
STORAGE DEPOT	23	20	-	-	-	43
MAIZE CRIBS	100	100	-	-	-	200
TOTAL	123	120	-	-	-	243

SOURCE: Ministry of Agriculture and Natural Resources - Rivers State

Table 9 - VEGETABLE AND FRUIT PRODUCTION PROJECT ESTIMATED YEAR-WISE FRUIT AND VEGETABLES PRODUCTION TARGETS (HECTARES)

CROP	1981	1982	1983	1984	1985	TOTAL
VEGETABLES	80	140	170	170	100	660
PINEAPPLE	220	321	358	358	252	1,509
BANANA	223	390	474	474	279	1,840
PAW-PAW	73	127	155	155	90	600
CITRUS	100	190	230	230	150	900
MANGO	21	36	44	44	25	170
COCONUT	24	42	52	52	30	200
KOLA	6	10	13	13	8	50
TOTAL	747	1,256	1,496	1,496	934	5,929

SOURCE: Ministry of Agriculture and Natural Resources - Rivers State.

Table 10 - VEGETABLE AND FRUIT PRODUCTION PROJECT - ACHIEVEMENTS (1982)

CROPS	AREA PLANTED (in Hectares)	PRODUCTION (in Tonnes)
VEGETABLES	260	-
PINEAPPLE	500	25,000
BANANA	841	8,410
PAW-PAW	256	10,401
CITRUS	281	703
MANGO	72	7,200
COCONUT	90	-
KOLA	11	-
TOTAL	2,311	51,714

SOURCE: Ministry of Agriculture and Natural Resources - RIVERS State.

4.1.5 Special Rice Project

The aim of the Project is to organize 10 rice-farmer groups engaged in clearing and planting 10 hectares of land to rice.

The proposed locations of the projects are :

. Umuokomo	KELGA
. Afam	OTELGA
. Ebubu	OTELGA
. Bodo	BOLGA
. Ogonokom	ALGA
. Amuruto	ALGA
. Obgwe	ALGA
. Igbeta	BALGA
. Nyong-Oron	OLGA
. Bonni	OLGA

Achievements (1982): nine out of the ten rice-farmer groups have each cleared 10 hectares of their farm land. All the nine groups have embarked on land preparation and planting activity.

Tractor units have already been handed over to the farmers by the State Green Revolution Co-ordinating Committee.

4.1.6 Accelerated Food Production Scheme

The emphasis of this scheme is on increased food production within the shortest possible time. The aim is to establish 50 Integrated Agricultural Production Projects in the Rivers State, each having a range of coverage of 200 - 500 hectares. The additional area under cultivation is estimated to be between 10-25,000 ha of which 5,000-12,500 ha for maize and 5,000-12,500 ha for cassava. The projects will be located in each of the Local Government Districts.

Livestock schemes, such as poultry and pig production, will be encouraged. Emphasis will also be given to land clearing, rural road construction, improved storage and processing facilities. Local farmers will be di[illegible]y involved in each project.

The estimated cost of the Scheme during the period 1981-1985 is 50 million Naira and is the most important project launched under the Green Revolution Programme.

4.1.7 Seed Multiplication Programme

The aim of the project is the multiplication of maize, cassava, rice plantain sweet potatoe, fruit and vegetable seeds for distribution to farmers.

The projects are located at: Choba, Ebubu, Rumuodomanya, Bori, Ahoada, Degema, Yenagoa, Abobiri, Agbeta, and at the 29 Agro-Service Centres.

Choba and Ebubu are the main food crop/vegetable/fruit multiplication centres. The others are sub-stations.

The project has already made progress but had hitherto been treated as subsidiary of the Small Holder Food Crop Scheme (see para. 4.1.1) and Vegetable and Fruit Production Project (see para. 4.1.4).

Achievements: (see Tables 11, 12, 13, 14).

The status of the project is: on-going project.

The estimated cost of the project is 2,324,163 Naira. The cost will be subsidized at 50%. Source of finance: Federal and State Governments.

4.1.8 Pabod Food Company Scheme

The aim of the Scheme is to grow maize, plantains and other suitable crops as found necessary.

The Scheme is sited at Bara-Obara in Tai/Eleme District of OTELGA.

The target is: 80 hectares of maize and 50 hectares of plantains. This is a continuing project. The land has already been acquired and surveyed. The estimated cost of the project is 812,800 Naira. The source of finance is: Federal Government.

4.1.9 Development of Warehouses, Agro-Service Centres, and Fertilizer Stores

The aim of the project is to assist farmers in their efforts to increase agricultural production, and to apply a decentralization policy in the State.

These Centres will function as sources of agriculture information, as suppliers of inputs, and as monitoring units for extension education activities (see Table 15).

Table 11 - SEED MULTIPLICATION PROGRAMME
PHYSICAL ACHIEVEMENTS (1982)

CROPS	SEED MULTIPLICATION	
	Hectares	Planting Materials
CASSAVA	82.6	10,300 Cuttings
MAIZE	90.5	321,2 Tons
YAM	-	-
RICE	43.9	87.8 Tons
PLANTAIN AND OTHERS	29,5	85,800 Suckers and 9 tons
TOTAL	246.5	

SOURCE : Ministry of Agriculture and Natural Resources - Rivers State

Table 12 - SEED MULTIPLICATION PROGRAMME-SEED MULTIPLICATION HORTICULTURAL CENTRE (1982)

CROPS	AREA CROPPED (in Hectares)	PLANTING MATERIAL DISTRIBUTED	
VEGETABLES	27.1	229.900	Packets
PINEAPPLE	20.7	362.682	Suckers
CITRUS	13.1	15.419	Budded Seedling
PAW PAW	4.8	324.625	Seedlings
MANGO	Nursery	7.476	Seedlings
KOLA	Nursery	860	Seedlings
COCONUT	Nursery	9.452	Seedlings
TOTAL	65.7		

SOURCE: Ministry of Agriculture and Natural Resources - Rivers State.

Table 13 - SEED MULTIPLICATION PROGRAMME ACHIEVEMENTS (1982)

CROPS	AREA CROPPED (Ha)	PALNTING MATERIAL DISTRIBUTED
CASSAVA	82.6	10,300 Bundles (*)
MAIZE	90.5	321.2 Tonnes
RICE	43.9	87.8 Tonnes
PLANTAIN	26.0	85.000 Suckers
SWEET POTATOE	3.5	0.9 Tonnes
TOTAL	246.5	-

(*) 1 Bundle = 50 Cuttings

SOURCE : Ministry of Agriculture and Natural Resources - Rivers State.

Table 14 - SEED MULTIPLICATION PROGRAMME-VEGETABLE AND FRUIT PRODUCTION (1982)

CROPS	AREA CROPPED (Ha)
VEGETABLE	27.1
PINEAPPLE	20.7
CITRUS	13.1
PAW-PAW	4.8
MANGO	nursery
KOLA	nursery
COCONUT	nursery
TOTAL	65.7

SOURCE : Ministry of Agriculture and Natural Resources - Rivers State

Table 15 - AGRO-SERVICE CENTRES - LIST OF THE EXISTING WAREHOUSE AND FERTILIZER STORES IN RIVERS STATE

TYPE	LOCAL GOVERNMENT AREA	LOCATION	CAPACITY (in tonnes)
1. Warehouse	BOLGA	Taabaa	1,000
2. Warehouse	OTELGA	Ebubu	1,000
3. Warehouse	PHALGA	Rumuodomanya	1,000
4. Warehouse	KELGA	Okehi	1,000
5. Warehouse	ALGA	Abua	1,000
6. Warehouse	YELGA	Yenagoa	1,000
7. Warehouse	PHALGA	P.H. City	500
1. Agro-service Centre	BOLGA	Uegwere-Boue	300
2. Agro-service Centre	BOLGA	Kpor	300
3. Agro-service Centre	BOLGA	Taabaa	300
4. Agro-service Centre	OTELGA	Obeama	300
5. Agro-service Centre	OTELGA	Ebubu	300
6. Agro-service Centre	OTELGA	Okrika	300
7. Agro-service Centre	OTELGA	Agbeta	300
8. Agro-service Centre	PHALGA	Choba	300
9. Agro-service Centre	KELGA	Okehi	300
10. Agro-service Centre	KELGA	Ozuaha	300
11. Agro-service Centre	KELGA	Umudioga	300
12. Agro-service Centre	ALGA	Obrikom	300
13. Agro-service Centre	ALGA	Ndoni	300
14. Agro-service Centre	ALGA	Abuao	300
15. Agro-service Centre	BALGA	Emeyal	300
16. Agro-service Centre	BALGA	Okpoma	300
17. Agro-service Centre	BALGA	Nembe	300
18. Agro-service Centre	SALGA	Ofoni	300
19. Agro-service Centre	YELGA	Ukubie	300
20. Agro-service Centre	YELGA	Peremabiri	300
21. Agro-service Centre	YELGA	Amassoma	300
22. Agro-service Centre	YELGA	Agudama	300
23. Agro-service Centre	YELGA	Kaiama	300
24. Agro-service Centre	DELGA	Mbiama	300
25. Agro-service Centre	DELGA	Ke	300
26. Agro-service Centre	DELGA	Bukuma	300
27. Agro-service Centre	OLGA	Bonny	300
28. Agro-service Centre	OLGA	Ngo	300
29. Agro-service Centre	OLGA	Opobo	300
1. Fertilizer Store	BALGA	Bori	100
2. Fertilizer Store	PHALGA	Diobu	100
3. Fertilizer Store	PHALGA	Rumuodomanya	100
4. Fertilizer Store	ALGA	Ahoada	100
5. Fertilizer Store	YELGA	Yenagoa	100

SOURCE : MINISTRY OF AGRICULTURE AND NATURAL RESOURCES - RIVERS STATE

The Centres will also procure and distribute plant protection equipment, chemicals, processing equipment and storage facilities.

At the present 7 Warehouses and 5 Fertilizer Stores have been completed. The situation regarding the 29 Agro-service Centres is the following :

a) completed and used by the agro-fisheries committees and special project areas as stores and temporary offices. The Centres are : Ebubu, Taabaa, Kpor, Ndoni, Umudioga, Choba, Bonni, Ngo, Opobo, Nembe, Okpoma, Emeyal, Ukubie, Amassoma, Okrika.

b) completed but not in use. The Centres are : Uegwere-Boue, Obrikom, Ozuaha, Ke, Ofoni, Kaiama, Agudma, Peremabiri.

c) uncompleted/abandoned. The Centres are : Bukuma, Mbiama, Agbeta, Obeama, Abua, Okehi.

The status of the project is : on-going project. The estimated cost of the project is 4,104,400 Naira. Source of finance : Federal and State Governments.

The Project is under the Green Revolution Programme (see Table 15).

4.1.10 Bush Clearing and Land Development Scheme

The aim of the Project is to increase the area under production of food crops, under the Green Revolution Programme. The Government pays the full cost of the clearing returning the cleared land to small scale producers.

The Project is located in all the ten Local Government Areas of the State. The aim is to clear about 5,000 ha.

The achievements (1982) are the followings :

Local Government Area	Number of Locations	Total hectarage cleared
Ahoada	19	341
Bonni	8	125
Bori	10	160
Brass	8	175
Degema	6	80
Ikwerre/Etche	9	150
Okrika/Tai/Eleme	7	115
P.H. City	5	94
Sagbama	4	70
Yenagoa	7	125
Total	83	1,435

SOURCE: Ministry of Agriculture and Natural Resources - Rivers State.

The estimated cost of the project is 2,332,816 Naira. The status of the project is : on-going project. Source of finance : Federal and State Governments.

4.1.11 Smallholder Tree Crop Scheme

The aim of the project is to plant 2,500 hectares of oil palm and 100 hectares of cocoa.

Achievements (1982) :

. oil palm 1,500 ha area planted;

. cocoa 60 ha area planted.

The status of the project is: on-going project. The stimated cost is 1,076,443 Naira. Source of finance: State Government.

4.1.12 Construction of Grain Storage Depots

The aim of the project is to provide adequate storage facilities for the grain surpluses that are expected to result from the current Green Revolution Programmes.

The locations of the depots are:

. Bori	capacity:	500 tonnes;
. Eleme	capacity:	500 tonnes;
. P. Harcourt Trans Amadi Layout	capacity:	1,000 tonnes.

Achievemnts: The Bori and Eleme depots have already been completed. The Port Harcourt buildings are under construction and are expected to be completed in 1983.

The project cost is estimated at 120,000 Naira. Source of finance: Federal Government.

4.1.13 Hammer Feed Mill

The aim of the project is to provide cheap poultry and other animal feeds to farmers to boost the Green Revolution Programme.

The location of the project is: Rumuodomanya.

Achievements: the Hammer Mill building has been completed. The necessary equipment and machinery are expected to arrive and start operations this year (1983).

4.1.14 Agricultural Loan Scheme

Under this scheme credit facilities are provided to proven farmers who are capable of utilizing such funds to improve agricultural productivity. Loans will be given in cash, kind or both depending on need and circumstances.

It is estimated that 200 co-operative societies, 100 communal farmer groups and 7,000 individual farmers will benefit from the scheme during the 1981-1985 period.

Capital expenditure of 30,000,000 Naira will be made over the five-year period. The status of the project is : new project.

5. NIGER DELTA BASIN DEVELOPMENT AUTHORITY - AGRICULTURAL PROJECTS

The Niger Delta Basin Development Authority is currently undertaking eleven major projects. These projects are:

1. Peremabiri Rice Project;
2. Commercial Fish Farm;
3. Sagbama River Project;
4. Isampou Rice Project;
5. Erosion and Flood Control;
6. Rural Water Supply;
7. Yenagoa Oil Palm Estate:
8. Ndoni River Project;
9. Nun River Project;
10. Orashi River Project;
11. Loan Scheme to Farmers and Fishermen.

For the purpose of this Report only the projects related to food, tree crop production and livestock are considered.

5.1 RICE PRODUCTION

5.1.1 Peremabiri Rice Project

This is one of the Authority's pioneer projects having first been developed by the defunct Niger Development Board. Under the initial scheme, a 24 hectare rice polder was constructed. This polder will eventually be expanded to 2,500 ha of swamp/irrigated rice by 1985.

Achievements: a total of 165 ha have up to now been cleared and levelled, and the croppped area has increased from 24 to 165 ha. Rice production is rainfed.

A 3 km long ring dyke and a 3 km primary irrigation canal have also been completed, but are still not in use.

A one-tonne-per-hour rice mill has also been installed and milling is in progress. The rice produced is parboiled rice. It has been confirmed by the Authority that the rice will be on the market by July this year. There are possibilities of expanding the rice estate to 10,000 ha.

The Project also assists farmers in six villages around Peremabiri in carrying out land preparation, fertilization and other agronomic practi - ces.

5.1.2 Sagbama River Project

This project includes also a Rice Village Scheme (300 ha in 1985) in the Sagbama Local Government Area at Ogobiri.

Achievements: at present 145 ha have been fully cleared and levelled and rice has planted. Efforts are being made to divide the rice farm into 2-hectare plots per farmer for cultivation after a training period of two years.

A temporary tractor shed, office and store have also been built at the Station.

5.1.3 Isampou Rice Project

The aim of this project is to establish 6,000 ha of rice polder in the fertile back swamps of the Delta at Isampou.

Achievements: land and soil surveying have been completed, and tender documents for detailed engineering designs are being processed.

5.1.4 Nun River Project

One of the sub-projects of the Nun River is the Village Scheme for rice production. The Scheme is designed to promote farm-family participation in the cultivation of essential food items.

The Authority plans to establish 100 ha of farm land under controlled water distribution measures at each of the following: Anyama, Ondewari, Igbematoru, Otuokpoti. The hectarage, in each location, will be shared out to the rural communities.

Achievements (1982) :

Location	Area cleared (in ha)	Area cropped (in ha)
Anyama	50	25
Ondewari	50	25
Igbematoru	40	20
Otuokpoti	70	50
Total	210	120

SOURCE : Niger Delta Basin Development Authority.

5.2 MAIZE/CASSAVA PRODUCTION

5.2.1 Ndoni River Project

One of the sub-projects is the maize/cassava production programme. This project is intended to increase the production of maize and cassava.

Achievements: 100 ha each have been surveyed at Nonwa and Oloko. At the Oloko Farm 30 ha of land have been cleared and planted with maize. Planting of cassava will commence soon.

At Nonwa the land has been acquired. A 100-ha maize and cassava farm has been set up. Planting will start this year (1983).

5.2.2 Orashi River Project

a) One of the sub-projects is the maize/cassava production programme. 150 ha have been developed in Odieke-Ubie and 60 ha cropped at Egwi. Other areas under consideration are:

   . Polaku cassava
   . Imiringi cassava
   . Obalama cassava

- Trofani cassava
- Agbere cassava, vegetables
- Oloma cassava
- Kalaoka maize
- Umacham cassava/maize.

This is an entirely new project and is expected to take off in 1983 with land already acquired.

b) Integrated garri/cassava Production Scheme
This sub-project is aimed at increasing the supply of garri in the State. Five different cassava plantations of 300-500 ha each will be established under this scheme.
Achievements: the Draft Feasibility Report is being studied.

5.3 PLANTAIN AND PINEAPPLE PRODUCTION

5.3.1 Sagbama River Project

This sub-project is located at the Ebedebiri Vegetable Farm. At present 100 ha have been cleared and the area is being planted with plantains and pineapple.

Infrastructures, buildings for staff, and a road link from the village to the farm site are in an advanced stage of construction.

5.4 VEGETABLE PRODUCTION

5.4.1 Andoni River Project

Large-scale vegetable Farm at Kpong. This sub-project is located in the Bori Local Government Area and is aimed at developing 100 ha of fruit and vegetables.

Achievements: at present a total area of 100 ha has been cleared and over 50 ha have been cropped with citrus, mangoes, pineapples, guava, eggplants, pumkins and plantains.

Water pumps, tanks and irrigation networks have been installed. Infrastructures, staff houses, road network and bore holes have been completed.

5.5 SEED MULTIPLICATION PROJECT

5.5.1 Nun River Project

The seed multiplication project is one of the sub-projects. The Project is intended to enable the Authority to meet demand for seeds.

Achievements: it is a new project for which 170 ha of land have been acquired at Odiereke and 85 ha at Nonwa.

5.6 RAFFIA PALM PROJECT

5.6.1 Nun River Project

One of the sub-projects is for raffia palm production. The Authority intends to establish a 200-ha raffia palm plantation at Onuebum which will eventually lead to a raffia wine bottling industry.

Achievements: a total area of 50 ha has been cleared and stumps uprooted; planting has started. There are 35,000 nursery seedlings at the site.

5.7 MANGROVE PRODUCTS INDUSTRIAL COMPLEX

5.7.1 Orashi River Project

This is one of the sub-projects. The project involves the establishement of an industrial complex utilizing mangrove wood. This will involve processing for the extraction of tannin, formaldehyde, phenol and wood powder.

Feasibility studies are in progress.

5.8 LIVESTOCK PROJECTS

5.8.1 Andoni River Project

Poultry Unit. This Poultry Unit is included in the Large-Scale Vegetable Farm Project at Kpong, in the Bori Local Government Area.

Achievements: a total of 3,500 broilers and 9,000 layers are already stocked at the poultry unit. The farm buildings have already been completed and egg production stands at 5,000 eggs per day. The Unit is also a ready source of organic manure.

5.8.2 Orashi River Project

a) Integrated Poultry Project

This project estimated at 18 million Naira will involve a hatchery, a broiler plant, a feed mill and egg production units.

Also included will be the establishment of 5 distribution centres each with a capacity of 15,000 layers and 30,000 point-of-lay pullets. About 50,000 layers and 5,000 broilers have already been stocked.

The project locations are: Aluu, Omoku, Yenagoa, Okrika and Kpong.

Achievements: 30 ha of land has been cleared and partially levelled. Staff buildings, water tanks, a hatchery house, and five poultry units have already been constructed at Aluu. The sale of eggs and broilers started this year.

At Yenagoa a distribution centre has already been completed. Eight thousand five hundred layers and 8,000 growers have already been installed at Kpong. Five thousand broilers were raised and sold between March - April 1982. The average daily egg production at Kpong stands at 5,000 units. The necessary land has been acquired at Omoku and Okrika.

b) Integrated Piggery Project

This is one of the sub-projects. The project is located at Isiokpo. The cost has been estimated at 12 million Naira. It is designed to produce pork meat on a commercial scale and will have a stocking capacity of 6,000 pigs. A feed mill and a slaughter house will also be incorporated.

Achievements: 30 ha of land has been acquired and surveyed. Construction of the building has already started and technical/management partners have been appointed.

c) Cattle Ranch Project
This project is expected to produce breeding, fattening and dairy cattle. It will have 10,000 heads of cattle and will cover a ranch area of 5,000 ha.
Importation of 5,000 cattle is expected to start soon.
Achievements: the draft feasibility report has been submitted and the final report is being awaited.

d) Small Ruminant Rural Integrated Scheme
The project is aimed at establishing a breeding and multiplication centre for goats and sheep.
Achievements: the draft feasibility study has been submitted.

5.9 AGRICULTURAL LOAN SCHEME

Under a special directive of the Ministry of Water Resources a Loan Disbursement Committee was established within the area of jurisdiction of the Niger Delta Basin Development Authority.

The main objective of the Committee is:

a) to prepare and maintain an accurate list and records of needy farmers in the State who are eligible to benefit from the Scheme;
b) to disburse the loans under mutually agreed conditions to be worked out with the farmers;
c) to evolve a recovery mechanism to minimize default in repayment of loans.

So far the Authority has been engaged in evolving appropriate administrative machinery for this operation.

A Loan Unit has been set up under the General Manager's Office. The Authority has so far registered 3,800 farmers. In the first phase of the Scheme, 410 farmers were granted loans, and the total disbursement to date stood at 2,650 million Naira.

Farm inspection for the second phase is proceeding.

5.10 PROGRESS MADE AND STAFF SITUATION

The various stages of progress of the on-going projects and the activity planned in different projects covering the whole of Rivers State indicate that the Niger Delta Basin Development Authority is having and will have a great impact in the development of the agricultural sector.

Up to date the highlights of this activity are:

Crop	1982 Area cleared (ha)	1982 Area cropped (ha)	Area planned to be developed 1983-1984 (ha)
Maize	280	190	1,000
Cassava	-	-	1,000
Rice	500	305	5,800
Plantains, pineapples	150	85	-
Citrus, mangoes, guava, eggplants, pupkins	50	50	-
Seed multiplication	-	-	235
Raffia palm	50	30	120
Total	1,030	660	8,155

SOURCE: Niger Delta Basin Development Authority.

The above figures show a remarkable achievement in a State where land fragmentation, farming conditions and land availability for agriculture present a serious problem.

It is necessary to mention here that the cost of developing one hectare of land for agricultural purposes in the riverine area is about three times the cost of developing an upland area within Rivers State.

As to livestock activity, the Authority, in 1982, produced: 16,500 broilers, 67,500 layers and 100,000 eggs. It is planned to produce about 75,000 layers in 1983.

The staff manpower status of the Authority in April 1982 was as follows: Junior Staff 1,737; Senior Staff 133.

The recruitment of highly qualified expatriate staff is also foreseen in 198[illegible].

6. RIVERS STATE ACCELERATED DEVELOPMENT AREA PROGRAMME (ADAP)

The Accelerated Development Area Programme (ADAP) in Rivers State is concentrated on improving food and fish production through four specific sub-programmes designed to strengthen the agricultural extension service, strengthen the State Fishery Programmes, establish a Commercial Services Division and upgrade the feeder road network.

The importance of training, credit facilities and marketing is also recognized.

The ADAP Programme is managed by an ADA Management Unit (ADAMU) under the policy direction of a 12-member ADA Executive Committee (ADAEC). A professional programme manager directs the Management Unit. The Unit will be autonomous and will report exclusively to the Executive Committee.

The State Agricultural Advisory Council will advise ADAEC on technical matters and a Technical Advisory Committee will advise ADAMU.

The expenses of the ADA programme will be shared by Rivers State and the Federal Government of Nigeria. The Federal Government will contribute 25% of the incremental costs and Rivers State will be responsible for 75% of the Programme costs together with existing costs.

The estimated total cost for the five years Rivers State ADA Programme is 61.3 million Naira, or 12.3 million Naira per year. All phases of the ADA Programme are designed to transform a Rivers State Agricultural Development Project into an ADP.

6.1 RIVERS STATE ADA PROGRAMME OBJECTIVE

The overall objective of the Rivers State Accelerated Development Programme is to assist smallholders to increase production and productivity of the major staple foodstuffs by an average of 3.5% per annum. This includes cassava, yams, plantains, cocoyams, and maize. The Programme also aims at assisting fishermen to improve their efficiency and increse the quantities of fish for sale.

The overall objective has been broken down into the following items:

6.1.1 Agriculture

The main activities will be: the establishment and organization of a well supported Extension Service based on the Training and Visit System; the increasing of the number of the Extension Agents to attain an Extension Agent/Farmer ratio of 1:640; The assembling of appropriate agronomic packages; and to carry our adaptive research up to date specific cropping recommendations.

6.1.2 Inputs

An effective, commercially oriented input distribution system will be established to ensure adequate and timely supply of essential inputs to farmers.

6.1.3 Rural Infrastructures

All-weather access to input stores and other ADAP facilities will be provided, together with facilities to properly maintain all plant and equipment to ensure efficient operation of the ADA Programme Management Unit.

6.1.4 Human Resources Development and Training

Steps will be taken to ensure that the recruitment and training of all personnel employed for implementing the Programme is adequate, and fully geared to provide the skills necessary for its success, whilst collaborative relationships with existing Institutions and Organizations in Rivers State will be developed.

6.1.5 Credit and Marketing

Thorough analyses of credit and marketing resources, policies and procedures in the State will be conducted and smallholders will be advised on sources of accessible credit and potential marketing outlets.

7. THE GREEN REVOLUTION PROGRAMME

The Green Revolution Programme was launched in January 1980. It aims at accelerating agricultural production through the modernization of the sector by removing constraints and by providing necessary inputs such as improved seeds, fertilizers, water, credit and machinery.

In 1981 the budget of the Green Revolution Programme was 1,853 million U.S. Dollars.

An additional programme to the Green Revolution Programme is a crash-rice production programme which was launched in May 1981 with a budget of 159 million U.S. Dollars. The main objective of this Programme is to reduce dependence on imported rice by removing constraints and encouraging domestic production.

8. AGRICULTURE IN RIVERS STATE

8.1 FOOD PRODUCTION AREAS

It is estimated that in Rivers State about 1.8 million ha of land are suitable for agricultural development.

Out of these 1.8 million ha, only 900,000 ha are under cultivation, including food and tree crops.

The most important areas of potential agricultural development are:

- Zone 1 This is an area of about 1,700 km^2 (5% of the State). It comprises Bori and Okrika/Obigbo/Tai/Eleme Local Government Areas.
- Zone 2 Area 750 km^2 (3.5% of the State). It comprises Yenagoa and Sagbama Local Government Areas.
- Zone 3 The area is about 400 km^2 (2% of the State). It comprises Brass Local Government Area.
- Zone 4 Area 1,300 km^2 (6% of the State). It comprises part of Yenagoa and Sagbama Local Government Areas.
- Zone 5 The area is about 5,720 km^2 (26% of the State). It comprises Ahoada, Ikwerre/Etche and Port Harcourt Local Government Areas
- Zone 6 (Coastal Belt). The area is about 1,295 km^2 (6% of the State). It comprises part of Brass, Degema and Bonny Local Government Areas.

It should be pointed out that zones 1 and 5 are the best food production areas, and that zone 6 (Coastal Belt) is a fish producing area. Zones 2, 3 and 4 are also good food production areas, but there is still abundance of land suitable for agriculture and considerable potential for further increasing food production by the application of available resources and technical recommendations.

The southern part of the State (Coastal Belt) constitutes the Riverine Area which is subjected to seasonal flooding and has marginal to sub-marginal areas for food production (see Table 16).

Table 16 - RIVERS STATE SELECTED ZONES FOR FOOD CROPS PRODUCTION SOME BASIC DATA

ZONE NAME	GROSS AREA Km^2	TOTAL POPULATION (000)	POPULATION DENSITY N°/ Km^2	ESTIMATED AGRICULTURAL POPULATION (000)	PERCENTAGE OVER TOTAL POPULATION	ESTIMATED NUMBER FARM FAMILIES (000)	LAND TYPE	CROPPED AREA/ FAMILY Ha	TOTAL HECTARES	MAIN FOOD CROPS	MAIN TOWNS
SOLGA and OTELGA	1,516	349	256	311	80	38.9	Upland	0.65	25,285	Yam Cassava Maize Cocoyam	Bori Okrika/ Obigbo/ Tai / Eleme
KELGA	2,934	315	109	276	89	34.5	Upland	0.90	31,050	Yam Cassava Maize Cocoyam	Ikwerre/Etche Isiokpo
AHOADA	1,434	133	89	117	88	14.6	Upland	1.10	16,060	Yam Cassava Maize Cocoyam	AHOADA Town
YENAGOA	1,000	81	81	69	85	8.6	Upper Riverine	1.10	9,460	Plantain Cassava Rice	Yenagoa Town
ROLGA	650	33	58	32	84	4.0	Middle Riverine	1.20	4,800	Plantain Cassava Rice	Abobiri
TOTALS	7,554	955	127	805	-	100.6	-	-	86,655	-	-

SOURCE: Rivers State accelerated development area programme.

The majority of the population in the riverine area is engaged in fishing activities.

However, rice and plantain production in selected areas of this part of the State and, to a lesser extent, that of cassava, yams and cocoyams could be extended and established with success mainly for auto-consumption because the riverine transportation system is very expensive.

In respect of the yields of the major food crops, table 17 gives the difference between the upland and riverine land type.

8.2 HERBACEOUS CROPS

These include annual and perennial species, among which the most important in Rivers State are :

. cereals : e.g. rice and maize;
. tuber crops : e.g. cassava, yams, cocoyams;
. vegetables : e.g. tomatoes, okra, sweet potatoes, plantains;
. fruit plants : e.g. pineapples, bananas, pawpaw.

8.2.1 Maize (Zea Mays)

Maize is generally grown in all parts of the State, but especially in upland areas where the soil is dry and there is a long tradition of maize cultivation.

Great importance is given to this crop and financial support by the Government is considerable. This support aims at reducing imports from overseas and at encouraging farmers to cultivate new areas with the objective of increasing local production for human consumption and for production of animal feedstuffs.

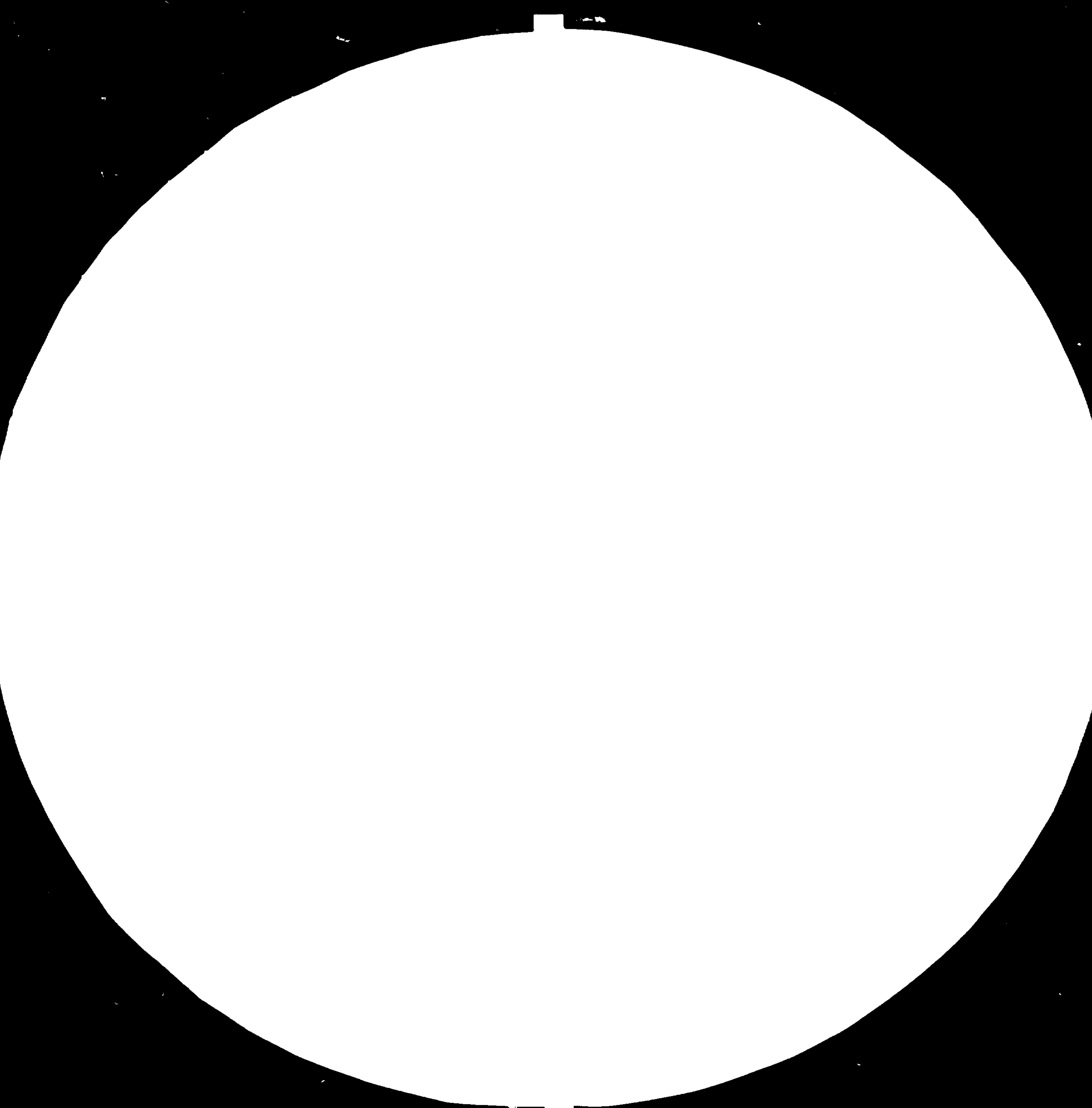
Large quantities of maize, in fact, are at the moment sold in the local markets as green maize which produces a prompt cash revenue. Maize is undoubtedly considered a cash crop by farmers, a new concept in food-crop production.

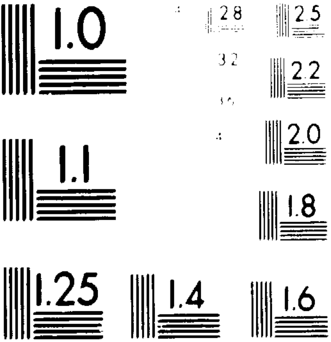
At present maize is interplanted with cassava. There are only a few cases of sole crop cultivation. Intercropping with cassava reduces cultivation costs since the main operations are carried out at the same time. It

Table 17- EXISTING AND POSSIBLE YIELDS OF FOOD CROPS IN SELECTED ZONES OF RIVERS STATE

CROPS	CROPPING SYSTEM	LAND TYPE	POSSIBLE YIELDS TONNES/HA	EXISTING YIELDS TONNES/HA
CASSAVA	Sole	Upland	16 - 20	6 - 10
	Intercropped	Upland	10 - 14	4 - 8
	Sole	Riverine	8 - 10	5 - 8
	Intercropped	Riverine	6 - 8	4 - 6
YAM	Intercropped	Upland	8 - 10	4 - 6
MAIZE	Sole	Upland	2.5 - 3.5	Not available
	Intercropped	Upland	2 - 2.5	0.6 - 1.2
COCOYAM	Sole	Upland	6 - 8	3 - 5
	Sole	Riverine	5 - 6	3 - 4
PLANTAIN	Sole	Riverine	12 - 15	6 - 8
RICE	Sole	Riverine	2 - 3	1 - 1.5

SOURCE : Rivers State accelerated development area programme - IFAGRARIA estimates





MICROCOPY RESOLUTION TEST CHART

has been proved by experience that cassava yields are not affected by the presence of maize; in any case the present favourable market conditions offer encouragement for the practice to be continued.

The area under cultivation is estimated at 10,000 ha according to the M.A.N.R. - Rivers State (see Table 6).

Yields vary considerably and are generally low being of 0.6-1.2 tonnes per hectare. This gives an estimated production of approximately 10,000 tonnes per annum.

In economic terms,at a farm-gate price of 450 Naira/tonne, this means a gross output per ha of 270-540 Naira. Maize cultivation costs consist mainly of land preparation, manpower, harvesting, and drying operations when sold as grain.

Since most part of maize produced in Rivers State is sold as green maize, by-products are not available for processing.

Some of the main areas actually under cultivation and still offering large possibilities for expansion are as follows :

	Local Government Area	District
1.	Ahoada	Abuaodua, Omoko, Ekpeye
2.	Ikwerre/Etche	Ikwerre, Etche
3.	Bori	Nyo-Rhana
4.	Okrika. Obigbo/Tai/Eleme	Eleme Urban, Tai/Asa/Ndoki
5.	Degema	Buguma

There is a great potential for maize production in the upland areas. Yields of 2.5-3.5 tonnes/ha as sole crop, and 2.0-2.5 tonnes/ha intercropped with cassava, are obtainable by the use of improved hybrid varieties, fertilizers and proper cultivation practices.

The development programmes carried-out by the various institutions have given an estimated incremental hectarage of maize of about 12,500-20,000 ha. The programmes have been launched under the Fourth National Development

Plan 1981-1985 but their achievements are expected to be delated over 2-3 years.

The following table 18 is a tentative to evaluate , for the next five years, the expected incremental hectarage and production.

Tables 19 and 20 show the cultivation costs per hectare of maize intercropped and as a sole crop.

8.2.2 Rice (Oryza sativa)

Rice remains a relatively minor cereal in Rivers State, despite the large possibilities of utilizing suitable areas for its production (mangrove rice, salt-tolerant irrigated rice, rainfed irrigable rice in riverine zones, and upland irrigated rice).

Intensive efforts are therefore being continued by the Federal and State Governments to increase rice production and to stimulate farmers in this sector.

The reason for this is because overall food production is lagging, and partly because rice consumption has been expanding much faster than production. The very rapid growth of income in recent years, the liberalization of rice imports till recently, and consumer preference for this grain have led to a sharp increase in imports and consequently in domestic consumption. The demand for rice it estimated to have increased by an average of 20% annually since 1974. Rice demand in 1977 was 1,080,000 tonnes. The projected demand for 1990 is 3,170,000 tonnes according to the Federal Ministry of Agriculture (Lagos - Nigeria).

The Green Revolution Programme has launched a crash rice production programme with the objeccive of reducing dependence on imported rice and of increasing State rice production.

Table n. 18 - ESTIMATED INCREMENTAL HECTARAGE OF MAIZE IN RIVERS STATE ACCORDING TO THE PROGRAMMES LAUNCHED UNDER THE F.N.D.P.

INSTITUTIONS	PROJECT DESCRIPTION	ESTIMATED INCREMENTAL HECTARAGE (AS SOLE CROP)	EXPECTED YIELDS IN TONNES/HA	EXPECTED INCREMENTAL PRODUCTION IN TONNES
a) Rivers State Ministery of Agriculture and Natural Resources and Federal Department of Agriculture	see 4.1.1	3,000	3,0	9,000
	see 4.1.2	3,000	3,0	9,000
	see 4.1.3	500	3,0	1,500
	see 4.1.6	5,000-12,500	3,0	15,000-37,500
	see 4.1.8	80	3,0	240
b) Niger Delta Basin Development Authority	see 5.1.0	1,000	3,0	3,000
	see 5.2.1	100 (^)	2,0	200
	see 5.2.2	200 (^)	2,0	400
TOTAL		12,500-20,000	-	38,340-60,840

(^) Intercropped with cassava

SOURCE: IFAGRARIA Elaboration

Table 19 - MAIZE : INTERPLANTED WITH CASSAVA-CULTIVATION COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Hand planting	6	Man-days	5.00	30.00
2. Fertilizer (2 applic.)	6	Man-days	5.00	30.00
3. Weeding	15	" "	5.00	75.00
4. Cultivation	6	" "	5.00	30.00
5. Spraying	3	" "	5.00	15.00
6. Harvesting,husking and hauling	10	" "	5.00	50.00
7. Drying, bagging, storage	8	" "	5.00	40.00
8. Shelling	3	" "	5.00	15.00
TOTAL	57		Sub-Total	285.00
B. INPUT COST				
1. Seeds	kg 20	Improved variety	0.20	4.00
2. Fertilizers	" 400	N.P.K. Materials	2.50 50 kg/bag	20.00
3. Spraying	-	-		5.00
4. Bags	20	Jute bags	1.00	20.00
			Sub-Total	49.00
	Grand Total Cost/ha. = 334 Naira			
	Total Cost for geen maize = 260.00 Naira			

SOURCE : Various sources,field survey and IFAGRARIA elaboration

Table 20 - MAIZE : SOLE CROP - CULTIVATION COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	35	Man-days	5.00	175.00
2. Planting	5	" "	5.00	25.00
3. Cultivation	8	" "	5.00	40.00
4. Fertilizer (2 applic.)	6	" "	5.00	30.00
5. Weeding	3	" "	5.00	15.00
6. Spraying	3	" "	5.00	15.00
7. Harvesting, husking, hauling	10	" "	5.00	50.00
8. Drying, bagging, storage	8	" "	5.00	40.00
9. Shelling	4	" "	5.00	20.00
TOTAL	82	Sub-Total		400.00
B. INPUT COST				
1..Seeds	kg 25	Improved variety	0.20	5.00
2. Fertilizers	" 400	N.P.K. Materials per 50 kg/bag	2.50	20.00
3. Sprying	-	-		5.00
4. Bags	20	Jute bags		20.00
		Sub-Total		50.00
	Grand Total 450.00 Naira			
	Grand Total Green Maize 380.00 Naira			

SOURCE : Various sources, field survey and IFAGRARIA elaboration

Rice in Rivers State can be considered mainly as a cash crop. Rice is principally cultivated in swamp areas without irrigation. The main producing areas in Rivers State are as follows:

Local Government Area	District
1. Ahoada	Abua, Kugbo Urban, Agba/Egbema
2. Brass	Ogbia, Nembe
3. Bori	Gokana
4. Ikwerre/Etche	Etche
5. Bonny	Bonny, Ndoni
6. Okrika/Obigbo/Tai/Eleme	Tai/Asa/Ndoki, Eleme Urban
7. Yenagoa	Boma, East Boma, Oporoma

Projected areas for rice production development are:

Local Government Area	District
1. Ahoada	Engenni
2. Brass	Okoroma
3. Degema	Kalabari/Hille
4. Sagbama	Sagbama, Aleibiri
5. Yenagoa	Apoi/Bassan, Koluama, Epie/Atissa, East Boma, Oporoma

In the Riverine zone cultivation of rice is restricted to river banks where the soil is sandy or sandy loam.

The area under cultivation has been estimated at 2,000 ha (see Table 6). Paddy production is estimated at 2,000-3,000 tonnes annually.

The yields vary considerably from zone to zone and are generally low being of 1.0-1.5 tonnes per ha of swamp paddy.

In economic terms at a farm-gate price of 900 Naira per tonne, this means a gross output per hectare of 900-1,350 Naira. Imported rice is sold in the local market at 1,400 Naira per tonne.

Threshing is generally manual and drying is usually carried out in the farm yard. Very little machinery is used.

Swamp paddy cultivation costs consist mainly of land preparation, manpower, transplanting and harvesting operations.

Upland rice is also cultivated in some areas. The yields in this case are lower ranging from 0.6 to 0.9 tonnes per ha, giving a gross output per ha of 540-810 Naira.

Since production is in small dispersed quantities and since the use of machinery is limited, by-products are not utilized.

Rice mills in Rivers State are located as follows: Yenagoa, Rumuodomanya, Bori, Choba, Abobiri, Otuckpoti, Degema.

At present only the Bori rice mill is in operation.

The potential for rice production development is considerable. Two rice crops per year can be obtained using transplanting, chemicals, fertilizers, weed control and very careful land preparation.

Yields of 3.0-3.5 tonnes per ha with swamp and irrigated rice could be commonly reached.

The development programmes at present carried-out by the agricultural Institutions have given an estimated incremental hectarage of rice of about 13,000 ha. The programmes have been launched under the Fourth National Development Plan 1981-1985 but their achievements are expected to be delated over 2-3 years.

The following Table 21 is a tentative to evaluate , for the next five years, the expected incremental hectarage and production. Out of the 13,000 ha planned,about 3,000 ha will be under irrigation in the Pe-emabiri area.

No industrial processing facilities are foreseen in the short and medium term because the present one are estimated sufficient.

Tables 22, 23, 24 show the cultivation costs per ha of traditionally cultivated rice and of irrigated double-cropping cultivation.

Table n. 21 - ESTIMATED INCREMENTAL HECTARAGE OF RICE IN RIVERS STATE ACCORDING TO THE PROGRAMMES LAUNCHED UNDER THE F.N.D.P.

INSTITUTIONS	PROJECT DESCRIPTION	ESTIMATED INCREMENTAL HECTARAGE (AS SOLE CROP)	EXPECTED YIELDS IN TONNES/HA	EXPECTED INCREMENTAL PRODUCTION IN TONNES
a) Rivers State Ministry of Agriculture and Natural Resources and Federal Department of Agriculture	see 4.1.1	1,100	1,3	1,400
	see 4.1.2	2,000	1,3	2,600
	see 4.1.3	500	1,3	700
	see 4.1.5	100	1,3	130
b) Niger Delta Basin Development Authority	see 5.1.1	2,500	3,0	7,500
	see 5.1.2	300	3,0	900
	see 5.1.3	6,000	3,0	18,000
	see 5.1.4	100	3,0	300
TOTAL		12,600	-	31,530

SOURCE: IFAGRARIA Elaboration

Table 22 - PADDY : TRADITIONAL SWAMP CULTIVATION COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	10	Man-days	5.00	50.00
2. Clearing and burning	25	" "	5.00	125.00
3. Transplanting	25	" "	5.00	125.00
4. Weeding	20	" "	5.00	100.00
5. Harvesting, threshing 20 Tonnes day	15	" "	5.00	75.00
6. Drying 10 tonnes/day bagging , storage	10	" "	5.00	50.00
TOTAL	105	Sub-Total		525.00
B. INPUT COST				
1. Seeds	kg 25	Local variety	0.20	5.00
2. Hand tools	-	-	-	20.00
3. Bags	20	60 kg/jute bag	1.00	20.00
		Sub-Total		45.00
		Grand Total : 565.00 Naira		

SOURCE: Various sources,field survey and IFAGRARIA elaboration

Table 23 - PADDY : TRADITIONAL UPLAND CULTIVATION-COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	10	Man-days	5.00	50.00
2. Clearing, burning	25	" "	5.00	125.00
3. Sowing (broadcasting)	12	" "	5.00	60.00
4. Weeding	20	" "	5.00	100.00
5. Harvesting, threshing, 20 tonnes/day	15	" "	5.00	75.00
6. Drying 10 tonnes/day, bagging, storage	10	" "	5.00	50.00
TOTAL	92		Sub-Total	460.00
B. INPUT COST				
1. Seeds	kg 20	Local variety	0.20	4.00
2. Hand tools	-	-	-	20.00
3. Bags	20	60 kg/jute bags	1.00	20.00
			Sub-Total	44.00
		Grand Total : 504.00 Naira		

SOURCE : Various sources field survey and IFAGRARIA elaboration

Table 24 - PADDY : IRRIGATED DOUBLE-CROPPING CULTIVATION - COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	25	Man-days	5.00	125.00
2. Seed bed preparation	10	" "	5.00	50.00
3. Transplanting	30	" "	5.00	150.00
4. Pesticides, fungicides (4 applic)	12	" "	5.00	60.00
5. Herbicides (2 applic.)	6	" "	5.00	30.00
6. Fertilizing (4 applic.)	12	" "	5.00	60.00
7. Irrigation	10	" "	5.00	50.00
8. Harvesting, threshing, 20 tonnes/day	25	" "	5.00	125.00
9. Drying 10 tonnes/day, bagging, storage	20	" "	5.00	100.00
10. Maintenance channels, dykes etc.	30	" "	5.00	150.00
TOTAL	180	Sub-Total		900.00
B. INPUTS COST				
1. Seeds	kg 20	Improved variety	0.30	6.00
2. Pesticides, fungicides	As required	-	-	20.00
3. Herbicides	" "	-	-	30.00
4. Fertilizers	kg 900	N.P.K. Materials per 50 kg/bag	2.50	45.00
5. Bags	20	Jute bags	1.00	20.00
		Sub-Total		121.00
		Grand Total : 1,021.00 Naira		

SOURCE : Various sources field survey and IFAGRARIA elaboration

8.3 OTHER CROPS

8.3.1 Cassava (Manihot utilissima)

Cassava is the main food crop in Rivers State. It is generally grown in all the 10 Local Government Areas but preference should be given to Ahoada, Ikwerre/Etche, Bori, Okrika/Tai/Eleme/Obigbo, Degema and Brass Local Government Areas.

Ahoada L.G.A., in particular, has an abundance of land suitable for cassava production. Although the land is at present still under-utilized, it is estimated that about 50% of the total annual output of cassava is produced in this L.G.A.

The Ahoada area alone is estimated to produce about 15-20,000 tonnes of cassava per annum.

All estimates indicate that 60% of the farmers in Rivers State grow cassava.

Existing yields vary when upland and riverine areas of production, and sole or intercropped production, again in upland and riverine areas, are considered. Yields vary from 6-10 tonnes/ha for sole crop in upland areas, from 4-8 tonnes/ha for intercropped cultivation in upland areas, from 5-8 tonnes/ha for sole crop in riverine zones, and from 4-6 tonnes/ha for intercropped cultivation in riverine zones.

Estimates of the area under cultivation are based on the results of rural economic surveys based on sampling techniques carried out on rural households and, therefore, related to peasant farming. Since cassava is mainly intercropped with maize, and considering sole crop hectarage to be about 15% of intercropped hectarage, the area under cultivation is estimated at about 27,000 hectares by the M.A.N.R. of Rivers State (see Table 6). This gives a production of approximately 280,000 tonnes of fresh tubers considering an average yield of 8 T/ha.

In economic terms, at a farm-gate price of 100 Naira/tonne, this means a gross revenue per hectare of approximately 800,000 Naira. Traditionally fresh cassava tubers are converted into garri, the most popular staple food in Rivers State. The ratio of conversion is 4:1. So that the local made garri at a market price of 60 kobos per kg gives a gross revenue per ha of 1,200 Naira.

Garri production is entirely processed by artisanal processing. At present the industrial processing of garri is not recommended due to :

. preference of local consumers for fresh garri;

. lower price compared to the industrial processed garri (^);

. the economic and social impact that, at the moment, artisanal garri production at village level has in the social life of the rural population;

. the increase of industrial garri sold in the supermarkets in all the non-producing areas of Nigeria;

. the difficulty to acquire land to establish cassava plantations for large scale industrial production;

. the absence of marketing facilities for fresh cassava tubers.

However, improvements of some of the phases of artisanal garri production are already under way in some of the L.G.A., and similar programmes must be encouraged.

Finally, industrial garri production can be foreseen in the medium-long term programme, particularly with the changes in social and family status which will occur in the future.

Cassava in Rivers State must be considered a cash crop.

Rivers State has an excellent potential for increasing cassava production. This could be achieved by reducing the fallow period, the use of chemical fertilizers, and variety selection and distribution in the upland areas devoted to cassava production.

The development programmes at present carried-out by the agricultural Institutions have given an estimated incremental hectarage of cassava of about 14,000-22,000 ha and a production of 114,000-174,000 tonnes of tubers. The programmes included in the F.N.D.P. 1981-85 are expected to be executed with a delay of 2-3 years. The following Table 25 contains the elaboration of the estimates regarding the hectarage and production in the next five years.

Other programmes regarding the cassava cultivation are being studied by the State M.A.N.R., State MRDCTE, State MLG; NDBDA, FDAC, NFC and ADA Agricultural Agencies, with the main objective to increase the yield of cassava. Tables 26 and 27 show cultivation costs per ha of traditional and improved cultivation.

(^) Garri produced in the Eastern States by NRCC.

Table n. 25 - ESTIMATED INCREMENTAL HECTARAGE OF CASSAVA IN RIVERS STATE ACCORDING TO THE PROGRAMME LAUNCHED UNDER THE F.N.D.P.

INSTITUTIONS	PROJECT DESCRIPTION	ESTIMATED INCREMENTAL HECTARAGE (AS SOLE CROP)	EXPECTED YIELDS IN TONNES/HA	EXPECTED INCREMENTAL PRODUCTION IN TONNES
a) Rivers State Ministry of Agriculture and Natural Resources and Federal Department of Agriculture	see 4.1.1	6,000	8,0	48,000
	see 4.1.2	3,000	8,0	24,000
	see 4.1.6	5,000-12,500	8,0	40,000-100,000
b) Niger Delta Basin Development Authority	see 5.2.1	100 (^)	6,0	600
	see 5.2.2	200 (^)	6,0	1,200
TOTAL		14,300-21,800	-	113,800 -173,800

(^) Intercropped with maize

SOURCE: IFAGRARIA Elaboration

Table 26 - CASSAVA : TRADITIONAL CULTIVATION COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	25	Man-days	5.00	125.00
2. Howing and ridging	35	" "	5.00	175.00
3. Cutting seed pieces	2	" "	5.00	10.00
4. Hauling seed pieces	1	" "	5.00	5.00
5. Planting	8	" "	5.00	40.00
6. Weeding	5	" "	5.00	25.00
7. Harvesting, transport, loading	20	" "	5.00	100.00
TOTAL	96	Sub-Total		480.00

SOURCE : Various sources, field survey and IFAGRARIA elaboration

Table 27 - CASSAVA : IMPROVED MANUAL CULTIVATION - COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation				
- Plowing	30	Man-days	5.00	150.00
-Harrowing	15	" "	5.00	75.00
- Furrowing	15	" "	5.00	75.00
2. Planting				
- Cutting seed pieces	2	" "	5.00	10.00
- Hauling seed pieces	2	" "	5.00	10.00
- Planting	10	" "	5.00	50.00
3. Replanting	2	" "	5.00	10.00
4. Weeding	10	" "	5.00	50.00
5. Cultivation	6	" "	5.00	30.00
6. Fertilizing	6	" "	5.00	30.00
7. Pesticides	6	" "	5.00	30.00
8. Harvesting, transport, loading	20	" "	5.00	100.00
9. Contingencies (10% of sub-total)	-	-	-	62.00
TOTAL	124	Sub-Total		682.00
B. INPUTS COST				
1. Fertilizers	550 kg	N.P.K	2.50 per 50 kg/bag	27.50
2. Purchase of cuttings	10,000	Improved variety	0.01	30.00
3. Pesticides	20 kg	-		30.00
		Sub - Total		87.50
		Grand Total : 769.50 Naira		

SOURCE : Various sources, field survey and IFAGRARIA elaboration

8.3.1.1 Processing Cassava into Garri

Garri is a granular meal derived from the tubers of the bitter varieties of the cassava plant.

The potential of the cassava plant is both vast and varied: food for human consumption, animal feedstuffs, starch for industry, and ethanol as a fuel substitute. By far the largest demand is for human consumption in the tropical regions. The process of converting cassava tubers into garri is still performed every day in Rivers State, and the present-day village system may be observed from the following stages:

a) Root preparation
After peeling by hand, the tubers are grated into a pulp, either by hand or on a motor driven rasping drum;

b) Fermentation and dewatering
The pulp is placed in bags, and allowed to ferment for three or four days; during this period the free liquid is squeezed out of the pulp by placing heavy weights or stones on the top of the bags. The fermentation period is necessary to reduce toxicity, but more important to allow the characteristic slightly sour taste to develop.

c) Gelatinizing and drying
The fermented and partially dewatered pulp is then cooked in a steel or clay receptable placed over a wood fire. This partly gelatinizes the starch granules and reduces the moisture content in the final product. During this stage the remaining cyanide compounds are driven out.

8.3.2 Yams (Dioscorea sp.)

The yam is considered the second major staple food crop in Rivers State. However, it has not been given as much importance as maize, cassava, and rice among the farmers. The cultivation of this crop though is not very popular, especially due to its high labour inputs and the high cost of seeds for planting which represent an onerous capital investment for peasant farmers.

Yams are generally intercropped with maize and cassava.

Special areas of farming in the State are Ikwerre/Etche, Bori, Okrika/Obigbo/Tai/Eleme and Ahoada Local Government Areas.

The area under cultivation, about 5,800 ha in 1979-80 (see Table 6), was estimated in 1982 to be around 6,500 ha. Estimated production is about 30,000 tonnes per annum. The expected increase of production is 20% in 1985 and 40% in 1990 mainly due to the yield increase and not for the hectarage expansion. Existing yields are estimated at 4-6 tonnes per ha.

In economic terms, at a farm-gate price of 400 Naira per tonne, the gross revenue per ha is approximately 2,000 Naira.

Yam tubers are not processed. No industrial processing is foreseen in the near future.

Tables 28 and 29 show the cultivation costs for traditional and improved manual cultivation practices.

8.3.3 Cocoyams (Colocasia esculenta)

Like yams, the cocoyam is quite extensively grown in Rivers State. It represents a very common foodstuff.

The main areas of production are Ikwerre/Etche, Brass, Okrika/Tai/Eleme, Ahoada Local Government Areas.

Data on cocoyam production in Rivers State is not available. An estimate based on family food consumption habits indicates a production of about 27,000 tonnes.

The present area under cultivation is estimated at 6,000 ha, yields averaging 4.5 tonnes per ha.

At a farm-gate price of 400 Naire/tonne, the gross output per ha would be 1,600 Naira.

An increase in production presents the same problems and requires the same conditions as for yams. However, the expected 10% increase in production by 1985 and 20% by 1990 are taken into consideration even for cocoyams for use of improved agronomic practices.

Table 28 - YAM : TRADITIONAL CULTIVATION-COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	35	Man-days	5.00	175.00
2. Cutting seed sets	15	" "	5.00	75.00
3. Planting	10	" "	5.00	50.00
4. Staking	10	" "	5.00	50.00
5. Weeding	20	" "	5.00	100.00
6. Harvesting	25	" "	5.00	125.00
7. Transport, storage	15	" "	5.00	75.00
TOTAL	130	Sub-Total		650.00
B. INPUT COST				
1. Yam seed sets	1,800 kg	-	300/tonne	540.00
2. Stakes	3,000	-	0.02	60.00
		Sub-Total		600.00
		Grand Total : 1,250.00 Naira		

SOURCE : Various sources, field survey and IFAGRARIA elaboration

Table 29 - YAM : IMPROVED MANUAL CULTIVATION - COST PER HECTARE

DESCRIPTION	QUANTITIES	UNIT	UNIT PRICE (in NAIRA)	TOTAL COST (in NAIRA)
A. LABOUR COST				
1. Land preparation	50	Man-days	5.00	250.00
2. Cutting seed sets	20	" "	5.00	100.00
3. Planting	20	" "	5.00	100.00
4. Staking	12	" "	5.00	60.00
5. Weeding	35	" "	5.00	175.00
6. Fertilizing	10	" "	5.00	50.00
7. Pesticides	10	" "	5.00	50.00
8. Harvesting	50	" "	5.00	250.00
9. Transport, storage	20	" "	5.00	100.00
TOTAL	227	Sub-Total		1,135.00
B. INPUT COST				
1. Fertilizers	kg 400	N.PK.	2.50 50 kg/bag	20.00
2. Stakes	4,000	-	0.03	120.00
3. Pesticides	kg 15	-	-	20.00
4. Yam seed sets	kg 2,400	-	300/tonne	720.00
		Sub- Total		880.00
		Grand Total : 2,015.00 Naira		

SOURCE : Various sources, field survey and IFAGRARIA elaboration

8.3.4 Plantains (Musa paradisiaci)

The plantain, together with the cassava and yam, is a typical subsistence food in Rivers State. It is grown in many parts of the State, but preference should be given to the Yenagoa, Brass, Ahoada, Bori, Degama, Sagbama Local Government Areas.

The plantain is also grown in the riverine zone where it uses the high rainfall and shows rapid growth and good yields.

Yields are estimated at about 15 tonnes per ha. The area under cultivation, although statistics are controversial (^), may be estimated at 15,000 ha. The production is estimated at 220,000 tonnes.

No further development is expected for this crop.

Artisanal produced plantain chips are available in small quantities in the local supermarkets. No industrial processing is foreseen.

8.3.5 Bananas

The present M.A.N.R. Rivers State estimates present production at about 30,000 tonnes. They are grown in almost all L.G.A.S and villages or scattered throughout the State. Small plantations exist here and there.

8.3.6 Pineapples (Ananas comosus)

The area under cultivation is estimated at about 1,000 ha according to the M.A.N.R. Rivers State.Estimated production is 3,000-3,500 tonnes.

They are mainly grown in the Bori Local Government Area (Abua District).

The pineapples are marketed in Port Harcourt and other towns.

8.3.7 Vegetables

Generally grown in the Ikwerre/Etche, Okrika/Tai/Eleme and Ahoada Local Government Areas. The area under cultivation is estimated at about 1,000 ha according to the M.A.N.R. Rivers State.

(^) 3,400 ha in 1980 according to the M.A.N.R. Rivers State (see Table 6).

8.4 TREE CROPS

The most important tree crop cultivated in Rivers State is the oil palm, which grows in some of the Local Government Areas, in plantations or spontaneous.

The oil palm sector is dealt with at length in another part of the present report.

Other species of importance are present in some areas of the State but in smaller proportions, or cultivated as a supplement for the stable food. They are represented by coconuts (Cocos nucifera), avocado pears (Persea gratissima), mangoes (Mangifera indica), kola (Cola nitida), raffia palm (Raphia ruffia), rubber (Hevea brasiliensis), citrus, pawpaw (Carica papaya), cocoa (Theobroma cacao) and guava (Psidium guayava).

Among the above-mentioned species, coconut, cocoa, rubber, citrus, pawpaw and raffia palm are worth consideration.

8.4.1 Coconuts (Cocos nucifera)

Coconut trees grow in Bonny, Ahoada, and the Degema Local Government Areas.

A large plantation at Bonny, which covered 700 ha some years ago, is now partly abandoned and reduced to 50 ha.

The area under cultivation is estimated by the M.A.N.R. Rivers State at 2,000 ha. The production is about 3,000 tonnes.

Coconuts are not processed in Rivers State. Only a few tonnes of copra were sold last year to neighbouring States.

8.4.2 Cocoa (Theobroma cacao)

Cocoa is generally cultivated in the Yenagoa, Degema, Okrika/Obigbo/Tai/Eleme, Ahoada and Ikwerre/Etche Local Government Areas.

Total hectarage in the State has been estimated by the M.A.N.R. Rivers State at 2,000 ha; production in 1982 reached about 1,000-1,500 tonnes.

Only seven tonnes of cocoa have been inspected and graded by the Produce Inspection Stations of Rivers State in 1982, since the product is sold to Imo and Anambra States. Farmers in Rivers State are not encouraged to increase cocoa cultivation because of the instability and low price, and the absence of licenced Buying Agents who do not favour the establishment of local market opportunities.

8.4.3 Rubber (Hevea brasiliensis)

Rubber trees are cultivated in the Ahoada and Ikwerre/Etche Local Government Areas.

The practice of tapping rubber trees is discontinuous, and figures are not available.

8.4.4 Citrus and pawpaw

These are commonly found in some of the Local Government Areas.

The hectarage is not known. The Government is giving, at present, support for the expansion of these tree crops.

8.4.5 Raffia palm

The raffia palm is found growing spontaneously in the central part of the Riverine area in vast areas, situated just after the portions of land cultivated to plantain, cassava and swamp rice on the river banks.

It is estimated by the M.A.N.R. Rivers State that about 300 - 350,000 ha are covered by this plant. Raffia palm is utilized by local farmers for the production of palm wine, distilled from the palm, following traditional methods. The raw product is then again distilled and converted into what is called "local gin".

Theoretically this part of the State constitutes the largest natural reservoir of alcohol in the world.

The crude gin produced in the area by small artisanal distilleries has an alcohol content of 40 - 50%. The product is sold in Port Harcourt to a distillery at a price of 0.80 - 1.00 Naira per litre and processed into various types of spirits with addition of flavours (whisky, gin, brandy).

The refined product is sold locally at 6 Naira/litre, at 40% proof.

A peculiar aspect of the supply of this product is its great variability throughout the year. At present, the distillery receives a supply of 2 million litres/month. Apparently there exists a wide open market for local gin, but smuggling and the selling of palm wine and crude gin reduces the possibilities of establishing a steady market.

The price of palm wine if 0.70-1.00 Naira per gallon.

8.5 LIVESTOCK PRODUCTION

The Ministry of Agriculture and Natural Resources Livestock Projects included in the Fourth National Development Programme 1981-1985 and classified as "on-going projects" are as follows:

8.5.1 Beef Cattle Multiplication Farm

The project was proposed with the aim of developing:

a) a dairy farm of 2,000 Holstein Friesian cows and 100 White Fulani cows at Onne near Port Harcourt;

b) a pilot dairy processing plant with a capacity of 2,000 litres of fresh milk, 1,000 litres of yoghourt, 100 litres of ice cream, to be established at Onne; this project will have to start all over again if it is still to be executed at all;

c) beef cattle farm of the N'dama/Muturu breeds to be established at Obelle in the Ikwerre District starting with 300 breeding cows. This project has been abandoned because the site at Onne and its buildings have been taken over by the Rivers State University of Science and Technology;

8.5.2 Sheep and Goat Multiplication Farm

A farm of 500 sheep and 500 goats to be developed at Obelle Farm in the Ikwerre District.

8.5.3 Pig Breeding/Multiplication Centre located at Emakalakala

This project has taken over the pig sector of a combined pig and rabbit breeding unit at Elimgbu.

8.5.4 Pig Production Units

These units are to be established at the Demonstration Farm Centres.

8.5.5 Rabbit Breeding Farm at Elimgbu

8.5.6 Livestock Farm Units

These units consist of poultry, pigs, rabbits, sheep, goats and cattle in all the Demonstration Farms in the Local Government Units. Out of these 16 are in operation.

8.5.7 Poultry Production Project

The aim of the Project is to expand extension activities for practical poultry production, construction of brooder-houses, broiler-houses, deep-litter houses, battery-cage laying houses, in all the 43 Units into which the State has been re-structured, to provide poultry production inputs at subsidized prices.

The hatchery will produce 25,000 chicks per week. The production will be in the ratio of 40% pullets/cockerels and 60% broilers (or 1.40 million and 1.56 million per annum respectively) utilizing about 30,000 parent stock.

The project is based at Atali but with 4 sub-stations for purposes of isolation.

The project targets are as follows: a 2,000-bird capacity brooder house to be erected in each District, 3,000-bird deep-litter layer houses, a 1,000-bird battery-cage house and a broiler house to produce 1,000 broilers per month to be established in each District.

The status of the project is: on-going project. Source of finance: Federal and State Governments.

8.5.7.1 Poultry Keeping

Poultry keeping is the predominant livestock activity in Rivers State. There are a number of farmers with over 20,000 layers. Most of the poultry farmers keep layers and raise a few broilers mainly to coincide with festive occasions.

Egg production is the sector most favoured by local poultry farmers because of the wide-open market and the eating habits of the urban population.

Poultry is mainly concentrated in the area commonly referred to as Greater Port Harcourt, where there is a ready market for poultry and poultry products. However, raising of layers is a common practice in almost all Local Government Areas.

The estimated poultry meat production in 1981 was about 900 tonnes against an estimated demand of 7,000 tonnes. The projected demand for 1985 is about 8,000 tonnes while the production is estimated to grow to 1,100 tonnes (see Annex 3 - para. 1.2).

Estimated eggs production in 1981 was about of 2 million eggs against a demand calculated at 12 million eggs. The projected figures for 1985 are as follows :

- production 2.5 million eggs/year
- demand 14.0 million eggs/year.

8.5.8 Pork Production

In Nigeria the gap between supply and demand of pork meat is of about 10,000 tonnes; in Rivers State it is estimated to be about 2,000 tonnes.

The on-going programme of the NDBDA for setting up a piggery at Isiokpo will considerably reduce the pressure of demand from local buyers. Presently no other initiatives are being implemented for the expansion of pork production.

8.5.9 Sheep and goat production

Sheeps and goats are kept by many farmers but not under modern standards. They are raised all over the State in small units (see Tables 30 and 31). The NDBDA is planning the establishment of a small Ruminant Rural Development Scheme.

8.5.10 Cattle production

As for cattle raising, it has to be noted that the Rivers State farmer is not a traditional cattle breeder, even though two or three cattle of the Muturu Breed may be encountered in a few villages within the State. Only one farmer at Abua, Ahoada Local Government Area, can be said to be keeping cattle to modern standards.

8.5.11 Meat consumption

Data on meat consumption are very unreliable thus making it difficult to estimate actual production in the State. However for all practical purposes production within the State is far below demand, as a lot of meat comes from outside.

It has been estimated that in 1982, 250,000 sheeps and 150,000 goats were imported for slaughter from Niger and Chad. This large-scale importation is confirmed by the fact that in the State 50% of the meat consumed comes from sheeps and goats.

The annual consumption of goat meat per person in the Eastern part of Nigeria has been calculated to be 1.5 kg.

Table 30 - SMALL RUMINANT POPULATION IN RIVERS STATE

LOCAL GOVERNMENT AREA	SHEEP Nº OF HEAD	GOATS Nº OF HEAD	DISTRIBUTION PERCENTAGE	TOTAL NUMBER SHEEP + GOATS
ALGA	9,568	23,296	20.8	32,864
BALGA	2,668	6,496	5.8	9,164
BOLGA	13,846	33,712	30.1	47,558
DELGA	920	2,240	2.0	3,160
KELGA	11,408	27,776	24,8	39,184
OLGA	460	1,120	1.0	1,580
OTELGA	1,058	2,576	2.3	3,634
PHALGA	1,058	2,576	2.3	3,634
SALGA	1,334	3,248	2.9	4,582
YELGA	3,680	8,960	8.0	12,640
TOTAL	46,000	112,000	100,0	158,000

SOURCE: FAO - Agricultural developmente in Nigeria - 1980-1981

Table 31 - REGISTERED SMALL RUMINANT FARMERS AND RELATED SHEEP AND GOAT POPULATION IN RIVERS STATE

LOCAL GOVERNMENT AREA	N° OF FARMERS	SHEEP N° OF HEAD	GOAT N° OF HEAD	TOTAL NUMBER OF HEAD
ALGA	20	978	1,500	2,478
BALGA	8	200	800	1,000
BOLGA	6	600	1,200	1,800
DELGA	19	700	6,000	6,700
KELGA	30	4,000	8,000	12,000
OLGA	12	500	850	1,350
OTELGA	14	530	920	1,450
PHALGA	12	600	2,000	2,600
SALGA	9	240	380	620
YELGA	25	740	988	1,728
TOTAL	155	9,088	22,638	31,726

SOURCE : Rivers State - Farmers council Secretariat - Port Harcourt 1981

8.5.11.1 Livestock Statistics (1980)

1.	Poultry	
	a) local type	4,500,000
	b) exotic type under modern management	800,000
2.	Pigs	4,000
3.	Sheep	46,000
4.	Goats	112,000
5.	Cattle	500

8.5.11.2 Livestock Feed Mills

a) Elimgbu capacity: 3 tonnes/hour

b) Rumuodomanya capacity: 7.5 tonnes/hour

c) Proposals for other sites being at Degema, Yenagoa, Okehi and Bori for 2.5 tonnes capacity/hour. None have taken off yet.

The Rumuodomanya feed mill is under construction.

9. FEDERAL DEPARTMENT OF AGRICULTURE COOPERATIVES (FDAC)

The Federal Department of Agriculture Cooperatives was established in October 1st, 1979.

The FDAC was established to use the agriculture cooperative movement as a vehicle of social and economic development at grass-roots level, under the Green Revolution Programme.

The Federal Government, through the FDAC, hopes to achieve the following objectives:

1. increase agriculture output;
2. use of better cultivation methods;
3. purchase of inputs at subsidized prices;
4. raise the farmers' income
5. offer services to members;
6. sale of pure and unadulterated goods;
7. avoid exploitation by middlemen;
8. provide adequate storage and marketing facilities;
9. supply and market consumer goods;
10. formulation of National policy on agriculture co-operatives;
11. co-ordination of inter-State and inter-Governmental activities in agricultural and food sectors;
12. promotion, development and supervision at Federal level of agriculture co operative organizations throughout the Federation.

The main projects of FDAC are:

a) Federal Co-operative Feed-Millsdevelopment;
b) Agricultural Co-operative Rural Storage Depots;
c) Inter-state food supply, marketing and distribution.

Table 32 shows the co-operatives in Rivers State.

Table 32 - REGISTERED AND UNREGISTERED CO-OPERATIVES - RIVERS STATE (AS AT DECEMBER 1982)

LOCAL GOVERNMENT AREAS	FOOD CROPS		CASH CROPS		MULTIPURPOSE		POULTRY		OTHERS		TOTAL	
	Number Regist Unregist	Member Ship	Number Regist Unregist	Member Ship	Number Regist Unregist	Member Ship	Number Regist Unregist	Member Ship	Number Regist Unregist	Member Ship	Number Regist Unregist	Member Ship
ALGA	53	2,750	5	125	83	3,719	8	240	10	193	165	7,027
BALGA	-	-	-	-	24	1,086	-	-	5	97	29	1,183
BOLGA	29	1,350	5	150	80	3,606	9	230	15	288	138	5,624
FELGA	30	1,200	-	-	19	938	16	455	5	96	70	2,589
KELGA	29	1,205	8	180	76	3,398	8	230	10	190	131	5,203
OLGA	-	-	4	100	23	978	9	235	9	176	45	1,499
OTELGA	89	3,550	-	-	48	2,099	16	460	16	309	169	6,418
PHALGA	-	-	-	-	93	4,135	8	245	12	231	113	4,611
SALGA	-	-	-	-	24	1,049	-	-	5	94	29	1,143
YELGA	-	-	-	-	63	2,834	-	-	8	155	71	2,989
TOTAL	235	10,055	22	555	533	22,742	74	2,095	95	1,829	959	38,276

SOURCE: Federal department of agricultural Co-operatives field office, Port Harcourt - Rivers State
IFAGRARIA estimates, March 1983 - Port Harcourt.

MINISTRY OF RURAL DEVELOPMENT AND COOPERATIVE SOCIETIES

REGISTERED COOPERATIVES IN RIVERS STATE

COOPERATIVE SOCIETIES TYPES:

CCF : Community Cooperative Farm
MCS : Multi-purpose Cooperative Society
FMCS : Farmers' Multi-purpose Cooperative Society
CU : Cooperative Union
CCS : Consumers' Cooperative Society
CTCS : Cooperative Thrift and Credit Society

- The Community Cooperative Farms are purely engaged in farming;
- The Multi-purpose Cooperative Society and the Farmers' Multi-purpose Cooperative Society are engaged in several activities such as farming, credit and distribution;
- The Cooperative Unions are partly engaged in farming;
- The Consumers' cooperative Societies are partly engaged in farming and distribution;
- The Cooperative Thrift and Credit Society has members who wre engaged in farming.

9.1 CO-OPERATIVE SOCIETIES

The main objectives of the societies are to promote the economic interestsof their members and especially:

1. to increase food and cash crop production not only for subsistance living but also for the market;
2. to encourage regular savings among the members so that the Society may serve as a village bank for the Local Community;
3. to stock consumers' and producers' goods;
4. to undertake the production or the manufacture of consumers' or/and producers' goods;
5. to acquire areas of farm land for development into tree crop plantations or food crops production;
6. to encourage the adoption of better farming methods;
7. to market in the best conditions first quality products;
8. to create processing facilities.

(See Tables 33 and 34)

Table 33 - REGISTERED CO-OPERATIVE SOCIETIES IN RIVERS STATE (AS AT 12/11/1982)

LOCAL GOVERNMENT AREA	C C F		M C S		F M C S		C U		C C S		C T C S		TOTAL	
	Nº	Initial Membership	Nº	Initial Membership	Nº	Initial Membership	Nº	Initial Membership	Nº	Initial Membership	Nº	Initial Membership	Nº	Initial Membership
ALGA	1	30	57	2,297	49	1,897	7	203	1	15	4	112	119	4,554
BALGA	-	-	25	966	6	140	4	60	4	141	4	208	43	1,515
BOLGA	2	59	85	3,307	18	739	4	119	4	228	10	314	123	4,766
ECLGA	-	-	15	422	9	243	3	44	-	-	-	-	27	709
KELGA	2	76	60	2,199	37	1,783	1	33	1	17	2	46	103	4,154
OLGA	-	-	24	1,309	4	83	2	11	-	-	3	220	33	1,623
OTELGA	5	289	33	1,110	27	1,203	2	18	2	71	-	-	69	2,691
PHALGA	-	-	116	3,203	2	70	3	396	5	196	6	209	132	4,074
SALGA	-	-	20	465	10	193	-	-	-	-	-	-	30	658
YELGA	2	99	60	1,710	21	592	4	48	3	102	2	49	92	2,599
TOTAL	12	552	405	16,088	183	6,943	30	932	20	770	31	1,158	771	27,343

SOURCE: Ministry of rural development and Co-operative societies
Port Harcourt - Rivers State.

Table 31 - CASSAVA/MAIZE GROUPS FOR 1992 - REGISTERED CO-OPERATIVE SOCIETIES - RIVERS STATE

NAME OF GROUP	LOCAL GVT AREA	LOCATION	MEMBERSHIP
Omoku F.M.C.S Lrd	Alga	Omoku	28
Omoku National F.M.C.S Ltd	"	"	41
Otapha Community M.C.S. Ltd	"	Otapha	45
B/Dere F.M.C.S.	Bolga	B/Dere	62
Tera-Ve F.M.C.S. Ltd	"	Tera-Ve	33
Vegwere F.M.C.S.	"	Vegwere	28
Ndle Farmers M.C.S.	Kelga	Ndele	32
Elele Alimini F.M.C.S.	"	Elele Alimini	19
Omuma F.M.C.S.	"	Omuma	42
Okehi M.C.S.	"	Okehi	30
Ulakwo Etche F.M.C.S.	"	Ulakwo	47
Ok Porowo Obbakiri F.M.C.S.	"	Ok Porowo	30
Etche F.M.C.S.	"	Etche	35
Ozuzu F.M.C.S.	"	Ozuzu	50
Omagwa progressive M.C.S.	"	Omagwa	36
Egbeda	"	Egbeda	32
Aleto F.M.C.S.	Otelga	Aleto	27
Ngofa	"	Ngofa	38
Rumuene F.M.C.S.	Phalga	Rumuene	60
			715

SOURCE: Ministry of Rural development and Co-operative societies
Port Harcourt - Rivers State.

10. THE NATIONAL COUNCIL OF NIGERIAN FARMERS - RIVERS STATE BRANCH

The National Council of Nigerian Farmers is a Group Farmers Organization operating in Rivers State at farmer level.

The Council has already organized Group Farmers all over the State and is carrying out a massive campaign to induce the farmers and stimulate their farming activity.

The main objective of the Council is to reach the major number of farmers and organize them into Group Producing farmers.

The capillary organization is already established, and massive efforts are being made to reach small farmers unable to benefit from Government agricultural programmes.

The Group Farmers are not at present market-oriented since most of them are engaged in food crop production mainly for family consumption.

The membership allocated to related fields, and the estimate of cropped area and numbers of farmers engaged in farming under the National Council of Nigerian Farmers Organization are shown in tables 35, 36 and 37.

Table 35 - ESTIMATED NUMBERS OF GROUP FARMERS ENGAGED ON FOOD CROP PRODUCTION (1982)

LOCAL GOV. AREA	CASSAVA	MAIZE	RICE	YAM	COCOYAM	PLANTAIN	VEGETABLE	TOTAL
ALGA	3,600	1,000	-	100	24	1,500	50	6,274
BALGA	360	150	250	15	16	2,000	2	2,793
BOLGA	1,800	1,000	-	100	40	1,300	2	4,242
DELGA	600	250	-	25	10	1,800	2	2,687
KELGA	3,000	1,250	-	125	40	50	80	4,545
OLGA	360	150	-	15	12	200	2	739
OTELGA	1,440	600	-	60	30	500	2	2,632
PHALGA	360	150	-	15	6	100	2	633
SALGA	120	50	-	5	4	10	2	191
YELGA	360	150	250	15	18	2,300	2	3,095
TOTAL	12,000	4,750	500	475	200	9,760	146	27,831

SOURCE: National Council of Nigerian farmers - Rivers State Branch.

Table 36 - ESTIMATED NUMBER OF FARMERS ENGAGED IN AGRICULTURE AND CROPPED AREA ON MAJOR FOOD AND TREE CROPS IN 1982

LOCAL GOVERNMENT AREA	FOOD CROPS			TREE CROPS		
	Membership N°	Cropped area Ha	Major crops	Membership N°	Cropped area Ha	Major crops
ALGA	6,374	17,655	C-CY-Y-V-M-P	765	2,538	RU-CN-CC
BALGA	2,822	7,552	CY-P-R	-	-	-
BOLGA	4,292	11,590	C-CY-Y-M-P	45	90	CN
DELGA	2,687	7,870	-	195	432	CN-CC
KELGA	4.595	12,670	C-CY-Y-M-V	200	900	PO
OLGA	789	2,142	CY-P-	355	720	CN
OTELGA	2.682	7,393	C-CY-Y-M-P-V	10	40	CC
PHALGA	683	1,777	-	-	-	-
SALGA	381	894	-	-	-	-
YELGA	3,095	8,457	CY-R-P	20	80	CC
TOTAL	28,400	78,000	-	1,590	4,800	-

C = Cassava
CY = Cocoyam
Y = Yam
M = Maize
P = Plantain
R = Rice
V = Vegetable
RU = Rubber
CN = Coconut
CC = Cocoa
PO = Palmoil

SOURCE: National Council of Nigerian farmers - Rivers State Branch.

Table 37 - ESTIMATED HECTARAGE OF MAJOR CROPS IN 1982

LOCAL GOV. AREA	CASSAVA	MAIZE	RICE	YAM	COCOYAM	PLANTAIN	VEGETABLE	TOTAL
ALGA	10,770	2,000	-	200	60	4,500	125	17,655
BALGA	1,077	300	50	30	40	6,000	5	7,502
BOLGA	5,385	2,000	-	200	100	3,900	5	11,590
DELGA	1,795	500	-	50	25	5,400	5	775
KELGA	8,975	2,500	-	250	100	600	200	12,625
OLGA	1,077	300	-	30	30	600	5	2,042
OTELGA	4,308	1,200	-	120	75	1,500	140	7,343
PHALGA	1,077	300	-	30	15	300	5	1,727
SALGA	359	100	-	10	10	300	5	784
YELGA	1,077	300	50	30	45	6,900	5	8,407
TOTAL	35,900	9,500	100	950	500	30,000	500	77,450

SOURCE: National Council of Nigerian farmers - Rivers State Branch.

11. CREDIT ACCESSIBILITY IN RIVERS STATE

Most of the agricultural food produced in Rivers State is from smallholders.

Smallholders, in fact, make up no less than 70% of the rural population. The productivity of these farmers is at present limited by the lack of extension and commercial services. The purchase of agricultural inputs (fertilizers, seeds, chemicals, tools, etc.) and hired labour is very often beyond the smallholders' financial means.

Farmers experience difficulty in obtaining credits for agricultural production from commercial banks and other formal financial institutions. This difficulty arises from:

a) high risks associated with smallholders' farming operations;
b) the lengthy bureaucratic procedures of the credit institutions;
c) the inaccessibility of credit institutions to the farmers;
d) inability of smallholders to provide adequate guarantees for the funds they require.

Agriculture credit is presently available in Rivers State through both formal and informal sources.

The formal sources are:

a) Ministry of Agriculture and Natural Resources supervised Agricultural Credit Scheme (SACS);
b) National Agricultural Credit Bank (NACB);
c) Shell Community Development Project (SCDP);
d) Niger Delta Basin Development Authority (NDBDA);
e) Commercial Banks.

The informal sources consist of friends and relations, local organizations, clubs, money lenders, merchants, and licenced buying Agents.

11.1 SUPERVISED AGRICULTURAL CREDIT SCHEME

This Scheme was set up in 1976. Currently any farmer can apply for a SACS loan for any of the following purposes:

a) cultivation of maize/cassava or plantains;
b) maintenance of oil palm plantations;
c) poultry production;
d) pig production.

Loans are granted in cash. The rate of interest on loans is 6% per annum, in accordance with the directive of the Central Bank of Nigeria. There is a grace period of between 12 and 24 months, and the repayment of food-crop loans is scheduled in 6 equal monthly instalments, with the first instalment including the total interest payment on the loan.

On receiving the loan, the farmer is expected to contribute 10% of estimated financial needs. On this basis, loans are granted as follows:

a)	4 ha maize/cassava cultivation	6,000 Naira
b)	4 ha plantain cultivation	6,000 Naira
c)	maintenance/production of 10 ha of oil palms	10,000 Naira
d)	500-layer poultry unit	4,000 Naira
e)	8-pen piggery unit	15,000 Naira

The maximum loan that can be granted to a co-operative society as an agriculture company is 40,000 Naira, whilst that of an individual farmer is 15,000 Naira.

The SACS receives its funds from two sources: the Rivers State Government and the NACB.

Up to now the SACS scheme has had a very poor repayment record. Because of this poor record it is unlikely that NACB will provide any further funds to the scheme.

The large amounts of loans due for repayment must be recovered from the defaulting farmers.

11.2 THE NIGERIAN AGRICULTURAL AND COOPERATIVE BANK (NACB)

The NACB Ltd. was founded as such in 1978 and is currently the principal Federal Agency for the supply of agricultural credit. The Bank was established with the following objectives:

a) to promote agricultural production and rural development;
b) to improve the income and the quality of life of Nigeria's rural population.

The NACB operates three types of loan schemes:

1. the direct lending scheme;
2. the on-lending scheme;
3. the smallholder Direct Loans Scheme.

11.2.1 Direct Lending Scheme

This provides loans to individuals, companies, corporations and farmers' organizations who can meet the NACB preconditions; the land concerned must be legally owned by the applicant and the loan must be adequately secured.

11.2.2 On-lending Programme

This programme is for established institutions against repayment guarantees for on-lending to thid parties; these institutions include public corporations, co-operative bodies and companies.

11.2.3 Direct Loans Scheme

The smallholder direct loans scheme allows each farmer to borrow an amount not exceeding 5,000 Naira, which means that very few farmers can benefit due to the small allocations made.

11.3 SHELL COMMUNITY DEVELOPMENT PROJECT (SCDP)

The ultimate objective of the project is to develop the communities based on the oil-field zones and build the necessary social and economic framework for them.

The immediate aim is to provide an agricultural extension service for animal and crop production, with supporting facilities for the rural population. The credit component of the project involves the provision of inputs, such as loans to crop and livestock farmers. Planting materials, cocoa spraying equipment, livestock feeds, chemicals and garri grating machines are given as credit in kind.

SCDP credit is given to farmers on an individual basis and guaranteed by farmers co-operative societies where necessary. Loan repayment is generally made in kind.

11.4 THE NIGER DELTA BASIN DEVELOPMENT AUTHORITY (NDBDA)

The NDBDA was requested in 1981 by the Federal Government to administer a 5 million Naira smallholder loan fund. The money has started to be loaned to the farmers at 7% interest.

As part of the NDBDA revised programme 1.5 million Naira out of the original grant was spent on machinery for land clearing and arable cultivation, which, in turn, was to be hired to beneficiaries of the loans.

The remaining 3.5 million Naira is being loaned to smallholders selected by the loan Committee.

11.5 FEDERAL CREDIT PACKAGE TO THE FARMERS THROUGH THE CO-OPERATIVE GROUP FARMERS

The package consists of:

a) tractors;

b) seeds;

c) fertilizers;

d) extension activities.

The tractor subsidy covers up to 75% of the cost, of which 50% is from Federal funds and 25% from Rivers State resources.

Repayment of the 25% of the cost is made within 36 months without any interest being charged. Maintenance and repairs of the machines are at co-operative Group Farmers' expense.

The Federal Credit Programme will also provide the assistance of a mechanical engineer.

Supply of seeds is free of charge.

The fertilizer subsidy covers up to 75% of the cost, 50% being provided by Federal and 25% by Rivers State funds.

The actual costs to the farmers are:

. Complex (15+15+15)	2.80 Naira per 50 kg bag
. Superphosphate	2.50 Naira per 50-kg bag
. Single Super	2.20 Naira per 50-kg bag

11.6 CREDIT CONSTRAINTS

The major constraints to effective credit administration in Rivers State are:

a) lack of adequate knowledge of the traditional agricultural credit scheme;
b) lack of information about the formal sources of credit available to small holders;
c) lack of adequate personnel and management capability for the existing Government Credit Institutions.

12. SUMMARY AND CONCLUSIONS

Agriculture activity in Rivers State has to be considered as "smallholder subsistence activity" with pronounced fragmentation of the land and with a pattern of land ownership that results in small farm holdings.

The present agricultural practices require long periods of fal - low for soil regeneration and intercropping is used.

Although there are co-operative societies throughout the State, individual farmers still practise small-scale agriculture mainly for family consumption and for limited sales on the market.

Land re-organization and re-structuration is one of the most urg ent problems to be solved in Rivers State and should favour setting up large Government and private plantations and bring under cultivation large extens- ions of land still unused for agriculture.

The introduction of modern agronomic practices and mechanization would, in some cases, create a new concept in the State of economic agricult ural production and would reach the goal of keeping yound farmers in the pro duction areas as well fostering the re-settlement of man-power previously em ployed in the farms abandoned during the oil boom in the State.

The Ministry of Agriculture and Natural Resources, the Ministry of Rural Development Co-operative and Technical Education together with the Agriculture Development Agencies, the Niger Delta Basin Development Authori- ty and the Green Revolution Programme are already exerting massive efforts to expand agriculture and guarantee extensive continuous support to farmers in rural areas.

The various development programs of the above said Institutions, also if well placed on the conceptual level and on the level of the actions to be taken, are normally late as regards the objectives achievement.

There's still need of restatements of the various programs oper- ational modalities and also of an improvement of the basic statistical mater ial. In fact, one of the most serious problems found in Rivers State is the estimates credibility of the areas concerned for the various crops and the relative productions.

During the survey, where it was possible, a few checkings have been tried (for example, through the Boards activity) without appreciable results. IFAGRARIA's mission final judgement upon the validity of the provided estimates (present situation and development programs), states that those are, every thing considered, acceptable.

This judgement is based upon the fact that :

- for the present situation it must be considered the modest entity of the area destined to agriculture in Rivers State, and therefore the error margin is lower;
- the above development programs, in that they aim to objectives not very large, may be implemented also with delay.

ANNEX 2

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

13233
(4 of 8)

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

THE PALM OIL INDUSTRY IN RIVERS STATE

December 1983

IFAGRARIA s.p.a.
ROMA

ANNEX 2

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIO OF NIGERIA
RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/30/069

THE PALM OIL INDUSTRY IN RIVERS STATE

June, 1983

IFAGRARIA s.p.a.
ROMA

LIST OF THE VOLUMES CONSTITUING THE STUDY

- EXECUTIVE SUMMARY
- GENERAL REPORT
- ANNEX 1 - Institutions involved in agriculture and their development programmes and the Co-operative Societies in Rivers State
- ANNEX 2 - The palm oil industry in Rivers State
- ANNEX 3 - Rivers State market analysis of the in-out products of the selected agro-industrial plant
- ANNEX 4 - Functional description of the selected agro-industrial plant and its economic evaluation and organizational aspects
- ANNEX 5 - Description of processes, prefabricated buildings, equipment and civil works of the selected agro-industrial plant
- ANNEX 6 - Drawings of civil works, prefabricated buildings and installed equipments of the selected agro-industrial plant

ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C. : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

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1. INTRODUCTION

The main oil palm planting activities are being carried out at the present time in the Isiokpo Local Government Area (KELGA) by Risonpalm Ltd. and in the northern parts of the Ahoada and Isiokpo Local Government Areas (ALGA and KELGA) by the Smallholder Management Unit (SMU), which are both founded by the World Bank. In the North Yenagoa Local Government Area (YELA) the activities are being carried out by the Niger Delta Basin Development Authority (NDBDA), which also has a demonstration plot in the Sagbama Local Government Area (SALGA).

Apart from the above-mentioned activities, the Rivers State Ministry of Agriculture and Natural Resources estimates that there are 5,770 ha of smallholder oil palm where, at the present time there is little sign of activity.

The Risonpalm Nucleus Estate, which is managed by the Belgian firm Socfinco, has established milling facilities for processing fruit from the Estate and from the SMU smallholders, and they are already milling fruit. The NDBDA plantings are not yet yielding fruit and milling facilities have yet to be established.

The Palm Oil is all sold locally at the present time at ₦ 750 to ₦ 900/tonne according to seasonal availability. The palm kernels are sold at First Grade (containing less than 2.7% impurities) to the Nigerian Palm Produce Board (NPPB) at a fixed price of ₦ 230 per tonne.

The NPPB owns facilities at Port Harcourt for bulk storage of oil in tanks and of palm kernels and palm kernel pelletes in begs. The bulk oil installation includes filters, centrifuges and heaters which were used before the Civil War to filter and dry incoming crude palm oil before bulking prior to export. However, no palm oil has been sold to NPPB since 1975 and the tanks are used for the storage of palm kernel oil, currently from adjoining states (about 100,000 tonnes/year), glycerine from the soap factories at Aba in Imo State (2,000-3,000 tonnes/year), tallow (about 30,000 tonnes/year) and palm stearine from Malaysia (5,000-6,000 tonnes/year) imported for the soap factories, alkane (5,000-6,000 tonnes) imported for detergent manufacture and an unspecified quantity of imported soya bean oil which is believed to be quite small. Some 3,000 tonnes/year of palm kernels and not more than 10,000 tonnes/year of palm kernel pellets are stored on the site. The installation can store 36,000 tonnes of oil at any one time in heatable tanks.

There is a large palm kernel mill at Port Harcourt owned by the Rivers State Vegetable Oil Company (RIVOC) that has not been operating since January 1982 but when working, processes the palm kernels on behalf of the NPPB for a processing fee of ₦ 100 per tonne to produce palm kernel oil and palm kernel pellets. The kernels and the pellets remain the property of the NPPB.

2. OIL PALM PLANTINGS

All recent and projected plantings are of improved tenera material supplied by the Nigerian Institute for Oil Palm Research (NIFOR). The Federal Government do not permit the import of oil palm planting material.

The Rivers State Oil Palm Project was appraised by the World Bank in 1978 (1) and subsequently funded by the Bank. It had the aim of establishing a Nucleus Estate by Risonpalm Ltd., planted with 10,000 ha of palms, together with the construction and operation of two palm oil mills and a fruit collection system for estate and smallholder production. The Project also aimed at establishing a Smallholder Management Unit (SMU) to plant or replant 10,000 ha of smallholdings, improve about 400 km of earth roads to facilitate all-weather collection of fresh fruit bunches (FFB), to keep smallholder accounts ant to ensure the repayment of loans due from smallholders (2).

The Nucleus Estate, at Ibima, comprises 6,000 ha already planted . Planting commenced in 1978 and is due to be completed in 1985 when the area will total 9,300 ha. There is also 3,800 ha of oil palm at Elele, which is about 10 km west of Ibima. Both estates are in KELGA and are linked by a good all-weather road.

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(1) Appraisal of Nucleus Estate/Smallholder Oil Palm Project, Rivers State, Nigeria, Document of the World Bank, Report no. 1525-UNI, May 18, 1978.

(2) Rivers State of Nigeria Ltd., Risonpalm Limited, Nucleus Estate Oil Palm Project, "Study of Smallholders Fruit Collection and Buying System" - Socfin Consultant Services, Brussels, September 1981.

The Elele Estate is already mature, with mixed *dura* and *tenera* plantings; those planted in the early 1960s are DxT. The Estate has been neglected in recent years but it is planned to replant it with improved *tenera* material from 1985, but the proposed planting programme is not known.

The Smallholder Management Unit (SMU) is a part State and part Federal Project, the main purpose being to help the smallholders to plant improved material. Planting commenced in 1978, but owing to the land tenure system, no land was available for planting in 1982 and it is anticipated that the final area will not exceed 2,500 ha which may be reached in 1984. The areas of SMU plantings are scattered in the northern parts of ALGA and KELGA.

The areas available to the Niger Delta Basin Development Authority (NDBDA) for oil palm planting are as follows:

. Yenagoa	4,000 ha
. Toru-Ebeni	3,000 ha
. Korokorosei	30 ha

The Yenagoa Estate extends from the Yenagoa Local Government Area (YELGA) into the Nembe Local Governemnt Area (BALGA). Planting commenced in 1981. The Toru-Ebeni Estate is 30 to 40 km from Yenagoa and can, at present, only be reached by water. However, a road link is under construction. Planting at Toru-Ebeni began in 1982. Future plantings at both of these estates are expected to be at a low annual level unless more funds become available, when planting would be greatly accelerated.

Korokorosei is approximately 15 km west of Toru-Ebeni and consists of 30 ha of oil palm which were planted in 1981. No further planting is planned for Korokorosei, which will be used as a demonstration plot to encourage villagers. There is no road between Korokorosei and Toru-Ebeni but it is understood that one is planned.

Smallholders in the Rivers State who do not come under the SMU project are estimated by the State Ministry of Agriculture and Natural Resources to amount to 5,770 ha comprising:

. private smallholder plantations	810 ha
. smallholder plantations under the Rehabilitation Subsidy Scheme (1961-1969)	2,800 ha
. smallholder establishments (1978-1980)	2,160 ha

However, no further plantings were being undertaken, as far as it could be ascertained, and little or no harvesting was being carried out due to the farmers' inability to attract labour.

3. YIELDS

It is anticipated that the build-up of FFB production and the extraction rated from the NIFOR improved <u>tenera</u> material planted in year zero will be as follows:

Description	YEARS					
	3	4	5	6	7	8 and seq.
. Estate plantings (tonnes FFB/ha)	2	6	9	11	14	15
. Smallholders' planting (tonnes FFB/ha)	1.5	4	6	7.5	9.5	10
. Extraction rates:						
- Oil (%)	16	18	19	20	21	21
- kernels (%)	3	3.5	4	4	4.5	4.5

The FFB yield for smallholdings is expected to be lower because most of the farms would be planted in heavily cultivated areas and because experience has shown that husbandry standards are not as high on small farms as on well managed estates.

With regard to the Elele Estate, this has proved difficult to harvest due to lack of pruning and general neglect since the Civil War. Risonpalm hope to harvest 10,000 tonnes FFB from it in 1983 and 26,600 tonnes FFB annually in subsequent years with replanting beginning in 1985.

Tables 1 and 2 show the planting programmes and computed annual yields of FFB for the Ibima Nucleus Estate and the SMU smallholders respectively.

Steady bearing will be reached for the Ibima Estate by 1993 and for the SMU smallholders by 1992. There was no SMU planting in 1982 due to lack of available land.

Table 3 shows the anticipated extended planting programme and annual FFB yields for the Yenagoa Estate, where planting would not be completed until 1996 and steady bearing would not be achieved until 2005. Table 4 shows an accelerated programme of planting and yields if funds become available when planting would be completed in 1986 and steady bearing reached by 1994.

Tables 5 and 6 show similar information for the Toru-Ebeni Estate while Table 7 shows the annual yields of FFB on the Korokorosei Plot which will reach steady bearing in 1989.

Table 8 gives the computed annual yields of palm oil and palm kernels from the Risonpalm Estates, and the SMU smallholders plantings. Table 9 gives the computed annuel yields of palm oil and palm kernels for the NDBDA if the anticipated planting rates are adhered to whilst. Table 10 gives the annual yields of palm oil and palm kernels for the accelerated planting rates.

4. MILLING REQUIREMENTS

The milling requirements for FFB are calculated in this report assuming, on the basis of experience at the Cowan Oil Palm Estate in Bendel State and in Ivory Coast, that 14.5% of the total annual crop will be harvested in the peak month. This was the figure quoted by the Project Manager of the Risonpalm Nucleus Estate and a comparison of annual rainfall distributions within the Rivers State, at NIFOR and in the Ivory Coast would suggest that the same figure would apply to the NDBDA Estates. It is also assumed that milling is carried out for 25 days in the peak month and 1, 2 or 3 shifts per day totalling 8, 16 or 20 hours per day respectively.

4.1 Rinsonpalm Nucleus Estate

A small mill with a nominal capacity of 1.5 tonnes FFB/hour manufactured by Vandekerckove, Belgium, with a continuous screw press was installed in 1982 at the Ibima Estate and is the only oil palm mill operating in the Rivers State at the present time. It is milling up to 45 tonnes FFB/day (up to 2.25 tonnes FFB/hour) producing oil of from 1.7 to 3.0% free fatty acid (ffa) and from 0.2 to 1.0% moisture content. The oil is dried by a heat exchanger. The mill effluent is discharged via a sludge pit into a stream.

A large mill is being erected at the Ibima Estate and is due to be commissioned by the manufacturers early in April 1983 and to be officially opened in June 1983. The manufacturers are Usine de Wecker S. à r.l., Luxembourg. The mill has two P9 continuous presses intalled and will have two further P9 presses installed in 1985. Each press has a rated throughput of 10 tonnes FFB/hour and thus the mill will have an initial capacity of 20 tonnes FFB/hour, increasing to 40 tonnes FFB/hour in 1985.

The mill has an effluent treatment plant under construction by a Belgian firm of sub-contractors. It comprises a concrete sludge pit from which the effluent can be directed to four anaerobic ponds of 650 m^3 each in which it is calculated that the material can be held at 55°C for at least 12 days. It will then pumped to the plantation via an aerobic stage. It is understood to be the first effluent treatment plant to be erected in West Africa and will cost 4.3% of the f.o.b. price of the mill.

The mill will have two oil storage tanks of 1,500 m^3 each and a third tank will be added in 1985.

Together with the small Vandekerckove mill, the Usine de Wecker mill will process all the FFB from the Ibima and Elele Estates and from the SMU smallholder plantings. In 1985 the small mill is due to be dismantled, modernised and re-erected at the Elele Estate where, according to the World Bank Appraisal Report (*), the second mill is to have an initial capacity of 10 tonnes/hour, building up to 40 tonnes/hour by 1989.

(*) Appraisal of Nucleus Estate/Smallholder Oil Palm Project, Rivers State, Nigeria, Document of the World Bank, Report no. 1525-UNI, May 18 1978, page 10.

Tables 11 and 12 show the hourly throughputs of FFB from the Ibima and Elele Estates and from the SMU plantings at 1, 2 or 3-shift working. The required milling capacity at 3-shift working compared with the proposed phasing of the mills will therefore be as follows:

Year	Required capacity (tonnes FFB/hour)	Installed capacity (tonnes FFB/hour)	
		Mill 1	Mill 2
1983	8	10	-
1984	18.1	20	-
1985	24.1	40	-
1986	30.4	40	10
1987	37.4	40	20
1988	43.9	40	30
1989	48.5	40	40
1990	51.8	40	40
1991	54.0	40	40
1992	55.2	40	40
1993	55.4	40	40
1994^	64.2	40	40

It will be seen that the capacity of the new mill at Ibima (Mill 1) will be adequate until 1988. With replanting of the Elele Estate due to commence in 1985, it is doubtful whether it will achieve full bearing with the improved tenera material by 1993 and the proposed milling capacity will certainly be adequate.

A good all-weather road link between the Ibima and Elele Estates already exists for the transport of FFB and products.

(^) At full bearing with Elele Estate completely replanted.

4.2 NDBDA Plantings

No milling facilities exist for the Yenagoa and Toru-Ebeni Estates or for the Korokorosei Plot.

The NDBDA intends to establish a 20 tonnes FFB/hour mill on Yenagoa BALGA border in 1985 and to establish a "stork" mill at Toru-Ebeni when that estate is in full bearing. The Authority intends to establish a 1.5 tonnes FFB/hour mill at Korokorosei.

Table 13 shows the only throughputs of FFB from the Yenagoa Estate at 1, 2 or 3-shift working for the present planting programme. Table 14 provides similar information for the Toru-Ebeni Estate. Table 15 shows the hourly throughputs of FFB for the Korokorosei Plot.

It will be seen that the required throughput for Korokorosei will be much less than can be channelled by the proposed 1.5 tonnes FFB/hour mill. However, since the plot is for demonstration purposes, it would be highly desirable to have such a mill on the site, and it is suggested that it should be installed by 1985 when, if communications permit, it could handle the early harvests from the Yenagoa and Toru-Ebeni Estates as well as FFB harvested by local farmers.

With the present planting programme, a 10 tonnes FFB/hour mill will be adequate at Yenagoa until after 1994 and likewise for Toru-Ebeni. The proposed phasing of the mills for the present planting programme would be as shown in the following scheme.

Description	YEARS				
	1984	1985	1986	1987	1988
. Required capacity (tonnes FFB/hour)					
- Korokorosei	-	0.1 ^	0.1	0.1	0.1
- Yenagoa	0.1^	0.1 ^^	0.4	0.9	1.8
- Toru-Ebeni	-	0.1 ^	0.2	0.6	1.1
TOTAL	-	-	0.7	1.6	3.0
. Installed capacity (tonnes FFB/hour)					
- Korokorosei	-	1.5	1.5	1.5	1.5
- Yenagoa	-	-	-	5	5
- Toru-Ebeni	-	-	-	-	-
TOTAL	-	1.5	1.5	6.5	6.5

Description	YEARS					
	1989	1990	1991	1992	1993	1994
. Required capacity (tonnes FFB/hour)						
- Korokorosei	0.1	0.1	0.1	0.1	0.1	0.1
- Yenagoa	2.8	4.0	5.3	6.6	7.7	9.2
- Toru-Ebeni	1.8	2.6	3.5	4.4	5.2	6.1
TOTAL	4.7	6.7	8.9	11.1	13.0	15.4
. Installed capacity (tonnes FFB/hour)						
- Korokorosei	1.5	1.5	1.5	1.5	1.5	1.5
- Yenagoa	5	5	10	10	10	10
- Toru-Ebeni	5	5	5	5	5	10
TOTAL	11.5	11.5	16.5	16.5	16.5	21.5

(^) 1 shift

(^^) 2 shifts

Thus a 1.5 tonnes FFB/hour mill should be installed at Korokorosei in 1985, a 5 tonnes FFB/hour mill at Yenagoa in 1987 increasing to 10 tonnes FFB/hour in 1991 and a 5 tonnes FFB/hour mill at Toru-Ebeni in 1989 increasing to 10 tonnes FFB/hour in 1994.

With an accelarate planting programme, the following phasing at the mills will be required:

Description	YEARS				
	1984	1985	1986	1987	1988
• Required capacity (tonnes FFB/hour)					
- Korokorosei	-	0.1ˆ	0.1	0.1	0.1
- Yenagoa	0.1ˆ	0.1ˆˆ	0.8	2.6	5.2
- Toru-Ebeni	-	0.1ˆ	0.6	2.4	5.0
TOTAL	-	-	1.5	5.1	10.3
• Installed capacity (tonnes FFB/hour)					
- Korokorosei	-	1.5	1.5	1.5	1.5
- Yenagoa	-	-	-	10	10
- Toru-Ebeni	-	-	-	-	10
TOTAL	-	1.5	1.5	11.5	21.5

(ˆ) 1 shift

(ˆˆ) 2 shifts

Description	YEARS					
	1989	1990	1991	1992	1993	1994
. Required capacity (tonnes FFB/hour)						
- Korokorosei	0.1	0.1	0.1	0.1	0.1	0.1
- Yenagoa	8.4	11.8	14.3	16.0	17.1	17.4
- Toru-Ebeni	7.6	9.9	11.6	12.8	13.0	13.0
TOTAL	16.1	21.8	26.0	28.9	30.2	30.5
. Installed capacity (tonnes FFB/hour)						
- Korokorosei	1.5	1.5	1.5	1.5	1.5	1.5
- Yenagoa	10	20	20	20	20	20
- Toru-Ebeni	10	10	20	20	20	20
TOTAL	21.5	31.5	51.5	51.5	51.5	51.5

In this case a 10 tonnes FFB/hour mill will be required at Yenagoa in 1987, increasing to 20 tonnes FFB/hour in 1990 and a 10 tonnes FFB/hour mill will be required at Toru-Ebeni in 1988, increasing to 20 tonnes FFB/hour in 1991.

Palm oil mill effluent is produced at a rate of 2 to 3 tonnes for every tonne of finished oil (^). It has a particular high Biological Oxygen Demand (BOD), usually at least 20,000 mg/litre, or about 100 times higher than raw sewage (^). It is therefore highly desirable that such effluent should not be discharged into streams or rivers without prior treatment to reduce the BOD to more acceptable levels. In Malaysia, a BOD of 250 mg/litre or less is now required by law. It is strongly recommended that suitable effluent treatment plant be attached to each mill.

(^) Olie, J.J., and Tieng, T.D. (1972) Oléagineux, 27, 215-218 and 273-275.
(^) Davis, J.B. (1978) Tropical Science, 20, 234.

5. PALM KERNEL MILLING

The palm kernel mill of the Rivers State Vegetable Oil Company (RIVOC) is situated at Port Harcourt. It was commissioned in 1978 with a rated capacity of 180 tonnes kernels/24 hours.

Direct solvent extraction is carried out with an equipment supplied by Extraction de Smet S.A., Belgium, with British equipment for initial preparation comprising Christy and Norris hammer mills and Simon Rosedowns breakers and flaking rolls. A large cooker was also installed but is, apparently, not used.

The mill has not been working since January 1982 due to a lack of funds to purchase spare parts. When it was functioning the average working capacity was only about 100 to 120 tonnes/24 hours due to extraction difficulties. Solvent losses were 3 to 5% of the weight of the raw material processed due to leackages.

The products of the mill are crude palm kernel oil and palm kernel pellets, the pellets being produced from the residual palm kernel meal by means of the pelletiser section supplied by Simon Rosedowns Ltd., including a mixing machine for adding water.

The meal, according to the production officer, contains up to 3% oil instead of the ideal 0.2%. However, according to the Nigerian Stored Products Research Institute, a sample of meal from this mill contained much as 13% oil and the NPPB has complained verbally about the poor extraction efficiency of the RIVOC mill.

It is intended to re-start the mill in April or May 1983 when the State Government will lease the mill for commercial management by R.G.N. Engineers (Nigeria) Limited.

It remains to be seen whether the mill will run successfully under commercial management. However, efficient extraction is unlikely to be possible without modification of the preparation stage to include cooking and also low pressure preliminary pressing of the cooked kernels to yield a cake with about 15% oil which would then be broken and flaked to about 0.025 to 0.03 mm for solvent extraction.

It is recommended that the extraction efficiency and solvent losses be closely monitored when the mill is working again. If the extraction efficiency cannot be raised to an acceptable level by direct solvent extraction, prepressing equipment with a capacity of 7.5 tonnes/hour together with a diesel generator to provide power will be required.

Since the production of palm kernels in the Rivers State, apart from private farmers outside the SMU scheme, is not expected to exceed 14,460 tonnes in 1994 (equivalent to a processing capacity of 48 tonnes/day for a mill working 300 days/year) the mill will continue to have capacity considerable in excess of the requirements, even in the long term, unless it can obtain kernels from other States (see Tables 8 and 9).Palm kernel cake pelletted price was of about N 45/Tonn farm-gate in Port Harcourt.

6. MISCELLANEOUS

It has been noted (see Introduction) that 5,000-6,000 tonnes / year of palm stearine is currently imported through the bulk oil installation of the NPPB at Port Harcourt for use by soap manufacturers in Imo State.

Palm stearine is produced as one of the products of palm oil fractionation, the other product being palm olein which has a lower melting point and has the properties of a liquid vegetable oil. Palm oil fractionation can be carried out most conveniently on a small scale using the day fractionation process.

A small plant would fractionate 25 tonnes/24 hours to yield some 65% oleine and 35% stearine, but this ratio can be varied according to the cloud point of the oleine and melting point of the stearing required. On the above fractionation basis, with an annual throughout of 15,000 tonnes of oil, yields of 4,875 tonnes of oleine and 2,625 tonnes of stearine would be obtained.

However, any fractionation proposed could be considered only in the medium or long term if there was a sufficient surplus of palm oil (estimated productions in 1988 and 1993 are expected to amount to 32,705 tonnes and 49,187 tonnes respectively) and that there is a radical change in the relative prices of locally produced palm oil (currently selling on the local market at 750 to 900 ₦/tonne) and of imported palm stearine (about ₦600/tonne).

The cost of such a plant is about US$ 700,000 c.i.f. Port Harcourt.

Other processing which should be considered in the long and medium term, if a study of the local market indicated that it would be economically feasible, is the production of refined oils both palm oil and palm kernel oil. The traditional use of palm oil in Nigeria for edible purposes is in the unrefined state in soups, in frying operations, and for the preparation of palm oil "chop" when palm oil is usually incorporated with curried chicken and rice (^).

The alpha and beta carotenes present in the carotenoid pigments have some nutritional value, being precursors of vitamina A. In countries other than those in West Africa, the oil is almost invariably refined for edible purposes.

Although palm kernel oil is extracted in Nigeria using primitive methods, this is only a very limited extent (^).

Crude palm kernel oil has a strong, very characteristic and tenacious taste and smell, tends to become rancid very rapidly and is normally refined before use. The refined oil keeps well and is similar to refined coconut oil.

Mill extracted palm kernel oil has been in demand for soap and detergent manufacture in Nigeria and none has been sold overseas since the second part of 1982. The NPPB price is at present fixed at ₦ 550/tonne. It is not yet used in Nigeria for edible purposes. Amounts available in the State, if a 47% extraction rate is assumed and the RIVOC mill is working, would be 3,210 tonnes in 1988 and 6,544 tonnes in 1993. The possibility of refining to produce an edible oil might be worth considering for the medium to long range situation.

A refinery for palm oil or palm kernel oil, of 100 tonnes/day capacity, would cost about US$ 2.25 - 2.7 million for imported machinery and equipment and US$ 3.75 - 4.05 million for the local costs.

(^) Cornelius, J.A. (1977) Prog. Chem. Fats other lipids, 15, 5-27.

7. RECOMMENDATION

Palm oil mills

In 1985, a 1.5 tonne FFB/hour continuous-screw press mill, with effluent treatment unit, was established at Korokorosei.

If the present planting programme at Yenagoa and Toru-Ebeni continues, in 1987 a 5 tonne FFB/hour continuous screw press mill will be set up at Yenagoa, which can be expanded to a total capacity of 10 tonnes FFB/hour in 1991. A 5 tonne FFB/hour mill will be required at Toru-Ebeni in 1989, which can be extended to 10 tonnes FFB/hour in 1994.

If the accelerated planting programme is carried out at Yenagoa and Toru-Ebeni, a 10 tonne FFB/hour mill will have to be established at Yenagoa in 1987 and a 10 tonne FFB/hour mill at Toru-Ebeni in 1988 with extensions to total capacities of 20 tonnes FFB/hour at Yenagoa in 1990 and at Toru-Ebeni in 1991 respectively.

Palm kernel milling

The extraction efficiency of the RIVOC mill should be monitored by oil-content analyses of meal or pellets by a competent analyst. If the residual oil content cannot be reduced to below 2%, the installation of low-pressure expelling machinery in 1985, should be considered to handle up to 100 tonnes/24 hours of kernels. Genrator capacity of about 210 kWH will also be required.

Fractionation and refining

Fractionation for palm oil production, and refining of palm oil or palm kernel oil should be considered in the medium to long term only if there is a fundamental change in the domestic versus world market that makes further processing economically attractive.

Approximate costs (thousand US$)

Palm oil mills with continuous-screw presses and including plant for effluent treatment:

	Foreign costs	Local costs	Total costs
. 1.5 tonne FFB/hour	680	200	880
. 5 tonne FFB/hour	2,300	700	3,000
. extension to 10 tonnes	680	200	880
. 10 tonne FFB/hour	3,800	1,200	5,000
. extension to 20 tonnes	1,200	300	1,500

Palm kernel low pressure expeller with cooker.

Throughput capacity 100 to 150 tonnes kernels/24 hour

	Foreign costs	Local costs	Total costs
. refinery (100 tonnes/24 hours)	2,500	4,000	6,500
. fractionation (25-75 tonnes/24 h)	700	-	700

Table 1 - IBIMA NUCLEUS ESTATE - PLANTING PROGRAMME AND COMPUTED ANNUAL YIELDS OF FFB

Year of planting		1978	1979	1980	1981	1982	1983	1984	1985	Total
Planted area (ha)		500	1,000	2,000	1,500	1,000	1,250	1,250	800	9,300
Annual FFB yields:	1983	4,500	6,000	4,000						14,500
	1984	5,500	9,000	12,000	3,000					29,500
	1985	7,000	11,000	18,000	9,000	2,000				47,000
	1986	7,500	14,000	22,000	13,500	6,000	2,500			65,500
	1987	7,500	15,000	28,000	16,500	9,000	7,500	2,500		86,000
	1988	7,500	15,000	30,000	21,000	11,000	11,250	7,500	1,600	104,850
	1989	7,500	15,000	30,000	22,500	14,000	13,750	11,250	4,800	118,800
	1990	7,500	15,000	30,000	22,500	15 000	17,500	13,750	7,200	128,450
	1991	7,500	15,000	30,000	22,500	15,000	18,750	17,500	8,800	135,050
	1992	7,500	15,000	30,000	22,500	15,000	18,750	18,750	11,200	138,700
	1993	7,500	15,000	30,000	22,500	15,000	18,750	18,750	12,000	139,500

Table 2 - SMU - SMALLHOLDERS - PLANTING PROGRAMME AND COMPUTED ANNUAL YIELDS OF FFB (tonnes)

Year of planting		1978	1979	1980	1981	1983	1984	Total
Planted area (ha)		132	431	522	450	465	500	2,500
Annual FFB yields up to steady bearing:	1983	792	1,724	783				3,299
	1984	990	2,586	2,088	675			6,339
	1985	1,254	3,232	3,132	1,800			9,418
	1986	1,320	4,094	3,915	2,700	698		12,727
	1987	1,320	4,310	4,959	3,375	1,860	750	16,574
	1988	1,320	4,310	5,220	4,275	2,790	2,000	19,915
	1989	1,320	4,310	5,220	4,500	3,488	3,000	21,838
	1990	1,320	4,310	5,220	4,500	4,418	3,750	23,518
	1991	1,320	4,310	5,220	4,500	4,650	4,750	24,750
	1992	1,320	4,310	5,220	4,500	4,650	5,000	25,000
	1993	1,320	4,310	5,220	4,500	4,650	5,000	25,000

Table 3 - YENAGOA PLANTATION - ANTICIPATED PLANTING PROGRAMME AND ANNUAL YIELDS OF FFB (tonnes)

[illegible] of planting	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	Total
Planted area (ha)	45	35	300	300	300	300	300	300	300	300	300	300	300	300	300	20	4,[illegible]
1984	90																[illegible]
1985	270	70															[illegible]
1986	405	210	600														1,2[illegible]
1987	495	315	1,800	600													3,2[illegible]
1988	630	385	2,700	1,800	600												6,[illegible]
1989	675	490	3,300	2,700	1,800	600											9,[illegible]
1990	675	525	4,200	3,300	2,700	1,800	600										13,[illegible]
1991	675	525	4,500	4,200	3,300	2,700	1,800	600									1[illegible]
1992	675	525	4,500	4,500	4,200	3,300	2,700	1,800	600								22,[illegible]
1993	675	525	4,500	4,500	4,500	4,200	3,300	2,700	1,800	600							2[illegible]
1994	675	525	4,500	4,500	4,500	4,500	4,200	3,300	2,700	1,800	600						31,[illegible]
1995	675	525	4,500	4,500	4,500	4,500	4,500	4,200	3,300	2,700	1,800	600					36,2[illegible]
1996	675	525	4,500	4,500	4,500	4,500	4,500	4,500	4,200	3,300	2,700	1,800	600				[illegible]

Table 4 - YENAGOA PLANTATION - PLANTING PROGRAMME AND ANNUAL YIELDS OF FFB IF FUNDS ARE AVAILABLE

Year of planting	1981	1982	1983	1984	1985	1986	Total
Planted area (ha)	45	35	1,000	1,000	1,000	920	4,000
Annual FFB up to steady bearing (tonne): 1984	90						90
1985	270	70					340
1986	405	210	2,000				2,615
1987	495	315	6,000	2,000			8,810
1988	630	385	9,000	6,000	2,000		18,015
1989	675	490	11,000	9,000	6,000	1,840	29,005
1990	675	525	14,000	11,000	9,000	5,520	40,720
1991	675	525	15,000	14,000	11,000	8,280	49,480
1992	675	525	15,000	15,000	14,000	10,120	55,320
1993	675	525	15,000	15,000	15,000	12,880	59,080
1994	675	525	15,000	15,000	15,000	13,800	60,000

Table 5 - TORI-EBENI PLANTATION - ANTIPATED PLANTING PROGRAMME AND ANNUAL YELDS OF FFB (tonnes)

Year of planting	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	TOTAL
Planted area (ha)	40	200	200	200	200	200	200	200	200	200	200	200	200	200	200	160	3,000
1985	80																80
1986	240	400															640
1987	360	1,200	400														1,960
1988	440	1,800	1,200	400													3,840
1989	560	2,200	1,800	1,200	400												6,160
1990	600	2,800	2,200	1,800	1,200	400											9,000
1991	600	3,000	2,800	2,200	1,800	1,200	400										12,000
1992	600	3,000	3,000	2,800	2,200	1,800	1,200	400									15,000
1993	600	3,000	3,000	3,000	2,800	2,200	1,800	1,200	400								18,000
1994	600	3,000	3,000	3,000	3,000	2,800	2,200	1,800	1,200	400							21,000
1995	600	3,000	3,000	3,000	3,000	3,000	2,800	2,200	1,800	1,200	400						24,000
1996	600	3,000	3,000	3,000	3,000	3,000	3,000	2,800	2,200	1,800	1,200	400					27,000
1997	600	3,000	3,000	3,000	3,000	3,000	3,000	3,000	2,800	2,200	1,800	1,200	400				30,000

Table 6 - TORU EBENI - PLANTING PROGRAMME AND ANNUAL YIELDS OF FFB IF FUNDS ARE AVAILABLE

Year of planting	1982	1983	1984	1985	Total
Planted area (ha)	40	1,000	1,000	960	3,000
Annual FFB up to steady bearing (tonnes)					
1985	80				80
1986	240	2,000			2,240
1987	360	6,000	2,000		8,360
1988	440	9,000	6,000	1,920	17,360
1989	560	11,000	9,000	5,760	26,320
1990	600	14,000	11,000	8,640	34,240
1991	600	15,000	14,000	10,560	40,160
1992	600	15,000	15,000	13,440	44,040
1993	600	15,000	15,000	14,400	45,000

Table 7 - KOROKOROSEI PLOT - ANNUAL YIELDS OF FFB

Year of planting	1981
Planted area (ha)	30
Annual FFB up to steady bearing (tonnes)	
1984	60
1985	180
1986	270
1987	330
1988	420
1989	450

Table 8 - TOTAL ANNUAL YIELDS - RISONPALM + SMU (tonnes)

Palm oil

YEAR	IBIMA	SMU	ELELE	TOTAL
1983	2,575	585	2,000	5,160
1984	4,955	1,173	5,320	11,448
1985	9,030	1,828	5,320	16,178
1986	12,960	2,545	5,320	20,825
1987	17,365	3,354	5,320	26,039
1988	21,379	4,066	5,320	30,765
1989	24,442	4,492	5,320	34,254
1990	26,693	4,901	5,320	36,914
1991	28,272	5,198	5,320	38,790
1992	29,127	5,250	5,320	39,697
1993	29,295	5,250	5,320	39,865
All mature	29,295	5,250	11,970 (*)	46,515 (*)

Palm kernel

YEAR	IBIMA	SMU	ELELE	TOTAL
1983	510	116	400	1,026
1984	991	236	1,064	2,291
1985	1,850	374	1,064	3,288
1986	2,673	530	1,064	4,267
1987	3,630	698	1,064	5,392
1988	4,508	863	1,064	6,435
1989	5,173	951	1,064	7,188
1990	5,676	1,040	1,064	7,780
1991	6,033	1,114	1,064	8,211
1992	6,242	1,125	1,064	8,431
1993	6,278	1,125	1,064	8,467
All mature	6,278	1,125	2,565 (*)	9,968 (*)

(*) Elele fully replanted and in full bearing.

Table 9 - TOTAL ANNUAL YIELDS - NDBDA (tonnes)

Palm oil

YEAR	YENAGOA	TORU-EBENI	KOROKOROSEI	TOTAL
1984	14	-	10	24
1985	60	13	32	105
1986	211	107	51	369
1987	579	348	66	993
1988	1,142	710	88	1,940
1989	1,838	1,180	94	3,112
1990	2,727	1,881	94	4,702
1991	3,672	2,406	94	6,172
1992	4,617	3,036	94	7,747
1993	5,562	3,666	94	9,322
1994	6,507	4,296	94	10,897
1995	7,452	4,926	94	12,472
1996	8,397	5,556	94	14,047

Palm kernel

YEAR	YENAGOA	TORU-EBENI	KOROKOROSEI	TOTAL
1984	3	-	2	5
1985	11	2	6	19
1986	41	20	11	72
1987	114	68	13	195
1988	232	144	19	395
1989	373	239	20	632
1990	564	390	20	974
1991	767	502	20	1,289
1992	969	637	20	1,626
1993	1,171	772	20	1,963
1994	1,374	907	20	2,301
1995	1,577	1,042	20	2,639
1996	1,779	1,177	20	2,976

Table 10 - TOTAL ANNUAL YIELDS - NDDBA - ACCELERATED PLANTING (tonnes)

Palm oil

YEAR	YENAGOA	TORU-EBENI	KOROKOROSEI	TOTAL
1984	14	-	10	24
1985	60	13	32	105
1986	438	363	51	849
1987	1,559	1,468	66	3,093
1988	3,319	3,185	88	6,592
1989	5,529	5,065	94	10,688
1990	8,096	6,908	94	15,098
1991	10,115	8,328	94	18,537
1992	11,516	9,248	94	20,858
1993	12,407	9,450	94	21,951
1994	12,600	9,450	94	22,144

Palm kernel

YEAR	YENAGOA	TORU-EBENI	KOROKOROSEI	TOTAL
1984	3	-	2	5
1985	11	2	6	19
1986	83	68	11	162
1987	303	284	13	600
1988	673	646	19	1,338
1989	1,117	1,027	20	2,164
1990	1,677	1,443	20	3,140
1991	2,130	1,754	20	3,904
1992	2,439	1,754	20	4,213
1993	2,659	1,754	20	4,433
1994	2,700	1,754	20	4,474

Table 11 - HOWLY THROUGHPUT OF FFB IN PEAK MONTH FROM YIELDS IN TABLES 1 AND 2 FOR IBIMA NUCLEUS ESTATE MILL

YEAR	ANNUAL PRODUCTION (tonnes)			TOTAL FFB PRODUCTION IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER DAY IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER HOURS IN PEAK MONTH (tonnes)		
	Ibima	SMU	Total			1 shift	2 shifts	3 shifts
1983	14,500	3,299	17,799	2,580	103.2	12.9	6.4	5.1
1984	29,500	6,339	35,839	5,197	207.9	26.0	13.0	10.4
1985	47,000	9,418	56,418	8,181	327.2	40.9	20.4	16.4
1986	65,500	12,727	78,227	11,343	453.7	56.7	28.4	22.7
1987	86,000	16,574	102,574	14,873	594.9	74.4	37.2	29.7
1988	104,850	19,915	124,765	18,090	723.6	90.4	45.2	36.2
1989	118,800	21,838	140,638	20,392	815.7	102.0	51.0	40.8
1990	128,450	23,518	151,968	22,035	881.4	110.2	55.1	44.1
1991	135,050	24,750	159,800	23,171	926.8	115.9	57.9	46.3
1992	138,700	25,000	163,700	23,736	949.5	118.7	59.3	47.5
1993	139,500	25,000	164,500	23,852	954.1	119.3	59.6	47.7

Table 12 - HOWLY THROUGHPUT OF FFB IN PEAK MONTH ANTICIPATED YIELDS FROM ELELE ESTATE

YEAR	TOTAL ANNUAL PRODUCTION (tonnes)	TOTAL FFB PRODUCTION IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER DAY IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER HOUR IN PEAK MONTH (tonnes)		
				1 shift	2 shifts	3 shifts
1983	10,000	1,450	58	7.2	3.6	2.9
1984 and seq.	26,600	3,857	154	19.2	9.6	7.7
(*)	57,000	8,265	331	41.3	20.7	16.5

(*) At full bearing after completely replanting with improved tenera material.

Table 13 - HOWLY THROUGHPUT OF FFB IN PEAK MONTH FOR YENAGOA PLANTATION MILL FROM YIELDS IN TABLES 3, 4

YEAR	ANNUAL PRODUCTION (tonnes)	TOTAL FFB PRODUCTION IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER DAY IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER HOUR IN PEAK MONTH (tonnes)		
				1 shift	2 shifts	3 shifts
Present planting programme (table n. 3)						
1984	90	13	0.5	0.1	-	-
1985	340	49	2.0	0.2	0.1	-
1986	1,215	176	7.0	0.9	0.4	0.4
1987	3,210	465	18.6	2.3	1.2	0.9
1988	6,115	887	35.5	4.4	2.2	1.8
1989	9,565	1,387	55.5	6.9	3.5	2.8
1990	13,800	2,001	80.0	10.0	5.0	4.0
1991	18,300	2,654	106.1	13.3	6.6	5.3
1992	22,850	3,313	132.5	16.6	8.3	6.6
1993	26,625	3,861	154.4	19.3	9.6	7.7
1994	31,800	4,611	184.4	23.0	11.5	9.2
1995	36,300	5,264	210.5	26.3	13.2	10.5
1996	40,800	5,916	236.6	29.6	14.8	11.8
Accelerated planting programme (table n. 4)						
1984	90	13	0.5	0.1	-	-
1985	340	49	2.0	0.2	0.1	-
1986	2,615	379	15.2	1.9	0.9	0.8
1987	8,310	1,277	51.1	6.4	3.2	2.6
1988	18,015	2,612	104.5	13.1	6.5	5.2
1989	29,005	4,206	168.2	21.0	10.5	8.4
1990	40,720	5,904	236.2	29.5	14.8	11.8
1991	49,480	7,175	287.0	35.9	17.9	14.3
1992	55,320	8,021	320.9	40.1	20.0	16.0
1993	59,080	8,567	342.7	42.8	21.4	17.1
1994	60,000	8,700	348.0	43.5	21.8	17.4

Table 14 - HOWLY THROUGHPUT OF FFB IN PEAK MONTH FOR TORU-EBENI PLANTATION MILL FROM YIELDS IN TABLES 5, 6

YEAR	ANNUAL PRODUCTION (tonnes)	TOTAL FFB PRODUCTION IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER DAY IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER HOUR IN PEAK MONTH (tonnes)		
				1 shift	2 shifts	3 shifts
Present planting programme (table n. 5)						
1985	80	12	0.5	0.1	-	-
1986	640	93	3.7	0.5	0.2	0.2
1987	1,960	284	11.4	1.4	0.7	0.6
1988	3,840	557	22.3	2.8	1.4	1.1
1989	6,160	893	35.7	4.5	2.2	1.8
1990	9,000	1,305	52.2	6.5	3.3	2.6
1991	12,000	1,740	69.6	8.7	4.4	3.5
1992	15,000	2,175	87.0	10.9	5.4	4.4
1993	18,000	2,610	104.4	13.0	6.5	5.2
1994	21,000	3,045	121.8	15.2	7.6	6.1
1995	24,000	3,480	139.2	17.4	8.7	7.0
1996	27,000	3,915	156.6	19.6	9.8	7.8
1997	30,000	4,350	174.0	21.8	10.9	8.7
Accelerated planting programme (table n. 6)						
1985	80	12	0.5	0.1	-	-
1986	2,240	325	13.0	1.6	0.8	0.6
1987	8,360	1,212	48.5	6.1	3.0	2.4
1988	17,360	2,517	100.7	12.6	6.3	5.0
1989	26,320	3,816	152.7	19.1	9.5	7.6
1990	34,240	4,965	198.6	24.8	12.4	9.9
1991	40,160	5,823	232.9	29.1	14.6	11.6
1992	44,040	6,386	255.4	31.9	16.0	12.8
1993	45,000	6,525	261.0	32.6	16.3	13.0

Table 15 - HOWLY THROUGHPUT OF FFB IN PEAK MONTH FOR KOROKOROSEI DEMONSTRATION PLANTING FORM YIELDS

YEAR	ANNUAL PRODUCTION (tonnes)	TOTAL FFB PRODUCTION IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER DAY IN PEAK MONTH (tonnes)	FFB THROUGHPUT PER HOUR IN PEAK MONTH (tonnes)		
				1 shift	2 shifts	3 shifts
1984	60	9	0.3	-	-	-
1985	180	26	1.0	0.1	-	-
1986	270	39	1.6	0.2	0.1	0.1
1987	330	48	1.9	0.2	0.1	0.1
1988	420	61	2.4	0.3	0.2	0.1
1989	450	65	2.6	0.3	0.2	0.1

ANNEX 2/1

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIO OF NIGERIA
RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

SECTION 1

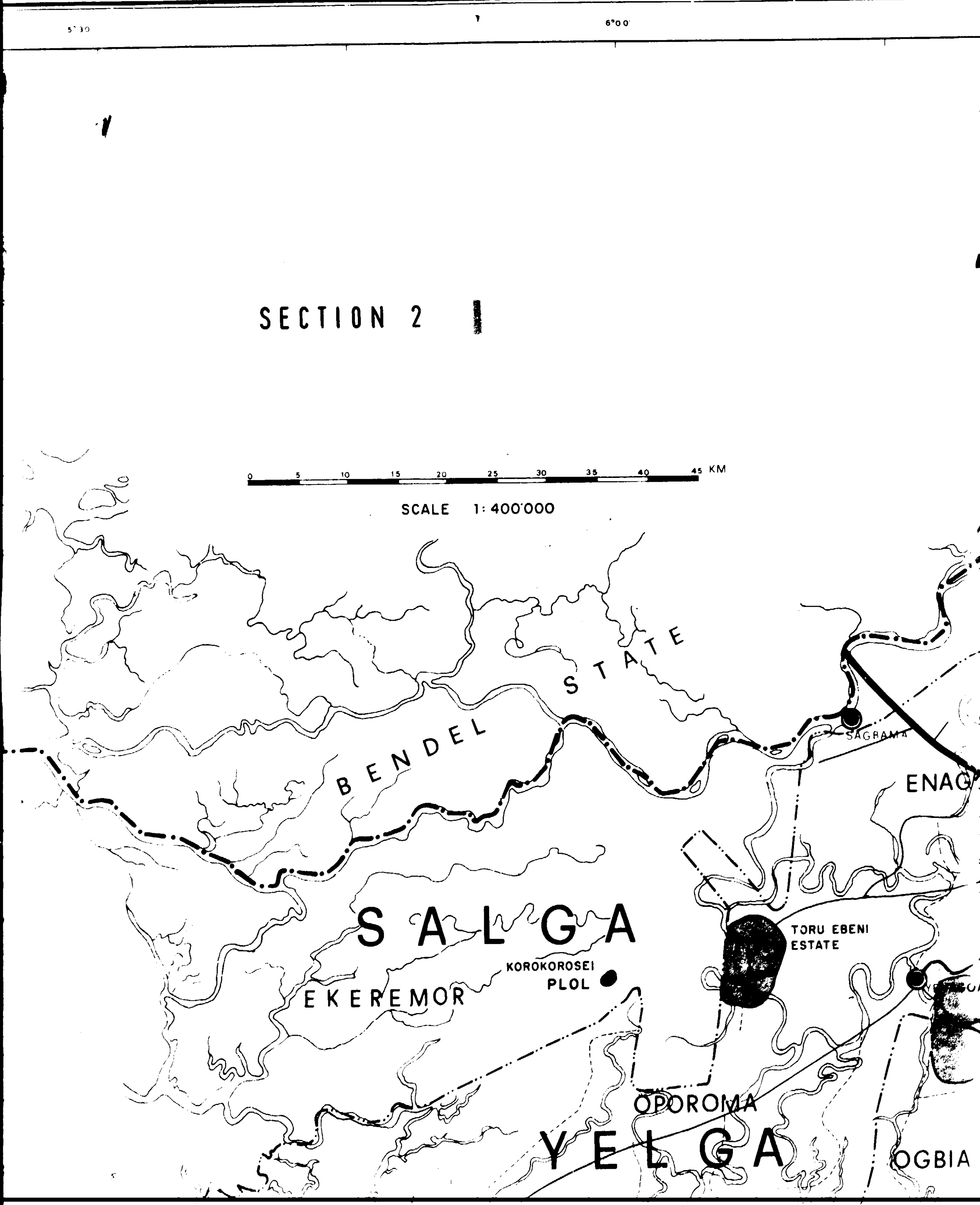
MAP SHOWING OIL PALM DEVELOPMENTS IN RIVERS STATE

SCALE 1:400 000

December 1983

IFAGRARIA s.p.a.
ROMA

SECTION 2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6°00
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SCALE 1: 400'000
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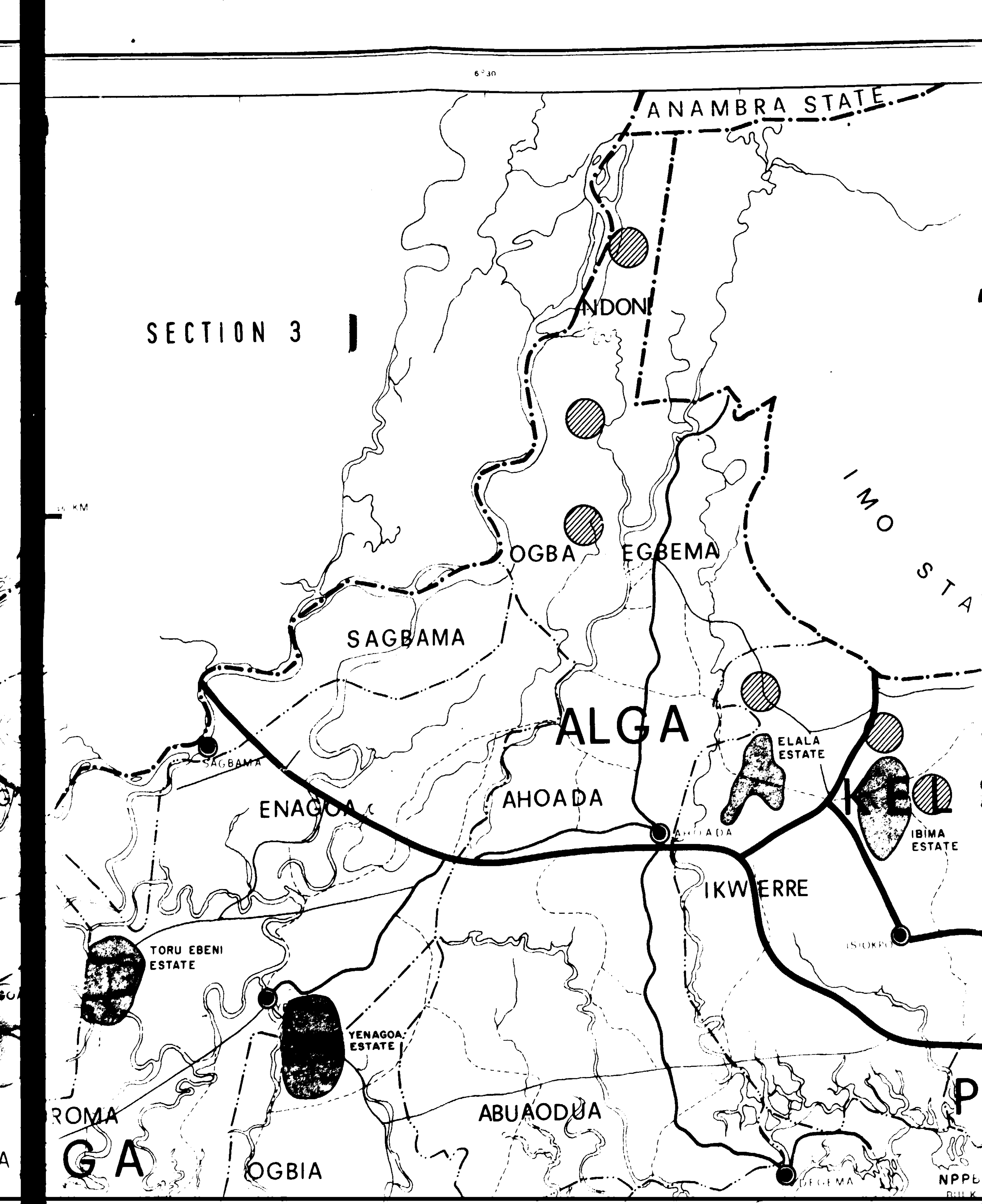
ENAG
TORU EBENI ESTATE
SALGA
KOROKOROSEI
PLOL
EKEREMOR
OPOROMA
YELGA
OGBIA



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SAGBAMA
ALGA
ELALA
ESTATE
SAGBAMA
ENAGOA
AHOADA
AHOADA
KE
IBIMA
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IKWERRE
TORU EBENI
ESTATE
YENAGOA
ESTATE
ROMA
ABUAODUA
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OGBIA
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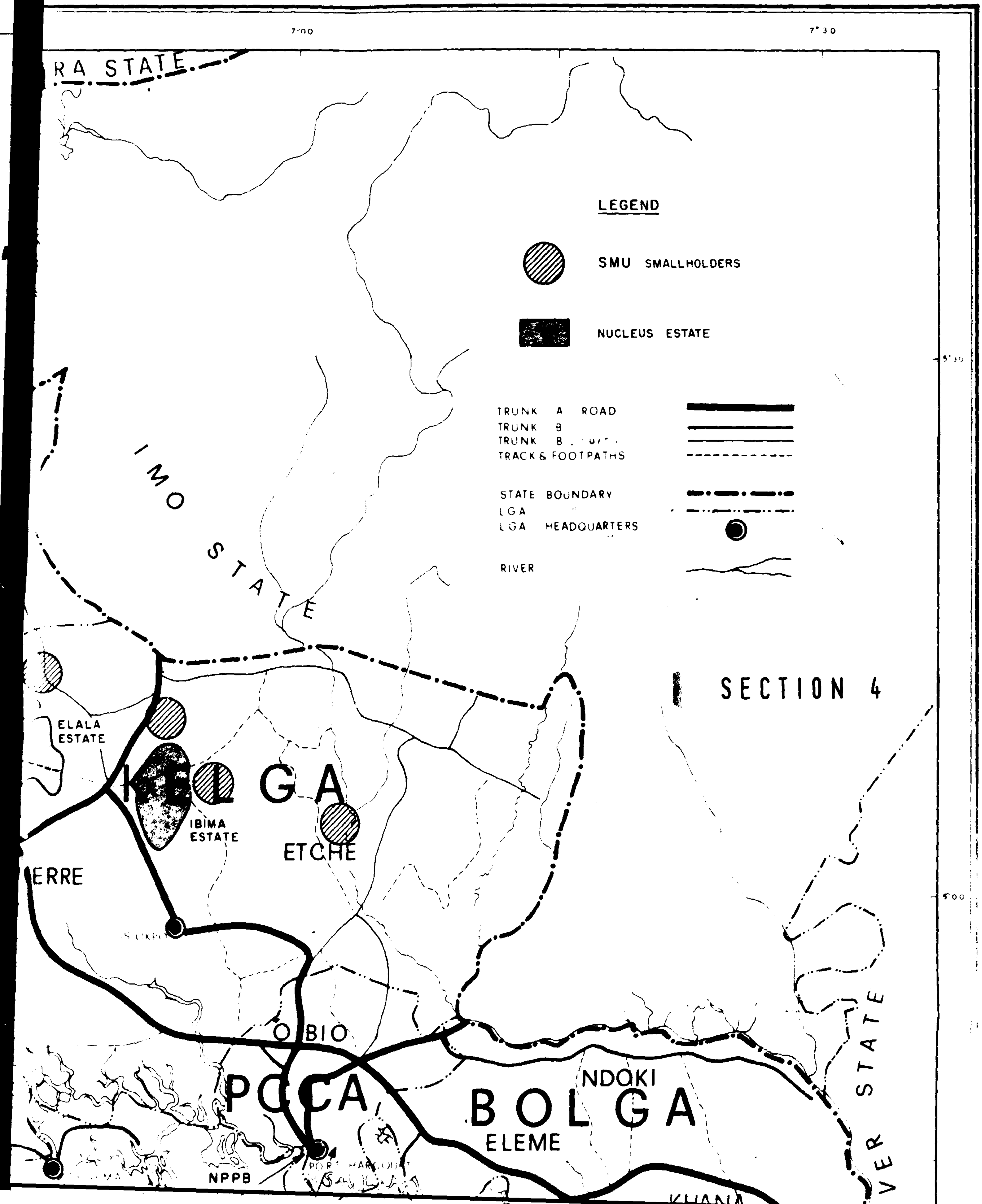

7°00
7°30
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LEGEND
SMU SMALLHOLDERS
NUCLEUS ESTATE
TRUNK A ROAD
TRUNK B
TRUNK B
TRACK & FOOTPATHS
STATE BOUNDARY
LGA
LGA HEADQUARTERS
RIVER
IMO STATE
SECTION 4
ELALA ESTATE
IBIMA ESTATE
ETCHE
ERRE
OBIO
POCA
NDOKI
BOLGA
ELEME
NPPB
KHANA
VER STATE

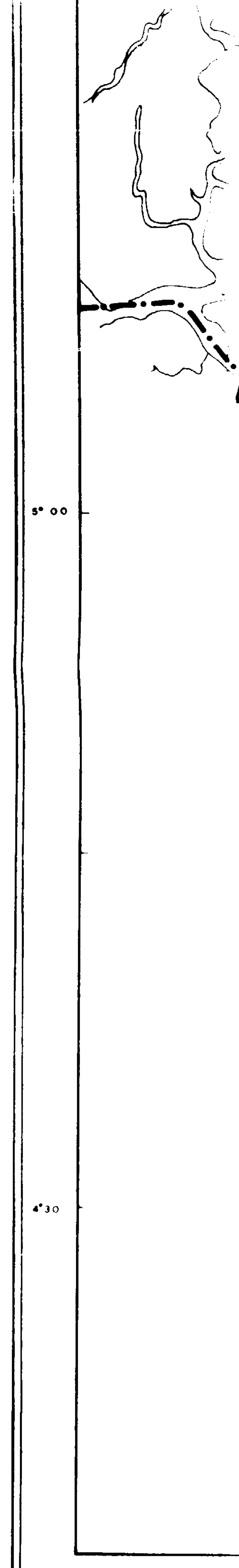
MAP SHOWING OIL PALM DEVELOPMENTS IN RIVERS STATE

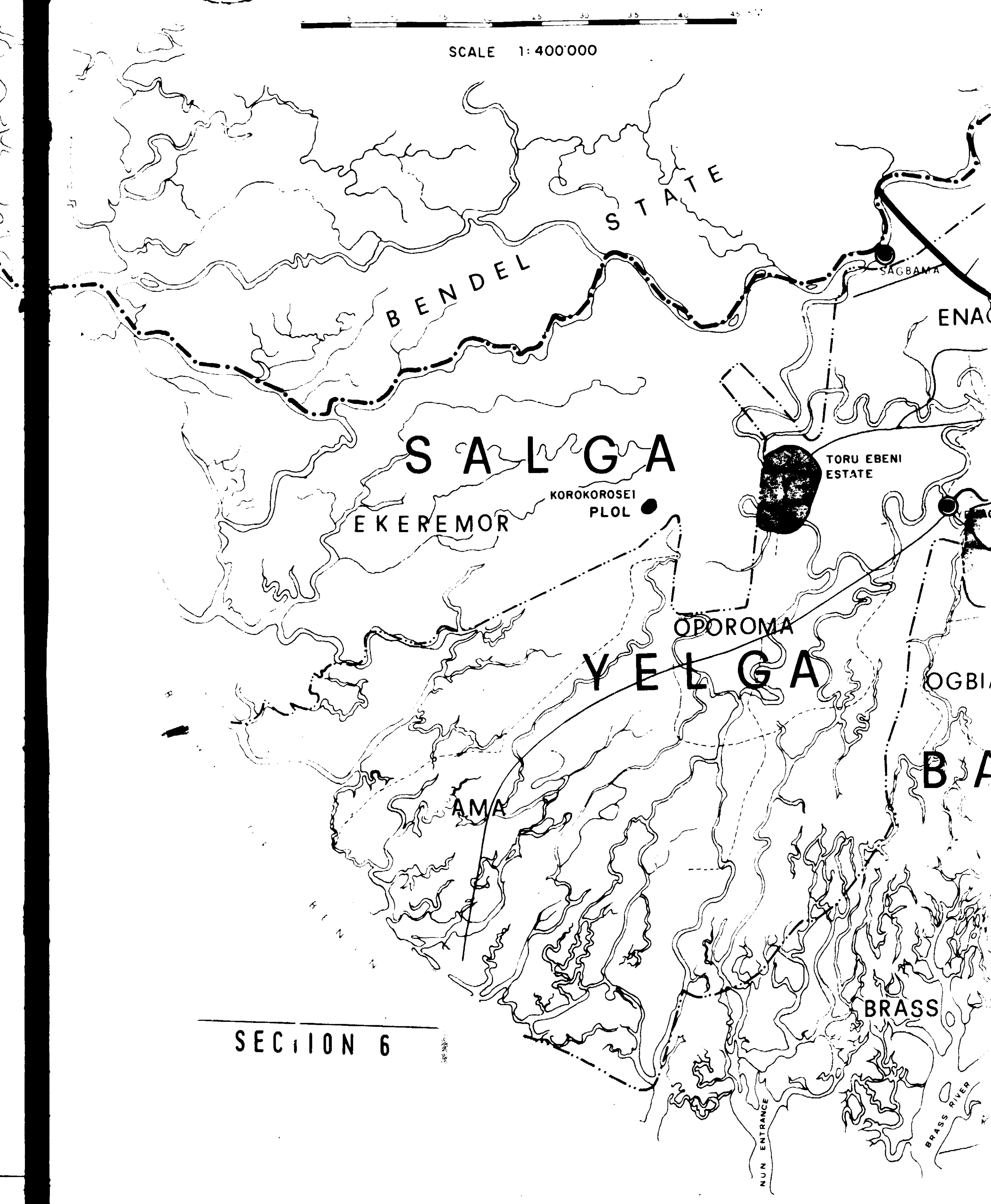
SCALE 1:400 000

December 1983

IFAGRARIA s.p.a.
ROMA

SECTION 5

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KOROKOROSEI
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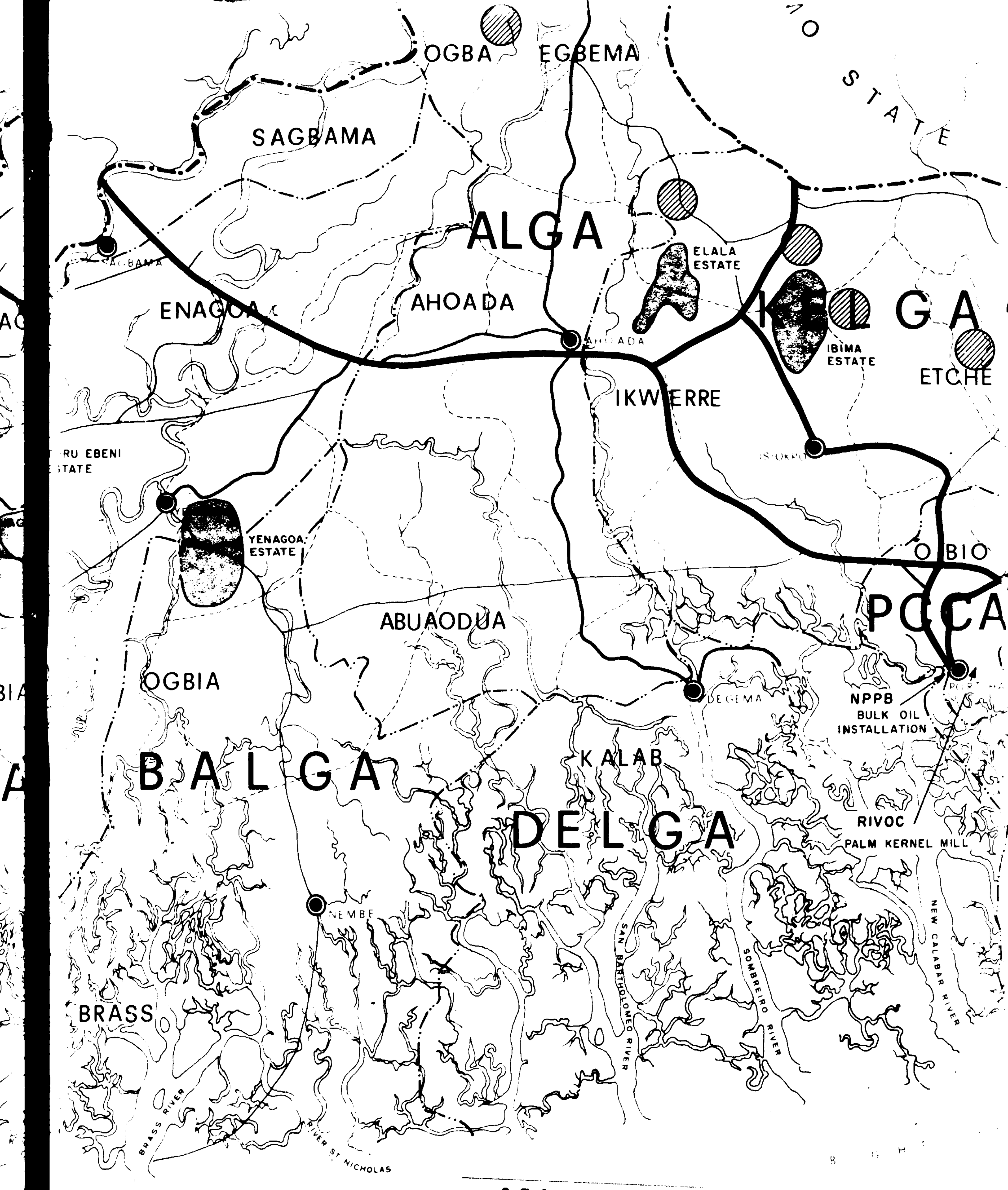
BRASS
NUN ENTRANCE
BRASS RIVER

SECiION 6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EGBEMA
STATE
SAGBAMA
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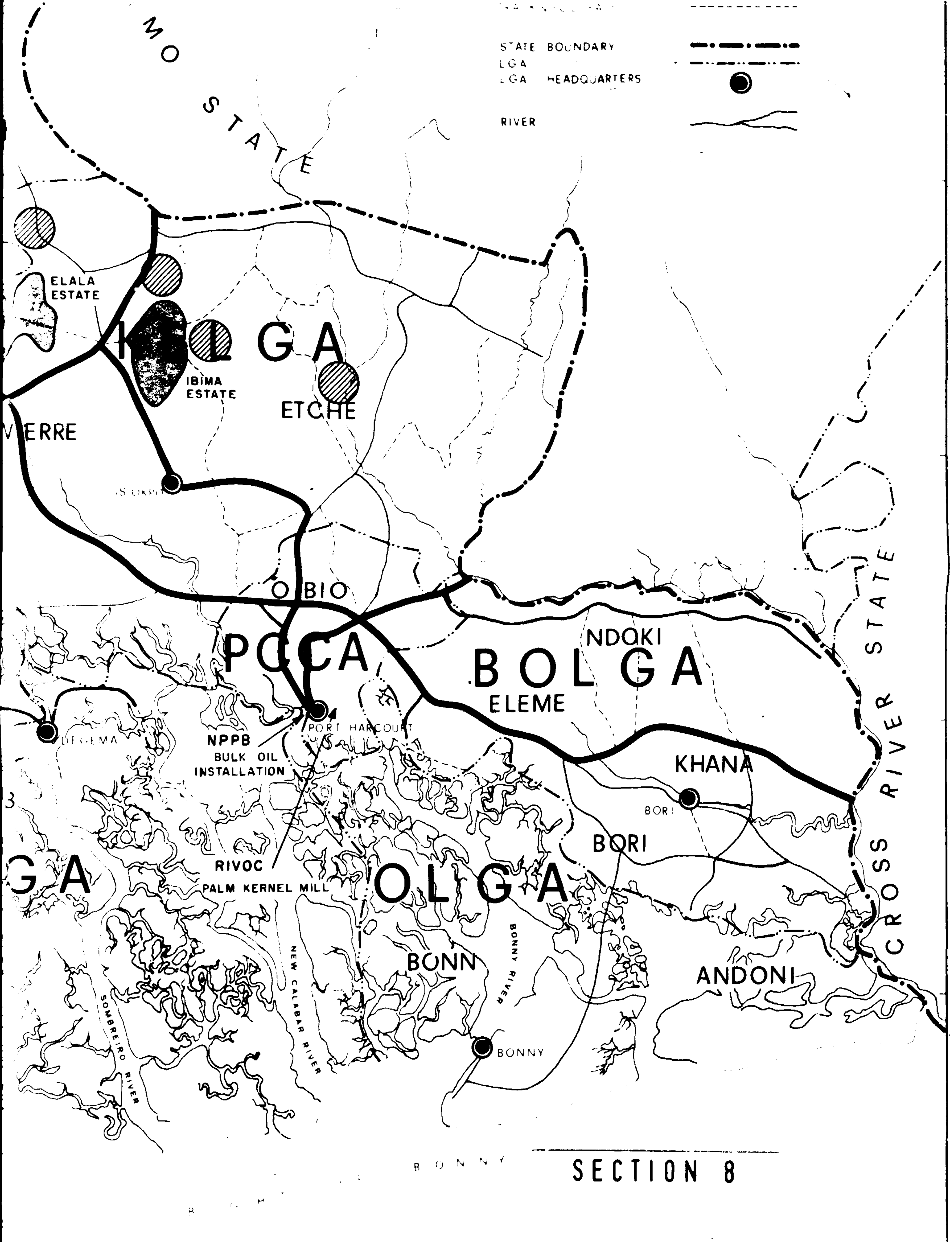
KOLGA
IBIMA ESTATE
ETCHE
IKWERRE
YENAGOA ESTATE
OBIO
PCCA
ABUAODUA
OGBIA
DEGEMA
NPPB BULK OIL INSTALLATION
BALGA
KALAB
DELGA
RIVOC PALM KERNEL MILL
NEMBE
SAN BARTHOLOMEO RIVER
SOMBREIRO RIVER
NEW CALABAR RIVER
BRASS
BRASS RIVER
RIVER ST NICHOLAS

SECTION 7


STATE BOUNDARY
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BOLGA
ELEME
PORT HARCOURT
NPPB BULK OIL INSTALLATION
DEGEMA
KHANA
BORI
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OLGA
BONN
BONNY RIVER
NEW CALABAR RIVER
SOMBREIRO RIVER
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SECTION 8

ANNEX 3

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

13233
(5 of 8)

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

RIVERS STATE MARKET ANALYSIS OF THE IN-OUT PRODUCTS OF THE SELECTED AGRO-INDUSTRIAL PLANT

December 1983

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ANNEX 3

UNIDO

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIO OF NIGERIA

RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

RIVERS STATE MARKET ANALYSIS OF THE IN-OUT PRODUCTS OF THE SELECTED AGRO-INDUSTRIAL PLANT

December 1983

IFAGRARIA s.p.a.
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LIST OF THE VOLUMES CONSTITUING THE STUDY

. EXECUTIVE SUMMARY

. GENERAL REPORT

. ANNEX 1 - Institutions involved in agriculture and their development programmes and the Co-operative Societies in Rivers State

. ANNEX 2 - The palm oil industry in Rivers State

. ANNEX 3 - Rivers State market analysis of the in-out products of the selected agro-industrial plant

. ANNEX 4 - Functional description of the selected agro-industrial plant and its economic evaluation and organizational aspects

. ANNEX 5 - Description of processes, prefabricated buildings, equipment and civil works of the selected agro-industrial plant

. ANNEX 6 - Drawings of civil works, prefabricated buildings and installed equipments of the selected agro-industrial plant

ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C. : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

INDEX

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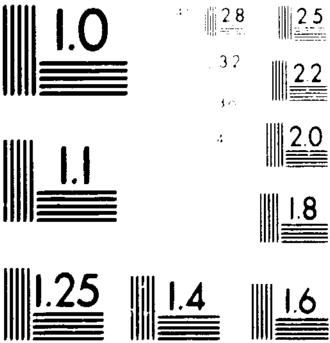

MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS

STANDARD REFERENCE MATERIAL 1010a

(ANSI and ISO TEST CHART No. 2)

1. THE BROILER AND EGG MARKETS

1.1 GENERAL

Eggs and broilers, including the layers at the end of their career, are the major local sources of animal protein in Rivers State.

Due to their different circumstances the egg industry is much more developed than broiler industry.

Encouraged by the relatively small capital investment, by a good feedstuff distribution network established by many small feedmill companies and especially by a large demand, the poultry industry is the best organized agro-based industry in Rivers State.

1.2 DEMAND AND SUPPLY OF POULTRY MEAT AND EGGS

A recent survey conducted by the Federal Department of Live - stock gave the following results for the demand and supply of poultry meat and eggs in Rivers State :

YEARS	DEMAND		SUPPLY		SUPPLY DEFICIT	
	Meat in million kilos	Eggs in million	Meat in million kilos	Eggs in million	Meat in million kilos	Eggs in million
1981	7.0	12.0	0.9	2.0	6.1	10.0
1985	8.0	14.0	1.1(^)	2.4(^)	6.9	11.6

The supply deficit translated into terms of the number of broilers and the number of hens becomes :

(^) Assume 5% annual growth rate in production from 1981-1985

YEARS	SUPPLY DEFICIT			
	Meat in million kilos	Eggs in million	No. Broilers in millions (weight of broiler 1.6kg)	No. Hens (average production for hen 215-220/year)
1981	6.1	10.0	3.8	46,000
1985	6.9	11.6	4.4	53,400

The above figures for the demand are based on the following pro-capite consumptions : for poultry meat : 2.2 kg/habitant in 1981 (7.0 mill - ion kilos per 3.2 million habitants); for eggs : 3.75 eggs/habitant in 1981 (12 million eggs for 3.2 million habitants).

Due to the small contribution made by other meats (goat, bovine, swine) as protein sources, the animal protein increase in the Rivers State diet can only be reached by poultry products.

Fish, another source of proteins in Rivers State, seems the only real alternative to poultry products.

The situation described for Rivers State applies to the other south-eastern States (Anambra, IMO, Benue, Cross Rivers).

The supply deficit in the above States was estimated in 1981 at 52.1 million kilos of poultry meat and 56.0 million eggs, while for 1985 the estimate is 58.7 million kilos of poultry meat and 62.0 million of eggs.

1.3 THE PRODUCTIVE STRUCTURE IN RIVERS STATE

The poultry production structure in Rivers State can be divided into :

- industrial poultry farms
- artisanal poultry farms
- family-level production.

Industrial poultry farms include poultry farms containing on average 10,000 or more birds. The most important farms are : Caroline Farms (approximately 20,000 birds), Confortance and Stella (approximately 20,000 birds), Farms Producer (approximately 16,000 birds), Mass Poultry Farm (approximately 12,000 birds), Million Eggs Producers (approximately 15,000 birds), Nimi Farm (approximately 10,000 birds), RDBDA Farms (approximately 10,000 birds) Woga Farms (approximately 10,000 birds). Most of them are located around Port Harcourt.

Artisanal poultry farms include poultry farms containing,on average, less than 10,000 birds. The number of these farms is estimated at between 30 and 50 spread throughout the River State. Most of the cooperative poultry farm fall within this category.

Family-level production includes the few birds kept by the farmers families for their own consumption or sold in the local markets.

Poultry production has expanded relatively fast because it assures a quick revenue, and imputs like feedstuffs, day-old chicks, veterinarian services and drugs are available in Rivers State.

The predominant poultry production in Rivers State is eggs, while the broiler industry is estimated to amount to 5-10% of the total poultry industry.

The reasons why the egg industry is more developed are :

- the enterprise can be started with a few hundred or a few thousand birds
- the initial investments are thus relatively small and can be afforded even at family level. Considering that family labour is used to erect the sheds and ancillary equipment, the initial investment is even further reduced
- enlargement of the bird stock will not in practice give rise to any serious management problems
- the supply of day-old chicks is more developed for layer breeds than for broilers
- once production starts a daily income is assured
- due to the high egg demand there are no marketing or storage problems
- despite increasing difficulties, the marketing of layers at the end of their career on local markets, has been profitable till now.

On the contrary, the broilers industry involves problems that can be summed up as follows:

- requires a higher working capital (especially for feedstuffs) and has a lower return;
- requires special facilities for dressing and storage due to the concentration of the broiler supply;
- requires a marketing system to channel production;
- requires a management and accounting systems that can not be afforded by a family enterprise.

1.4 THE DEMAND FOR POULTRY PRODUCTS IN RIVERS STATE

The poultry products are channelled to the consumers through departmental stores, wholesale dealers, retail shops and general stores, local markets, restaurants and hotels. Cold storage companies process and store poultry meat, especially imported products.

1.4.1 Departmental stores

15 Departmental stores are registered in Rivers State as supermarkets, 13 of these being in Port Harcourt. Six department stores provide all facilities and merchandise, including poultry products, at a very high standard. Customers are mostly in the high and middle income class.

As to poultry products, eggs are usually local while poultry meat is normally imported. Chilled, or more often frozen, poultry meat is consequently more common.

Commercial controllers interviewed have complained about the lack of local good-quality poultry meat and recently about the difficulties of obtaining regular supplies of the imported product.

As already mentioned in General Report, the recent import restriction have badly affected poultry meat imports. They are, in fact subject to import licences, usually monopolized by Lagos importers. So far, scarcity and insecurity of supply have created problems for the supermarkets.

According to our survey in supermarkets, the weekly demand of fresh and frozen broiler can easily reach about 180-200,000 broilers in Port Harcourt and neighbouring areas against the present consumption of 30-40,000 broiler imported from abroad or other State of the Federation. Consumers (60%) prefer fresh rather than frozen broilers. Broiler consumption is at present hampered because of the absence of broiler production units in Rivers State and of the lack of dressing facilities. The eggs weekly demand is reported to be about 100,000 against a weekly consumption of about 15-20,000.

Poultry meat is, in price terms, the only alternative to other meats (beef, goat meat, pork).

Marketing outlets can also be found in the neighbouring States; from Port Harcourt extensive channels can be easily find to the Aba, Owerri, Calabar and Bendel State markets.

Pabod Stores, a supermarket of the Pabod Supply Limited, a Rivers State Government Agency for Procurement of Supplies and Distribution, has shown great interest in marketing good quality poultry meat through its marketing distribution centres.

As stated by all those interviewed, payment for all goods, and especially poultry meat and eggs, is in cash.

The prices practised in the Port Harcourt supermarkets were as follows (March 1983) :

- frozen poultry meat : N 5/kg Imported and Nigerian (from Lagos) sold in plastic bag, dressed. Imported (USA) : N 5.50/kg
- eggs (1/2 dozen) : N 0.99 sold in plastic bag. Egg grading is not required by the Nigerian market
- goat meat (local) : leg : N 8.50/kg - rib : N 7.00/kg
- beef (local) : fillet : N 8.50/kg - boneless cuts : N 6.50/kg - T. bone steak : N 8.00/kg
- beef (imported) various cuts : N 11.00 - 12.00/kg
- pork (local) : fillet : N LL.65/kg - leg : N 8.30/kg

1.4.2 Wholesalers, retailers, general businesses

Numerous companies whose main business is trading, importing and distributing food including poultry products and providing catering services are registered under these categories.

Their impact on the marketing of poultry meat and eggs is estimated to be very limited.

In fact, the biggest operators act directly at both supply and distribution levels.

A certain amount of business is estimated to be carried out with restaurants and hotels. According to our interviews, the turnover of these companies can reach 5-10,000 broilers/week; whereas for eggs the figure is about 30-35,000/week. At the present, most of them are not operating in the poultry products sectors due to the scarcety of the production.

1.4.3 Local markets

Thirty-four local markets of great importance are established in Rivers State. Most of them are held daily and some every four or six days.

Along the main roads and near the villages small local markets are held permanently.

The distribution of the 34 local markets is based on the number of inhabitants and the local food supply.

Among the great variety of goods and food items, poultry products are marketed.

Poultry is usually sold alive, both from family breeders and from artisanal or agro-industrial enterprises. Poultry is sold by unit at an average price of between ₦ 3 and ₦ 5.

The weight of poultry coming from egg-producing enterprises is about kg 2.0 - kg 2.5 (sold at ₦ 6/unit), while poultry from family breeders is about kg 0.8 - kg 1.4.

Eggs are usually sold at about ₦ 1.60 - ₦ 1.70 a dozen, single eggs commonly fetch 15 kobos.

The sale of hard-boiled egg has often been observed; the most frequent price is 20 kobos/each.

Our direct observations regarding the demand of poultry and eggs in the local markets have brought off a very wide evaluation of 20-30,000 birds/week and 100-150,000 eggs/week.

1.4.4. Hotels and restaurants

Seventy-nine hotels and restaurants are registered in Rivers State. Further hotels and restaurants, including those of international standard, are presently under construction.

Most of them (65) are concentrated in Port Harcourt. It is estimated that hotel capacity ranges between 3,000 and 4,000 beds.

Poultry meat and eggs are widely served. Weekly demand of 3-5,000 broilers/week and 10-15,000 eggs/week has been reported.

1.4.5 Hospitals and clinics

There about 30 hospitals and clinics in Rivers State, 20 being in Port Harcourt. Weekly demand of 1-1,300 broilers/week and 5-6,000 eggs/week has been reported.

1.4.6 Other institutions

Other institutions include :

a) The University of Port Harcourt and the University of Science and Technology
b) Colleges and secondary schools
c) Army units.

Weekly evaluation of consumption of poultry meat and eggs has not reached a significant conclusion due to the great variety of the institutions.

1.4.7 Total demand for broilers and eggs

The demand for broilers comes only from modern market channels, while birds are marketed in the local markets.

The total demand for broilers can be evaluated at 190-220,000 / week (^).

Eggs, instead, are more usually sold on the local markets than through modern marketing structures. The total demand for eggs can be evaluated at 300-350,000/week (^).

The yearly demand can be evaluated as follows:

- Broilers: 9.88 - 11.44 millions (egual to 14.7 - 17.2 million kilos of meat, considering an average net weight of 1.5 kg/broiler)
- Eggs : 15.6 - 18.2 millions

(^) See : 1.4.1, 1.4.2, 1.4.3, 1.4.4, 1.4.5, 1.4.6.

2. THE FEEDSTUFF MARKET IN RIVERS STATE

2.1 GENERAL

The feedstuff industry in Rivers State is not developed at an industrial level, but is nevertheless able to provide farmers and poultry industries with a product of relatively good quality. Its force is probably more in an extensive commercial network around the State than in industrial structures. Other feedmills located in the neighbouring States (Cross River, Imo) have their own commercial network in Rivers State.

2.2 THE PRODUCTION UNITS

The following are the industrial-artisanal units preparing feed stuffs in Rivers State :

a) NAFCO - National Animal Feed Co. Ltd

b) Desba feeds

c) Pita Feedmill

d) Feedmill International

e) Amba Feedmill

They are all located in Port Harcourt in the industrial area.

NAFCO FEED-MILL

NAFCO feedmill has a capacity of 8 tons/h , and is the biggest in Rivers State. Its main activity is to prepare animal feeds by mixing raw material coming, mostly, from U.S.A. Its connection with a USA firm gives it the opportunity to import a trademark nucleus (Compak) to which others ingredients are added according to the trademark formula.

For NAFCO the main purpose of establishing this feedmill is to train personnel for the proposed new 20-tons/h feedmill.

NAFCO, as a Federal Agency, will than monitor feedmill production throughout the State.

The major production is poultry formula, followed far behind by pig feeds.

DESBA FEEDS

This is the second largest feedmill in River State. The main activity is to mix nucleus and raw materials, most of them imported.

It produces day-old chicks. The commercial network is efficiently spread throughout the State.

Feedmill production is oriented (90%) versus poultry formula.

PITA FEEDMILL - FEEDMILL INTERNATIONAL - AMBA FEEDMILL

Due to the existing equipment, their work consists of mixing raw materials coming from abroad. They are, practically, solely producing poultry formula. Their presence on the market is assured by a network of small distributors.

2.3 RAW MATERIAL SOURCES AND THEIR PRICES

According to our survey, most of the raw material utilized in the feedstuff formulas is imported. In fact, until the effects of the recent restrictive measure had been felt by the raw material market, the trend of the utilizers was directed almost exclusively toward importation. This explains the proximity of the feedmills to the port. In other words, their location minimizes the transportation cost of raw materials.

The importation of raw materials was much cheaper than buying them locally although they were available in large quantities of standard quality; everything concurred to use and increase the import component of feedstuffs. In addition, not many efforts were made to try to utilize local raw materials. If for certain cases the agricultural sector was not ready to supply raw materials in sufficient quantity and quality (see maize), other products could be partially used to reduce the import components (e.g. palm kernel cake).

In our opinion the feed-formula makers are subject to dogmatic beliefs in which a good feedstuff formula can only be prepared with maize and soyabean meal.

On the contrary, local raw material can be used to a great extent in feed formula with the same results. This will, of course, need both the involvement of the agricultural sector and necessitate the establishment of marketing connections with local industries.

Imports restrictions have paved the way for new endeavours towards finding new components aimed at maximizing the utilization of local raw material. For instance the export prohibition covering wheat offals and dried breweries grains will encourage feedstuff-makers to utilize local supplies to the maximum extent.

The current prices for raw materials commonly used in poultry feed formula are as follows :

a) Maize, at present under import licence, N 230-250/tonn. The Nigerian Grains Board has fixed the buying price for local maize at N 325/tonn.and the selling price at N 240/tonn.
b) Soyabean meal (imported) : N 365 /tonn.
c) Meat meal (imported) : N 380 /tonn.
d) Wheat offals : 100-110 N / tonn.
e) Dried brewery grains : N 30 /tonn.
f) Brewery yeast : N 20-25 /tonn.
g) Limestone and mineral salts : N 95 / tonn.
h) Palm kernel cake, pelleted : N 45 / tonn.
i) Palm kernel oil : N 240 / tonn.
l) Palm oil : N 900 / tonn.
m) Additives, antibiotics, coccidiostats : N 645 / tonn.
n) Oyster shells : N 150 / tonn.

The feedstuff for layers (more than 60-70% of all feedstuff prepared in Rivers State) costs at present N 7.60/25-kg bag ex-factory Port Harcourt.

The same feedstuff reaches an average price of N 8.80/25-kg bag at the wholesalers depot (different distribution points in Rivers State).

As the following data show, the feedstuff cost amounts to 36 - 42% of egg revenue :

- 50 kg feedstuff (₦ 15.20 or ₦ 17.60) for 400 layers/day
- 400 layers (80% production) = 320 eggs/day
- 320 eggs = 26 dozen x 1.60 a dozen = ₦ 41.60.

With a more realistic average production of 60%, the feedstuff cost amounts to 47.5-55% of the egg revenue.

This cost is considered very high if compared with European or USA Standards.

The feedstuff is usually paid for in cash.

On the Nigerian market, soyabean meal can be purchased from Companies like Ecotrale, Top feeds, Emorine and drugs and feed additives from Companies like Pfizer and Roche.

Vaccines are distributed through the Ministry of Agriculture.

3. THE 1-DAY-OLD CHICKS MARKET

The breeds better adapted to the Rivers State climate are : Warren, Hubbard, Babcock 380, Ross 1, Starbro, Anak Cobb, Yarkon.

The supply of day-old chicks is provided by Nigerian local companies utilizing the above foreign breeds, or by direct importation.

Due to the restrictive measures now in force in Nigeria day-old chicks require an import licence.

A boost has thus been given to the production of day-old chicks in the country.

In Port Harcourt, in Rivers State, there are two small companies producing layer day-old chicks (Desba Feed and Dr Nwokolo); their production does not cover more than 5-10% of the demand.

The demand for layer day-old chicks is met by imports from other neighbouring States or from the North.

Imports from foreign countries are very small. On the basis of the interviews held, it seems that there are no problems to have an even larger supply of layer chicks in Rivers State; it is however, necessary to draw up an annual programme with the producers.

The day-old chicks are supplied regularly and, on average,reach Port Harcourt in good condition. Dispatch is either by road or by plane. Day-old chick mortality has been evaluated, in the poultry farms visited,at an average of 3-5%.

The day-old chick producing plants employ their own expatriate personnel and even look after transportation.

Less satisfactoring is the situation regarding broiler day-old chicks. This is due mostly to the limited development of the sector and to the faster renewal of these birds in comparison with layers.

According to our findings, there is not, at the moment,in Rivers State an outlet to channel a large quantity of broiler 1 day-old chicks.

Due to the short broiler production cycle (70 days including the cleaning of the installations), a medium size project with 10 installations will require a weekly supply of 1 day-old chicks.

Even importations - with the present restrictions - do not seem viable.

So far, it has been commonly accepted that a medium size broiler project must have its own parent stock installation and hatchery plant to produce 1-day-old chicks. In this way importations will occur every 3-4 months and will reduce the risk for the enterprise (mortality and required import licence).

The 1-day-old parent broiler chicks can be imported directly from Europe through Port Harcourt International Airport.

The present prices of 1-day-old chicks in Rivers State are :

- layers : 80-85 kobo:each
- broiler : 75-80 kobo/each.

Parent stock 1-day-old chicks CIF Port Harcourt Airport can be priced at ₦ 2.10-2.15/each.

4. MARKETS FOR OTHER PRODUCTS

As stated before, the market research was finalized to the in-out products of the poultry farm.

In this chapter the most important products necessary for the poultry farm processes have been investigated in terms of their availability in Rivers State.

From this point of view Rivers State in general and Port Harcourt in particular offer a network of traders and manufactures that can be defined more than satisfactory.

In fact, No. 54 export-import enterprises are at present operating in Rivers State dealing with practically every known product and No. 43 industries (manufacturing) operate in Port Harcourt giving industrial support for the must important sectors (metal, electronics, equipments, etc.).

For the specific needs of the poultry farm the following is a result of our findings.

4.1 CHEMICALS

The chemical products required by the poultry farm are mostly: surface-active agents, disinfectants, detergents, emollients, products for water softening plant, products for waste water treatment (Fells, polyelectrolite, NaOH).

Five enterprise in Port Harcourt deal with chemical importations. All products can be available with delivery two months after order.

4.2 PLASTIC PRODUCTS

Four factories produce plastic products in Port Harcourt. The poultry farm will need : plastic bags, heat-shrunk plastic film, and plastic baskets. All the products are available; special plastic baskets can be produced by order in advance.

4.3 VEHICLES

All the major vehicles makers are represented in Port Harcourt and offer all types of vehicle necessary for the poultry farm (cars, trucks, tractors, trailers). It is possible to transform the trucks locally,e.g. equip them with air conditioning. The poultry farm will require an air-conditioned truck for egg transportation from the Parent stock installation to the hatchery plant (18°-20°) and for transporting the 1-day-old chicks from the poultry farm to the Farmers' Co-operatives (25°-27°).

The internal feedstuff transportation will require special trucks for the pneumatic loading of the silos of the different (broilers and layers) installations .

Broiler collection from the Farmers' Co-operative to the poultry farm slaughterhouse while require proper adaptations to fit cages containing 10 broilers each.

4.4 CARBONED BAGS

One factory produces paper packaging in Port Harcourt. Any kind of product can be produced under specific order in advance.

4.5 DRUMS AND PAILS

One factory produces drums (209 liters) and pails (20 liters)in Port Harcourt.

4.6 CLOTHES

Four of which 1 Co-operative tailoring enterprise produces special clothes for any kind of factory on artisanal/industrial scale.

4.7 PAINTS

Three enterprises deal with import all kind of paints required in a plant, such as a poultry farms.

4.8 RICE STRAW

Available in large quantity especially in the s uthern part of Rivers State. If must be collected and transported to the poultry farm.

5. THE NIGERIAN COMMODITY BOARDS

Six Nigerian Commodity Boards were created on 1st April 1977 by Decree No. 29 following the dissolution of the Nigerian Produce Marketing Companies and the various State Marketing Boards. In Rivers State their activity is as follows :

5.1 NIGERIAN GRAINS BOARD

The operations of NGRB are directed towards fulfilling the functions and objectives stipulated in the Decree. These may be summarised as:

- securing the most favourable arrangements for the purchase, storage and sale of grains which conform to established grades and quality standards;
- treating, processing and transporting these commodities both for the domestic markets and for export;
- stabilising prices of scheduled grains;
- development and rehabilitation of producing areas;
- the NGRB also acts as custodian of long term strategic grain reserves, as required by the Federal Government from time to time.

Marketing activities concentrate on the major crops of rice,guinea corn, maize, millet, beans (cowpeas) and wheat.

NGRB does not have exclusive or monopoly buying rights, except in the case of exports, but it seeks to provide incentive and security to producers by always being ready to buy crops at the guaranteed minimum prices which are set annually by the Federal Government. At the same time better buying opportunities are given to consumers through supplementing existing distribution systems within the country.

The operations are conducted through a two tier decentralised structure consisting of five Zonal Offices and subsidiary Area Offices. There is in addition a liaison office in Lagos which also houses the Area staff for Lagos State.

Actual buying operations take place mainly through authorised agents including River Basin Development Authorities, Agricultural Development Projects, Co-operatives, major commercial production units and well established merchants. In order to further encourage commercial production throughout the country and to provide an alternative market outlet for producers, arrangements are also made for direct purchases from individual farmers as well as from groups and associations of smaller farmers.

Buying, and subsequent redistribution, is centred on major storage installations at nine sites and all produce is carefully inspected and graded before being accepted for purchase. Poor quality deliveries which fail to meet the required standards are rejected.

The Head Office is established in Minna, an Area Office operates in Port Harcourt. The prices fixed for 1983 are :

	Buying price	Selling price
- Maize	₦ 325 / ton	₦ 240 / ton
- Rice (paddy)	₦ 480 / ton	₦ 800 / ton

The Port Harcourt Area Office is dealing at the moment with the Niger Delta Basin Authority, Agricultural Projects, Nigerian Prison Service, and the Equatorial refugee settlement Project. The activity of the Board is slowly increasing with the development of the various agricultural projects (see Annex 1). At present the quantities bought are sold to Institutions like Ministries, Army, etc.

5.2 NIGERIAN GROUNDNUT BOARD

The products which the Nigerian Groundnut Board deals with are: groundnuts, groundnut cake, soya beans, benni seed, shell nuts, ginger.

The Port Harcourt Area Office deals only with ginger coming from Zaira for export purposes. In 1983 the office has already exported 300 tonnes of ginger. The ginger is priced f.o.b. at ₦ 413/tonne.

5.3 NIGERIAN COTTON BOARD

The Port Harcourt Area Office's main activity is to provide assistance in exporting products.

The producer price for cottonseed has been established for 1983 at ₦ 510/tonne.

5.4 NIGERIAN COCOA BOARD

The Port Harcourt Area Office's main activity is also to provide assistance in exporting. The declining production and the week buying agents network is reducing the collection of the State production (see Annex 1 - 8.4.2.).

5.5 NIGERIAN RUBBER BOARD

Declining and discontinuous production is reducing the activity of the Port Harcourt Area Office mainly to support for export.

6. PRICE OF SOME SELECTED COMMODITIES AND GOODS (JANUARY, FEBRUARY, MARCH 1983)

6.1 LOCAL FOOD PRICES AT LOCAL MARKETS IN PORT HARCOURT

ITEMS	UNITS	MARKETS			AVERAGE
		NEWLAYOUT	MILE I	MILE III	
- YAM	1 (Medium Size)	162	-	159	158.0
- PLANTAIN	3 (Medium Size)	68	153	57	59.0
- TOMATOES (FRESH)	I Kg	153	52	133	161.3
- FISH (ICED)	I Kg	300	198	300	278.3
- STOCK FISH	I (Medium Size)	1,200	235	855	1,027.5
- BEEF(CATTLE MEAT)	I Kg	633	600	605	612.6
- GARRI	I Cig. Cup	8	8	8	8.0
- RICE	I Cig. Cup	35	35	30	33.3
- BEANS	I Cig. Cup	25	30	30	28.3
- MELLON	I Cig. Cup	120	100	86	102.0
- OGBONO	I Cig. Cup	160	161	159	160.0
- PEPPER(SMALL DRY)	I Cig. Cup	40	50	50	46.6
- SALT	I Cig. Cup	15	15	15	15.0
- GROUNDNUT OIL	I Beer bottle	100	120	100	106.6
- PALM OIL	I Beer bottle	120	130	120	123.3
- PEAK MILK	I Tin of 170 gm	25	30	30	28.3
- COW AND GATE	I Tin of 400 gm	200	200	200	200.0
- BREAD (Medium)	I Loaf of 454 gm	30	30	40	3.3
- SUGAR (CUBE)	I Pkt. of 454 gm	60	75	75	68.3

6.2 PORT HARCOURT SUPERMARKET PRICES

ITEMS	PACKING	QUANTITY	PRICE ₦
- SOYA OIL	CAN	1 Liter	2.00
- CORN OIL	CAN	1 Liter	4.75
- PALM OIL	CAN	½ Liter	2.00
- REFINED VEG. OIL	CAN	1 Liter	2.50
- GROUNDNUT OIL	BOTTLE	1 Liter	4.75
- OLIVE OIL	BOTTLE	1 Liter	8.00
- ORANGE JUICE	CAN	22 cl	1.50
- TOMATO JUICE	CAN	22 cl	0.35
- PINEAPPLE DRINK	CAN	35 cl	1.52
- CHILLI	CAN	300 gr	3.40
- GROUND LEGUM (MELON)	CAN	300 gr	3.45
- CASSAVA FLOUR	PLASTIC BAG	1 kg	1.90
- PURE YAM FLOUR	PLASTIC BAG	1 kg	2.50
- RICE SEMOLINA	PLASTIC BAG	1 kg	2.25
- GARRI	PLASTIC BAG	2 kg	4.05
- COW PEAS	PLASTIC BAG	1 kg	2.25
- PLUM RASE (IMPORTED)	CAN	115 gr	1.50
- HOT DOG (No. 10)	CAN	225 gr	2.40
- PORK SHOULDER (IMPORTED)	CAN	213 gr	3.30
- RICE SEMOLINA + VITAMINS	CAN	1 kg	2.45
- LONG GRAIN RICE	PLASTIC BAG	0.5 kg	0.70
- WHEAT FLOUR	PLASTIC BAG	2 kg	2.00

6.3 VARIOUS MATERIALS

- Detergents (^)	2.5	N / kg
- Emollients and surface tensioners (^)	3.5	N / kg
- Iron Chloride (Fe C13) (^)	1.5	N / kg
- Soda (Na OH) (^)	1.0	N / kg
- Polyelectralite (^)	1.8	N / kg
- Plastic baskets	5	N / each
- Plastic bag	5	N / 1,000 bags
- Plastic film	20	N / kg
- Carton box (80 x 20 x 1.2)	0.80	N / each
- Drums	19.70	N / each
- Pails	4	N / each
- Rice straw	40	N / tonn

6.4 VEHICLES

- "Argenta" air-cond.	9,417	N / each
- "Campagnola"	13,667	"
- FIAT 682 trailer 20 m3 35 tons	74,992	"
- FIAT 682 crane 7 tons	62.362	"
- FIAT 602 tipper 11 m3 8 tons	29,495	"
- FIAT 40 ordinary 3 tons	9,667	"
- FIAT 40 tipper	12,767	"
- TRACTOR SAME "Corsaro" 70 HP 2x 3	10,863	"
- TRACTOR SAME "Corsaro" 70 HP 4 x 4	14,586	"
- FORKLIFT 2 tons to 3 mt	17,789	"
- FIAT 602 tanker	28,847	"

(^) prices according to our interviews, price including transport from Port Harcourt to Omoko, minimum quantity 1 Ton, total transported goods minimum 7 tons.

6.5 FUEL, GASOIL, LUBRICANTS

- Fuel	20 Kobo/liter
- Gasoil	2 ₦ / 4 gallons
- Lubricants	5 ₦ / gallon

Transportation costs

- up 10 kms	65 Kobo/ton/kms or 8 ₦ /m3
- till 150 kms	25 - 30 kobo/ ton/kms
- in town	8 ₦ / ton

6.6 ELECTRIC POWER

For self-generation a licence is needed for the Federal Ministry of Mines and Power; a small amount is parid as a "lump sum" and for periodic inspections.

From the NEPA national grid the price in the same throughout the territory. If the power is produced by the local State the price may, at times, be lower.

- Demand chargé	
. beyond 75 KVA	first KVA ₦ 3.75
	additional KVA ₦ 5.00 per KVA
- Energy chargé	
. first 50,000 KWh/month	K 6.5 per Kwh
. next 100,000 Kwh/month	K 6 per Kwh
. next 850,000 Kwh/month	K 5 per Kwh
. all over 1,000,000 Kwh/month	K 4 per Kwh

6.7 WATER

It seems that abundant groundwaters are present every where.

Potability is ensured around 60 m in the northern band of Rivers State and around 300 m in the southern strip. In the latter, non-potable water is present at depths of even less than 20 m.

Where power is available for pumping, water supplies can always be obtained.

6.8 CIVIL WORKS LOCAL COSTS (^)

- Excavation not exceding 3 mt deep and remove to sproil	₦ 5	cu.mt
- Hardcore backfill	₦ 30	cu.mt
- Reinforced concrete class 20/19 for foundation and paving	₦ 240	cu.mt
- 225 mm thick Sand-crete block wall	₦ 18	sq.mt
- Internal plastering	₦ 7	sq.mt
- Galvanized roofing sheets	₦ 12	sq.mt
- Asbestos ceiling sheets	₦ 12	sq.mt
- 150 mm thick macadam	₦ 14	sq.mt
- Clearing	₦ 1.40	sq.mt
- 100 mm galvanized pipe, trench excavating and backfilling included	₦ 25	linear meter
- 200 mm dia. sewage concrete pipe, trench excavating and backfilling included	₦ 15	linear meter
- Galvanized iron mesh fencing, 2 mt high	₦ 10	linear meter
- Shed with galvanized roofing sheets, iron structure and concrete paving	₦ 100	sq.mt

(^) Our interviews among local contractors

7. REVIEW OF SOME SELECTED IMPORT-EXPORT COMMODITIES PASSING THROUGH PORT HARCOURT PORT

Tables 1 and 2 summarize the results of a survey conducted in Port Harcourt port. The survey was limited to the major commodities influencing the results of a poultry project in general and other most important food products.

The major quantity imported is corn which during the period January 1982 - Decembrer 1982 reached almost 110,000 tonnes: then come frozen fish (93,000 tonnes), rice (72,000 tonnes), wheat (72,000 tonnes), sugar (54,000 tonnes), barley (28,000 tonnes), and milk (27,000 tonnes).

Far behind are the quantities for frozen chicken (962 tonnes), frozen meat (316 tonnes), flour (532 tonnes), and groundnut pellets (2,200 tonnes).

With the adoption of the Economic Stabilisation Measures (see General Report)in April 1982, imports are gradually decreasing in importance at Port Harcourt port.

In fact, not only are the most important goods under import licence, but once the import licence is obtained it needs foreign currency cover from the Central Bank of Nigeria.

So far, most of the reduced import activity is actually passing through Lagos port where local importers have better facilities to get import licences and financial cover.

Other products, such as palm oil are usually imported through Lagos.

As to exports, Table 2 shows very limited export activity for palm kernel oil and palm kernels. The small quantities are due to the fact that from March 1982 the RIVOC industry has stopped production due to management and maintenance problems; the new start of activity will boost exports.

The other important product exported in 1982 (except ginger coming from other States) was the wheat offals (6,000 tonnes).

The recent export prohibition (24th January 1983) of this product together with dried brewers grains will facilitate the purchase of raw material for feed formula.

TABLE 1 - <u>IMPORT TONNAGES OF SPECIFIED CARGO</u>

(YEAR 1982)

MONTHS / COMMODITIES	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEM.	OCTOBER	NOVEMB.	DECEM.	TOTAL
- SPIRIT LIQUOR x WINE	34	8	93	59	-	-	-	-	-	-	-	87	281
- MALT X BARLEY	649	8,134	1,588	500	8,480	3,869	-	2,133	-	-	908	1,556	27,817
- FLOUR	334	-	-	198	-	-	-	-	-	-	-	-	532
- VEGETABLE OIL	-	-	2,800	-	3,700	1,200	3,300	1,100	3,200	1,000	-	1,000	17,300
- STOCK FISH	998	600	615	1,248	-	-	636	-	636	-	-	-	4,733
- PALM OIL	-	-	-	-	-	-	-	-	-	-	-	-	-
- CORN	-	-	2,410	890	-	7,574	2,395	-	87,140	5,149	-	3,300	108,858
- RICE	17,419	-	-	-	-	4,630	19,705	-	-	20,500	10,000	-	72,254
- SUGAR	12,867	2,104	3,231	5,642	1,966	4,998	2,750	1,000	753	1,753	-	17,242	54,306
- WHEAT	10,500	2,520	8,354	9,245	-	5,464	1,511	-	6,969	19,316	-	7,999	71,878
- MILK	2,317	4,350	1,654	4,092	-	947	3,900	1,070	2,017	2,716	844	3,192	27,099
- GROUNDNUT PELLET	-	-	-	2,200	-	-	-	-	-	-	-	-	2,200
- FROZEN FISH	7,412	8,051	12,176	1,087	1,127	3,898	8,270	15,516	10,106	9,475	5,122	11,176	93,416
- FROZEN CHICKEN	962	-	-	-	-	-	-	-	-	-	-	-	962
- FROZEN MEAT	-	-	-	316	-	-	-	-	-	-	-	-	316

SOURCE : NIGERIAN PORT AUTHORITY (PORT HARCOURT)

TABLE 2 - EXPORT TONNAGES OF SPECIFIED CARGO

(YEAR 1982)

MONTHS / COMMODITIES	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEM.	OCTOBER	NOVEMB.	DECEM.	TOTAL
- COCOA	500	-	-	-	-	-	-	-	-	-	-	1,210	1,710
- GINGER	40	154	124	103	-	-	21	23	65	96	21	-	647
- PALM KERNEL	-	-	-	-	-	-	-	2,000	-	-	-	4,490	6,490
- PALM KERNEL OIL	-	-	3,992	-	-	-	-	-	-	-	-	-	3,992
- PALM KERNEL PELLET	-	-	-	-	-	-	-	-	-	-	-	-	-
- PALM KERNEL CAKE	-	-	-	-	-	-	-	-	-	-	-	-	-
- PALM OIL	-	-	-	-	-	-	-	-	-	-	-	-	-
- WHEAT OFFAL	-	1,448	1,200	-	-	-	-	-	-	1,700	-	1,600	5,948

SOURCE : NIGERIAN PORT AUTHORITY (PORT HARCOURT)

ANNEX 4

UNIDO
UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

13233
(6 of 8)

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

FUNCTIONAL DESCRIPTION OF THE SELECTED AGRO-INDUSTRIAL PLANT
AND ITS ECONOMIC EVALUATION AND ORGANIZATIONAL ASPECTS

December 1983

IFAGRARIA s.p.a.
ROMA

ANNEX 4

UNIDO
UNITED NATIONS INDUSTRIAL
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RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

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FUNCTIONAL DESCRIPTION OF THE SELECTED AGRO-INDUSTRIAL PLANT AND ITS ECONOMIC EVALUATION AND ORGANIZATIONAL ASPECTS

June, 1983

IFAGRARIA s.p.a.
ROMA

LIST OF THE VOLUMES CONSTITUING THE STUDY

ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C. : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

I N D E X

Page

1. FUNCTIONAL DESCRIPTION OF THE POULTRY FARM AND COSTS EVALUATION

1.1 GENERALITIES

The Omoko Poultry farm is designed to produce:

a) 750,000 broilers/year;

b) 11 million table eggs;

c) about 4,2 million of 1 day old chicks/year of which about 750,000 will be grown in the poultry farm and about 3,450,000 will be sold to farmers Co-operatives;

d) about 25,000 t of feed stuff both for broilers and layers, about 16,000 t will be sold to the Farmers' Co-operative;

e) about 4,000,000 processed broilers coming from the poultry farm and from Farmers' Co-operatives;

f) about 750 t of poultry meat meal that will be utilized by the feed mill.

The capacity chosen for the complex has been fixed bearing in mind that the weakest point in the poultry industry in Rivers State is the absence of slaughtering facilities.

Considering the scarcety and the high price of meat meal has been considered useful to utilize the slaughtering waste to be transformed into poultry meal. Lost but not less important, it has been planned the complex as a anti-pollution industry.

The other main objective has been to involve - as much as possible - the local Co-operatives in the project.

Starting from the above points, the combined minimum economic unit for the three operations - slaughterhouse, poultry meat plant, water waste treatment plant - has been fixed, according to our findings and calculations, in:

. slaughterhouse: 2,000 broiler/hour,

. by product plant producing poultry meal: 900 kg/hour,

. water waste treatment plant: 25 m^3/hour.

The above slaughtering capacity will require a 16,000 broilers/day and, for 250 working days/year, approximately 4,000,000 broilers.

The broilers production is planned to be assumed by the poultry farm for the 19% and by the farmers Co-operatives for 81% (^); i· other words the slaughterhouse will be supplied by the poultry farm for about 42 working days and by the farmers Co-operative for 208 working days.

To ensure the total 4,000,000 finished broilers is foreseen a production of 4,265,000 1 day-old broiler chicks/year of which 3,497,000 given to the farmers' Co-operatives.

To produce 4,265,000 1 day-old broilers chicks is necessary to incubate at list 5,000,000 eggs/year (83% of the incubated eggs producing live chicks), so far to incubate 5,000,000 eggs is necessary to produce about 6,000,000 eggs/year (considering that 80% of the produced eggs can be incubated).

The 6,000,000 eggs are foreseen to be produced by a totalling of 48,000 parent stock of which 43,200 females and 4,800 males distributed in 12 parent stock installations.

Considering the biological cycle (the parents will start eggs production at about 24 weeks and will be kept in production for 40-41 weeks) is assumed a production for cycle/layer of 180 eggs.

The hatchery sector should produce, as stated before, about 4,265,000 1 day-old broilers chicks/year; this will be accomplished by a weekly production of 83,000 1 day-old chicks. The hatchery plant has No. 6 incubators of a working capacity of 50,400 eggs/each and No. 3 hatchers of a working capacity of 16,300 eggs/each.

The incubation programme is biweekly (every week 2 incubators of the 6 installed and totalling 100,800 eggs will produce 83,600 1 day-old chicks) and is planned to facilitate the distribution of the 1 day-old chicks and to ensure better conditions of the employement for the personnel.

Of the 83,600 1 day-old chicks weekly production, 67,600 will be sold to the farmers Co-operatives and 16,000 will be kept in the poultry farm.

The farmers Co-operatives will then receive about 3,497,000 1 day-old chicks/year (67,250 x 52 weeks) and will send to the poultry farm about 3,250,000 broilers year or 16,000 broilers for 4 day/week for 52 weeks.

(^) Respectively 750,000 and 3,250,000 broilers.

The number of farmers Co-operatives to be involved in such production is derived by technical and economic consideration.

The trucks to transport the finished broilers from the farmers to the poultry farm have a capacity of 3,000 bird (^).

To avoid any management problem each truck is supposed to be filled with the single farmer production. So far, each farmer is supposed to be furnished of 3,000 1 day-old chicks for 5 times. The number of farmers will be: 3,497,000 : 3,000 : 5 cycles/year = 233 (para 4.1.1).

The management problems originated by this number of farmers - described in the following pages - can make conclude that at this initial stage of the poultry farm operation is the higher involvement to be planned.

The table eggs production is entirely confined in the poultry farm; the egg packing machine with a high reliability has a minimum working capacity of 21,000 eggs/hour.

To ensure an economic installation, at least a production of 10-12 million eggs is supposed to be produced. So far, this production is planned to be obtained by No. 1 layer rearing installation (capacity No. 17,280 birds) and No. 3 layer production installations (capacity No. 15,360 birds/each).

To feed the birds, both at poultry farm level and Farmer Co-operatives level, a total yearly amount of 24,700 t is required. The requirement is planned to be satisfied by a feed mill plant of 10 t/hour capacity (8 hour working day for 300 working days). Full description of the above mentioned process can be found in the present Annex and in Annex 5.

(^) In practice are planned 2,700 considering the mortality and family consumption.

To accomplish these targets a specific project was prepared. Annex 3 gives the markets outlook in which the integrated complex will operate and all the prices and costs regarding its economic life. This Annex 4 gives the production scheme and the general services required to make the poultry farm operative. Annexes 5 and 6 give, respectively, the description of the necessary equipments and the drawings of the project.

1.2 INVESTMENT COSTS (FIXED ASSETS)

The base on which the whole construction and functioning of the poultry farm rests is the time schedule shown in Fig. 1.

The construction and functioning are at the same time the cause and effect of each particular phase of the whole establishment. The time schedule has been realized as follows :

- first : general services
- second : feed mill
- third : parent stock installations
- fourth : layer rearing installations
- fifth : hatchery plant
- sixth : broiler installations
- seventh : layers production installations
- eighth : processing plant

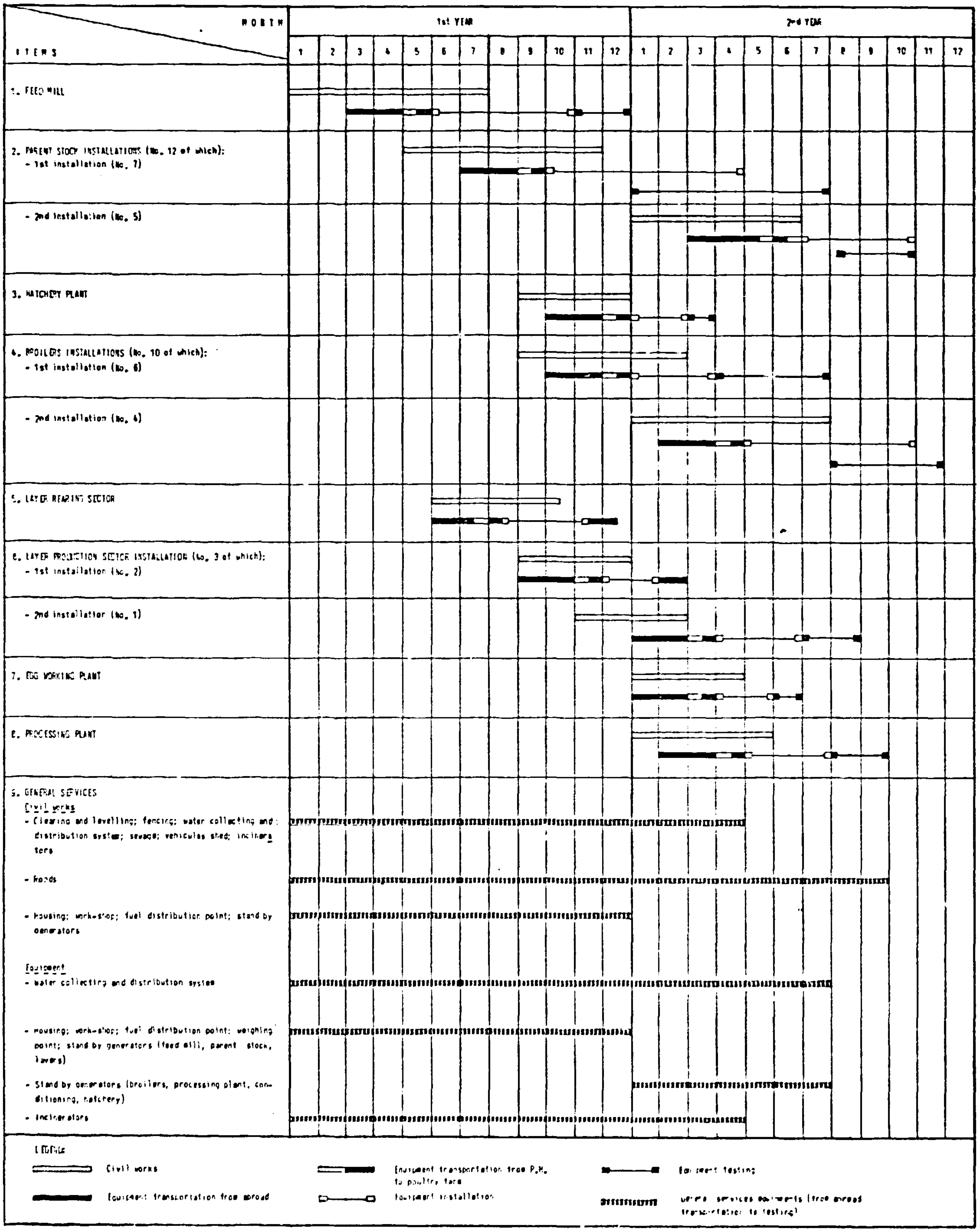
1.2.1 Land

The proposed site of the poultry farm is Omoko in Alga Local Government Area (Fig. 2).

The area has been chosen by the N.D.B.D.A. because of the land availability. In the event of the project being sponsored by the N.D.B.D.A. the land will be acquired by this Agency. It is for this reason that is was assumed that land will not entail any cost. The land clearing and levelling have, however, been considered.

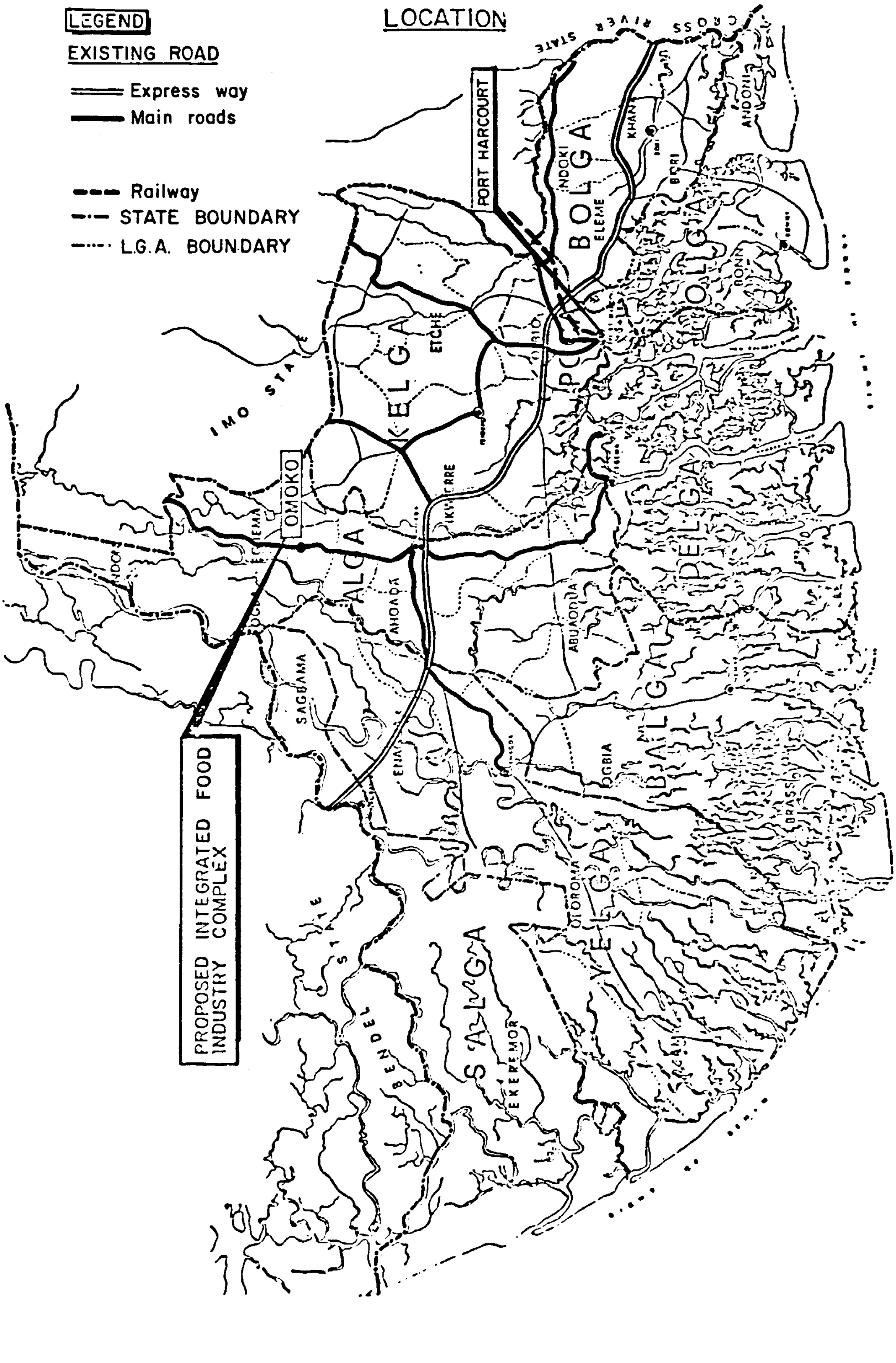
FIG. 1

TIMING SCHEDULE FOR THE ESTABLISHMENT OF THE POULTRY FARM



RIVER STATE
PROPOSED INTEGRATED FOOD INDUSTRY COMPLEX
(INTEGRATED POULTRY PROJECT)

FIG. 2



According to the project, the area where the different installa - tions will be set up is about 30 ha; the surface occupied by the poultry farm will be about 4 ha.

The clearing and levelling have been calculated on this last area.

1.2.2 Buildings and civil works

The cost evaluation of the building and civil works is based on the description contained in Annex 5, and the quantity required by the va - rious building shown in Annex 6.

The total sum amounts to ₦ 3,925,800 according to table 1.

1.2.3 Prefabricated buildings, equipments and ancillaries

Annexes 5 and 6 give a detailed description of the type of techno logy adopted for the poultry farm and a description of each piece of equip - ment that will be installed. Table 2 summarizes all the equipments which tot al ₦ 9,005,000.

This cost has been calculated in Omoko and includes the erection freight. Table 3 gives the detailed transportation cost from Port Harcourt to Omoko (less than 150 km). Table 4 shows the costs of the prefabricated buildings (₦ 2,388,180) and the equipments (₦ 6,616,820).

1.2.4 Time schedule of the civil works and equipment assembly

In accordance with Fig. 1, Table 5 evaluates the percentage of the civil works and the equipment assembly in the 1st year and 2nd year.

1.2.5 Civil works and equipment assembly costs by year

Table 6 shows the progressive civil works and equipment costs in year 1 and year 2. Civil works amount to ₦ 2,465,740 and ₦ 1,460,060 respec- tively while the amounts for equipments are ₦ 3,222,540 and 5,782,460.

Table 1. COST EVALUATION OF THE CIVIL WORKS FOR THE POULTRY FARM ACCORDING TO THE DESCRIPTION IN ANNEX 5 AND 6

NAIRA

ITEMS	UNIT COST	TOTAL COST
1. Hatchery Plant	-	37,000
2. n. 12 Parent stock installations	50,700	608,400
3. n. 10 Broiler installations	64,090	640,900
4. Table egg production		
4.1 Rearing sector	-	57,600
4.2 n. 3 Production installations	-	251,700
4.3 Egg working plant	-	10,900
5. Processing plant		
5.1 Slaughter house and meat storage plant	-	112,600
5.2 By-product plant	-	32,000
5.3 Waste water treatment	-	8,000
6. Feed mill		
6.1 Plant, silos and services	-	290,000
7. General services		
7.1 Clearing and levelling	-	346,500
7.2 Roads	-	950,000
7.3 Fencing	-	42,000
7.4 Sewage	-	22,400
7.5 Housing	-	-
7.5.1 Office	50,000	7,000
7.5.2 Staff (n.5 units)	2,000	250,000
7.6 n. 3 incinerators	-	6,000
7.7 Work shop	-	15,000
7.8 Stand-by generators	-	14,800
7.9 Vehicles shed	-	40,000
7.10 Fuel distribution point	-	20,000
7.11 Water collecting and distribution system	-	153,000
7.12 Weighing scale (in-out products)	-	10,000
TOTAL		3,925,800

TABLE 2 - COST OF THE PREFABRICATED BUILDING AND EQUIPMENT OF THE POULTRY FARM ACCORDING TO THE DESCRIPTION IN ANNEX 5-6 (MAY 1983)

(NAIRA)

ITEMS	UNIT N°	C.I.F. PORT HARCOURT	PORT CHARGES AND TRANSPORT PORT HARCOURT-OKOKO	ERECTION FREIGHT COSTS	TOTAL COST (FINAL)	UNIT COST
1. HATCHERY PLANT						
1.1 Hatchery building	1	56,400	1,180	12,000	69,580	-
1.2 Hatchery equipment	1	338,470	5,160	73,000	415,630	
TOTAL 1		394,870	6,340	85,000	486,210	
2. PARENT STOCK INSTALLATIONS						
2.1 Buildings	12	430,600	8,320	94,000	538,920	44,910
2.2 Equipments	12	407,800	7,960	86,000	503,760	41,980
TOTAL 2		844,400	16,280	182,000	1,042,680	86,890
3. BROILER INSTALLATIONS						
3.1 Buildings	10	414,950	15,050	90,000	520,000	52,000
3.2 Equipments	10	279,550	13,450	60,000	353,000	35,300
TOTAL 3		694,500	28,500	150,000	873,000	87,300
4. TABLE EGG PRODUCTION						
4.1 Rearing sector		-	-	-	-	-
4.1.1 Building	1	25,400	800	5,500	31,700	-
4.1.2 Equipment	1	56,170	1,680	12,000	69,850	-
4.2 Production sector		-	-	-	-	-
4.2.1 Buildings	3	95,740	2,260	13,000	111,000	37,000
4.2.2 Equipments	3	185,060	3,750	40,000	228,810	76,270
4.3 Egg working building		-	-	-	-	-
4.3.1 Building	1	12,800	640	2,000	15,440	-
4.3.2 Equipment	1	21,800	760	4,700	27,260	-
TOTAL 4		330,370	9,890	83,800	454,060	-
5. PROCESSING PLANT						
5.1 Buildings	4	304,000	6,240	64,800	375,040	-
5.2 Equipment		-	-	-	-	-
5.2.1 Slaughterhouse	1	-	-	-	-	-
5.2.2 Meat storage plant	1	-	-	-	-	-
5.2.3 Working room condition	1	1,926,800	32,400	334,500	2,292,000	-
5.2.4 Electric system	1	-	-	-	-	-
5.2.5 Hydro system	1	-	-	-	-	-
TOTAL 5		2,130,700	38,640	455,800	2,623,140	-

(Continued Table 2)

ITEMS	UNIT Nº	C.I.F. PORT HARCOURT	PORT CHARGES AND TRANSPORT PORT HARCOURT-OMOKO	ERECTION FREIGHT COSTS	TOTAL COST (FINAL)	UNIT COST
6. FEED MILL						
6.1 Buildings and sheds		492.100	15.500	113.000	620.600	-
6.2 Equipments		1,175,150	24.450	270.000	1.469.600	-
TOTAL 6		1,667,250	39.950	383,000	2.030.200	-
7. GENERAL SERVICES						
7.1 Office building						
7.1.1 Building	1	64.000	1.300	13.800	79.100	-
7.1.2 Equipment	1	30.800	660	-	31.460	-
7.2 Workshop building		-	-	-	-	-
7.2.1 Building	1	20.650	740	4.500	25.900	-
7.2.2 Equipment	1	50.500	1.600	2.000	54.100	-
7.3 Carcass incinerators	3	16.450	700	3.500	20.650	-
7.4 High pressure and hot water hydrocleaners machines	3	8,240	600	1.700	10.540	-
7.5 Stand-by generators	7	762.000	19.400	148.600	930 000	-
7.6 Electric distribution system	1	71.400	2.500	10.000	83 900	-
7.7 Weighing scale (in-out products)	1	20.000	1.000	2.000	22.000	-
7.8 Water collection system and distributions	1	61.300	1.760	13.000	76.060	-
7.9 Fuel distribution point		10.000	1.000	2.000	13.000	-
7.10 Furniture for staff housing		50.000	3.000	-	53.000	-
TOTAL 7		1,166,350	32.260	201.100	1.400.710	-
GRAND TOTAL		7,255,445	172.860	1.543.700	9.005.000	

TABLE 3 - COST EVALUATION FOR CONTAINER TRUCK ON BOARD IN PORT HARCOURT

		CONTAINERS 20'	CONTAINERS 40'
Port Charges: CTC charges :	NPA shore handling	₦73	₦91
	Transfer charges	₦30	₦60
	Delivery charges	₦70	₦87.50
	Custom Examination	₦75	₦93.75
	+ rent if any		
	first 6 days	Free	Free
	Next 6 days per day	₦5	₦11
	Next 6 days per day	₦33	₦66
	Next 6 days per day	₦44	₦88
	Thereafter	₦55	₦110
Shipping Line Charges :		₦210	₦370
Container deposit (refundable if no demurrage)		₦500	₦1.000
Container demurrage if any :	First 3 days	Free	Free
	Next 7 days	₦5	₦10
	Next 7 days	₦10	₦20
Transport from PHC to around 150 km by good road (including return of the empty boxes)		₦500	₦1.000
Demurrage on trucks per day per truck		₦150	

NOTE:

1/ Rate for transport means that the container is returned same day with same truck. If it is necessary to send another truck to pick up the empty then rate is double.

2/ Container stays with the consignee for a while then demurrage as per line's tariff will accrue.

3/ Demurrage rate can be discussed with the line.

TABLE 4. COST OF PREFABRICATED BUILDINGS AND EQUIPMENTS OF THE POULTRYFARM ACCORDING TO THE DESCRIPTION IN ANNEX 5.

(NAIRA)

ITEMS	BUILDINGS	EQUIPMENTS	TOTAL
1. Hatchery Plant	69,580	416,630	428,210
2. Parent stock installations	538,920	503,760	1,042,680
3. Broiler installations	520,000	353,000	873,000
4. Table egg production			
4.1. Rearing sector	31,700	69,850	101,550
4.2. Production sector	111,000	228,810	339,810
4.3. Egg working building	15,440	27,270	42,700
5. Processing plant	375,940	2,252,200	2,628,140
6. Feed mill	620,600	1,469,600	2,090,200
7. General services			
7.1. Office bu'lding	79,100	31,460	110,560
7.2. Workshop building	25,900	54,100	80,000
7.3. Carcass incinerators	-	20,650	20,650
7.4. High pressure and hot water hydro-cleaner machines	-	10,540	10,540
7.5. Weighing scale (in-out products)	-	23,000	23,000
7.6. Stand-by generators	-	930,000	930,000
7.7. Eletric distribution system	-	83,900	83,900
7.8. Water collection system and distribution	-	76,000	76,000
7.9. Fuel distribution point	-	13,000	13,000
7.10. Furniture for staff housing	-	53,000	53,000
GRAND TOTAL	2,388,180	6,616,820	9,005,000

TABLE 5. ESTIMATED PERCENTAGE PROGRESS OF CIVIL WORKS AND EQUIPMENT ASSEMBLY ACCORDING TO THE TIME SCHEDULE IN FIG. 1

ITEMS	CIVIL WORKS		EQUIPMENT	
	1st year	2nd year	1st year	2nd year
1. Clearing and levelling	60	40	-	-
2. Roads	50	50	-	-
3. Fencing	60	40	-	-
4. Sewage	50	50	-	-
5. Workshop	100	-	100	-
6. Vehicle shed	100	-	-	-
7. Fuel distributon point	100	-	100	-
8. Housing	100	-	100	-
9. Water distribution system	60	40	60	40
10. Stand-by generators	100	-	40	60
11. Electric distribution system	-	-	50	50
12. Incinerators	100	-	100	-
13. Hot water and hydro-cleaner machine	-	-	-	100
14. Furniture for staff housing	-	-	100	-
15. Weighing scale (in-out products)	100	-	100	-
16. Feed mill	100	-	100	-
17. Parent stock installation	(n.7)	(n.5)	(n.2)	(n.10)
18. Hatchery plant	100	-	20	80
19. Broilers installations	(n.6)	(n.4)	-	(n.10)
20. Layer rearing sector	100	-	100	-
21. Layer production installations	(n.2)	(n.1)	-	(n.3)
22. Egg working plant	-	100	-	100
23. Processing plant	-	100	-	100

Table 6 - CIVIL WORK AND EQUIPMENT ASSEMBLY COSTS BY YEAR ACCORDING TO: table 5, 4, 1

(Naira)

ITEMS	CIVIL WORK			EQUIPMENTS		
	1st year	2nd year	Total	1st year	2nd year	Total
1. Clearing and levelling	207,900	138,600	346,500	-	-	-
2. Roads and aprons	475,000	475,000	950,000	-	-	-
3. Fencing	25,200	16,800	42,000	-	-	-
4. Sewage	11,200	11,200	22,400	-	-	-
5. Workshop	15,000	-	15,000	80,000	-	80,000
6. Housing						
6.1 Office	7,000	-	7,000	110,560	-	110,560
6.2 Houses for staff	250,000	-	250,000	53,000	-	53,000
7. Incinerators	6,000	-	6,000	20,650	-	20,650
8. Stand-by generators	14,800	-	14,800	372,000	558,000	930,000
9. Electric distribution system	-	-	-	42,000	41,900	83,900
10. Vehicle shed	40,000	-	40,000	-	-	-
11. Full distribution point	20,000	-	20,000	13,000	-	13,000
12. Water collection and distribution system	91,800	61,200	153,000	45,600	30,400	76,000
13. High pressure and hot water hydrocleaner machines	-	-	-	-	10,540	10,540
14. Weighing scale (in-out products)	10,000	-	10,000	23,000	-	23,000
15. Feed mill	290,000	-	29.00	2,090,200	-	2,090,200
16. Hatchery plant	37,000	-	37,00	97,200	389,010	486,210
17. Parent stock installations	354,900	253,500	608,400	173,780	869,900	1,042,680
18. Broiler installations	384 540	256,360	640,900	-	873,000	873,000
19. Layer rearing sector	57,600	-	57,600	101,550	-	101,550
20. Layer production installations	167,800	83,900	251,700	-	339;810	339,810
21. Egg-working plant	-	10,900	10,900	-	42,700	42,700
22. Processing plant	-	152,600	152,600	-	2,628,140	2,628,140
TOTAL	2,465,740	1,460,060	3,925,800	3,222,540	5,782,460	9,005,000

1.2.6 Vehicles

Tables 7 and 8 show the number and the type of vehicles required by the poultry farms and their cost by year. The vehicle costs are N 545,000 in the first year and N 612,000 in second year respectively and total N 1,157,000.

While the Peugeots are for the expatriate and Nigerian personnel, the other poultry farm vehicles are used for :

a) one of the conditioned trucks for the transportation of the eggs from the parent stock installations to the hatchery plant;

b) two of the conditioned trucks (carrying platform 2.0 x 2.0 x 3.5 m) for the transportation of the 1 day-old chicks from the poultry farm to the farmers' Co-operative. They will start to operate in the 2nd year and will transport about 67,000 chicks per week; while the hatchings are twice per week they will transport 33,500 chicks on two days a week. In good condition the trucks are allowed to carry 18,000 chicks/trip in the surrounding area. The 18,000 chicks can be divided in 6 lot of 3,000 chicks delivered to 6 farmers;

c) of the nine trucks, 6 trucks are mostly devoted to the transport of the Feedstuffs to the Farmers' Cooperatives and to the installation silos of the poultry farm. They are equipped with the pneumatic foodstuff unloading systems;

d) the other 3 trucks are devoted to transport the finished broilers to be slaughtered from the Farmers' Cooperative to the poultry farm. This transport involves a transfer of 16,000 birds 4 days each week. The truck can transport (in cages) an average of 15 birds (^) cage and a total of about 3,000 birds. The cage measures about 1.0 x 0.60 x 0.25 m; average number of cages transported : 200; length of truck loading platform: 6.0m;

e) tractors and trailers are used by the various poultry farm installations; mainly to remove the poultry manure.

(^) 2.0 kg l.w. each.

TABLE 7 - VEHICLES REQUIRED BY THE POULTRY FARM (*)

ITEMS	SECTORS					Total
	General Services	Parents Broilers Layers Installtat.	Hatchery	Processing Plant	Feed Mill	
. Peugeot 504	10	-	-	-	-	10
. Trucks	2	-	-	3	4	9
. Trailers	-	6	-	-	-	6
. Air-conditioned trucks	-	1	2	-	-	3
. Tractors	-	5	-	-	-	5
TOTAL	12	12	2	3	4	33

(*) The dressed broilers and eggs are sold in the poultry farm. The feed stuff raw-material and the various materials are delivered to the poultry farm.

TABLE 8 VEHICLES COST BY YEAR

NAIRA

ITEMS	UNIT COST NAIRA	YEARS				
		1		2- 20		1 - 20
		n°	Naira	n°	Naira	n°
. Peugeot 504	9,500	10	95,000	-	-	10
. Trucks	75,000	6	450,000	3	225,000	9
. Trailers	7,000	-	-	6	42,000	6
. Air-conditioned trucks	90,000	-	-	3	270,000	3
. Tractors	15,000	-	-	5	75,000	5
TOTAL	-	-	545,000	-	612,000	-

1.2.7 Preliminary and organizational costs

These costs include :

- initial investigations, research and studies (technical economic, marketing, etc.) and for the establishment of the whole technical, administrative and managerial organization. They can be estimated at about ₦ 100,000;
- the cost of the project design : estimated at about ₦ 200,000
- the total preliminary and organizational costs are then about ₦ 300,000 allocated in the 1st year.

1.2.8 Time schedule of the investment costs and interest during construction and assembling

Table 9 and 9 /a show the time schedule of the investment cost by year.

In the first year they total ₦ 6,833,280 and in the second year ₦ 8,354,520.

The total investment costs amount to ₦ 15,187,800.

1.2.9 Depreciation of the investment costs and replacement scheme

The yearly depreciation was estimated on the basis of the average technical-economic life of the capital goods. The adopted scheme is as follows :

	Year	%
- Buildings and civil works	20	5.0
- Prefabricated buildings	20	5.0
- Machinery, equipments and ancillary	7	14.3
- Vehicles	3	33.3
- Preliminary and organizational costs	5	20.0

Table 10 shows the results of the calculations.

Table 11, instead, shows the replacement scheme according to the year of capital renewal.

TABLE 9 POULTRY FARM: RECAPITULATION OF THE INVESTMENT COSTS (:)

(NAIRA)

INVESTMENT ITEMS	TOTAL	OF WHICH IN FOREIGN CURRENCY (*)	%
. Civil works	3,925,800	-	-
. Prefabricated buildings	2,388,180	2,231,200	93
. Specific machinery and equipment (^)	5,321,110	4,996,000	94
. General installations, ancillary, services (^)	1,242,710	1,168,800	94
. Vehicles	1,157,000	-	-
. Furniture	53,000	-	-
. Prelimenary and organizational costs	300,000	100,000	33
SUB TOTAL	14,837,800	8,496,000	59
. Interest during construction and assembling	800,000	-	-
TOTAL	15,187,800	8,496,000	56

(^) For hatchery, parent stock plant, broiler's plant, table egg plant, processing plant and feed mill.

(:) Costs of machinary equipment, general installations and vehicles include also spare parts.

(*) CIF + 75% of assembling and erection cost (remaining 25% in local money viz with local labour)

(:) Investment cost included contigencies and spare parts

(:) Excluding technical assistance and professional training

Table 9/a - TIME SCHEDULE OF THE INVESTMENT COSTS

(Naira)

INVESTMENT ITEMS	YEARS		TOTAL
	1st year	2nd year	
1. Clearing and levelling	207,900	138,600	346,500
2. Buildings and civil works	2,257,840	1,321,460	3,579,300
3. Prefabricated buildings	885,000 (*)	1,503,180	2,388,180
4. Machinery, equipment and ancillary	2,337,540	4,279,280	6,616,820
5. Vehicles	545,000	612,000	1,157,000
6. Preliminary and organizational costs	300,000	-	300,000
SUBTOTAL	6,533,280	7,854,520	14,387,800
7. Interest during construction and assembling	300,000	500,000	800,000
TOTAL	6,833,280	8,354,520	15,187,800

(*) Hatchery plant, feed mill, office, workshop, no. 2 parent-stock installations (see table 2).

Table 10 - DEPRECIATION OF THE INVESTMENT COSTS

(Naira)

INVESTMENTS	YEARS (*)	AMOUNT OF INVESTMENTS	DEPRECIATION		
			2	3-6	7-20
1. Buildings and civil works	1	2.257.840	112,890	112,890	112,890
(20 years = 5.0%)	2	1.321.460	-	66,070	66.070
2. Prefabricated buildings	1	885.000	44,250	44,250	44,250
(20 years = 5.0%)	2	1.503.180	-	75,160	75,160
3. Machinary, equipments and					
ancillary	1	2,337,540	334,270	334,270	334,270
(7 years = 14,3%) (*)	2	4,279,280	-	611,940	611,940
4. Vehicles	1	545,000	181,500	181,500	181,500
(3 years = 33,3%) (*)	2	612,000	-	203,800	203,800
5. Preliminary and organizational costs					
nal costs	1	300,000	60,000	60,000	-
(5 years = 20%)	-	-	-	-	-
TOTAL			732,910	1,689,880	1,629,880

Table 11 - REPLACEMENT SCHEME OF THE RENEWABLE CAPITAL GOODS AND THEIR RESIDUAL VALUE (R.V.)

(Naira)

YEARS	MACHINERY, EQUIPMENTS AND ANCILLARY	VEHICLES	TOTAL
4	-	545,000	545,000
5	-	612,000	612,000
6	-	-	-
7	-	545,000	545,000
8	2,337,540	612,000	2,949,540
9	4,279,280	-	4,279,280
10	-	545,000	545,000
11	-	612,000	612,000
12	-	-	-
13	-	545,000	545,000
14	-	612,000	612,000
15	2,337,540	-	2,337,540
16	4,279,280	545,000	4,824,280
17	-	612,000	612,000
18	-	-	-
19	-	545,000	545,000
20	-	612,000	612,000
R.V.	1,558,150	589,100	2,147,250

1.3 ANNUAL OPERATING COSTS

Generalities

The description and evaluation of the annual operating costs and sales receipts give the picture of how the model poultry farm is organized inside the complex and its relations with the co-operative farmers and the markets (see Fig. 3 at page 54). This is why we precede the annual costs and the sales receipt with the following description.

1.3.1 Internal organization of the poultry farms and its production (^)

1.3.1.1 The broilers operation

According to the operating hypotheses, the complex will start its activity in January of the second year, with the introduction of the 1 day-old chicks parents broilers. In fact, by that time (see Fig. 1 and Tables 12, 13), n. 4 parent stock installations will have already been completed; in the meanwhile, the feed mill will be already entered in production.

The 12 parent stock installations are divided into 3 groups each and are filled with 2 months of decalage; in each year is foreseen to buy 3 lot (19,600 birds/lot of which 16,000 females and 1,600 males necessary to fill 4 installations each with 4,000 females and 400 males) of 1 day-old chicks parent broilers for a total of 58,800 birds.

The Table 12 gives the synthesis of the production cycle in the 2nd year of the poultry farm's life. From the 3rd year full production is reached.

At the end of 6.5 months, the egg production will be calculated on 3,600 layers and 360 males for each installation (dead birds, culls, etc) against the 4,000 female and 400 males originally bought.

The eggs are then sent to the hatchery plant, which has a capacity of 302,400 eggs for the incubators (n. 6 each having a capacity of 50,400 eggs), and 50,400 eggs for the "hatching" machines (n. 3 each having a capacity of 16,800 eggs).

(^) The year sequence that will be mentioned in this report is according to the poultry farm life.

TABLE 12 -1 DAY OLD CHICKS CYCLE OF PRODUCTION - SECOND YEAR

- n. 12 Parent stock installation divided into 3 Groups of 4 installations each
- Group A (4 installations) a) filled with 1 day parent old chicks : January
  b) Starting production: mid-June
  c) Egg productions to be incubated from mid-June to December (6,5 Mo): n. 1,400,000 (*)

- Group B (4 installations) a) filled with 1 day parent old chicks: March
  b) Starting production: mid- August
  c) Egg production to be incubated from mid-August to December (4,5 Mo): n. 970,000 (*)

- Group C (4 installations) a) filled with 1 day parent old chicks: May
  b) Starting production: mid-October
  c) Egg production be incubated from mid-October to December (2,5 Mo): n. 540,000

(*)Assuming the same average % eggs deposition for the 10 months; incubable eggs = 83% of eggs production

TABLE 13 - BROILER PRODUCTION IN THE SECOND YEAR

MONTHS	JULY				AUGUST				SEPTEMBER				OCTOBER				NOVEMBER				DECEMBER				NOT FINISHED CYCLES	CYLE OF PRODUCTION (n. 15,000 BROILERS FOR INSTALLATIONS	Nº OF BROILERS
WEEKS	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4			
BROILERS INSTALLATIONS																											
N. 1																									...	2	30,000
N. 2																									...	2	30,000
N. 3																									...	2	30,000
N. 4																									...	2	30,000
N. 5																										2	30,000
N. 6																										2	30,000
N. 7																									...	1	15,000
N. 8																									...	1	15,000
N. 9																									...	1	15,000
N. 10																									...	1	15,000
TOTAL																									8	16	240,000

The weekly production of the hatchery plant will be 83,000 1 day-old chicks, assuming 83% of the weekly incubated eggs produce live chicken.

The incubation programme is biweekly and is planned to facilitate the distribution of the 1 day-old chicks and to ensure better conditions of employment for the personnel.

The buying of the 1-day-old chicks will be as follows : every two months n. 16,000 female broilers and n. 1,600 male broilers.

Production of 1-day-old chicks

The parents (^) will start egg production at about 24 weeks or 6.0 months of their life and will finish production (economically) at 64-65 weeks or 16 months. The production period will be then about 40-41 weeks or 10 months.

The first parent stock installation (filled with 1-day-old chicks in January) will start egg production at the middle of June. The average production of each parent is evaluated at 180 eggs per cycle/layer of which 80% will be incubated. At the end of the production cycle each parent stock installation will observe two months suspension of activity as a "health break" and for the necessary cleanings, disinfecting and maintenance.

Table 12 gives the detailed production cycle of the incubator eggs during the second year, while in third year the system will enter into full production.

The 1-day-old chick production, since it is related to the capacity of the hatchery plant, will be of about 1,826,000 (22 weeks-from middle of July to December x 83,000/1-day-old chicks).

Broilers production in the poultry farm

Broiler production in the poultry farm is based on n. 10 broiler installations having a total capacity of n. 150,000 broilers (n.15,000 each).

The production cycle is planned to take 2 months, to which must be added 10 days for cleaning, disinfecting and maintenance.

(^) Suggested breeds: Hubbard

In the second year of production the poultry farm will produce n. 240,000 broilers according to the production plan contained in table 13.

The broilers will be kept in the installation till they reach 2.0 kg l.w. The average feed-stuff consumption is assumed to be 2.5 kg of feed - stuff per 1 kg l.w.

The total number of 1-day-old chicks required by the second year will be about 252,000 assuming each installation to be filled with 15,750 1-day-old chicks. In the third year the poultry farm will have reached full production : n. 750,000 broilers/year utilizing 787,500 1-day-old chicks. The 750,000 birds represent the 19% of the 4,000,000 broilers processed in the poultry farm.

Broilers production at the Farmer Co-operatives level

The broilers production will be related to the availability of the 1-day-old chicks.

In the second year, about 1,574,000 (total production in second year minus the internal poultry farm requirements) can be sold to the farm - ers" Co-operatives.

The distribution will start at the middle of July; during two day each week n. 67.250 1-day-old chicks will be distributed. The production cy- cle is assumed to be the same as that of the poultry farm: about 8 weeks for the same live weight. Starting from the middle of september, for 4 days of each week about n. 16,000 broilers of 2.0 kg l.w. should be ready; taking in- to account losses for mortality and family consumption (n. 16,000 x 4 days = n. 64,000 broilers/week against the 67,600 1-day-old chicks). All in all, in the second year, the Farmers' Co-operative will supply about 960,000 broilers (15 weeks x 4 days x 16,000 broilers).

In the third year of activity, while the poultry farm will enter into full production, the total production at the Farmers' Co-operative will be : n. 16,000 broilers x 4 days x 52 weeks = 3,328,000 broilers. Taking into account family consumption the total broilers delivered to poultry farm are about 3,250,000 birds or the 81% of the 4,000,000 birds processed in the poultry farm.

The 1-day-old chicks bought by the Farmers' Co-operative will be:
- n. 67,600 x 52 weeks = 3,515,000 1-day -old chicks.

1.3.1.2 Table eggs operation

The poultry farm sectors for egg production consist of :
- 1 rearing sector installation having a capacity of 17,280 pullets;
- 3 production sector installations having a total capacity of 46,080 layers.

While the rearing sector installation is planned to be finished at the end of the 1st year, egg operation is assumed to start at the beginning of January of second year.

In January, about 18,000 1-day-old layer chicks (^) will be bought and placed in the rearing sector where they will be kept for about 3 months (^) and then transferred to the 1st production installation. It is assumed that mortality during rearing will amount to 4% (from 18,000 1-day-old chicks to 17,280 pullets).

Considering 1 month for cleaning, disinfecting and maintenance, the second rearing filling will be in May (18,000 1-day-old chicks) and the third in September (18,000 1-day-old chicks).

The total of 1-day-old layer chicks will be 54,000 in the second year and in the following years (^^).

The 2nd and 3rd production installations will be thus filled in August and in December respectively (see Table 14).

In the second year, egg production (5,752,000 eggs) is shown in Table 14; while in the third year and in the subsequent years it is assumed at about 11,000,000(^^)eggs (3 cycles per year: n. 3,653,000 eggs/cycle - see note Table 14).

(^) Suggested breed : Warren

(^) Pullets consuming on average of 0.090 kg/day feed-stuff.

(^^) The average mortality from 1-day-old chicks to pullets is 4% (17,280 pullets against the 18,000 1-day-old chicks).

(^^) The number of eggs will vary each year according to the production cycles position. The above production has been taken for the economic calculations.

TABLE 14 - EGG PRODUCTION SECOND YEAR IN THE POULTRY FARM

DESCRIPTION	(MONTHS)												TOTAL (000)
	J	F	M	A	M	J	J	A	S	O	N	D	
. Rearing sector filling period	X (18,000 1day old chicks)				Y (18,000 1day old chicks)				X (18,000 1day old chicks)				54,000
. Egg production sector filling period by installations													
- n. 1				Y (17,280 pullets)									
- n. 2								X (17,280 pullets)					
- n. 3												Y (17,280 pullets)	51,840
. Egg production by installation and cycle (*):													
a) No. of pullets				17,280								17,280	
b) Average of deposition by day in each months				76	80	78	76	75	70	68	66	60	
c) Average day production (000 eggs)				13,1	13,8	13,5	13,1	13,0	12,1	11,7	11,4	10,4	
d) Average month production (000 eggs)				394	414	404	394	389	363	352	342	311	
. Total eggs production by installations (in 000)													
- n. 1				394	414	404	394	389	363	352	342	311	3,363
- n. 2				-	-	-	-	394	414	404	394	389	1,995
- n. 3				-	-	-	-	-	-	-	-	394	394
TOTAL				394	414	404	394	783	777	756	726	1,094	5,752

(*) - The cycle is assumed to be 10 months. In January 3rd year the average % of deposition by day is 56 equivalent to a daily deposition of 9,676 eggs and a monthly deposition of 290,000 eggs. This will bring the total eggs deposition by installation and cycle to 3,653,000 eggs (3,363,000 + 290,000). The adopted calculation system based on the introduced pullets is theoretical; it avoids the pullets/layers mortality occurrence by months. In fact from each 17,280 pullets (a) the residual layers are 15,360 with a total mortality of about 12%. By this, the average layers production by cycle is 211 eggs if is considered the pullets number or 238 eggs if is considered the layers number.

1.3.1.3 Feed-stuffs required by the poultry farm and Farmers' Co-operatives

The amount of feed-stuffs required by the poultry farm and farmers' Co-operative totals 24,730 tonnes occuring to the evaluation made in Table 15.

The feed-mill has a working capacity of 10 t/h and will reach the above production in one shift of 8 hours and for 300 days.

Ninety-five per cent of the feed-stuffs produced by the feed-mill (see Annex 5 and 6) is of the "crushed" kind (minced pellets having the size of a rice grain); with this feed-stuff losses are reduced and, most important, the feed-stuff does note become "unmixed". In fact when the feed-stuff is not "crushed", it loses during the loading and unloading operation the fixed mix prepared by the feed-mill, and in addition the birds look only for the most appetizing contents. Only 5% of the feed-stuff produced will be packed in plastic/paper bags for the consumption of the 1-day-old chicks till their 15th day of life.

For the purposes of this report, only one standard formula has been examined - both for broilers and for layers - instead of the 8 required by the birds during their productive cycle.

The exact chemical and structural composition (the feed-mill has its own analysis laboratory - see Annex 6) greatly change the formula composition (^). So far, the minimum and maximum content have been indicated of the available raw material that can be employed in the feed formula. The average content has been chosen for the economic calculations.

Raw material % in a standard poultry formula

	Min	Max	Average
. Maize	35	45	40.0
. Soya meal	15	20	17.5
. Cassava	5	10	7.5
. Palm Kernel cake pelletted (^^)	6	10	8.0
. Palm oil	3	4	3.5
. Wheat Offals	7.5	15.5	10.0
. Meat meal	4	6	5.0
. Mineral salt	3	10	6.5
. Antibiotics,Coccidiostats Additiv.	1.5	2.5	2.0
		Total	100.0

(^) Computerized system (see Annex 5)

(^^) See "Tropical Feeds" by Bo GOHL, F.A.O.

According to the average content of the formula and to the total quantity of feed-stuff consumed and to be produced (see Table 15) the quantity of each raw material will be - by year - the following (tonnes):

Average poultry formula	2nd year	3rd/20th years
. Maize	4.309	9.892
. Soya meal	1.885	4.328
. Cassava chips	807	1.854
. Palm kernel cake	862	1.978
. Palm oil	377	866
. Wheat Offals	1.077	2.473
. Meat meal	538 (^)	1.237 (^)
. Mineral salts	700	1.607
. Antibiotics,coccidiostats, Additives	215	495
Total feed-stuff requirements	10.770	24.730

The total cost for raw material will be, in 2nd and 3rd - 20th years, ₦ 2,696,910 and ₦ 6,097,310 respectively according to table 16.

In the above average feed-stuff formula the ingredients are planned to be (percentage of quantity) :

a) Local

. Maize	40.0%	equivalent	to	tonnes	9,892
. Cassava chips	7.5%	"	"	"	1,854
. Palm kernel cake	8.0%	"	"	"	1,978
. Palm oil	3.5%	"	"	"	866
. Wheat Offals	10.0%	"	"	"	2,473
. Mineral salt	6.5%	"	"	"	1,607
. 50% average meat meal requirement (^^)	2.5%	"	"	"	750
Total	78.0%	"	"	"	19,420

(^) Of the 538 tonnes as total amount : 216 tonnes will be produced by the poultry farm processing plant (see Table 17) and 322 tonnes will be bought in the local markets.

(^) Of the 1,237 tonnes as total amount : 750 tonnes will be produced by the poultry farm processing plant (see Table 17) and 487 tonnes will be bought in the markets.

(^^) In consideration of the above foot-notes.

Table 15 - FEEDSTUFF CONSUMPTION AT POULTRY FARM AND FARMERS' CO-OPERATIVE LEVEL

ITEMS	2nd YEAR			3rd - 20th YEAR		
	No. birds	Time in days	Feedstuff(t) Rounded Figures	No. birds	Time in days	Feedstuff(t) Rounded Figures
1. Poultry Farm						
1.1 Parent stock installations						
. Group A (0.150 Kg/day)	16,000	360	864	16,000	360	864
. Group B (0.150 Kg/day)	16,000	270	648	16,000	360	864
. Group C (0.150 Kg/day)	16,000	210	503	16,000	360	864
1.2 Broiler installations						
. Finished broilers (2 Kg l.w.)(^) (2.5 Kg x 1.0 Kg l.w.)	240,000	-	1,200	750,000	-	3,750
. Not finished broilers (15,000birds x 8 instal. x 2 Kg)(^^) (see table 13)	-	-	240	-	-	-
TOTAL FOR BROILERS	-	-	3,455	-	-	6,340
1.3 Layer rearing sector						
. Pullets (0.090 Kg/day) (see 1.3.1.2)	54,000	90	435	54,000	90	435
1.4 Layer production sector (see table 14)						
. Layers (0.110 Kg/day)						
- No. 1	17,280	270	513	17,280	300	570
- No. 2	17,280	150	285	17,280	300	570
- No. 3	17,280	30	57	17,280	300	570
TOTAL FOR LAYERS	-	-	1,290	-	-	2,145
TOTAL POULTRY FARM	-	-	4,740	-	-	8,480
2. Farmers' Co-operative						
. Finished broilers (2Kg l.w.)(^) (2.5 Kg x1.0 Kg l.w.)	960,000	-	4,800	3,250,000	-	16,250
. Not finished broilers(^) (2 Kg/each)(^^)	614,000	-	1,230	-	-	-
TOTAL FARMERS' CO-OPERATIVE	-	-	6,030	-	-	16,250
GRAND TOTAL	-	-	10,770	-	-	24,730

(^) See 1.3.1.1.

(^^) Average consumption according to the cycle of production

Table 16 - FEED-MILL RAW MATERIAL COSTS ACCORDING TO THE ASSUMED AVERAGE POULTRY-FEED FORMULA

I T E M S	UNIT(^) PRICE ₦/tonn.	YEARS				
		2nd		3rd-20th		
		tonn.	₦	tonn.	₦	%
. Maize	240	4,309	1,034,160	9,892	2,374,080	39,0
. Soya meal	365	1,885	688,025	4,328	1,579,720	25,9
. Cassava chips	200	807	161,400	1,854	370,800	6,1
. Palm kernel cake	45	862	38,790	1,978	89,010	1,5
. Palm oil	900	377	339,300	866	779,400	12,8
. Wheat offal	100	1,077	107,700	2,473	247,300	4,1
. Meat meal	380	322(ˆ̬)	122,360	487(ˆ̬)	185,060	2,9
. Mineral salts	95	700	66,500	1,607	152,665	2,5
. Antibiotics, coccidiostats, additives	645	215	138,675	495	319,275	5,2
. Meat meal, poultry farm production	-	216(.)	-	750(.)	-	-
T O T A L		10,770	2,696,910	24,730	6,097,310	100,0

(^) See Annex 3/2.3

(ˆ̬) See 1.3.1.3.

(.) See table 17

b) Imported

. Soya meal	17.5%	equivalent	to	tonnes	4,328
. Meat meal	2.5%	"	"	"	487
. Antibiotics, coccidiostats Additives	2.0	"	"	"	495
Total	22.0%	"	"	"	5,310

Soya meal - which represents 80% of the foreseen imported raw material- is produced in the North of Nigeria and all locally consumed. Development programmes are undertaken by the various Federal and State Agencies but is a general opinion that in the short-medium period they won't be able to substitute the need of importations. On the contrary meat meal can be substituted in the medium-long term by fish meal of which development production programmes are underway in Rivers State. Regarding antibiotics, coccidiostats and additives they will be imported or as finished products or semi-finished products to be processed by the nigerian pharmaceutical chemical industry. In terms of value, Table 16 shows that the 22% of quantity becomes 31.1% of the total value of the formula; it must be considered that the percentage is higher due to the fact that a great part of meat meal is produced by the poultry farms.

1.3.1.4 Processing Plant

The slaughterhouse will enter in function around the middle of September (second year of operation) when the broilers, both from the poultry farm and from the Farmers' Co-operative, will be ready at an average of 2.0 kg l.w.

In the first year the slaughterhouse will process :

- n. 240,000 broilers from the poultry farm
- n. 960,000 broilers from the Farmers' Co-operative

The working capacity is of 2,000 broilers/hour or 16,000 broilers for working day/one shift. The slaughterhouse is assumed to work 5 days /week.

In the third year of operation - while the poultry farm enters in to full production - the number of birds to be slaughtered will be :

- n. 750,000 broilers from the poultry farm
- n. 3,250,000 broilers from the Farmers' Co-operative
- n. 48,000 Parent stock for broilers from the poultry farm
- n. 52,000 layers

The working technology described in Annex 5 can evaluate at about 30% (^) the slaughtering process losses from live weight to poultry meat.Each broiler is assumed to have a weight of 1.5 kg poultry meat.

1.3.1.5 By-products plant

All the residual of the slaughterhouse process are immediately sent to the by-product plant (feathers, heads, legs, offal).

According to the technological process described in Annex 5, the poultry meat meal coming from residual slaughterhouse products is evaluated at 30%.

Table 17 gives the estimated production by year.

(^) Feathers (15%); legs and head (8%); blood and offal (6%).

Table 17 - ESTIMATED PRODUCTION OF POULTRY MEAT MEAL IN THE POULTRY FARM

ITEMS	2nd YEAR			3rd-20th YEARS		
	No.	Slaughterhouse by-products (tonnes)	Poultry meat meal (tonnes)	No.	Slaughterhouse by-products (tonnes)	Poultry meat meal (tonnes)
. Broilers	1,200,000	720	216	4,000,000	2,400	720
. Parent stocks (*)	-	-	-	48,000	47	14
. Layers (**)	-	-	-	54,000	52	16
TOTAL	-	-	216	-	-	750

(*) Average l.w. 3.3 Kg.

(**) Average l.w. 3.2 Kg.

1.3.2 Other Operating Costs

1.3.2.1 Expatriate technical assistance personnel

In the poultry farm the presence of n. 5 expatriate experts is foreseen in the sectors described in Table 18.

The technical assistance will be given during the first three years of operation and will cover the most important key points of the poultry farm. Close to each expert a Nigerian assistant has been foreseen so as to be trained during 3 years.

The experts, and among them especially the veterinarian, will provide technical assistance to the Farmers' Co-operatives. The total cost for technical assistance amounts to ₦ 550,000

1.3.2.2 Nigerian personnel

Table 19 gives a detailed description of the Nigerian personnel employed by the poultry farm. The personnel has been assumed to be recruited 4-6 months before the specific operations start (e.g. feed-mill, installations, etc.) for training purposes. The total Nigerian personnel is estimated to be of 124 persons. The costs are respectively : ₦ 339,400 in the first year, ₦ 880,200 in the second year; ₦ 1,072,800 in third and following years.

1.3.2.3 Poultry farm inputs

Table 20 gives the evaluation of the major inputs regarding the functionning of the poultry farm. For the purpose of this economic evaluation most of the items have been calculated on the basis of the average physical quantities priced according to local markets (see Annex 3). The total amount is respectively :₦ 50,000 first year; ₦ 9,153,710 second year, ₦ 26,644,110 third and following years.

Table 18 - WAGES AND SALARIES OF EXPATRIATE TECHNICAL ASSISTANCE PERSONNEL

(Naira)

PERSONNEL	SALARY YEAR (*)	YEARS			TOTAL
		0-1	1-2	2-3	
1. Assistant General Manager	50,000	50,000	50,000	50,000	150,000
2. Veterinarian Supervisor	40,000	40,000	40,000	40,000	120,000
3. Feed-mill Supervisor	40,000	40,000	40,000	40,000	120,000
4. Hatchery plant and parent stock installations Supervisor	40,000	-	40,000	40,000	80,000
5. Processing plant Supervisor	40,000	-	40,000	40,000	80,000
TOTAL		130,000	210,000	210,000	550,000

(*) Including average annual allowance.

TABLE 19 WAGES AND SALARIES OF NIGERIAN PERSONNEL

PERSONNEL	UNIT	YEARS			UNIT COST		COST FOR YEAR		
		0 - 1	1 - 2	2 - 30	Monthly	Yearly	0 - 1	1 - 2	2 - 20
		Months	Months	Months	₦	₦	₦	₦	₦
1. GENERAL SERVICES									
1.1 General manager	1	12	12	12	5,000	60,000	60,000	60,000	60,000
1.2 Assistant veterinarien supervisor	1	12	12	12	2,000	24,000	24,000	24,000	24,000
1.3 Assistant chief electrical-mechanic	1	12	12	12	2,000	24,000	24,000	24,000	24,000
1.4 Supervisor commercial officier(buying section)	1	12	12	12	2,000	24,000	24,000	24,000	24,000
1.5 Commercial officier (seling section)	1	12	12	12	2,000	24,000	24,000	24,000	24,000
1.6 Administration officier	1	12	12	12	2,000	24,000	24,000	24,000	24,000
1.7 Cooperatives'liaison officier	2	12	12	12	2,000	24,000	48,000	48,000	48,000
1.8 Clerk	5	6	12	12	1,000	12,000	30,000	60,000	60,000
1.9 Guardians	5	-	12	12	300	3,600	-	18,000	18,000
1.10 Electrician mechanic	4	-	6	12	1,500	18,000	-	36,000	72,000
1.11 Drivers (truck and personnal)	6	6	12	12	400	4,800	14,400	28,800	28,800
TOTAL 1	28						272,400	370,800	406,800
2. HATCHERY PLANT									
2.1 Assistant supervisor	1	-	12	12	1,500	18,000	-	18,000	18,000
2.2. Hatchery plant officer in charge	1	-	12	12	1,000	12,000	-	12,000	12,000
2.3 Technical officer	1	-	12	12	1,000	12,000	-	12,000	12,000
2.4 Technical officer (electrician mechanic)	1	-	6	12	1,000	12,000	-	6,000	12,000
2.5 Incubator officer	1	-	12	12	1,000	12,000	-	12,000	12,000
2.6 Drivers (delivering 1-day-old chicks)	2	-	6	12	400	4,800	-	4,800	9,600
2.7 Drivers (collecting eggs from P.S.I.)	1	-	12	12	400	4,800	-	4,800	4,800
TOTAL 2	8						-	69,600	80,400
3. PARENT STOCK INSTALLATIONS									
3.1 P.S.I. (*) officer-in-charge	1	-	12	12	1,000	12,000	-	12,000	12,000
3.2 Indoor employees	12	-	12	12	500	6,000	-	72,000	72,000
3.3 Miscellaneous operations team	4	-	12	12	400	4,800	-	19,200	19,200
TOTAL 3	17						-	103,200	103,200
4. BROILER INSTALLATIONS									
4.1 B.I. (*)officer-in-charge	1	-	6	12	1,000	12,000	-	6,000	12,000
4.2 Indoor employees	6	-	6	12	500	6,000	-	18,000	36,000
4.3 Miscellaneous operations team	4	-	6	12	400	4,800	-	9,600	19,200
TOTAL 4	11						-	33,600	67,200
5. LAYERS (rearing and production)									
5.1 Layers officer-in-charge	1	-	12	12	1,000	12,000	-	12,000	12,000
5.2 Rearing officer-in-charge	1	-	12	12	1,000	12,000	-	12,000	12,000
5.3 Indoor employees	2	-	8	12	500	6,000	-	8,000	12,000
5.4 Miscellaneous operation-team	3	-	8	12	400	4,800	-	9,600	14,400
5.5. Egg packers	2	-	8	12	400	4,800	-	6,400	9,600
TOTAL 5	9						-	48,000	60,000

(continued Table 19)

PERSONNEL	UNIT	YEARS			UNIT COST		COST FOR YEAR		
		0 - 1	1 - 2	2 - 30	Monthly	Yearly	0 - 1	1 - 2	2 - 30
		Months	Months	Months	₦	₦	₦	₦	₦
6. PROCESSING PLANT									
6.1 Assistant supervisor	1	-	6	12	1,500	18,000	-	9,000	18,000
6.2 Electrician mechanic	1	-	6	12	1,000	12,000	-	6,000	12,000
6.3 Bird-slaughtering personnel	20	-	6	12	500	6,000	-	60,000	120,000
6.4 Bird-slaughtering personnel by product	3	-	6	12	500	6,000	-	9,000	18,000
6.5 Bird-slaughtering packaging	2	-	6	12	500	6,000	-	6,000	12,000
6.6 Bird-slaughtering personnel wast treatment	1	-	6	12	500	6,000	-	3,000	6,000
6.7 Drivers (collection broilers)	3	-	6	12	400	4,800	-	7,200	14,400
TOTAL 6	31						-	100,200	200,400
7. FEED MILL									
7.1 Assistant supervisor	1	12	12	12	2,000	24,000	24,000	24,000	24,000
7.2 Mechanic	1	6	12	12	1,500	18,000	9,000	18,000	18,000
7.3 Electrician	1	6	12	12	1,500	18,000	9,000	18,000	18,000
7.4 Analitical chemist	1	6	12	12	1,500	18,000	9,000	18,000	18,000
7.5 Feed mill personnel	8	4	12	12	500	6,000	16,000	48,000	48,000
7.6 Drivers (delivery of feed stuffs)	6	-	12	12	400	4,800	-	28,800	28,800
TOTAL 7	20						67,000	154,800	154,800
GRAND TOTAL	124						339,400	560,200	1,070,800

(*) P.S.I. = Parent stock installations
(*) B.I. = Broiler installations

TABLE 20 POULTRY FARM INPUTS EVALUATION COSTS BY YEAR

(NAIRA)

ITEMS	YEARS 1	2	3 - 20
1. RAW MATERIAL FOR FEED-MILL	-	2,698,910	6,097,310
1.1 Maize	-	1,034,160	2,374,080
1.2 Soja meal	-	693,025	1,579,720
1.3 Cassava chips	-	161,400	370,800
1.4 Palm kernel cake	-	36,790	89,010
1.5 Palm oil	-	339,300	779,400
1.6 Wheat offal	-	107,700	247,300
1.6 Meat meal	-	122,360	185,060
1.7 Mineral salt	-	66,500	152,565
1.8 Antibiotics, coccidiostats, additives	-	133,675	319,275
1.9 Meat meal, poultry farm production	-	-	-
2. 1-DAY-OLD CHICKS			
2.1 Parent broilers n. 58,800/year x ₦ 2,25/each	-	132,300	132,300
2.2 Layers n. 54,000/year x ₦ 0,75/each	-	40,500	40,500
3. CONSUMPTIONS			
3.1 Packages (*) (feed stuff 1 day old chicks, poultry meat meal, dressed broilers, eggs)	-	80,000	160,000
3.2 Chemical products (*) (disinfectants, emollients and surface - active agents, products for waste water treatment)	-	40,000	120,000
3.3 Vaccines and medicines (*)	-	100,000	130,000
3.4 Rice straw (average 600 tons/year x ₦ 40/tons)	-	24,000	24,000
3.5 Fuel, gasoil, lubrificants and gas (*) (vehicles, stand-by generators, steam for feed mill and processing plant, incinerators, burners of pullet heating plant gas for parent stock and broilers installations)	50,000	250,000	400,000
3.6 Other consumable products (standard hand tools, cleaning tools and materials, special clothes, fire prevention materials)	-	30,000	40,000
4. BROILERS FROM FARMERS' CO-OPERATIVES (2,0 Kg. l.w.)			
4.1 2nd year n. 960,000 x 2,0 x ₦ 3,0 Kg. l.w.	-	5,760,000	-
4.2 3rd - 20 years: n. 3,250,000 x 2,0 x ₦ 3,0 Kg. l.w.	-	-	19,500,000
TOTAL	50,000	9,153,710	26,644,110

(*) Average consumptions based on the analisys of other similar poultry farms in tropical and temperate climates.

1.3.2.4 Maintenance costs

Table 21 gives the maintenance cost by year according to the following hypothesis of incidence of the maintenance on the investment costs:

a) roads, aprons, fencing, sewage	10%
b) buildings and civil works	2%
c) machinery, equipments and ancillary	8%
d) vehicles	10%

₦ 328,000 is the maintenance cost in the second year, while it is ₦ 797,000 from 3rd to 20th years.

1.3.2.5 Total annual operating costs

Table 22 sums up the annual operating cost described above adding the overheads and sundries (3%) and contingencies (10%).

The following are the results :

- Total operating costs before financial charges :

. year 1	: ₦	588,000
. year 2	: ₦	12,711,000
. year 3	: ₦	34,235,000
. year 4 ÷ 6	: ₦	33,996,000
. years 7 ÷ 20	: ₦	33,936,000

Table 21 - MAINTENANCE ACCUMULATED ANNUAL COSTS

(Naira)

ITEMS	YEARS		
	1	2	3-20
1. Roads and aprons, fencing, sewage			
. accumulated cost	511,400	1,014,400	-
. maintenance (10%)	-	51,000	101,000
2. Buildings and other civil works			
. accumulated cost	1,746,440	2,564,900	-
. maintenance (2%)	-	35,000	51,000
3. Machinery, equipments and ancillary			
. accumulated cost	2,337,540	6,616,820	-
. maintenance (8%)	-	187,000	529,000
4. Vehicles			
. accumulated cost	545,000	1,157,000	-
. maintenance (10%)	-	55,000	116,000
TOTAL MAINTENANCE	-	328,000	797,000

Table 22 - PROJECTION OF ANNUAL OPERATING COSTS (Rounded figures)

(000 ₦)

ITEMS	REF TABLES	YEARS				
		1	2	3	4-6	7-20
OPERATING COSTS						
. Poultry farm inputs	20	50	9,154	26,644	26,644	26,644
. Maintenance	21	-	328	797	797	797
. Wages and salaries						
- Nigerian personnel	19	339	880	1,073	1,073	1,073
- Technical assistance	18	130	210	210	-	-
TOTAL		(519)	(10,572)	(28,724)	28,514	28,514
. Overheads and miscellaneus (3%)		16	317	862	855	855
TOTAL		(535)	(10,889)	(29,586)	(29,369)	(29,369)
. Contingencies (10%)		53	1,089	2,959	2,937	2,937
TOTAL COSTS BEFORE DEPRECIATION		588	11,978	32,545	32,306	32,306
DEPRECIATION	10	-	733	1,690	1,690	1,630
TOTAL COSTS BEFORE FINANCIAL CHARGES		588	12,711	34,235	33,996	33,936

2. SALES RECEIPTS OF THE POULTRY FARM

The Table 23 gives a detailed resumé of the internal and external operations of the poultry farms.

In fact, while the poultry meat meal is utilized inside the complex, the poultry manure is given free to the Farmers' Co-operative and all the other products are sold both on the markets or to the Farmers" Co-operatives.

All the elements (qüantities) can be found in the previous chapters while the prices have been chosen according to the present market situation (see Annex 3).

Sales receipts will be :

- 2^{nd} year : ₦ 12,107,300
- 3^{rd} - 20^{th} years : ₦ 37,503,050

TABLE 23 - SALES RECEIPTS OF THE POULTRY FARM BY YEAR

(NAIRA)

ITEMS	UNIT PRICE (NAIRA)	2nd YEAR		3rd - 20th YEARS	
		UNITS	REVENUE (NAIRA)	UNITS	REVENUE (NAIRA)
1. POULTRY MEAT					
1.1 POULTRY FARM PRODUCTION					
1.1.1 Broilers (average weight 1,5 KG)	(*) 4,5/Kg	240,000	1,620,000	750,000	5,062,500
1.1.2 Parents(average weight 2,3 KG)	(*) 4,5/Kg	-	-	48,000	496,800
1.1.3 Layers (average weight 2,2 KG)	(*) 4,5/Kg	-	-	52,000	514,000
1.2 FARMERS'CO-OPERATIVES PRODUCTION					
1.2.1 Broilers (average weight 1,5 Kg)	(*) 4,5/Kg	960,000	6,480,000	3,250,000	21,937,500
2. TABLE EGGS					
2.1 Eggs (dozens)	(*) 2,0/dozen	479,000	958,000	916,000	1,832,000
3. 1 DAY-OLD CHICKS					
3.1 FARMERS' CO-OPERATIVES (65,000 x 6 Months x 4 weeks)	(**)0,75/each	1,574,000	1,180,000	3,497,000	2,622,750
4. FEED STUFF					
4.1 Farmers' Co-operatives	(**) 310/ton	6,030	1,869,000	16,250	5,037,500
5. POULTRY MEAT MEAL (to the poultry farm feed mill)	-	-	-	-	-
6. POULTRY MANURE (Free to the farmers'Co-operative)	-	-	-	-	-
GRAND TOTAL			12,107,300		37,503,050

(*) Farm-gate prices

(**) Delivered to the Farmers' Co-operative sites.

3. FINANCIAL ANALYSIS, CASH FLOW AND FINANCIAL PLAN

3.1 FINANCIAL INTERNAL RATE OF RETURN OF THE POULTRY FARM

Table 24 contains the figures which give the internal rate of return of the poultry farm project.

The F.R.R. is 25.2%, which seems very actractive considering the various functions performed by the complex for itself and for the surround ing agricultural world.

3.2 CASH FLOW AND FINANCIAL PLAN OF THE POULTRY FARM

3.2.1 Working capital requirements

The working capital (initial and following increases) was estim ated on the basis of the inventories, projection of annual operating cost, and the statement that every product in Nigeria is paid for in cash at the time of purchasing.

Table 25 gives the results and the methodology adopted.

3.2.2 Evaluation of the profits before financial charge

Table 26 shows the profits earned by the poultry farm during its economic life, before financial charge.

3.2.3 Cash flow and financial plan (General)

Before showing the cash flow and financial plan, the following are the present interest rates practised in Nigeria during the survey period. Lending rates, time of repayment, grace period and interest during grace period used in the cash flow are those commonly practised in agro-allied industry projects.

According to the survey conducted among the Port-Harcourt Banks the following interest rate will be practised in 1983:

Table 24. - FINANCIAL INTERNAL RATE OF RETURN FOR THE POULTRY FARM

000 ₦

YEARS	INVESTMENTS	CONSOLIDATED COSTS				TOTAL CONSOLIDATED SALES RECEIPTS	LOSSES OR PROFITS (CASH-FLOW)
		REPLACEMENT OF CAPITAL GOODS TABLE	TOTAL INVESTMENT OR AND RENEWAL	ANNUAL OPERATING COSTS (^)	TOTAL COSTS		
1	6.813	-	6.813	588	7,401	-	- 7,401
2	8.354	-	8.354	11,978	20,332	12,107	- 8,225
3	-	-	-	32,545	32,545	37,503	4,958
4	-	545	545	32,306	32,851	37,503	4,652
5	-	612	612	32,306	32,918	37,503	4,585
6	-	-	-	32,306	32,306	37,503	5,197
7	-	545	545	32,306	32,851	37,503	4,652
8	-	2,949	2,949	32,306	32,255	37,503	5,248
9	-	4,279	4,279	32,306	36,585	37,503	918
10	-	545	545	32,306	32,851	37,503	4,652
11	-	612	612	32,306	32,918	37,503	4,585
12	-	-	-	32,306	32,306	37,503	5,197
13	-	545	545	32,306	32,851	37,503	4,652
14	-	612	612	32,306	32,918	37,503	4,585
15	-	2,337	2,337	32,306	34,643	37,503	2,860
16	-	4,824	4,824	32,306	37,130	37,503	373
17	-	612	612	32,306	32,918	37,503	4,585
18	-	-	-	32,306	32,306	37,503	5,197
19	-	545	545	32,306	32,851	37,503	4,652
20	-	612	612	32,306	32,918	37,503	4,585
R.V.	-	-	-	-	-	-	2,174
Rate of return: 25,2%							

(^) Excluding depreciation

TABLE 25 - ESTIMATE OF WORKING CAPITAL REQUIREMENTS (Rounded figures)

DESCRIPTION	TABLES	YEARS								
		1			2			3 - 20		
		VOLUME PER YEAR 000 ₦	TURNOVER COEFFICIENT	NECESSARY WORKING CAPITAL 000 ₦	VOLUME PER YEAR 000 ₦	TURNOVER COEFFICIENT	NECESSARY WORKING CAPITAL 000 ₦	VOLUME PER YEAR 000 ₦	TURNOVER COEFFICIENT	NECESSARY WORKING CAPITAL 000 ₦
1. CURRENT ASSETS										
Inventories										
- Raw material for feed mill	20	-	-	-	2,697	24	112	6,097	24	254
- Packing material for finished products	20	-	-	-	80	24	3	160	24	7
- Chemicals, vaccines, Drugs	20	-	-	-	140	24	6	250	24	10
- Rice straw	20	-	-	-	24	24	1	24	24	1
- Other consumable products	20	-	-	-	30	24	1	40	24	2
Receivables										
- Finished products (*)	-	-	-	-	-	-	-	-	-	-
- Cash and banks	-	-	-	-	-	-	-	-	-	-
- energy	20	50	12	4	250	12	21	400	12	33
- personnel	18-19	469	12	39	1,130	12	94	1,282	12	107
- raw material for feed mill	-	-	-	-	2,697	24	112	6,097	24	254
- packaging	-	-	-	-	80	24	3	160	24	7
- chemicals	-	-	-	-	40	24	2	120	24	5
- vaccines and drugs	-	-	-	-	100	24	4	130	24	5
- rice straw	-	-	-	-	24	24	1	24	24	1
- other consumable products	-	-	-	-	30	24	1	40	24	2
- maintenance	21	-	-	-	328	24	13	797	24	33
- overheads and miscellaneous	22	16	24	1	317	24	13	862	24	36
- contingencies	22	53	24	2	1,089	24	45	2,959	24	123
- 1-day -old- chicks	-	-	-	-	173	4	43	173	4	43
- broilers from Farmers' Co-operative	-	-	-	-	5,760	60	96	19,500	203	96
TOTAL WORKING CAPITAL		-	-	46			571			1,019
INCREASE IN WORKING CAPITAL		-	-	46			525	-	-	448

(*) Paid cash every day x 5 days / week

TABLE 26 - PROFITS BEFORE FINANCIAL CHARGE

ITEMS	TABLE	1	2	3	4 - 6	7 - 20
• SALES RECEPTS	23	-	12,107	37,503	37,503	37,503
• TOTAL OPERATING COSTS BEFORE FINANCIAL CHARGE	22	588	12,711	34,235	33,996	33,936
• PROFITS BEFORE FINANCIAL CHARGE	-	(-588)	(- 604)	3,268	3,507	3,567

a) Minimum rediscount rate	8%
b) Treasury bill issue rate	7%
c) Treasury certificates (1 year)	7½%
d) Treasury certificates (2 years)	8%
e) Federal Government Stock	9-9 3/4%
4 - 8 years maturity	9%
9 - 14 years maturity	9 1/4%
15 - 20 years maturity	9 1/2%
21 - 25 years maturity	9 3/4%
f) Deposit rates (Commercial Banks)	
Saving deposit	7½%
Time Dep. with 7 days notice	6½%
Time Dep. for 1 month	7%
Time Dep. from 1 - 3 months	7 1/4%
Time Dep. from 3 - 6 months	7½%
Time Dep. from 6 - 12 months	7 3/4%
Time Dep. over 12 months	8%
Lending rate	
Minimum	9½%
Maximum	3%
. preferred sector max	11½%
. less preferred sector max	13%
. agricultural Credit guarantee scheme	6-7%
. residential housing cost, no more than ₦ 100,000	7%
. agricultural production	7%
g) Specialized Institutions	
. Federal Saving Bank (saving deposit rate)	7½%
. Nigerian Industrial Development Bank (lending rates)	10½-13%
. Nigerian Bank for Commerce and Industry (lending rates)	10½-13%
. Nigerian Agricultural Bank (lending rates)	
- for agricultural production	6-7%
- for agricultural commodities and marketing	10-13%

. Federal Mortgage Bank (saving rate) $7\frac{1}{2}$-$8\frac{1}{2}$%

Lending rates:

- Residential housing 7%
- Commercial property $9\frac{1}{2}$%-13%

The range of lending rates for the preferred sector/sub-sector for loans maturing within 3 years is $9\frac{1}{2}$ to $11\frac{1}{2}$%, but loans to those sectors maturing after 3 years could carry interest rates uo to a max of 13%.

h) Commercial Banks should employ a minimum % share in agricultural production (10,0%) and agro-allied industry (3,0%).

i) Merchant Banks should employ a minimum % share in agricultural production (5,0) and agro-allied industry (5,0)%.

The Nigerian Industrial Development Bank grants a normal grace period over 2 years for agro-allied industries; interest during grace period is capitalized. The average rate is about 11%. Repayment of the loans are usually on a 15-year base. The Nigerian Agricultural Bank can give in medium term loans at an average interest rate of 12%. Repayment is usually established over 5 years. A grace period of 2 years can be negotiated; interest during this period is then capitalized.

3.2.4 Cash flow

Table 27 shows the cash flow of the complex during the economic life of 20 years. The available funds before tax are amounting to 41.3 million Naira.

3.2.5 Value added

The yearly value added of the complex, starting from the 3rd year, amounts at 10.9 million Naira, 37.5 million Naira of sales receipts (see Table 23) against 26.6 million Naira of imputs (see Table 20).

TABLE 27 CASH FLOW AND FINANCIAL PLAN : PROJECTION IN THE 20 YEARS OF OPERATION

000 N

DESCRIPTION	REF TABLE	YEAR 1	2	3	4	5	6	7	8	9	10
. SOURCES		[illegible],959	8,879	5,406	5,197	5,197	5,197	5,197	5,688	7,018	5,197
- Profit	26	- 593	- 694	3,2[illegible]	3,567	3,567	3,567	3,567	3,567	3,567	3,567
- Depreciation	10	-	733	1,630	1,690	1,630	1,630	1,630	1,630	1,630	1,630
- Long-term external loan		5,813	8,354	-	-	-	-	-	491	1,821	-
- Middle-term external loan		634	396	448	-	-	-	-	-	-	-
- Residual value (working capital, fixed assets)		-	-	-	-	-	-	-	-	-	-
. USES		[illegible],859	8,979	5,406	5,197	5,197	5,197	5,197	5,688	7,018	5,197
- Investment (incl. invest. during construction)	9	5,813	8,354	-	-	-	-	-	-	-	-
- Replacement of renewable capital goods	11	-	-	-	545	612	-	545	2,949	4,279	545
- Increase of working capital	25	45	525	448	-	-	-	-	-	-	-
- Repayment of loans											
L.t. 1st loan (*)		-	-	1,230	1,230	1,230	1,230	1,230	1,230	1,230	1,230
L.t. 2nd loan (*)		-	-	-	1,509	1,509	1,509	1,509	1,509	1,509	1,509
L.t. 3rd loan (*)		-	-	-	-	-	-	-	-	-	96
L.t. 4th loan (°)		-	-	-	-	-	-	-	-	-	-
M.T. 1st loan (*)		-	-	327	327	327	-	-	-	-	-
M.T. 2nd loan (*)		-	-	-	2[illegible]4	2[illegible]4	2[illegible]4	-	-	-	-
M.T. 3rd loan (*)		-	-	-	-	231	231	231	-	-	-
. CASH FLOW At the end of each year		-	-	3,401	1,382	1,084	2,023	1,681	-	-	1,817
- CASH FLOW accumulated (available funds before taxation)		-	-	3,401	4,783	5,867	7,890	9,571	9,571	9,571	11,398

DESCRIPTION	11	12	13	14	15	16	17	18	19	20
. SOURCES	5,197	5,197	5,197	5,197	5,197	5,197	5,197	5,197	5,197	[illegible]
- Profit	3,567	3,567	3,567	3,567	3,567	3,567	3,567	3,567	3,567	[illegible]
- Depreciation	1,630	1,630	1,630	1,630	1,630	1,630	1,630	1,630	1,630	[illegible]
- Long-term external loan	-	-	-	-	-	-	-	-	-	-
- Middle-term external loan	-	-	-	-	-	-	-	-	-	-
- Residual value (working capital, fixed assets)	-	-	-	-	-	-	-	-	-	2,[illegible]
. USES	5,197	5,197	5,197	5,197	5,197	5,197	5,197	5,197	5,197	[illegible]
- Investment (incl. invest. during construction)	-	-	-	-	-	-	-	-	-	-
- Replacement of renewable capital goods	612	-	545	612	2,337	4,824	612	-	545	612
- Increase of working capital	-	-	-	-	-	-	-	-	-	-
- Repayment of loans										
L.t. 1st loan (*)	1,230	1,230	1,230	-	-	-	-	-	-	-
L.t. 2nd loan (*)	1,509	1,509	1,509	1,509	-	-	-	-	-	-
L.t. 3rd loan (*)	96	96	96	96	96	96	96	96	96	[illegible]
L.t. 4th loan (°)	377	377	377	377	377	377	377	377	377	[illegible]
M.T. 1st loan (*)	-	-	-	-	-	-	-	-	-	-
M.T. 2nd loan (*)	-	-	-	-	-	-	-	-	-	-
M.T. 3rd loan (*)	-	-	-	-	-	-	-	-	-	-
. CASH FLOW At the end of each year	1,373	1,985	1,440	2,603	2,397	150	4,112	4,724	4,179	7,[illegible]
- CASH FLOW accumulated (available funds before taxation)	12,761	14,746	16,186	18,789	21,176	21,026	25,138	29,862	34,041	[illegible]

(*) 11% interest; 2 years grace, 13 years, interest during grace period capitalized
(°) 11% interest; 2 years grace; 12 years; interest during grace period capitalized } (see 3.2.3)
(*) 12% interest; 2 years grace; 5 years; interest during grace period capitalized

4. THE ORGANIZATIONAL ASPECTS OF THE AGRO-INDUSTRY COMPLEX

GENERALITIES

The organizational aspects of the agro-industry complex suggested are the most important to be solved.

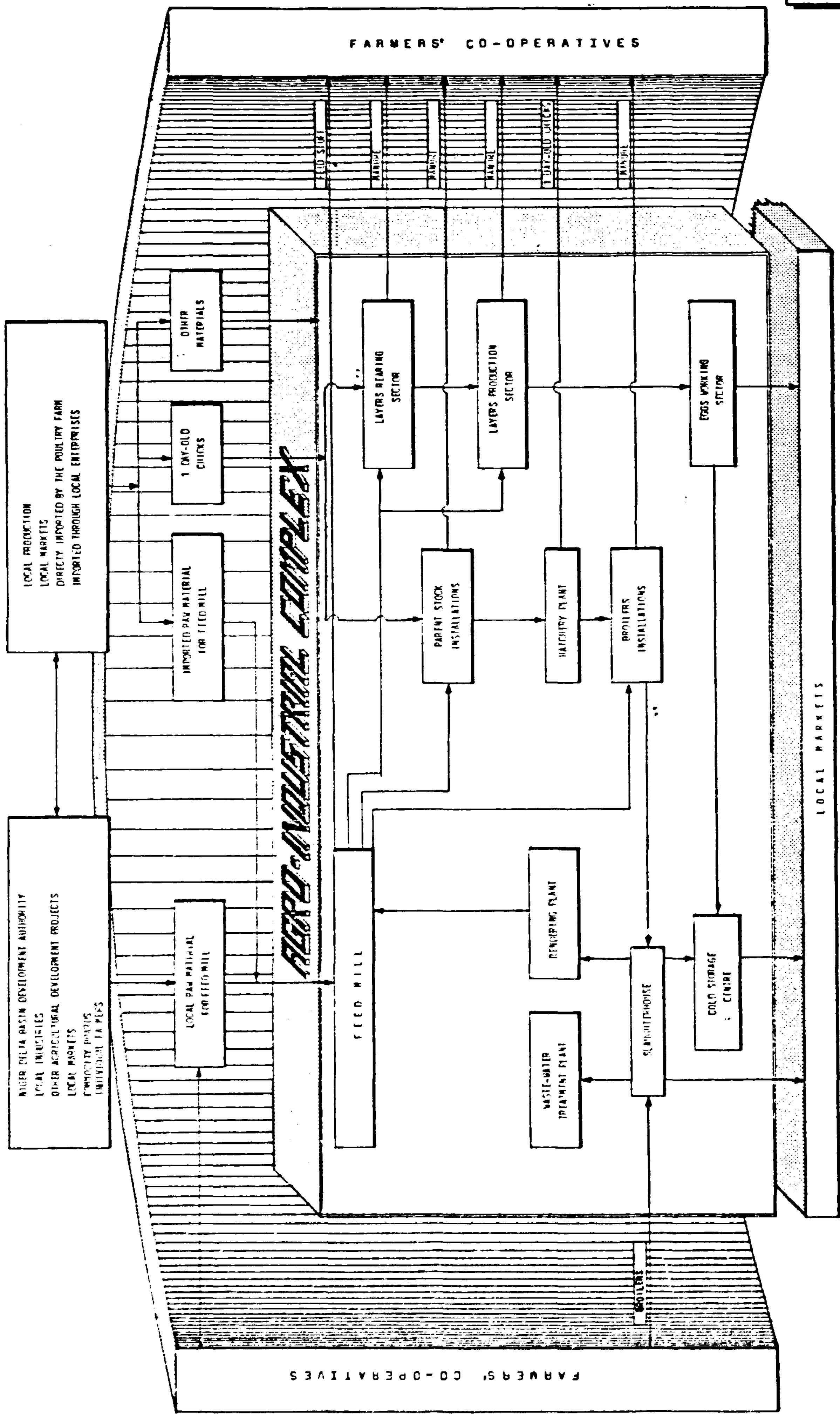
In fact the poultry farm itself, even if it contains a different processing scheme and kind of general technology at medium level, is an operation that at the stage of industrial development of Nigeria and River State can be managed quite easily. The technical assistance for 3 years will ensure the complex works at high level of efficiency; the Nigerian personnel is quite familiar with this type of production and also training activities are performed even if under other norme (employement). The organizational aspects instead are more difficult to establish, due, in a certain way, to the many different agencies involved.

The first task was to contact all the agencies involved, directly and indirectly, in this agro-industry scheme. By them the major importance, always underlined, was versus the Farmers' Co-operatives. In other words the success of the operation lay on the Farmers' Co-operative involvement.

These are the suggestions after interviews with each Agency , Ministries, Industries and other local organizations. To sum up the relations between the poultry farm and the outside Fig. 3 and Fig. 4 have been prepared.

FIG. 3

PROCESSING SCHEME AND EXTERNAL RELATIONS OF POULTRY FARM



SUGGESTED ORGANIZATIONAL SCHEME OF THE INTEGRATED FOOD INDUSTRY COMPLEX IN RIVERS STATE

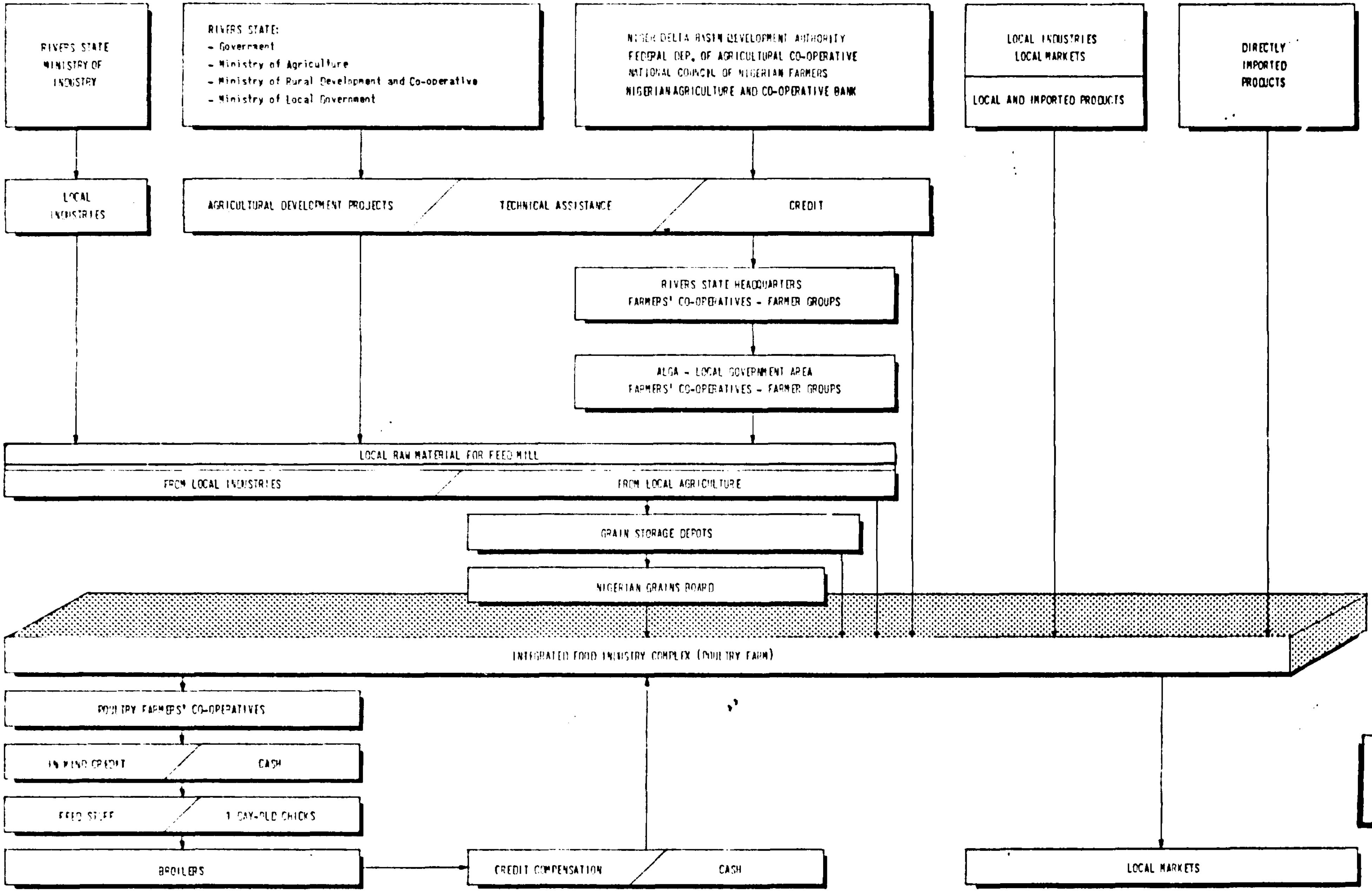


FIG. 4

4.1 FARMERS'CO-OPERATIVES

The total number of Farmers' Co-operatives in Rivers State is 959 with 38,276 member ship recording to the Federal Department of agricultural Co-operatives - Port Harcourt field office (see Annex 1 - Table 32), while the registered Co-operatives are 771 with 27,343 member ship according to the Ministry of rural development and Co-operative societies (Annex 1 - table 33).

Of this 165, with 7,027 membership, 21,4% and 25,7% of the total respectively are located in ALGA local Government Area.

During the contacts with the above two Institutions at State level and at local Government Area level, they have shown a great interest for the proposed integrated food industry complex and fully support the involvement and the relations between the complex and the farmers' Co-operatives.

4.1.1 Poultry Farmers' Co-operatives

The Farmers' Co-operatives that can be involved at the beginning of the operation are the so-called multipurpose Co-operatives which are 83 with 3,719 membership in Alga. The average membership in each Co-operative society is thus 44 (Annex 1 - Table 32).

For the purposes of the integrated food industry complex a number of 230 - 240 farmers grouped in 10 - 12 Co-operative Societies is required according to the following assumption.

As reported in paragraph 1.2.6. of this Annex, the truck collecting the finished broilers can have an average transport capacity of 3.000 birds. Assuming a trasport capacity of 2.700 birds, this is our hypothetical elementary broilers farm unit. This assumption is made :

- to avoid any problems regarding the total weight of the broilers of each farmer when delivered to the poultry farm;

- to have, for the recognizable broilers lot of each farmer, by the slaughtering process, all the technical parameters that give a general idea of how the breeding operation has been carried out (e.g. weight in comparison with the feedstuff consumption; length of the cycle, meat wholesomeness aspect, etc.);

- to reach the daily requirement of the slaughterhouse (n. 16,000 broilers) with an "exact" number of Co-operative members (n. 6).

The number of farmers at full operation is given by this calculation :

- n° of 1-day-old chicks delivered annually by the poultry farm: _ 3,497,000

- n° of the deliveries of the 1-day-old chicks (3,497,000: 3000)(^) 1,165

- n° of the farmers involved (1165 : 5) _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _233
  (5 are the assumed broiler cycles per year : 60 days production + 10 days cleaning/each cycle - see. 1.3.1.1.).

Assuming that 50% of the average Co-operative society members (44) will be interested in the poultry breeding, a n. of 10 Co-operative societies is required grouping the above 233 poultry farmers.

The relatively small required number of Co-operatives and their members in Comparison with the existing one, will give the ample opportunity to make a good selection in terms of technical capacity and reliability of both Co-operative societies and memberships.

This will even give the opportunity to choose the Co-operative societies spread out in the ALGA Local Government Area to avoid, as much as possible, infection and desease problems.

(^) see 1.2.6.

The assured gross revenue for each farmer will be thus about ₦ 81,000/year (2700 broilers x 2 kg l.w. x ₦ 3,0 kg l.w. x 5 cycles); the expenses directly linked with the poultry farm will account to :

- 1-day-old-chicks : ₦ 11,250 (3000 (^) 1-day-old-chicks x ₦ 0,75 x 5 cycles)
- feed-stuffs : ₦ 23,250 (3000 birds x 2 kg l.w. x 2,5 kg feed-stuff/1 kg l.w. x ₦ 0,31/kg x 5 cycles).

The broiler sheds will be of the most simple design; the expatriate technical assistance in the complex is assumed to suggest the best equipment at a minimum cost. The only foreseen common equipment should be a silo to receive the feed-stuffs delivered to the farmers by a pneumatic truck discharger.

Considering all the other expenses of the broilers farm during the year (depreciations, repayment of loans, vaccines (^^), drugs (^^), rice straw, etc.) at 30% of the gross revenue (₦ 24,300) the net revenue for the farmer and his family will be of about ₦ 22,200/year.

The above-described scheme of incoming and outgoing product at the farmers' level, gives the Poultry Farm the opportunity to follow the breeding activity regularly. In fact during the year each farmer will be in contact with the Poultry Farm, at the following times :

- n.5 times for 1-day-old-chicks delivery
- n. 5 times for finished broilers collection
- n. 15-20 to more time for feed-stuff delivery (according to the farmers silos capacity).

The farmers will thus have the possibility to promptly inform the Poultry Farm about their breeding problems.

(^) The difference between 1-day-old-chicks and finished broilers is due to mortality and family consumption.

(^^) Subsidized by the River State Ministry of Agriculture

The producing scheme and its organization has been given an opportunity to discuss with the above-mentioned Institutions the credit problem to the Farmers' Co-operative and their members. As mentioned in Annex 1 - Chapter 11, one of the major constraints to delivery of credit to the farmers is their unability to provide adequate guarantees. In this case the Poultry Farm, for its various functions and its frequent contacts with the Co-operative and the farmers and its own interest to collect the finished broilers, can become the "beneficiary" of the credit on behalf of the Co-operative itself or their member. Credit for shed installations and later 1-day-old-chicks and feed-stuffs will be supervised by the Poultry Farm management in co-operation with the Institutions.

4.1.2 Farmers Agricultural Co-operatives

ALGA Local Government Area (L.G.A.) is one of the best production areas of Rivers State for maize and cassava (Annex 1 - 8.2.1 and 8.3.1). The maize yields range between 2,5 - 3,5 tonnes/ha as sole crop and 2,0 - 2,5 when intercropped with cassava; cassava yields range between 6,0 - 10,0 tonnes/ha as sale crop and from 4,0 - 8,0 tonnes when intercropped.

The Farmers'Agricultural Co-operatives existing in the ALGA are 59 with 2,750 members (see Annex 1 - Table 32).

Assuming that the Farmers' Co-operative contribution of maize and cassava chips is fixed at 30% of the total poultry farm feed mill requirements at full operation (see 1.3.1.3), we have :

- total maize requirement : 9,892 tonnes
- Farmers' Co-operative maize contribution (^) (30%) : 2,968 tonnes
- total cassava chips requirement : 1,854 tonnes
- Farmers' Co-operative cassava chips contribution (^) (30%) 556 tonnes

(^) The recipient 70% it is assumed to be supplied by the Rivers State Development Agencies and Projects : maize (6,924 tonnes), cassava chips (1,298 tonnes).

Regarding maize the surface under cultivation for the purpose of maize deliveries to the Poultry Farm will be of about 970 ha assuming an average yield of 3 tonnes/ha, that will involve the contribution of about 1 acre or 3500 sq.m of each member (970 ha/2 750 members).

According to the present land resources use in the L.G.A., this fits in normally with the traditional agricultural system of cultivation.

As for the storage facilities at present existing in Rivers State, they amount to about 15,200 tonnes of which there are of about 1900 tonnes in ALGA L.G.A. (see Annex 1- Table 15).Three grain storage depots totalling 3,000 tonnes capacity are under construction (see Annex 1 - 4.1.12).

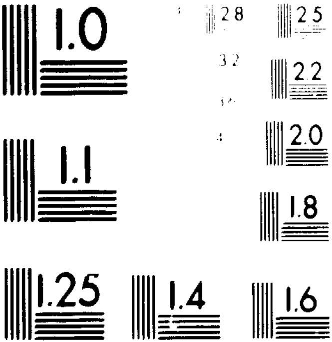
In the surrounding area of the L.G.A. there are, in any case plenty of storage facilities which are most of the time under used or not used at all (see Annex 1 - 4.1.9).

The main problems, as can be understood, are not physical, climate or productive land constraints, but economic. Cost production evaluation (Annex 1 - Table 20) shows a total cost per ha of about ₦ 450, with an average production of 3 tonnes/ha that means a ₦ 150/tonnes as a farm cost.

The present buying price (especially for imported maize) is ₦ 240/tonnes which gives a poor net revenue (₦ 270/ha) for a cultivation requiring, with the present cultivation system, about 82 man/days. The situation can be completely changed if the maize can be delivered to the Nigerian Grains Board (Annex 3 - 5.1) where the buying price fixed by the Nigerian Government is ₦ 325/tonnes.

In this case the gross revenue per hectare is ₦ 975 and the net revenue ₦ 525. This buying price can be judged more convenient than the market price where the maize for food consumption reached ₦ 35/ 100 kg bag (^). Delivery at the harvest time in fact avoids all the great storage losses at farm level, not counting the bag, the transport and the marketing losses.

(^) Nigerian Grains Board - Port Harcourt Area office - Price statistics Unit - February 1983.



MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS

STANDARD REFERENCE MATERIAL 1010a

ANSI and ISO TEST CHART No. 2

In other words, there is a kind of indifference for the farmer to deliver the maize to the Board or to sell to the market. The only problem is to organize the collecting of maize and then deliver it to the Board which operates in Port Harcourt, and wait for the payment.

The suggestion, for this reason, is the following: the Poultry Farm supposed to act as a branch of the Nigerian Grains Board in Omuko, utilizing by itself the collected maize paying cash at the time of delivery.

In this way, while the general interest of the Country is safeguarded, locally available incentives will immediately boost maize production.

Regarding cassava chips the production of 556 (^) tonnes will imply a raw material (fresh tubers) tonnage of about 1100 - 1200 tonnes equivalent to an hectorage of about 130 - 150 ha (assuming an average yield of 8 tonnes/ha).

In term of area cultivated by each member it will be 500 sq mts . Even in this case, as shown, the problem is more economic than productive. As stated in Annex 1 - 8.3.1 there is not at the moment a cassava chips market due to the traditional conversion of cassava into garri and the conflict between human consumption and feed-stuff utilization. In the near future while cassava production will increase and industrial-artisanal equipment will be spread out in the country, the cassava chips can become an economic industry (more yields and less working time than garri). The demand of the Poultry Farm will boost local production as referred to during IFAGRARIA team survey in the local Government Area.

(^) Assuming a conversion ratio of 1:0.5

4.2 OTHER INSTITUTIONS, AGENCIES AND AGRICULTURAL PROJECTS AS SUPPLY SOURCES FOR FEED MILL RAW MATERIALS

As Annex 1 gives a detailed specification of the agricultural development programmes undertaken by the various Institutions, Agencies , Agricultural Projects, in this chapter their targets only will be listed and summarized.

The on-going projects to fulfill the Green Revolution Programme of Nigeria are undertaken by :

a) N.D.B.D.A. - Niger Delta Basin Development Authority
b) Federal Ministry of Agriculture and Natural Resources
c) Rivers State Ministry of Agriculture
d) Federal Department of Agriculture Co-operative societies
e) Rivers State Ministry of rural development and Co-operative societies

According to their programme, in five years time, the following hectarage will be developed (major food crops) :

- maize : 12 - 20,000 ha (see Annex 1 - 8.2.1)
- rice : 10 - 13,000 ha (see Annex 1 - 8.2.2)
- cassava : 14 - 22,000 ha (see Annex 1 - 8.3.1)

These different sources are supposed to supply to the Poultry Farm an average of 6,900 tonnes of maize and 1,300 tonnes of cassava chips as a complement to the farmers' Co-operatives' supply (^). In terms of area, that will mean about 2,300 ha for maize (^) and about 300 ha of cassava (^^). In other words, of the existing and on-going development projects regarding those two crops (26 - 42,000 ha), about 6-10% (2,600 ha) are supposed to be channeled to the Poultry Farm.

The Rivers State survey has shown that these apparently modest figures will require a lot of organizational efforts to reach this goal .

(^) See 4.1.2

(^) assuming an average yield of 3.0 tonnes/ha/sole crop (Annex 1 - Tab.18)

(^^) assuming an average yield of 8.0 tonnes/ha sole crop (Annex 1 - Tab.25) and a conversion ratio cassava tubers : cassava chips of 1:0.5.

. Aside from the selling prices of this production (we are supposing the same situation as described in the chapter 4.1.2), it is IFAGRARIA opinion that the establishment of the Poultry Farm will help the achievements of the agricultural objectives of the various projects. In this particular case, in fact, it will play the propulsive rule of the Poultry Farm in a way that her concrete needs for maize and cassava will urge the finalization of the programmes themselves. The human and financial resources devoted by the Nigerian Government to agricultural development are quite enough to reach the proposed objectives; in the consultant opinion they should be more finalized. It is expected that the presence of an industrial and commercial operation such as a Poultry Farm will help in this way.

4.3 LOCAL INDUSTRIES

As mentioned in Annex 3, Port Harcourt is one of the most industrialized Nigerian cities with the presence of an industrial network covering a wide range of sectors. In this part of the report special consideration is given to local industry that can supply raw material for the feed-mill.

4.3.1 Port Harcourt Flour Mill

Established near the wharf of Port Harcourt, to which it is pneumatically connected for wheat loading. It is almost entirely owned by the Government of Rivers State. Due to its strategic position, it is supplying the wheat flour requirements not only of Rivers State but for the neighbouring States.

The interest of the Poultry Farm feed mill in this industry is related to its by-product production : wheat offals (see 1.3.1.3).

The average production of wheat offals is estimated at about

8oo tonnes per month. Until last year wheat offals were exported to neighbouring countries ,In 1982, 6,000 tonnes were exported (Annex 3 - Table 2). The recent Economic Stabilization Measures and in particular the Presidential Decree of 24th January, 1983 prohibited the exportation of wheat offals. So far there is an ample opportunity to use this product to the maximum extent in the poultry formula. The foreseen utilization in the Poultry Farm has been estimated at about 2,500 tonnes (see 1.3.1.3). The price ranges between ₦ 90 - 95/ton, ex factory.

4.3.2 RI.V.O.C (Rivers State Vegetable Oil Company)

Located in the industrial area of Port Harcourt is a Rivers State Government Company. A detailed explanation of this factory can be found in Annex 2 - 1.6. Interest has been showed in its pelletted palm kernel to be introduced in the poultry formula as the recent FAO research indicates.

4.3.3 RISOMPALM LIMITED (Palm oil development and producing company)

Annex 2 gives a full detailed explanation of the activity of this very important company for the agricultural and industrial development of the palm oil industry. Rivers State Government owned Company is supposed to supply the palm oil for the poultry formula. Palm oil will be utilized for its fat content and for pelletting purposes. It is expected to use about 860 tonnes per year.

4.3.4 Pabod Breweries Limited

Recently established in Port Harcourt, it is partially owned by the Government of Rivers State. Its production of dried brewery spent grains is about 60 tonnes/month, while that of yeast is about

1 tonne/month. Exportation of dried brewers grains has been prohibited (Presidential Decree - 24th, January 1983). Its utilization in the poultry formula can be extended to the maximum of the factory production of the whole feed mill industry in Rivers State.

4.4 THE POULTRY FARM CUSTOMERS

As mentioned in Annex 3 - 1.4.1, our marketing researches have shown strong propension, by the most important Department Stores of Port-Harcourt, to be locally supplied with fresh or chilled-frozen poultry meat and eggs. Selling preference should be given to Pabod Stores, a supermarket of Pabod Supply Limited, a Rivers State Government Agency for procurement of Supplies and Distribution.

It owns a fleet of conditioned trucks able to collect the poultry meat and eggs at the poultry farm daily. The Pabod Stores can also market the amounts surplus to its needs. Its institutional duties - as a Government Agency - ant its own convenience can solve - without any problem - the allocation of the poultry farm products.

4.5 THE MANAGEMENT SCHEME OF THE INTEGRATED FOOD INDUSTRY COMPLEX

Fig. 5 gives an outline of the main aspects regarding the management of the complex. Of course, the management will be in line with the fixed principles of the complex ownership; while the investors could be either the public sector or the private sector, changes and different approaches can be chosen. Two points must be considered : the establishment of a policy-making Committee for the complex and a Technical Committee suggesting how to achieve the objectives.

Without the co-ordination of these aspects, the role of the complex will not have the required completness and univocal action to monitor all the various actions.

MANAGEMENT SCHEME OF THE INTEGRATED FOOD INDUSTRY COMPLEX (POULTRY FARM) IN RIVERS STATE

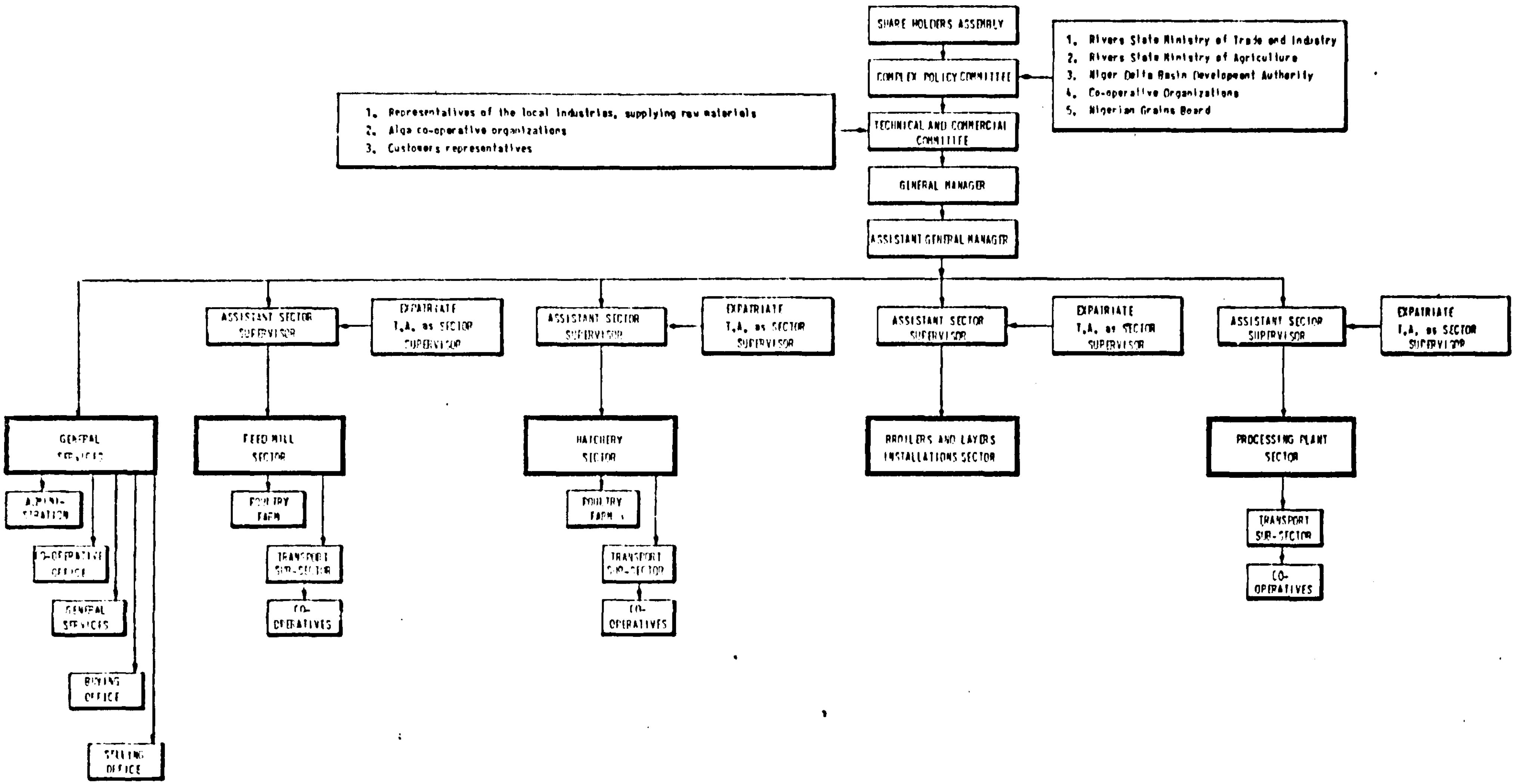


FIG. 5

In other words, the full support of all the institutions and development agencies is necessary due to the fact that the complex will mobilize a large amount of human and financial resources. This, of course, will have a great impact on the technical solutions to be adopted to ensure the complex a successful economic life.

Once those two key points are assured successive management organization by sector represents only the best work division according to the specialized activities.

ANNEX 5

UNIDO
UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

13233

(7 of 8)

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

DESCRIPTION OF PROCESSES, PREFABRICATED BUILDINGS, EQUIPMENT AND CIVIL WORKS OF THE SELECTED AGRO-INDUSTRIAL PLANT

December 1983

IFAGRARIA s.p.a.
ROMA

ANNEX 5

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

DESCRIPTION OF PROCESSES, PREFABRICATED BUILDINGS, EQUIPMENT AND CIVIL WORKS OF THE SELECTED AGRO-INDUSTRIAL PLANT

December 1983

IFAGRARIA s.p.a.
ROMA

LIST OF THE VOLUMES CONSTITUING THE STUDY

. EXECUTIVE SUMMARY

. GENERAL REPORT

. ANNEX 1 - Institutions involved in agriculture and their development programmes and the Co-operative Societies in Rivers State

. ANNEX 2 - The palm oil industry in Rivers State

. ANNEX 3 - Rivers State market analysis of the in-out products of the selected agro-industrial plant

. ANNEX 4 - Functional description of the selected agro-industrial plant and its economic evaluation and organizational aspects

. ANNEX 5 - Description of processes, prefabricated buildings, equipment and civil works of the selected agro-industrial plant

. ANNEX 6 - Drawings of civil works, prefabricated buildings and installed equipments of the selected agro-industrial plant

ABBREVIATIONS USED

- U.N.D.P. : UNITED NATIONS DEVELOPMENT PROGRAMME
- R.S.M.O.A.N.R. : RIVERS STATE MINISTRY OF AGRICULTURE AND NATURAL RESOURCES
- R.S.M.R.D.C. : RIVERS STATE MINISTRY OF RURAL DEVELOPMENT AND CO-OPERATIVES
- R.S.M.L.G. : RIVERS STATE MINISTRY OF LOCAL GOVERNMENT
- N.D.B.D..A : NIGER DELTA BASIN DEVELOPMENT AUTHORITY
- F.D.A. : FEDERAL DEPARTMENT OF AGRICULTURE
- N.C.F. : NIGERIAN COUNCIL FARMERS
- R.S.A.D.A. : RIVERS STATE AGRICULTURAL DEVELOPMENT AGENCY
- N.R.C.C. : NATIONAL ROOT CROPS PRODUCTION Co. LTD
- L.G.A. : LOCAL GOVERNMENT AREA
- N.A.F.C.O. : NATIONAL ANIMAL FEEDS COMPANY LTD.
- F.M.W.R. : FEDERAL MINISTRY OF WATER RESOURCES
- E.S.M. : ECONOMIC STABILIZATION MEASURES (1982-1983)
- F.F.B. : FRESH FRUIT BUNCHES OF PALM OIL
- A.L.G.A. : AHOADA LOCAL GOVERNMENT AREA
- F.N.D.P. : FOURTH NATIONAL DEVELOPMENT PLAN (1981-1985)

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INTRODUCTION

Annex 5 contains a description of the process, prefabricated buildings, equipment and civil works of the selected agro-industrial processing plant, according to the Annex 6 drawings.

The drawings have been separated from the technical and functional description to facilitate cross-checking the whole poultry farm.

The type of prefabricated buildings and equipments for the selected agro-industrial plant has been chosen in accordance with the first objective, namely to save as many costly and scarce feed-stuffs as possible. This is why a pelleting section is planned for the feed mill and the poultry installations have an automatic feeding system. The problem, already discussed in Annex 4, is to avoid the "de-mixage" of the feed-stuffs, usually one of the major loss factors, which accounts for increasing feed-stuff consumption per kg of live weight of the birds or per number of eggs produced.

The prefabricated buildings and equipments adopted are very well-known in Nigeria, especially in the west and north States of the Federation, where they are giving satisfactoring results in both private and government-controlled projects. According to made interviews, the equipment meets the reliability standards required by Nigerian conditions.

The new equipment - at least for Rivers State - is for the slaughterhouse and the by-products processing plant.

First of all, the chosen "principle" has been the maximum reliability of the equipment; secondly, as described in Annex 4, expatriate technical assistance staff has been envisaged for a period of two years, and the assistant supervisor and skilled workers will be hired by the poultry farm before starting the installation of the equipment. In practice, a training course will be taken by the erection worker staff and by the expatriate supervisor.

A three-years' spare-parts stock has been foreseen for all the poultry farm equipment, and a two years' stock for the feed mill.

The civil works foreseen meet the Nigerian regulations and equipment requirements.

The lay-out of the poultry farm is shown in Annex 6/1.

1. AGRO-INDUSTRIAL PLANT LOCATION

The selected agro-industrial complex should be launched in Omoku, about 100 km north-west of Port Harcourt.

Since, at the time the Study was made, the exact site of the Poultry Farm was unknown, the assumption has been adopted that an almost level area would be available, covering a total of about 90 ha and measuring approximately 3,600 x 300 m. The various buildings and services have been distributed over this area as shown in the attached layout (see Annex 3).

This layout takes into consideration both the functional aspects of the farm, cutting down to a minimum the distance of the roads and of the general services, and basing the various sectors on a logical order and on the health aspects, placing the minimum distances recommended between the sectors themselves to prevent epidemic diseases from breaking out and spreading.

Having made a site inspection, in February this year, of the area in which the poultry farm would be erected, the assumption made appears to be altogether realistic. The whole area, in fact, is thoroughly level and the soil offers excellent characteristics for building purposes. The water supply system is extensive and well ramified and there is an artesian aquifer offering abundant groundwaters with good potability characteristics.

The road system consists of some main asphalted roads in good state of maintenance and of tracks with good natural surface and capable of easy restructuring.

The main towns and villages are included in the electrification programme of the State, which will be implemented soon.

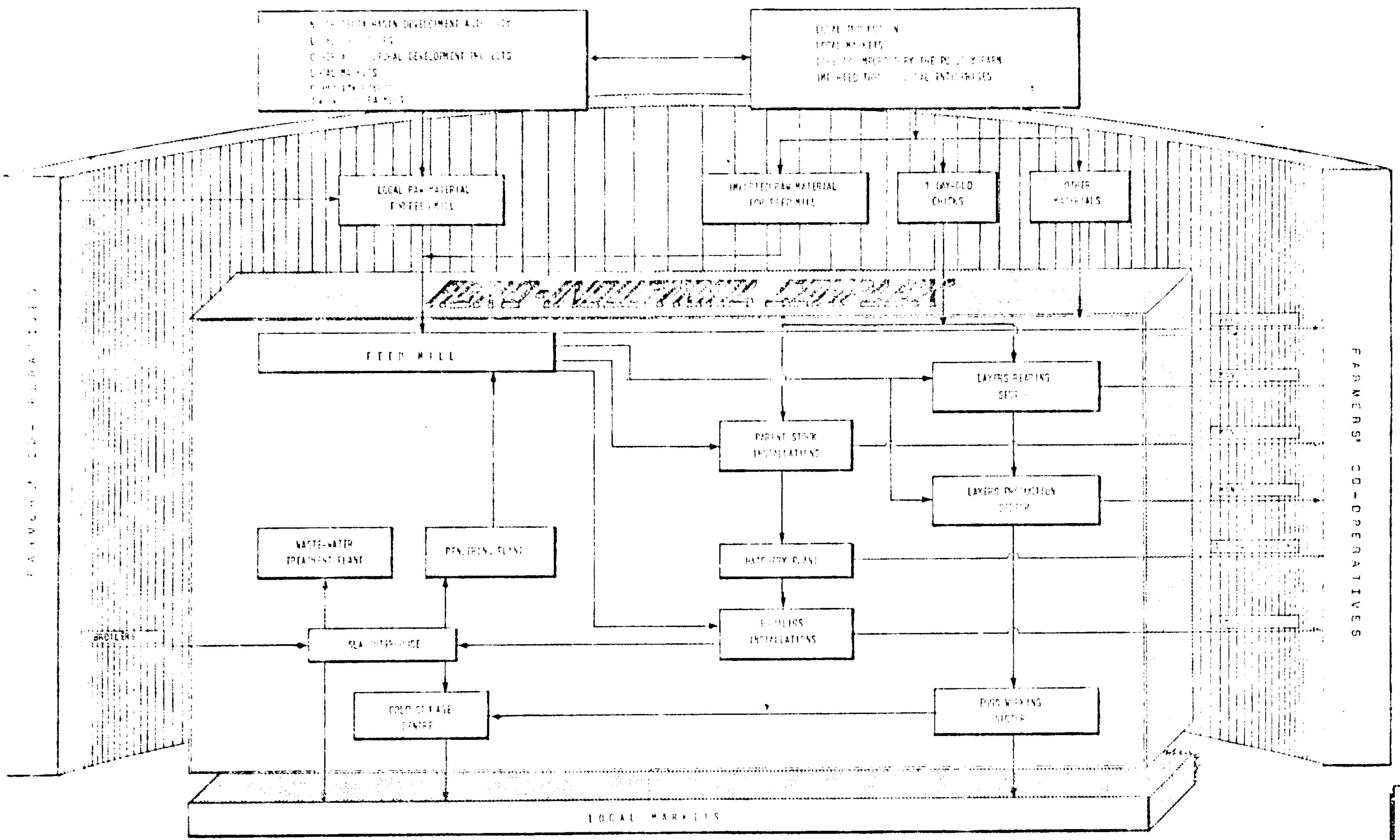
LOCAL MARKETS
LOCAL RAW MATERIAL FOR FEED MILL
IMPORTED RAW MATERIAL FOR FEED MILL
1 DAY-OLD CHICKS
OTHER MATERIALS
FEED MILL
LAYERS REARING
PARENT STOCK INSTALLATIONS
LAYERS PRODUCTION
WASTE-WATER TREATMENT PLANT
HATCHERY PLANT
BROILERS INSTALLATIONS
BROILERS
COLD STORAGE CENTER
EGGS WORKING
LOCAL MARKETS
FARMERS' CO-OPERATIVES

FIG. 1

2. PROCESSING SCHEME OF POULTRY FARMS AND APPLIED TECHNOLOGY

Fig. 1 shows the entire processing scheme of the selected agro-industrial plant.

The process can be divided into two main production lines.

The first line is for table eggs production while the second one is for poultry meat production. The two lines are supported by the feedstuff production line.

a) Table eggs production line

The 1-day-old chicks are sent to the rearing sector (see para 3.1) where they will be kept for 16-18 weeks of life in special cages.

From the rearing sector the pullets are transferred to the layers production sector (see para. 3.2), where they will be kept for a period of approximately one year.

During this period the average layer production is assumed to be 250-260 eggs/cycle.

The eggs are then sent to the egg working building (see para 3.3) where they are packed and immediately conveyed to the market or to the cold storage centre.

Further details of the process scheme and the applied technology will be given in the next chapter. While the equipment is especially designed to assure the best living condition for the layers, all the main important operations are automatic (feeding and manure-removing systems). This kind of technology has been chosen to avoid health problems for the birds, and to save feedstuffs.

To avoid these problems altogether or to reduce them to a satis - factoring level means - more or less - to ensure the success of the whole operation.

b) Poultry meat production line

The parent 1-day-old chicks (females and males) are sent to the parent stock installation (see para. 4.1) where they will be kept throughout their life.

The eggs production is duly conveyed to the hatchery plant (see para. 4.2) where the setting and hatchery equipment are installed.

The produced and selected 1-day-old chicks are then sent to the broilers installation (see para. 4.3) where, after an average cycle of 60 days, they will reach a live weight of approximately 2.0 kg.

The broilers are then sent to the slaughterhouse (see para. 4.4) where - after a serials of different phases - a dressed broiler of approximately 1.5 kg of meat/each will be the finished product. In accordance with the market situation, the poultry meat is immediately sold or stored in the cold storage centre.

A rendering plant, which, at full operation, is expected to produce about 750 t of poultry meat meal, is connected to the slaughterhouse.

A waste-water treatment plant is provided to process the affluent coming from both the slaughterhouse and the rendering plant.

The chapters 4.1, 4.2, 4.3, and 4.4 give further details of the 1-day-old chicks, the broiler production, the slaughtering, the by-product and the water treatment process.

For broiler production, the applied technology meets two main requirements of the operation: to ensure the best health conditions and to ensure an appropriate and economical distribution of the feedstuffs.

The slaughterhouse, the rendering plant and the waste -water treatment plant equipment has been chosen not least on the basis of its reliability. It has given satisfactoring results in other states of the Federation and in other countries with similar conditions to those in Nigeria.

c) Feedstuff production line

A 10 t/h feed mill is scheduled to provide feedstuffs for the two above production lines and for the poultry farmers.

Chapter 5 is devoted exclusively to the feedstuff production process (para 5.1), prefabricated feed mill building (para 5.2) and feed mill equipment (para 5.3).

The applied technology - besides its reliability already proved in similar Nigerian conditions - is designed for the production of pelletted feedstuff. We do indeed give the utmost importance to this processing phase for the success of the poultry operation (see Annex 4 - para 1.2.1.6), to justify the increase of the investment cost.

3. TABLE EGG PRODUCTION LINE PROCESSING, BUILDINGS AND EQUIPMENT DESCRIPTION

3.1 REARING SECTOR (See drawning Annex 6/2-3-4)

3.1.1 Prefabricated building

One prefabricated building (48 x 12 x 2.7 mts) is foreseen having a capacity of 17,280 pullets in "Comfort" battery-cages. The prefabricated building has the following characteristics:

- 576 sq. mt. bearing structure
- 576 sq. mt. roof and ceiling
- perimetral walls
- main door, door, door with inspection eye
- 6 emergency windows

The structure of the building. The framework is made of two pillars surmounted by trusses placed 4 mts. apart. Each pillar is made of IPE type hot-rolled sections and it is fixed to the foundations by 4 buried connection rods (18 mms. Ø). The reticular trusses have a slope of 12° and are joined together by roof-covering purlins and by side plates along the house whole length.

The longitudinal stability of the houses is secured by braces placed at the two ends of the house.

The structure is electrowelded in the workshop and then assembled and bolted on site to allow for eventual disassembling operations.

All the dimensions given in the estimate refer to the axes.

For dimensioning the different components of the framework, the following loads have been taken into consideration:

- vertical overload: 30 Kg/sq.mt.
- wind pressure: at 20 mts. from ground level; 80 Kg./sq.mt., which corresponds to 128 Km/h

The design calculations have been made according to the Italian Standards which are part of law n. 1086 of 10.11.71 and relate to the Ministerial Decree of 18.06.76.

The bearing structure is made of FE 37 and FE 52, respectively named by the CNR/UNI 10011 as type 1 and type 2 steels.

The protection from corrosion is obtained through the hot galvanisation procedure according to ASTM Standards, where the minimum zinc coat is 500 gr./sq.mt. for the column and the trusses while for the cold bent parts such as the purlins and the side plates, the minimum zinc coat is 200 gr./sq.mt. on both sides according to Sendzmir galvanisation procedure.

The type 4.6 junction bolts and nuts are cold-galvanised.

The double-pitch roofing with 20° slant, is made of 7/10 thick corrugated aluminium sheets:

- 8/10 thick aluminium ridge
- 6/10 thick galvanised sheet roof-head frames, white plastified on their outside
- fixing through self-tapping cadmium-plated screws and PVC washers, duraluminium caps and bitumised cardboard insulation.

The aluminium alloy is the 3003 type, and its manganese percentage gives it great mechanical resistance and surface hardness.

The ceiling is made of 5/10 thick corrugated aluminium sheets and is directly fixed to the lower part of the truss by self-drilling screws.

The aluminium alloy is of the type mentioned above.

The insulation consists of a 10-cm. thick fiberglass layer (K = 0.4 KCal/sq.mt. h C) on the plates.

The fiberglass has one sheet of tarred paper on one side, which prevents penetration of damp.

Between the roof covering plates and the ceiling there is a 40 cm gap as insulation, especially during the summer.

The walls are made as follows:

- 7/10 thick aluminium plate, corrugated profiles, on the outside
- 5/10 thick aluminium plates, corrugated profiles, on the inside
- galvanised bearing structure made of a lower section utilised as a joint between the foundation footings and the prefabricated wall, an intermediate purlin and an upper section for connection to the ceiling
- 12.5 Kg/cub.mt. density fiberglass insulation; average thickness: 10 cms. (K = 0.4 KCal/sq.mt./h C°).

The aluminium alloy is of the type mentioned above.

The wing of the safety windows is hinged on top and they open by pulling the lower part outwards.

To keep them open, a hook, fixed to the frame itself, is used.

The wing hinged on the top is made of a 6/10 thick galvanised furnace-painted panel, having a 3 cms. thick polyurethane insulation.

The window frame is made of 10/10 thick furnace-painted galvanised sheet; its opening dimensions are of 82 x 137 cms.

Each wing of doors and main doors is made of a 15/10 thick surface painted galvanised frame and a polyurethane filled panel (30 mms. thick) sandwiched between two 5/10 thick painted galvanised plates; panel and frame are joined together by rivets.

Door and main door frames are made of 20/10 thick furnace-painted galvanised steel sections.

Their lower part is buried into the floor concrete. Water tightness is provided by a plastic gasket fixed to the frame of each door.

The Viro type security lock is equipped with a chrome handle.

The passage dimensions are as follows:

- semi-main doors: 140 x 223
- main doors: 288 x 223
- doors: 89 x 223

The store partition door wing has a small 30 x 40 plexiglass inspection window, which allows the inside situation to be controlled without opening the door.

3.1.2 Equipments

3.1.2.1 "Comfort" cages

The cages are used for the rearing of pullets from the first day of life until the 16-18 week of life. The "comfort" cages are constituted by n. 4 Rows of 3-level "Comfort" batteries, each row 40 mts. long with a total foreseen capacity of 17,280 pullets.

Dimension of the "comfort" batteries

Length (4 x 40 mts.) 160 mts.

Width 1,81 mts.

Height with hopper 2,25 mts.

Cage dimensions

Front width 1,00 mts.

Depth 0,55 mts.

Drinking system

- 2 stainless steel nipples per cage, placed at the back of the same
- nipple supply: plastic cup with float for each level; capacity 7 lts.
- water inlet, rigid PVC piping with flexible polyethylene joints.

Feeding system

Feed troughs: linear troughs in galvanised sheet with antiwaste profile.

Hot section

Accessories for the intermediate level (equipped for the chicks in their first day of life):

- square 12 x 12, plastic mesh walk-over grid
- the nipple height may be regulated
- 1 cup and 2 nipples
- cage front with opening regulating sheet, according to the chick age.

3.1.2.2 Automatic feed system using running hoppers

Constituted b

- n. 4 head-frames and end-frames complete with crank gears;
- n. 4 running hoppers for feed distribution;
- n. 4 automatic-drive units for feed distribution including: geared motor, tow rope, automatic-stop, switch and feed unloading screw feeders.

3.1.2.3 Silo and screw feeders

Constituted by:

- n. 1 silo - capacity 23 cubic meters (about 14 metric tons).

It is made of smooth galvanised sheet having a thickness which varies from bottom to top from 20/10 to 12/10:

- sealed junctions ensure water proofing
- openable trap door on the top for inspections, if required
- ladder with safety protection

- shutters to stop the feed outflow
- galvanised supporting legs
- lower cone
- upper cone and cover
- piping for pneumatic loading

- n. 1 screw feeder for silo loading.

  Projected to allow easy silo loading, it is set up with:
- feed intake hopper placed on the silo base having a capacity of 50 Kg.
- 150 mm. dia. tube
- outlet opening inside the silo
- relative supports
- electric driving unit

- n. 1 screw-feeder for loading feed into the feed distribution hopper.
  Helical feed conveyor from the silo into the house inside.
  It is set up with a 120 mm. dia. tube in the inside in which runs a 100 mm. dia. auger having a 100 mm. pitch.
  It is run by a 272 rev/1' 2 HP. motor.
  The capacity is 2 ton/hour.
  The motion from the horizontal to the slanting section is provided by a universal joint.
  Proper running is also guaranteed by the fact that the auger is supported, thus avoiding vibration and noise.

3.1.2.4 Automatic manure-removing system

Constituted by:

- n. 4 manure-removing installation, each including:
  - 1,5 HP. geared-motor with base-plate, pulley and fittings
  - 1 scraper, complete with side guides, cable hooks and cable tensioning device
  - scraper cable made of 7 dia. plastified steel
  - idling pulleys with support
  - cable safety device which stops the installation running when the cable is loose.

- n. 1 12 mts. horizontal manure-removing chain with 1.5 HP. draft electric group.
- n. 1 6 mts. long manure-removing elevator with 1.5 HP. electric driving group with reducer.

The installation runs automatically through a programmed timer.

3.1.2.5 Watering system

Constituted by:

- n. 1 coloured reinforced plastic tank, placed in the store house - volume: 0.5 cub.mt.

  Dimensions:

  . Width 90 cms.

  . Depth 90 cms.

  . Height 65 cms.
- PVC pipe, with all connections for the feeding of the water troughs, conveys the water inside the house.

The installation is complete with connections and shutters.

3.1.2.6 Heating system

Costituted by:

- n. 1 hot-air generator having a capacity of 125,000 K.Cal./h. placed in the store, complete with carrying structure, stiff and strong enough to meet requirements - structure outside cover, phosphate treated, hot painted - inox steel oven for high temperatures - air treating group - switch gears and control equipment, channel connection plenum.
- Galvanised-sheet chimney for combustion fumes
- Gasoil burner
- Galvanised sheet channel for air delivery to the JDV.

The JDV is the most suitable system to obtain even air diffusion in the house.

To meet this purpose, further to the JDV, an hot air generator is foreseen with burner which, through a proper galvanised sheet channelling, conveys the hot air in correspondence with the JDV fan exhauster.

The generator is able to suck the air from the inside by means of channelling. It is important to see that a set quantity of renewal air, is introduced through the JDV shutter and that this is mixed up wich ambient hot air before reaching the birds.

In this way a high temperature is kept in the all rooms whilst at the same time introducing a quantity of outside renewal air.

Very satisfactory results of the house temperature continuity and uniformity have been obtained through this method.

The Jet Diffuser Ventilation system is particularly advisable for heating utilizing a hot-air generator.

3.1.2.7 Ventilation system

Composed by:

- n. 6 "B 41" type extractor-fans, complete with outside shutters, with automatic opening darkening system, and galvanised sheet container for wall-mounting.

Characteristics:

- 41,000 cub.mts./h. capacity at 1 mm. of water column
- 1.5 HP. motor
- protection net

- n. 1 jet-diffuser including:
  . galvanised sheet container on the wall on the house head-frame
  . "B 15" fan having a capacity of 15,000 cub.mt./h. at 1 mm. of water column - 0.75 motor HP.
  . 45 mts. of polyetylene diffusor tube, fixed to the ceiling, complete with 2 rows of holes placed longitudinally along the upper wall
  . motorised shutter that, depending on the ventilation needs, allows the air suction from the outside or the intake of the inside air.

- n. 1 CTE/5 A control panel

This instrument is called a 5-step electronic thermostat, as after receiving the signal from a temperature probe it is able to perform sequentially the switching of different relays according to the temperature changes.

The required temperature variation to move from one relay to another is of 1 centigrade degree.

The instrument is equipped with a circular potentiometer on which the desired temperature is preset; if the room temperature where the probe is placed corresponds to the one preset on the temperature knob, then a group of fans starts working.

Further fans start working if the temperature goes up and they will all be working if the temperature increases further.

If the temperature drops, the number of working fans is gradually reduced. The required temperature difference to set on one relay from another is of 1°C.

Should there be panel breakdown, minimum ventilation is guaranteed.

The instrument presents a little square display which constantly shows the real room temperature.

5 warning lights alternatively show which ventilation step is working.

- The instrument is equipped with a knob-type circular potentiometer on which the temperature below which the eventual heating system starts may be preset.
  The sensitivity of this potentiometer is 0.5 °C.
- The instrument is equipped with another knob-type circular potentiometer on which the temperature over which the eventual humidification system starts may be preset.
  The sensitivity is fixed for 0.5 °C.
  The panel is complete with 3,000-ohm temperature probe, calibrable on the back of the panel on a proper trimmer.
  The panel feeding is 110 V at 50 or 60 Hz.
  The max acceptable tension stage is of +/- 20%.

3.1.2.8 Humidification system

Composed by n. 48 sq.mts. humidification panels, set up with modular prefabricated sections, they are fitted in correspondence with the air intake on the house walls.

The panel watering system includes:

2 high capacity recycling pumps (0.50 HP. each), complete with shutters and manometer;

1+1 plastic reinforced fiberglass collection tanks (500 lts. each), complete with reintegration float-valve and safety electrolevel;

- feeding and discharge pipe, complete with drain shutter.

The cellulosed panel parts are fitted into a metallic supporting frame, (made of galvanized sheet) which includes the low gutter for water collection, the upper section containing the PVC water distribution pipe and the closing side parts.

The running of this humidification system is automatic and the starting is obtained through the O.K. given by the enviromental humidostat (which is gauged at 40% relative humidity) and through the CTE/5 cooling contact (humidification cursor positioned on 25°C).

The cellulose panel is replaced without disassembling any metallic part of the frame.

Dust is removed from the panel by broom.

3.1.2.9 Electric system

Conforming to the CEI rules it is composed by:

. control panel

The electric panel structure has been designed by taking into due consideration its functionality and the place where it has to be installed.

All the electric equipment inside the panel is fixed to a steel base; the controls are fixed to the front door with the knobs accessible from the outside.

In the protection and control system relative to the user points there are two well distinguished electrical circuits:

a) ancillary circuit

b) power circuit

The ancillary or control circuit works with duly calculated fuse protection.

It connects a number of automatisms together allowing user - point electric control.

The power circuit is constructed as follows, with respect to each user point:

a) set of fuses of previously calculated value on the top of the whole system;
b) contactor to connect the user point directly to the electric power line
c) thermal relay duly calculated for user-point protection
d) terminal board to facilitate the connection of the electric line to the panel itself.

The cabling uses 3000-V cable. Section insulation and the colour differ according to the different amperage and functions.

Each single cable is classified by numbers inserted in the electrical scheme; this is the only way to obtain an accurate and rapid control of the whole electrical system, which is protected by a main switch with relative easy-to-replace fuse.

All the electrical equipments utilized in the electric panel are supplied by leading manufacturers.

. Electric cables

Supply and installation of all electric cables necessary for the inside connections.

The cables utilized are of high quality; have an insulation of 3rd degree; 600 working and 1000 testing volts and are furthermore utilised to connect the following motors:

- motors for hopper feeding system
- motor for auger loading the feed distribution
- motor for auger filling up the bin
- motors for the manure scrapers
- motors for manure removing chain
- motors for "B 41" fans
- motor for JD "B 15" fan
- motor for JD shutter
- hot-air generator

- motors for humidification pumps

Cable raceway along the whole house length and supplied in galvanised sheet.

3.1.2.10 Alarm system

The alarm system of the house includes:

- electrical voltage failure
- low temperature
- high temperature

The alarm system is complete with a 12-Volt battery and all the systems are connected to an acoustic device and to a warning light.

3.1.2.11 Lighting system

Includes 5 rows of 60 watt, 220-240 V incandescent lamps; along the rows the lamps are placed at a distance of 4 meters one from the other.

Each lamp is provided with white round reflector which increases the luminous intensity at bird level.

The lamps are not kept in a lamp-holder so they are in direct contact with the air and do not overheat, thus lasting longer.

The lampholder is fixed to the self-bearing cable by means of a special terminal.

Standard automatic switch to connect the clock.

Automatic switch for line protection.

Adjustable timer, having 15' intervals.

Each row of lamps is equipped with its own manual switch.

Lamp luminous intensity variator.

3.2 LAYERS PRODUCTION SECTOR (See drawing Annex 6/5 - 6)

3.2.1 Prefabricated buildings

N. 3 prefabricated buildings (72 x 12 x 2.7 mts.) are each designed for a capacity of 15,360 layers in "Nevada" battery-cages.

Total capacity 46,080 layers. Each production sector building is constituted by:

- 864 sq.mt. bearing structure
- 864 sq.mt. roof and ceiling
- main door, door, door with inspection eye
- side curtain
- side curtain automatisms
- anti-bird net

For the description of the building refer to para 3.1.1.

3.2.2 Equipments

3.2.2.1 "Nevada" battery-cages

Total capacity of the installation in each prefabricated building is 15,360 layers. This capacity is obtained by n. 4 rows of "Nevada" automatic batteries - 64 mts. long each row.

The capacity of the battery is 60 layers per metre of battery .

The batteries are complete with nipple drinkers and a line of feed troughs made of galvanised sheet.

Dimension of the batteries
Utilisable length (4 x 64 mts.) 256 mts.
Width 1,78 mts.
Height 2,45 mts.

Dimension of the cages
Inside height 37 cms.
Outside height 43 cms.
Width 40 cms.
Depth 45 cms.

3.2.2.2 Automatic feeding system by running hoppers

As per Rearing Sector (para 3.1.2.2).

3.2.2.3 Silo and screw feeders

As per Rearing Sector (para 3.1.2.3).

3.2.2.4 Egg collecting system

Constituted by: n. 4 egg collecting installations, each one including:

- 1 Niagara head to convey the eggs of each tier into a single level;
- electric drive-unit for jute conveyor belt;
- jute belt to convey the eggs to Niagara heads placed in front of each row of cages.

3.2.2.5 Automatic manure-removing system

As per Rearing Sector (para 3.1.2.4).

3.2.2.6 Watering system

As per Rearing Sector (para 3.1.2.5).

3.2.2.7 Ventilation system

Composed by:

- n. 8 Fans " B 15" type with exhausting capacity of 15,000 cubic meters/hour at 1 mm. of water column;
- n. 8 galvanised ducts for conveying air to external environment;
- n. 2 thermostats to control fans working in accordance to the temperature in the house.

3.2.2.8 Humidification system

Humidification system through high pressure nozzles installed along the building walls in correspondence with the curtains.

The installation is complete with pumps, PVC piping and nebulizing nozzles.

3.2.2.9 Electric system

Conforming to CEI standards it is composed by:

- Control panel.

As per Rearing Sector (para 3.1.2.9).

- Electric cables.

Supply and installation of all electric cables necessary for the inside connections.

The cables utilized are of high quality; have an insulation of 3rd degree; 600 working and 1000 testing volts and are furthermore utilised to connect the following motors:

- motors for hopper feeding system
- motor for auger loading the feed distribution
- motor for auger filling up the bin
- motors for head-frames "Niagara"
- motors for the manure scrapers
- motors for manure removing chain
- motors for "B 15" fans
- motor for humidification pump

Cable raceway along the whole house length and supplied in galvanised sheet.

3.2.2.10 Alarm system

As per Rearing Sector (para 3.1.2.10).

3.2.2.11 Lighting system

As per Rearing Sector (para 3.1.2.11), without lamp luminous intensity variator.

3.3 EGG WORKING BUILDING (See drawing Annex 6/7)

3.3.1 Prefabricated building

One prefabricated building (20 x 12 x 2.7 mts) is foreseen. The egg-working building has the following characteristics:

- 240 sq.mt. bearing structure
- 240 sq.mt. roof and ceiling
- perimetral walls
- door, main doors
- windows
- lighting system

For technical detail refer to para 3.1.1

3.3.2 Equipments

3.3.2.1 Egg centralisation

Constituted by:

- starting groups including supports and transmission gears
- horizontal channel complete with plastic conveyor belt for the transport of the eggs
- motor drive for the plastic belt
- the electric panel is complete with motor safety device, switches, warning and lights.

3.3.2.2 "Farmpacker type 60" egg packing machine

21,000 eggs/hour capacity constituted by:

- Peack-absorber, equipped with pressure switch for accumulation of the eggs, supplied by the egg-collection conveyors.
  Packer for packing 6 eggs at a time automatically and carefully into the trays with the air-cell up.
  Carton infeed lane for transport of empty trays.
- Automatic denester, which start on signal of the packer and drop one by one a tray, and 1 set of grippers.
- Straight or 90° incline conveyor, which transports the trays to the packing table, equipped with overload security switch.

4. POULTRY MEAT PRODUCTION LINE PROCESSING, BUILDINGS AND EQUIPMENT DE - SCRIPTION

4.1 PARENT STOCK INSTALLATION (see drawings Annex 6/8 - 9)

4.1.1 Prefabricated buildings

No. 12 prefabricated buildings (84 x 12 x 2 mts) are foreseen, each one having a capacity of 3,600 females and 360 - 400 males. Total capacity 43,200 birds. Each parent-stock building has the following caract eristics :

- 1,008 sq. mt. bearing structure
- 1,008 sq. mt. roof and ceiling
- main door, door, door with inspection eye
- side curtain
- side curtain automatism
- anti-bird net
- transversal partitions
- door for partitions

For technical details refer to 3.1.1

4.1.2 Equipments

4.1.2.1 Partitions

Constituted by No. 3 transversal partitions, of 12 mts., including:

- galvanised iron bearing supports fixed to the floor and to the roof.
- blocking panels consisting of a galvanised iron framework with hooks for fixing to the supports - electrowelded and galvanised net fixed to the panel.
- entrance door to the various departments complete with pintles and handle.

4.1.2.2 Nests

Constituted by :

No. 78 Sets of nests, each with 14 holes - total 1,092 holes.
Nests complete with structure, galvanised partitions.

Hole dimensions:

- width	28.5	cms.
- depth	33	cms.
- height	34	cms.

No. 2 Automatic head-frames for the automatic egg collection from the nests.

Egg collection table for headframes.

Jute, conveyor belt for eggs complete with supports and connecting guides.

4.1.2.3 Chick equipment

Constituted by :

No. 40 feed trays for chicks from 1 day old up to two weeks.

No. 40 plastic siphon drinkers with a capacity of 2.6 lts. needed for the first days of life.

No. 16 of 18 Kg. capacity feed troughs for cocks.

4.1.2.4 Automatic feeding system

Constituted by No. 1 automatic chain feeding system complete with:

- 1 hopper

  Two-way hopper, made of galvanized sheet, 12/10 mms. thick, painted with special paint. A vertical mixer operated by a connecting rod receives the movement from a drive unit and so obtains a regular load on the chain, eliminating the possibility of the feed stopping in the hopper.

The hopper is easily regulated by supports provided with pulleys. The hopper is equipped with two motors, each motor drives one chain.

- 2 Cleaners

  A special cleaner permits the chain, at the beginning of the hopper, remove the bedding, the feathers, the gravel and the manure which are in the feed.

  The cleaner is towed by the chain. When the feed is cleaned, it is to wed by the chain. When the feed is cleaned, it is conveyed into the feed troughs near the beginning of the hopper.

- 8-90° angles

  These angles are supplied with a pulley made of semisteel; their supports assure a regular motion of the chain.

- 334 linear mts. of chain

  The chain, made of special steel, drives into the feed troughs, made of galvanized sheet, specially shaped to prevent wasting feed.

  It conveys uniform quantity of feed; this quantity may be adjusted at the exit of the hopper, according to the needs of the birds.

4.1.2.5 Silo and screw feeders

Constituted by :

. No. 1 silo - capacity 17.65 cubic meters (about 10.5 metric tons).

It is made of smooth galvanised sheet having a thickness wich varies from bottom to top from 20/10 to 12/10:

- sealed junctions to ensure water-proofing
- openable trap door on the roof for inspections
- ladder with safety protection
- shutters to stop feed outflow
- galvanised supporting legs
- lower cone
- upper cone and cover
- piping for pneumatic loading

. No. 1 weighing machine;

. No. 1 screw-feeder for loading silo.

Designed to allow easy silo loading, it is set up with:

- feed intake hopper placed on the silo base having a capacity of 50 kg; it is made of galvanised sheet and equipped with relative lid,
- 150 mm dia. tube with 130 dia.,
- outlet opening in the silo inside,
- relative supports,
- electric drive placed at the end of the auger itself with 3 HP motor, 520 rev/min auger;

. No. 1 screw feeder for loading feed into the weighing machine and the hopper of feed distribution.

Helical feed conveyor from the silo into the house inside.

It is set up with a 120 mm dia. tube inside which a 110 mm auger having a 100 mm pitch runs.

It is run by a 272 rev/1' 2 HP motor.

The capacity is of 2 ton/hour.

The motion from the horizontal to the slanting section is transmitted by a universal joint.

4.1.2.6 Watering system and drinkers

Constituted by :

. No. 1 coloured reinforced plastic tank, placed in the store house - volume: 0.5 cub. mt.

Dimensions:

- width	90 cms
- depth	90 cms
- height	65 cms

. PVC pipe, with all connections for feeding the water troughs, conveys the water inside the house.

The installation is complete with connections and shutters.

. 80 Round automatic drinkers.

The round automatic drinkers present a series of advantages including practicality and easy handling of the rearing.

The water inlet valve, with double closing, guarantees continuous water flow at a constant level; it is supplied with a specially shaped edge in order to make it easy for the birds to drink (even for the youngest ones), keeping the bedding always dry.

Furthermore the round automatic drinker is characterized by easy fitting, disassembling, cleaning, disinfecting, packing and economic transport.

Characteristics:

- minimum working pressure 0.2 Atm.
- maximum working pressure 1.0 Atm.
- Diameter : 400 mms
- Height : 500 mms

4.1.2.7 Heating system

Constituted by :

. No. 6 gas brooders, 2,500 K.Cal./h. each one with safety valve for starting;

. piping connections for brooders;

. No. 1 gas delivery regulator with safety thermostat.

4.1.2.8 Ventilation system

As per Layers Production Sector (para 3.2.2.7).

4.1.2.9 Humidification system

As per Layers Production Sector (para 3.2.2.8).

4.1.2.10 Electric system

Conforming to CEI standards, it is composed by:

. control panel:

as per Rearing Sector;

. electric cables:

supply and installation of all electric cables necessary for the inside connections.

The cables utilized are of high quality; have an insulation of 3rd degree; 600 working and 1,000 testing volts and are furthermore utilised to connect the following motors:

- motors for chain feeding system,
- motor for auger loading the feed distribution,
- motor for auger filling up the bin,
- weighing machine,
- motors for "B 15" fans,
- motor for humidification pump.

Cable containing channel for the whole house length and supplied in galvanised sheet.

4.1.2.11 Alarm system

As per Rearing Sector (para 3.1.2.10).

4.2 HATCHERY PLANT (see drawing Annex 6/10)

4.2.1 Prefabricated building

One prefabricated building (44 x 18 x 3.5 m) is foreseen having the following characteristics:

- prefabricated house with 0.7 m side over hang,
- 792 sq. m bearing structure,
- 792 sq. m covering and ceiling,
- perimetral walls,
- inside monowall partitions,
- 6 outside doors,
- 25 inside doors.

For technical details refer to Rearing Sector (para 3.1.1).

Prefabricated walls

Prefabricated walls set up with rigid panels made of a 6/10 thick galvanised and painted sheet outside layer and a 5/10 thick galvanised and painted sheet inside layer; the insulation is provided with self-extinguishing polyurethane foam, 35-40 kg/cub. m density.

The total panel thickness is 3-3.5 cm, equal to an insulation of K = 0.57 K.Cal./sq. m h. C. The panels are supported in their low and upper part by galvanised sheet profiles fixed to the ground and to the bearing structure of the house itself.

4.2.2 Process description and equipments

Hatching eggs are delivered to the hatchery plant in plastic or cardboard trays. They are put into the settertrays by an vacuum egglifter. Settertrays are then sent to the coldstore where they are kept at a temperature of about + 12°C. and a humidity level of 65-70%.

The settertrays are then sent to the setter-room equipped with the setter-type "Petersime 504".

The Petersime 504 is especially designed to operate in the "all in - all out", as well as in the "multistage" system. Because there are no parts protruding from the side and backwalls, the models can be installed in groups of any size.

No. 6 setters Petersime 504 for a total setting capacity of 302,400 eggs are foreseen.

Each machine has 12 trolleys each holding 4,200 eggs, the total capacity is 50,400 eggs, the capacity per tray is 150 eggs and the number of setter-trays is 336.

The weight per machine is approx. 3,300 kg while the dimensions are:

- lenght : 4,220 m
- depth : 3,656 m
- height : 2,460 m.

The machine, as mentioned, has sides free from protruding parts so that installation can be done side to side and back to back. The machine has an aluminium front. The doors are covered on both sides with aluminium sheet and coated with a special paint on the outside. The walls are constructed as follows:

- water-boiled proof plywood (W.B.P.)	:	8.0 mm
- polystyrol insulation	:	34.0 mm
- water-boiled proof plywood (W.B.P.)	:	8.0 mm
- aluminium sheet	:	0.6 mm

The electronic temperature measure and control-system, as used in the Petersime, offers the opportunity to measure and control the temperature inside the machine with an extreme degree of accuracy. The temperature level can be adjusted over a wide range by means of one control-knob located on the front-panel. The so-called "targetfinder" device means that this adjustment takes just a few seconds, even in case of a cold machine. A specially adapted circuit switches-off half the number of heating elements as soon as the temperature has nearly reached the present level, thus saving energy and allowing a more accurate temperature control.

The temperature inside the machine is sensed by just one sensor, thus preventing control difficulties. The temperature is displayed on a large-type electronic panel-meter, mounted on the control-panel.

The setter is equipped with an automatic cooling system, consisting of two separated circuits of copper pipes, through which cold water flows in case of too high a temperature. The cooling system is controlled by the same electronic temperature control system.

The humidity level inside the machine is sensed by one sensor equipped with a large water supply tube, which can contain an amount of distilled water, sufficient for approx. 3 weeks. The accuracy of the system is unparalleled.

The new Petersime electronic humidity measure and control-system is constructed in the same way as the above-mentioned temperature system and offers the same unique features, such as wide ranges, easy setting of the humidity level, "targetfinder", easy-to-read meter, etc.

The alarm system is fully integrated in the control-system and, once connected to a 12 V battery, gives alarmsignals in case of:

1. too high temperature (+ 101°F),
2. too low temperature (+ 97°F),
3. defect temperature sensor,
4. troubles in humidy-sensing e.g. empty water-container, dried-out wick, etc.
5. cut in main supply - broken fan-bealt, etc.

During the warming-up of the machine, the low-alarm is suppressed. In case of a too high temperature, and a simultaneous failure of the electronic alarm circuit, a fully independent electromechanical alarm system comes into action.

The setter is equipped with two slow rotating pulsators providing an almost ideal air circulation.

Setter and hatcher are fitted with an air in and outlet device which allows the ducting of the stale air out of the room.

The Petersime 504 is standard equipped with an electronically controlled, temperature-dependant ventilation control. In case of an inside temperature exceeding the present level, the ventilation-valves will be opened automatically, in this way lowering the inside temperature. The minimum and maximum opening of the valves can be limited by means of setting knobs. The automatic ventilation can be switched-off too. The maximum limit control and the on/off switch are inside the control cabinet.

The eggs are automatically turned every hour. The trolleys are introduced into the mechanism and the regulation of turning is done by electronic regulation.

The eggs are transfered from setter to hatcher-tray after the 18th day of incubation by handling and transfer trolleys.

The egg then pass to the hatcherrom.

The hatcherroom is equipped with Petersime hatcher 168. This machine has nearly the same electronic control system as the b.m. Petersime setter, except for the ventilation, which is not automatic. Also the panels are of the same construction and quality.

Provision is made for 3 hatchers for a total hatching capacity of 50,400 eggs.

Each hatcher has 4 trolleys each holding 4,200 eggs for a total capacity of 16,800 eggs. The capacity per tray is 150 eggs.

The weight per machine is approximately 1,265 kg and the dimensions are:

- length: 2,890 mm,
- depth : 2,120 mm
- height: 2,490 mm - motor included.

In connection with the machine, provision will be made for a chick-sorting conveyor with fast chickhandling. This is especially recommended for hatcheries with important hatches and where quick deliveries are required.

Regulable velocity is between 3 and 15 m/min.

4.3 BROILERS INSTALLATION (see Drawings Annex 6/11-12)

4.3.1 Prefabricated buildings

No. 10 prefabricated buildings (104 x 12 x 2 m) are foreseen, each having a capacity of 15,000 floor broilers. Total capacity 150,000 birds. Each broiler building has the following characteristics:

- 1,248 sq. m bearing structure,
- 1,248 sq. m roof and ceiling,
- main door, door, door with inspection eye,
- side curtain,
- side curtain automatisms,
- anti-bird net.

For technical details refert to para 3.1.1.

4.3.2 Equipments

4.3.2.1 Automatic feeding system

Constituted by No. 1 automatic feeding system by chain, complete with :

- No. 1 hopper. Two-way hopper, made of galvanized sheet, 12/10 mm thick, painted with special paint. A vertical mixer operated by a connecting rod, receives the movement from a drive unit and obtains a regular load on the chain, eliminating the possibility of the feed stopping in the hopper. The hopper is easily regulated by supports provided with pulleys;

- No 2 cleaners. A special cleaner lets the chain, at the beginning of the hopper, to remove the bedding, the feathers, the gravel and the manure which are in the feed.
  The cleaner is towed by the chain. When the feed is cleaned, it is conv - eyed into the feed troughs near the beginning of the hopper;

- No. 8 90° angles. These angles are supplied with a pulley made of semi - steel; their supports assure a regular motion of the chain;

- No. 414 linear m of chain. The chain, made of special steel, drives into the feed troughs, made of galvanized sheet, specially shaped to prevent waste of feed.
  It conveys a uniform quantity of feed; this quantity may be adjusted at the exit of the hopper, according to the needs of the birds.

4.3.2.2 Chick equipment

Constituted by :

. No. 150 feed trays for chicks from 1 dayold up to two weeks;

. No. 150 plastic siphon drinkers with a capacity of 2.6 lts needed for the first days of life.

4.3.2.3 Silo and screw feeders

As per Rearing Sector (para 3.1.2.3).

4.3.2.4 Watering system and drinkers

Constituted by :

. No. 1 coloured reinforced plastic tank, placed in the store house - volume: 0.5 cub. m. The dimensions are:
- width 90 cm,
- depth 90 cm,
- height 65 cm.

. PVC pipe, with all connections for the feeding of the water troughs, conveys the water inside the house.
The installation is complete with connections and shutters.

. No. 144 Round automatic drinkers.
The round automatic drinkers present a series of advantages, including practicality and easy handling.
The water inlet valve, with double closing, guarantees the continuous water flow at a constant level; it is supplied with a specially shaped edge in order to make it easy for the birds to drink (even for the youngest ones), keeping the bedding always dry.
Furthermore the round automatic drinker is characterized by easy fitting, disassembling, cleaning, disinfecting, packing and economic transport. The characteristics are:
- minimum working pressure 0.2 Atm.,
- maximum working pressure 1.0 Atm.,
- diameter : 400 mm,
- height : 500 mm.

4.3.2.5 Heating sy-tem

Composed by :

. No. 16 gas brooders, 2,500 K.Cal./h each with safety valve for starting;

. piping connections for brooders;

. No. 1 gas delivery regulator with safety thermostat.

4.3.2.6 Ventilation system

Composed by :

. No. 10 fans "B 15" type: exhausting capacity 15,000 cubic meters/hour at 1 mm of water column ;

. No. 10 galvanised ducts for conveying air to external environment;

. No. 2 thermostats to control fans working in accordance with the temperature in the house.

4.3.2.7 Electric system

Conforming to the CEI standards it is composed by:

. Control panel.
As per Rearing Sector (para 3.1.2.9).

. Electric cables.
Supply and installation of all electric cables necessary for the inside connections.
The cables utilized are of high quality; have an insulation of 3rd degree; 600 working and 1,000 testing volts and connect the following motors:

- motors for chain feeding system,
- motor for feed distribution,
- motor for filling up the bin,
- motors for "B 15" fans
- motor for humidification pump.

Cable containing channel for the whole house length and supplied in galvanised sheet.

4.3.2.8 Alarm system

As per Rearing Sector (para 3.1.2.10).

4.3.2.9 Lighting system

3 rows of 60-watt, 220-240 V incandescent lamps; along the rows the lamps are placed 4 meters apart. Each lamp is provided with round white reflector which increases the luminous intensity at bird level.

The lamps are not kept in lamp-holder and are thus in direct contact with the air and do not overheat so that their lasting is longer.

The lampholder is fixed to the self-bearing cable by means of a special terminal.

Standard automatic switch to connect the clock.

Automatic switch for line protection.

Adjustable timer, having 15' intervals.

Each row of lamps is equipped with its own manual switch.

4.4 SLAUGHTERHOUSE AND PROCESSING PLANT (see drawing Annex 6/13-14-15)

4.4.1 Prefabricated buildings

The following buildings are foreseen:

- one of 1,680 sq. m (80 x 12 x 4.5 m),
- one of 650 sq. m (65 x 10 m),
- one roof of 250 sq. m (50 x 5 m),
- one of 735 sq. m (35 x 21 x 8 m).

They are: completed with structure, roofing, ceiling, outside walls, inside partition, doors, and accessories.

For technical details refer to 3.1.1.

4.4.2 Equipments

4.4.2.1 Slaughterhouse equipments

4.4.2.1.1 Reception

Includes:

. No. 13 m roller conveyor for transport of plastic crates inclusdive of 1 90° bend and adjustable pipe legs.
In addition, as outlined in the enclosed leaflet No. 11-650, the following are provided;
. No. 1 pneumatic pusher with air cylinder and air valves. In stainless steel execution. For transfer from roller conveyor to crate washer;
. No. 1 crate washer model I for cleaning of plastic crates, in stainless steel and complete with high-pressure pump, dirt separator for cleaning the recirculated water. In addition, as outlined in the enclosed leaflet No. 11-080;
. No. 1 high pressure hot-water cleaner for desinfection of plastic crates and for cleaning the processing plant;

4.4.2.1.2 Killing/scalding/defeathering section

Includes :

. No. 95 m overhead slaughtering conveyor type "Silverlink" complete with chain, trolleys with nylon wheels with bushes, stainless steel suspension pieces with stainless steel slaughtering shackles, shackles at a distance of 6" (152 mm);
. No. 2 hydraulic drive unit model H-160-II complete with oil engine and gears, as weel as suspension for mounting on overhead conveyor;
. No. 1 hydraulic power back model III complete with electric motor and oil pump mounted on floor-based tank;
. No. 6 m single guide rail in stainless stees execution, complete with suspension for mounting on overhead conveyor;
. No. 1 water stunner BA 3 inclusive of transformer, automatic water filling device and adjustable floor stand;
. No. 1 killing machine model II complete with motor and rotating knife. The killing machine is able to kill the birds according to Islamic regulations by cutting the throat (Halal killing);
. No. 7 m bleeding trough length = 7 m, in stainless steel execution, complete with detachable side screens and galvanised bottom frame, inclusive of 1 m stainless steel slide;

. No. 1 scalding machine 2-pass, effective scalding length 12.75 m, complete in stainless steel execution and including thermostat TC 2 for automatic temperature control;
  - Chimney and fan for exhaust hood,
  - Fan capacity max. 300 cub.m/h.,
  - Fan motor 0.3 KW with speed variator,
  - 6 m chimney of 200 mm dia.
. No. 1 picking machine LINCOMATIC 2 x I/3 complete with 3 picking rows on each side, and adjustable telescopes for each row;
. No. 1 automatic head/trachea remover HA 2 complete with suspension for mounting on overhead conveyor;
. No. 1 automatic neck skin slitter NSA 1 complete with adjustable bottom frame and hydraulic drive unit;
. No. 1 singeing furnace model II complete with continuous flame burners and adjustable bottom frame;
. No. 1 automatic leg cutter model B complete with suspension for mounting in a 90° conveyor bend;
. No. 1 slide in stainless steel execution, complete with suspension;
. No. 1 automatic leg releaser model I complete with suspension for mounting on overhead conveyor;
. No. 1 chain/shackle cleaner model V complete with rotating brushes and water spray device. For effective washing of chain and shackles.

4.4.2.1.3 Evisceration section

Includes:

. No. 1 belt conveyor length 4.0 m width of belt 400 mm, complete with adjustable frame;
. No. 83 m overhead evisceration conveyor type "Silverlink" complete with chain, trolleys with nylon wheels with bushes, stainless steel suspension pieces with stainless steel evisceration shackles, shackle distance 8" (200 mm);
. No. 2 hydraulic drive unit model H-160-II complete with oil engine and gears as well as suspension for mounting on overhead conveyor;

- No. 1 hydraulic power pack model III complete with electric motor and oil pump mounted on floor based tank;
- No. 12 m single guide rail in stainless steel execution, complete with suspension for mounting on overhead conveyor;
- No. 1 automatic vent cutter Model OA 6 in stainless steel execution and with adjustable bottom frame;
- No. 1 automatic opening machine model OM1-8 units in stainless steel execution and with adjustable bottom frame;
- No. 1 automatic eviscerator model Mark IV/200-12 units in stainless steel execution with adjustable bottom frame;
- No. 1 evisceration belt conveyor length 4.0 m complete with adjustable frame;
- No. 3 sinks, hand wash-basins with foot operating valve;
- No. 5 m giblet chutes complete in stainless steel with funnels, slides, nozzles, tubes and suspension as well as bends;
- No. 1 gizzard processing machine Model GA2 for separating, splitting , washing and peeling of gizzards, in stainless steel execution;
- No. 1 automatic neck remover model NA 3 complete with bottom frame. In stainless steel execution;
- No. 1 automatic lung remover LA 1, complete in stainless steel execution and for mounting in a 180 degr. conveyor bend;
- No. 1 vacuum pump model 9 for automatic lung remover LA 1;
- No. 1 collecting tank in stainless steel execution with automatic emptying system. Volume 500 lt;
- No. 1 automatic in-and outside bird washer model WA 1, complete in stainless steel execution and for mounting in a 180° conveyor Belt;
- No. 1 automatic shackle unloader model I in stainless steel execution, complete for suspension on overhead conveyor at 90° degr. bend;
- No. 1 slide 1 m, in stainless steel execution;
- No. 1 automatic shackle unloader model B complete with suspension for mounting on overhead conveyor;
- No. 1 m slide in stainless steel execution;
- No. 1 chain shackle cleaner model V with rotating brushes and water spray device;
- No. 1 diaphragm pump unit model SMC 80. For transport of liver and heart inclusive of 1 set of PVC-pipes and valves;
- No. 1 vacuum reservoir volume 500 lt.;

. No. 1 Diaphragm pump unit for transport of gizzard, inclusive of one set of PVC-pipes and valves;

. No. 1 diaphragm pump unit for transport of neck, inclusive of one set of PVC-pipes and valves;

. No. 8 mm 1,600 mm dia. spiral chiller (two sections). Washing section 2.5 m, chilling section 5.5 m, with two air blowers, and one set of PVC-pipes. In stainless steel execution;

. No. 1 collecting tray in stainless steel execution complete with bottom frame;

. No. 3 giblet water separator consisting of a mini-bow strainer on a stainless steel table;

. No. 1 giblet packing machine LINCOWRAP model II for wrapping giblets in to polyethylene film.

. No. 1 plastic bucket/table for wrapping giblet. With stainless steel table top;

. No. 1 collecting tray in stainless steel execution.

4.4.2.1.4 Equipment for hen processing

Includes:

. No. 2 vent cutter, manual type, model OS 4 for hens;

. No. 2 stainless steel collecting trays for eggs with shell;

. No. 2 stainless steel collecting trays for eggs without shell;

. No. 2 suction pistols for hen-lung removing;

. No. 1 stainless steel gizzard peeling table for hens, with double set of peeler rollers;

. No. 1 set of hand tools for hen-evisceration inclusive of one grinding machine.

4.4.2.1.5 Cutting and freezing sectors

Include :

. No. 98 m overhead grading conveyor type "Silve-link" complete with chain, trolleys with nylon wheels with bushes, and special stainless steel grading shackles, shackle distance 8" (200 mm);

- No. 2 electric drive units model II G complete with suspension for mounting on overhead conveyor and inclusive of frequency converter;
- No. 1 single guide rail in stainless steel execution, length 6 m for mounting on overhead conveyor;
- No. 1 weight grading system LINCOTRONIC II consisting of:
  - No. 1 weigh bridge,
  - No. 1 computer,
  - No. 1 display with key-boards,
  - No. 1 printer,
  - No. 15 releasing stations,
  - No. 1 drop-off station. A second drop-off station will be installed for the hens, giving the possibility to put the hens in a chilling tunnel;
- No. 1 voltage stabilizer, 250 VA;
- No. 15 collecting trays in stainless steel execution, inclusive of stainless steel bottom frame;
- No. 5 LINCOPACK packing machines model VIII for packing of birds into plastic bags. In stainless steel execution and inclusive of 5 tape sealers model 3 M;
- No. 1 belt conveyor length 7.0 m,width of belt 400 mm, complete with adjustable frame. For cardboard shaping;
- No. 1 belt conveyor length 19.0 m, width of belt 400 mm, complete with adjustable frame. For cardboard shaping;
- No. 1 belt conveyor length 14.0 m, width of belt 400 mm, complete with adjustable frame. For empty boxes;
- No. 1 electronic scale with label print-out;
- No. 1 wrapping machine for wrapping the filled cartons/boxes in a heat-shrink plastic film;
- No. 1 bend for roller conveyor;
- No. 15 m roller conveyor for transport of filled carton/boxes complete with adjustable legs;
- No. 1 belt conveyor length 8 m, width of belt 400 mm, complete with adjustable frame. For filled cartons/boxes;
- No. 1 bend for roller conveyor;
- No. 1 electronic scale with label print-out;

. No. 3 roller conveyor for transport of filled cartons/boxes complete with adjustable legs;

. No. 150 Racked trolley for chilling;

. No. 120 treezing shelves for freezing cartoned chickens/hens;

. No. 1 high pressure cleaner for washing bucket and trolleys.

4.4.2.1.6 Chilling/freezing store sectors

Include No. 425 shelved trolley for chilled chicken.

4.4.2.2 Meat storage plant equipment

The processing refrigeration and conditioning unit is subdivided into the 4 parts as hereinafter described into detail:

A) low temperature installation for 1 freezing tunnel at -25° and for the frozen product cold storage room at -20°C;

B) medium temperature installation for 0°C for the fresh product conservation cold storage room;

C) air-cooled water chillers for the production of freezing water, at +1°C for the bird freezing in the chiller;

D) air handling units for conditioning of the work rooms.

The first two mentioned installations work by ammonia and are connected together because they have a common evaporative condenser in order to ensure the best thermal efficiency.

The other two mentioned installations work by means of Freon gas (R22).

A) Low temperature installation

The low temperature installation for the freezing tunnel at -25°C and for the conservation cold storage rooms at -20°C is such as to supply 265,000 fg./h. where 112,500 x 2 goes for the tunnel and 40,000 for the cold storage room, and it is set up as follows:

- 3 ammonia alternative two-stage refrigerating compressors, each one coupled to a 120 HP electric motor through pulleys and belts, comple te with all necessary fittings such as safety pressure switch, manometers, valves, etc., pumps for the circulation of the liquid to be delivered to the evaporators and liquid separator;

- 1 ammonia two-stage refrigerating compressor coupled to a 75 HP motor, equipped with safety pressure switch, manometer, valves, etc. having a capacity of 40,000 fg./h. for cold storage room feeding, when the tunnels are not working;
- evaporative condenser made of galvanised steel sheet painted with anti corrosion paints, suitable for the outside environments.
  The condenser is set up with a water distribution device. Nozzle nest with wide passage section where this section is full, so as to increase the yield.
  The condenser is complete with galvanized steel collection tank;
- pumping station unit set up with 2 pump sets, where one is stand-by. The pump group for water circulation is complete with electric control panel, connection pipes, valves, shutters and all other required fittings;
- 2 evaporators for the tunnel of galvanised sheet structure and steel exchange battery; the two evaporators are complete with fittings such as valves, three 15 HP electric fans for each evaporator, check thermostat, air distribution galvanised sheet duct and manual defrosting system;
- 1 galvanised sheet structure and evaporation for cold storage room (-20°C) having steel exchange battery, complete with valves, two 7.5 HP electric fans and manual water defrosting system;
- set of steel pipes for connection to the above described equipment, duly insulated where necessary;
- set of galvanised pipes for the evaporator defrosting circuit, complete with all fittings and pump sets;
- main electric check panel which is the same for both the refrigeration installations A) and B);
- electric connections between the above described equipment and the main electric panel.

B) Medium temperature installation

The "medium" temperature installation for the two cooling tunnels at 0°C and for the conservation room at +-0°C is such as to supply 40,000 fg./h. It is set up as follows:

- 1 ammonia alternative refrigerating compressor, coupled to a 50 HP electric motor through pulleys and belts, complete with safety pressure switch, manometers, valves, etc., pumps for the circulation of the liquid to be delivered to the evaporators and the liquid separator;
- 1 galvanised sheet evaporator for the room at +2/0°C and steel exchange battery, complete with valves, two 4 HP electric fans, check thermostat and manual water defrosting system;
- set of steel pipes for connection to the above-mentioned equipment, duly insulated where necessary;
- galvanised pipe set for the water-type defrosting circuit, complete with all fittings;
- electric connections between the above described equipment and the electric main panel;
- pump set (one as stand-by to the other) complete with fittings for the two defrosting water circulation installations A) and B).

C) Chilled water installation

The installation for the production of chilled water requires in total 900,000 fg./h. for the production of 65,000 l/h. of freezing water at +1°C (see also the related scheme), it is set up as follows:

- 2 air-cooled water chillers (enbloc type) for the outside, each one having a capacity of 450,000 fg./h., with outside max. temperature of 40°C, each chiller is equipped with 4 compressors and total power consumption is 180 x 2 = 360 KW; they are also complete with electric control and check panel.

The installation is complete with:

- 1 pump set (having two pumps where one is as stand-by to the other), for the water chillers.

  The pumps are complete with fittings and control electric panel;
- 1 steel piping main, insulated through foamed synthetic material for water delivery from the chillers to the bird chiller. The main is complete with fittings and cut-out valves;

- 1 electric connection set for the above described equipments.

D) Air conditioning plant for the work rooms

The air conditioning plant for 3 work rooms is set up as follows:

- 3 air treatment units, one for each of the 3 rooms to be conditioned. Each unit is made of inside insulated galvanised and painted sheet and has, also in the inside, the centrifugal fan which is coupled to the electric motor, and the air exchange coil; it is complete with electric control panel and air-cooled compressors;
- for air distribution into the room provision is made for a galvanised steel canalisation insulated on the inside, complete with adjustable openings at the outlets.
  Air canalisations are placed in the counter ceiling.

E) Features on the meat conservation storage rooms

The materials foreseen for this work are "Sendzmir" system galvanised sheet panels, having the following thicknesses:

- for low temperature rooms and tunnels: -35°C,150 mm thickness;
- for 0°C/+2°C rooms, tunnels and anterooms,100 mm thickness.

The joints between the panels are sealed on site through polyurethane resin foam so as to guarantee the maximum efficiency for the insulation.

The connection between the outside and inside profile section joint is made by self-tapping screws and insulating material presenting high mechanical strength.

The insulation is guaranteed by polyurethane, having the following characteristics:

- medium density determined on the panel 38-42 kg/cub. m;
- compression resistance 1.8-2 kg/sq. cm;
- thermal conductivity to the average temperature of -7°C 0.020 K.Cal./lin.m.h.°C;
- closed rooms percentage 02%;
- exercise maximum temperature + 100°C;
- application field - 100°C + 100°C;
- combustibility,self-extinguishing according to ASTM 1692 standards.

The freezing room and chilling tunnel are complete with a vertical plastic curtain placed after the entrance and a vertical plastic curtain placed after the entering doors.

4.4.2.3 By products processing plant equipments

4.4.2.3.1 Boiler plant

Includes:

. No. 1 high-pressure steam boiler. Working pressure 10 bar;
. No. 1 set of valves and armatures;
. No. 1 oil burner for light fuel oil and complete with automatics, oil piping and oil filter;
. No. 1 electric panel complete for control of steam boiler plant;
. No. 1 feed water unit with built-in feed water pump;
. No. 1 water softening plant inclusive of dosing unit;
. No. 1 steel chimney with accessories,height 12 m, inside diamter 400 mm, outside diameter 580 mm.

4.4.2.3.2 By-product/feather treatment

Includes:

. No. 1 suction funnel type 110 in stainless steel execution, for heads;
. No. 1 suction funnel type 110 in stainless steel execution, for legs;
. No. 1 hashing machine for mounting in suction funnel, to ease handling of heads and legs;
. No. 1 suction funnel type 110 in stainless steel execution, for viscera;
. No. 1 drum separator in stainless steel execution, for gizzard offal;
. No. 1 suction funnel type 110 in stainless steel execution, for gizzard;
. No. 1 suction funnel type 110 in stainless steel execution, for trimming;
. No. 1 vacuum pump unit model VII S for transport of heads, legs and viscera;
. No. 1 vacuum reservoir volume 500 l;

. No. 1 collecting bin with automatic emptying system, in stainless steel execution;

. No. 2 timer unit each with 1-line, and inclusive of 6 valves;

. No. 1 vacuum pump unit model VS for transport of blood and vents;

. No. 1 vacuum reservoir volume 500 l;

. No. 1 blood storage tank volume 1,000 l, in stainless steel. The blood will be loaded from the blood collecting tank into a blood batch tank and finally into the cooker by compressed air;

. No. 2 feather/offal pump 6" (one as stand-by) inclusive of 15 HP electric motor and one receiving bin;

. No. 1 feather/offal separator ,length 2.5 m, with stainless steel mesh wires, side screens, and galvanised bottom frame, and recirculation pump;

. No. 1 recirculation pump for feather/offal separator;

. No. 1 set of PVC-pipes from pump to separator (120 m);

. No. 1 set of PVC-pipes for recirculated water (120 m);

. No. 1 set of PVC-pipes from blood trough to tank;

. No. 1 set of PVC-pipes from head funnel to bin;

. No. 1 PVC-pipes from leg funnel to bin;

. No. 1 PVC-pipes from viscera funnel to bin;

. No. 1 oil and grease for the plant;

. No. 1 first oil change;

. No. 3 air compressor (one as stand-by), the capacity of each compressor will be 1.1 cub. m.per minute. The system is complete with air water cooler system tank and drying unit;

. No. 1 by-product silo lamelle silo of 12 cub. m, complete with accessories, will be installed in the by-product house;

. No. 1 electric chain hoist, capacity 1,500 kg, complete with guide bar and remote control;

. No. 1 dry rendering cooker, volume 5,000 l, complete delivered as packaged unit, inclusive ot 60 HP electric motor, gear box, internal pipe connections, insulation and stainless steel cover plates, steam pressure in Jacket 10 ato.,steam pressure in Cooking Room 7 ato. The odours and condensable gas are burned in the cooker;

. No. 1 moisture index meter for efficient control of the cooking process. The process will be stopped at a preset moisture content of the meal;
. No. 1 percolating tank for collecting the meal coming from the cooker, complete with steam heated jacket and discharge screw conveyor in the bottom;
. No. 1 centrifugal fat extractor complete with steam heated jacket, 2 centrifugal baskets and one trolley for moving the baskets;
. No. 1 electric chain hoist for hoisting the centrifuge baskets from percolating tank into the centrifuge and to meal cooling floor. Capacity 500 kg, complete with guide bar and remote control;
. No. 1 milling plant for milling the defatted feather meal. The milling plant contains a feeding screw conveyor, hammer mill, mild steam frame with ladder, and a sacking device under the mill;
. No. 2 fat balance tank for collecting the free floating fat from percolating tank and from centrifuge to the fat settling tank;
. No. 1 fat settling tank volume: 1,000 l. For collecting and cleaning the fat from solids and impurities, complete with steam heating coil, insulation and cover plates;
. No. 1 bag sewing machine for closing bags, either paper or jute, complete with suspension spring;
. No. 1 scale range 0-50 kg;
. No. 1 water saving shell and tube condenser 60 sqm for condensing the vapours coming from the cooker during the dry rendering process.
All pipes coming in contact with the exhaust fumes are made of stainless steel;
. No. 1 cooling tower capacity 600,000 kcal, for cooling the water coming from the shell and tube condenser;
. No. 1 recirculated pump;
. No. 1 cyclone dia. 1,000 mm complete in stainless steel execution for separating particles and sludge coming from the cooker with the exhaust steam;
. No. 2 inspection platform with stairs and rail;
. No. 1 cooling platform for cooling defatted cracklings, including a sive for the meal. It is placed over the cooling platform to catch foreign objects;

- No. 1 set of pipes for connecting the plant components with steam, condensate return and water.

4.4.2.4 Water waste treatment plant

4.4.2.4.1 Process flow

The waste water to be treated is pumped out of a pumppit over a screen to remove feathers and bones. The screened water is the pumped out of a second pumppit, from which it will be pumped into the flocculator, where chemical agents are added for floc formation and pH correction.

Unlike conventional tank flocculators, this flocculator is of the plug-flow reactor type. The required mixing capacity is obtained by energy exchange due to turbulence.

The tube flocculator offers the advantage that:

- the dosage of chemical agents can be very precise;
- the residence time is negligible resulting in very short reaction and mixing times.

These factors substantially economise on space, power and chemical requirements. Having undergone a physico-chemical pretreatment, the effluent stream is mixed at the outlet side of the flocculator with a side stream which contains air bubbles of colloidal dimensions and originates from the outlet compartment of the microflotator. This stream is transferred by a special pump, after this has been injected in its suction line.

When passing through the pump the finely dispersed air is dissolved in the water under increasing pressure. The air in water solution is fed into the specially constructed saturation tank.

Excess air, if any, leaves the water via a daerator.

The air-saturated water, free from dispersed fine air bubbles, flows through specially designed flash valves in which the colloidal dispersion of air in water is generated.

The very fine air bubbles attach to the flocs formed so that rising conglomerates build up which are separated in the flotator and collect in a floating layer which is subsequently dehydrated and skimmed off.

Accumulated solid material which have settled is removed by hand operated butterfly valves. The physico-chemically treated water flows through adjustable outlet pipes in a collecting main which can be connected to the water discharge system. The water is not desinfected.

4.4.2.4.2 Automation

In designing the automatic control we have taken into account that the operation of the plant should require a minimum of attention or manpower. In view of the irregular water feed, start and stop cycles have been incorporated. In the starting cycle the various instruments and devices which govern the whole process are started in the correct sequence, when the water level in the pumppit has reached a certain level. This is done to obtain optimal treatment within the shortest possible time. When the feed is too low, the plant is shut down to prevent the feed pump from running dry. Since these operations must be done in a certain sequence, a stop cycle has been provided for.

4.4.2.4.3 Description of automatic start and stop cycles of the plant

- Start cycle:
  a. at a "high level" in the filter pumppit the feed pump starts;
  b. at a "high level" in the CPF-TPF pumppit the recycling pump starts;
  c. after having reached the preset delivery pressure, the pneumatic valves in the air supply line of the pump open.

  If after a given preset period the required pressure is not attained, an audible alarm follows.

  If the required pressure is attained, the following plant components are set in motion, after a lapse of time:
  . the feed pump,
  . the dosing pumps with their corresponding valves,
  . the skimmer.
- Stop cycle:
  a. after "low level" signals the feed pumps stop;
  b. after a preset period;
     . the pneumatic valve in the air supply line to the recirculation pump closes;

. the dosing pumps stop and the corresponding valves close;

c. subsequently after a preset period:

. the recirculation pump stops;

. the skimmer stops

4.4.2.4.4 Main data of the installation

- Design parameters:

Type of influent	: slaughterhouse waste water
water temperature	: 20°C
pH	: 6-7.5
capacity	: 25 m^3/hr
site	: above ground
electricity	: 220/380 Volts; 3 phase; 50 Hz
reduction	: 70% Nitrogen; 75% COD; 95% Fat

- Features of the plant:

type of installation:

CPF/TPF physico-chemical waste water treatment for the high rate purification of the effluent of: slaughterhouse waste water.

- Capacities:

nominal	: 25 m^3/hr

- Consumption figures (based on normal operational conditions):

water	: approx. 130 l/hr
air	: approx. 2.5 Nm^3/hr
electricity (installed power)	: approx. 10 kW
reagents - $FeCl_3$ (or equivalent) 42%	: 14 t/year
- Polyelectrolite	: 400 kg/year
- NaOh 21%	: to be determined later

- Connected load and supply pressure:

water	: 2 ato.
air	: 7 ato.
electricity	: 13 kW

4.4.2.4.5 TPF microflotation plant

- Basin

  The separator consists of a 5 mm mild steel vessel with supporting steel work and stiffeners. The distribution manifold and adjustable outlet cuffs are made of polythene. On one side a plateform with stairs and rail ings is provided.

  Dimensions :

length	: 4,000 mm
width	: 2,000 mm (with platform)
height	: 3,550 mm (excl. skimmer device)
empty weight	: 3,000 kg
operational weight	: 15,000 kg

- Separating element

type	: TPI S24
distance between plates	: 4 cm
dimensions of plate packs	: 1,000 x 1,000 x 1,750 mm
material	: glassfibre reinforced isophtalic, acid polyester resin
number of packs	: 1

- Flocculator

  The tube flocculator is of an all-polythene coiled pipe construction and mounted on a steel support structure.

- Skimmer

  A patented pneumatically driven skimmer made from mild steel is mounted on the separator. All parts coming into contact with the liquid are con structed from mild steel.

- Seeve

Type	: R 600
material	: mild steel
material screen	: AISI 304
capacity	: 35 m^3/h

- Feed pump seeve

Type	: centrifugal pump
pressure	: 10 m.w.c.
output	: 25 m^3/h
material	: cast iron
installed power	: 3 kW
protection class	: IP 68
isolation class	: F

- Feed pump CPF-TPF

Type	: centrifugal pump
pressure	: 10 m.w.c.
output	: 25 m^3/h
material	: cast iron
installed power	: 3 kW
protection class	: IP 68
isolation class	: F

- Recirculation pump

Type	: lateral channel pump
pressure	: 60 m.w.c.
output	: 3 m^3/h
material	: cast iron
installed power	: 3 kW
protection class	: IP 55
isolation class	: F

- Dosing section

This section consists of:

. 1 dosing pump for $FeCl_3$ dosage;

. 1 dosing pump for Polyelectrolite dosage;

. 1 dosing pump for NaOH dosage.

The pumps are provided with replaceable suction filters, pulsation dampers, pressure safety valves and pressure retention valves.

$FeCl_3$	: output 0-30 l/h, 0.17 kW, manually adjustable:
Polyelectrolite	: output 0-50 l/h, 0.17 kW, manually adjustable;

NaOH : output 0-30 l/h, 0.17 kW, manually adjustable.

- Storage of chemicals

  A storage tank is employed for storing $FeCl_3$ and NaOH.
  The make-up and dosing section for Polyelectrolite consists of a tank equipped with an agitator, a disperser and the required valves. An automatic make-up unit for Polyelectrolite can be delivered at an additional price. This automatic unit is included in the price, above capacities of 90 m^3/hr.

- Level measuring in pumppits

  This is done by level meters still to be specified, whose signals start or stop the feed pumps.

- Sludge disposal

  The sludge is disposed off by means of hand-operated butterfly valves.

- Level metering

- Electrical panel

  This system consists of a panel which must be installed in a dry room. The panel houses all switches and other devices to control the entire process.
  The main panel also displays:
  . optical alarms as mentioned below;
  . "hand" or "automatic" switch.
  The following visual alarms and indications are included in the switch panel:
  . high/low level of the pumppits;
  . low pressure in the aeration system;
  . on/off position of dosing stations;
  . on/off position of skimmers;
  . on/off position of the plant.
  The automatic polyelectrolite make-up unit is a self contained unit with its own control panel.

- Pneumatic panel

  The penumatic system consists of a box containing the devices, switches, etc. for the skimmer drive, aeration and the dosing station valves.

- Surface treatment

The separator to be gritblasted inside and outside SA-2 1/2.

The interior covered with epoxy-coaltar layer. The exterior covered with the three layer PV-Fortis standard paint.

Supporting structure of flocculator, filter and steel components of skimmer device will have the same finish as the exterior of the separator.

4.4.3 Working room air conditioning installation

Includes:

. No. 3 air treatment units;
. insulated galvanized steel canalisation.

4.4.4 Electric system

Includes:

. control panel for slaughtering plant;
. control panel for meat processing plant;
. control panel for meat conservation plant;
. control panel for by-products plant;
. lighting system for the plants;
. external lighting in each corner of the buildings.

4.4.5 Hydric system

Internal processing plant hydric distribution sytem will be made according to standard connection.

5. FEEDSTUFF PRODUCTION LINE, PROCESSING BUILDINGS AND EQUIPMENT DESCRIPTION (SEE DRAWINGS ANNEX 6/20 - 21 - 22 - 23)

5.1 FEED-MILL PROCESS DESCRIPTION

5.1.1 General

The factory for the production of poultry feeds, is designed for an output of 10 tons/hour.

Essentially, it is composed of steel silos for raw material storage, both for grains and flours, with a total capacity of 1,020 tons; a working steel tower; a warehouse for storing finished products; a concrete room for the intake hopper; a boiler room; and transformer cabin. Large windows are provided on the ground floor and in the working tower to ensure adequate natural lighting and ventilation.

The arrangement of the different intake sections for the raw material operations and bagging, permits smooth working and allows idle times to be completely eliminated.

All the controls for the various operations are automatized and centralized.

The mill foreseen is a modern feed mill designed for rapid and economic production.

It is provided with the most advanced devices for the control of machine operations and silo conditions.

It is, furthermore, equipped with accident prevention devices and with an efficient system of air purification in the work environment.

It should be noted that :

- no dust or water loss occurs from the plant because condensate water produced by the boiler is recovered and re-cycled;
- the fuel used is in compliance with legal regulations;
- the plant is in strict conformity with accident and pollution laws.

5.1.2 Storage silos for raw materials

Four steel silos measuring 5,000 x 5,000 mm with an effective height (excluding bearing slab and roof) of 18,000 mm are envisaged. These silos are for storing cereals. Their total capacity is 1,020 tons with s.w. 0.78.

For meal and other hard-flowing product 4 bins with total capacity of 350 tons., s.w. 0.60, have been foreseen.

All meal bins are fitted with expansion hoppers and with walls of differente shape and inclination, allowing unloading of difficult products from the silos.

The silos are equipped with air vents and inspection doors protected by grids.

The silos are designed with a roof, to protect mechanical handling of the feeds and to allow easy inspection.

The total silo height, including roof and support slâb, is 24,000 mm.

Raw material storage silos are loaded by an outside hopper installed in a special masonry room, equipped with an intake hopper, measuring 3,500 x 4,000 mm, and able to receive trucks. Raw materials in the form of grain, pellets and meal can be unloaded into this hopper.

The upper part of the hopper is protected by iron gratings able to bear the weight of the trucks.

To unload trucks not provided with a self-tipping system, a steel section and checkered plate platform is provided to tip the whole truck.

A dust suction system is foreseen to eliminate dust during unloading of raw materials.

This suction system consists of a set of hoods placed over the hopper and of a manifold, through which the air and dust are drawn in by a low pressure fan.

Then dust and air pass through wool-hose self-clearing filters. Clean air is conveyed back to the room, while the collected dust is delivered to the hopper.

On the bottom of the intake hopper a chain conveyor is provided to collect the raw materials and convey them, through chain conveyors, to continuous column elevators. These elevators take the product up to chain conveyors, which deliver the raw materials to the silo bins. These conveyors are equipped with unloading outlets and pneumatic diverters, which direct the raw materials to the silo where it has to be unloaded. All the above chain conveyors are fitted with antiflooding safety devices. Mechanical handling output from intake hoppers to silo has been calculated for 50 tons /hour with dry maize 0.78 s.w. The operational area is connected by spouts to the main suction system.

Elevators are "continuous column" type, i.e. they are provided with open bottomed cups, allowing a 50% reduction of space and a 25% saving in electricity consumption with the same output.

5.1.3 Dosing of raw materials

a) Extraction from the silos

Unlike what happens by following standard diagrams for feed production, in this newly designed plant, dosing procedure takes place after storage.

In fact, it has been noticed that by using grain or pellets during the dosing, considering the proportion of these flowing products in relation to the total amount of the mixtures, it is possible to get 30% increased speed in the dosing, with consequent increase of the total processing capacity of the plant, in comparison with that of traditional plants.

Under the storage silos a 1-ton scale with overall length of 14,000 mm will be installed.

The scale hopper is dimensioned to keep a maximum of 75% of the product from one silo only. Of course extraction will be effected from the middle row silos.

We have foreseen lamellar extractors to extract and dose the products from the silos.

The lamellar extractor is particularly advantageous because of its dosing speed and low consumption.

In fact, a dosing output of 150-200 t/h of meal can be obtained with negligible consumption (3 HP).

This is because the extractors exploit product gravity on account of the hydraulic drive.

Extractors are equipped with a device for coarse and fine dosing.

This dosing system is fitted with electronic equipment for the automatic mixing of the composition as will be described later.

b) Dosing system

The operator responsible for the dosing operation, the most important in the plant, must at the same time do both a high precision job and attain a high processing output level.

These are two opposite aspects of the same problem, if the dosing is not simplified by the use of automatic systems.

The lack of adequate equipment forces the diligent operator to make the mental and direct checks required to the detriment of productivity.

It must not be forgotten that the real difficulty for production managers is that they have to obtain a high daily output and yet comply with a feed preparation to be delivered to the Farmers' Co-operative.

For the above reasons, while fully aware of the different aspects of the matter, and the already acquired considerable experience in electronic dosing plants using punched cards and the like with "cabled logic", a new dosing system has been chosen representing a further advance in the feed - mill processing industry. This system uses an electronic computer.

It offers the following main advantages :

- recording of all the formulas foreseen in the plant processing program
- recording of the dosing data, by video keyboard. For each component extracted the following items are shown :
  . code
  . number of silo where it is stored
  . number of scale where it is extracted

. percentage in the formula

. percentage weight

. real extracted quantity.

The manually added products also are recorded by the video keyboard. Furthermore a system is provided to avoid these components being added twice, or omitted, by mistake.

Should more the one silo store the same raw material, the computer program foresees the extraction by rotation of the same product from one silo to another at any following batch.

At the operator's request, by video keyboard, it is possible to obtain the following data :

- recall and print-out of one or all of the formulas recorded in the program
- check of the working sections during passage from one process to another (grinding - premixing - mixing-silo unloading).

These performances must be considered as basic for the plant in accordance with its specific needs. As this system works on real time, the following performances can be added :

- automatic issue of incoming-outgoing goods bills, with automatic recording,
- pre-invoicing of goods for plant administration,
- optimization of the costs of production formula,
- automatic control of the other processing sections, such as : automation for silo storing.

The system is provided with different devices for manual processing in order to assure the most absolute process continuity in the plant, even in case of equipment failure.

5.1.4 Grading and milling

As per our proposal, the milling diagram is an improvement of what is normally done in the other plants.

The proposed system is a fractional milling system. The 75 HP first mill works with a 6-mm diameter hole grid issuing 70% of the product passing through a 2-mm diameter sieve.

For this purpose, a sieving system has been placed downstream of the 1st mill, to separate fines.

The coarse product is then sent to the 2nd 100-HP mill, which provides for milling the product to the requested grade.

Until a short time ago for such a plant, and for fine milling 300 HP was required.

A reduction of 50% of electric power consumption in the milling section not only looks very satisfactory but is by no means negligible for new plants.

Furthermore, this system allows a remarkable reduction in the temperature rise caused by milling, because the first mill works with a large grid without altering the temperature, and from this milling phase 70% of the finished product is obtained.

Mixing operation can be completed in 6 minutes, including 1 minute for mill feeding and for the opening of the mixer slide.

The milling line output conditions the output of the whole plant and is 10 tons/hour considering a ground product with 2.50 mm diameter grid.

Constant mill feeding is ensured by an electronic device which regulates the product flow according to the power consumption of the mill motor.

For cooling, extraction of the air from the mill rotor by a pneumatic system equipped with air-cleaning filter is foreseen.

Still by gravity, the ground product falls into a hopper over the mixer.

5.1.5 Micro-ingredients and dosing system

For small components, i.e., components forming a small percentage of the formula, a hopper is provided in the warehouse, with screw conveyor and relevant suction system, as well as a small 100-kg mixer for possible blending.

These components are conveyed to a storage silo by pneumatic handling under pressure which allows any form of demixing to be avoided.

An air-filtering system will consent the dusts to be recovered in case of dispersion in the transporting air.

At the disposal of these components, 4 silos having a capacity of 104 tons with s.w. 0.6 kg/dm^3 will be provided.

The turnhead conveyors carry the product to the appropriate bin.

One bin is built in stainless steel because in it salt mixed with an inert product will be stored. Due to the mixture's very high corrosive power, the bin must be made in corrosion-proof metal.

At the silo bottom, screw conveyors with two-speed motorized-drive are provided, which are able to give a coarse and fine dosing. The product is weighed by a 200-kg scale with a truncated conical bin equipped with pneumatic discharging slide.

This dosing system is interlocked with the electronic equipment.

The micro-ingredients and the dosed salts in the scales described above are then conveyed to two storage bins placed above the mixer.

5.1.6 Molasses/fat system

In the formation of composed mixtures, liquid products are also used on account of their low cost and for their high content of sugars or calories, which are necessary to make a balanced and complete feed.

The liquids are conveyed by means of gear pumps to 4 ready- use tanks, and from these, always by means of a pump, to a dosing scale of 100 kg capacity, where they are accumulated in the proportions required by the formula.

The dosing of fat and molasses is interlocked with the automatic system.

5.1.7 Mixing

At this point, all the formula components are in the tank above the mixer.

A mixer with 10 tons capacity has been foreseen which is able to make a perfectly homogeneous mixture in five minutes' time in the proportion of 1:100,000, e.e., that it is possible to let into the mixer a minimum dose of 100 gr.

However, it is advisable, in order to speed up production, not to work with unitary batches of less than 1,000 gr.

The product coming from mixing, and from the micro-ingredients dosing scale is made to flow into the mixer.

As soon as these products are distributed in the mixer, the liquids, which will be uniformerly distributed in the solid mixture underneath, are made to flow.

A surge bin is provided beneath the mixer and, when mixing is complete, the product will be discharged quickly (in about 40 ").

At the mixer outlet, the product is conveyed through two classifiers by means of a screw conveyor, and continuous, column type, bucket elevators.

These classifiers have the task of eliminating foreign bodies such as labels, papers etc. which might be in the mixture before it is conveyed to the bagging section.

5.1.8 Pelleting

The pulverized finished product is delivered by means of mechanical handling equipment (bucket elevators and screw conveyor) to the finished product silos or to the pelleting section.

Available for this operation No.2 bins are envisaged.These steel bins are equipped, like all the others, with a manhole and inspection door, while devices to prevent the demixing of the product are installed inside them.

Two pellet wheels fitted for the plant production of 10C tons are foreseen.

Before the actual die drawing, the product is treated with saturated steam in a conditioner-feeder.

All parts in contact with hot feed are in stainless steel to avoid corrosion due to the moisture which is generated during the operations.

Beneath the pellet mill 1 vertical coler is installed for the pellets.

These machines are necessary because the pellets coming from the die at an average temperature of 60°C. are very moist and soft and therefore unsuitable for ensiling and bagging.

With the coolers it is possible to take the product down to room temperature in a short time eliminating the moisture caused by the steam operation, and enabling transport to be effected without itbeing excessively milled.

Cooling is effected by flow from electric fans. The drawn-in air, mixed with moisted dusts, is decanted in cyclones and conveyed outside.

Before ensiling the product, it is necessary to sift it so as to extract the dusts contained in it. These dusts are recycled in the pellet mill to be pelleted again.

5.1.9 Packing and delivery

The finished product can be delivered both in bulk and in variously sized bags. If in bulk, tank-trucks either with screw unloading or with pneumatic unloading can be used.

In both cases trucks are driven on the weighbridge under the finished product silos.

The delivery operator will record the tare and load the truck by gravity.

The feed weight will be displayed on the scale and will allow the feed flow to be arrested in due time.

5.1.10 Bagging

Finished product bagging is carried out by means of a net - weight scale suitable for filling open mouthed 25/50 kg bags and which is able to use both pellets and mash.

Bags are then conveyed again by a belt conveyor which takes them to the sewing machine to be closed.

The bag is fitted on to the scale mouth manually.

The sewing system will provide for labelling, according to the law regulations.

Downstream of the bagging system, there is a flat-floored warehouse, where the finished products can be paletized.

5.1.11 Plant accessories

All the necessary slide controls and the silo-working tower by-pass in the finished product silos are pneumatic and with on-off push buttons for motors, ammetters, etc. The controls are gathered in a control room from which it is possible to control the plant operation.

Maximum/minimum level detectors are foreseen for silos and stores.

5.1.12 Centralized suction plant

In order to avoid dust and dust losses in the environment, 2 suction plants are provided. These are connected to all points o. the plant where dust is present, namely on chain conveyors, screw-conveyors, elevator heads, hoppers, mixers, etc.

The aim of this system is to avoid the problem of air dust produced during processing, thus reducing health risks for the workers and eliminating dust losses, often coming from high quality products.

The suction plant is made up of pipe conveyors equipped with large cleaning and inspection doors, and with a low-pressure fan to ensure the high efficiency of the plant, and with self-cleaning wool sleeves for dust recovery.

5.1.13 Thermal plant - Steam production

In order to heat the fat and molasses tanks and for use in the pelleting plant, steam is produced by a steam boiler of 1,000 kg/h. capacity at a working pressure of 10 atm.

In order to heat the molasses and fat plant, a steam heat-exchanger is provided so as to have hot water for the tank coils, in the interspace of the conveying pipes and in the tanks used.

5.1.14 Compressed air station

A centralized station for compressed air production is provided for all feed-mill services.

5.1.15 Electric plant

Electric plant is provided, according to present safety and accident regulations, with protected raceways and flexible pipes for connecting up to various services both for motive power and for lighting mill premises and outside yards.

This plant includes all duly sized cables and all power boards for the different production sections.

- Installed power is 795 kVA.
- Absorbed power is 596 kVA.

5.1.16 Maintenance needs

a) Workshop equipment

Machinery suitable for carrying out repairs and for overhauling worn equipment will be provided in proper premises.

b) Accessories and spare parts

Normal spare part kit will be provided for precautionary purposes.

5.2 PREFABRICATED FEED-MILL BUILDING

To the four steel silos having a storage capacity of 1,020 tons of cereals, the following prefabricated building are foreseen.

a) One shed for intake hopper protection (11 x 9 height 7.5÷5.0 mts):
   - covered area 99 sq.mts.
   - wall with piers in HE section
   - wall framework covering
   - covering of 3 inside walls consisting of 2 ribbed plates

b) One prefabricated metal shed for bins and machinery installation (16.5 x 16.5 mts plus ancillary premises 5.5 x 5.5 height 24.0 mts) :
   - total covered area 303 sq.mts
   - piers in duly sized sections complete with plates
   - floor
   - roof structure supported on portals
   - wall framework
   - access staircase
   - windows
   - wall covering from concrete floor to the top
   - roof covering
   - gutters

c) No. 2 sheds for raw material and finished products storage (16.5 x 62.0 height 6.0 mts and 16.5 x 2.5 height 6.0 mts) :

- total covered area 1,065 mts
- piers in HE beam
- wall framework
- shed-covering framework
- wall covering from the floor to the top
- gutters
- main doors and windows

5.3 FEED MILL EQUIPMENT

5.3.1 Silos

- Protection grate for intake hopper (3.5 x 4.0 mts)
- Chain conveyor and motorization (23.0 mts)
- Protection grate for intake hopper (2.0 x 3.0 mts)
- Panel breaker
- Chain conveyor and motorization (7.0 mts)
- Two-way valve
- Metal elevator with continuous column and motorization
- Electromagnetic device
- Grain separator for silos
- Low-pressure fan
- Cyclon
- Airlock valve
- Metal elevator with continuous column
- Chain conveyor and motorization (15.5 mts)
- Outlets
- Two-way valve
- Chain conveyor (18.4 mts)
- Outlets
- Chain conveyor (12.0 mts)

- Outlets
- No. 4 grain storage bins (total capacity 1,020 tons)
- Outlets
- Chain conveyor (18.5 mts)

5.3.2 Grinding

- No. 6 preground products storage bins
- No. 4 outlets
- No. 2 spiral double screw conveyors and motorization
- Hammer mills and motorization
- Dosing feeder
- Hopper
- Pneumatic unit
- High pressure fan
- Airlock valve
- Cyclon
- Conveyor line
- Multitubolar filter
- Continuous-column metal elevator
- Spiral screw conveyor and motorization
- No. 4 outlets
- No. 4 two-way valve

5.3.3 Metal-loading from warehouse

- Hopper
- Metal elevator with continuous-column
- Two-way valve
- Spiral screw conveyors
- Turbhead distributors

5.3.4 Dosing

- No. 14 product storage bins
- No. 14 spiral screw conveyors
- No. 6 product storage bins
- No. 6 spiral screw conveyors
- Automatic scale (1,000 kg each weight)
- Automatic scale (200 kg each weight)
- Horizontal mixer (capacity 1 ton batch)
- Two-way valves
- Horizontal mixer (capacity 0.5 ton batch)
- Metal continuous-column elevators
- Centrifugal classifyiers
- No. 2 spiral metal screw conveyors
- No. 6 outlets
- No. 5 two spiral valves

5.3.5 Liquid system

- No. 4 tanks complete with bearings and maximum level detectors
- No. 2 cyclidal volumetric rotary pumps
- No. 2 three-way ball valves
- No. 2 conveying pipes
- No. 2 two-way ball valves
- ducts

5.3.6 Pelleting plant

- No. 2 storage bins for pelleting products
- No. 2 double extracting screw conveyors
- No. 2 outlets
- A pelleting press

- Pellet cooler
- Low-pressure fan
- Cyclone
- Air-lock valve
- Continuous-column metal elevator
- Sifter
- No. 2 special chain conveyor for pellets
- No. 5 outlets
- No. 4 two-way valves
- Suction piping
- No. 4 product storage bins for bagging
- No. 4 product storage bins for bulk loading
- No. 8 outlets
- Automatic-weighing bagging unit
- Automatic bag-hanger
- Automatic sewing machine
- General suction system
- Metal suction piping
- Compressed-air system
- Lubrificators

5.3.7 Material for electric system

- Mimic board for main control
- Desk board
- Power boards and electric cubicles
- Material for electric motive-power system
- Material for lighting system
- Material for medium tension cabin, 20 KV-H $_{2.50}$
- 1,000 KVA power transformer
- Material for H.T. and L.T. connection 1,000 KVA transformer
- L.T. distribution boards
- General power factor correction system

- Material for connecting lines
- Material for protecting systems against atmospheric and electrostatic discharge and earthing system

5.3.8 Steam system material

- Enbloc boiler (1,000 kg/h; pressure 10 atm.)
- Tank for water feeding (1,000 lt capacity)
- Manifold
- Pressure reducing valve
- Steel pipe
- No. 2 tanks for fuel oil storage
- Fuel oil duct system

5.3.9 Raw material dosing automation by means of micro-computerized system

6. GENERAL SERVICES

6.1 OFFICE BUILDING AND MANAGER HOUSING (see drawing Annex 6/17)

6.1.1 Prefabricated building

A 120 sq.mts prefabricated building (10 x 12 mts) is foreseen

6.1.2 Office furniture and equipment

Standard office equipment including : furniture, filing cabinet, typewriters, computers, telephone, telex.

6.2 WORKSHOP BUILDING (see drawing Annex 6/18)

6.2.1 Prefabricated building

A 268 sq.mts prefabricated building (24 x 12 x 2.7 mts) is foreseen.

6.2.2 Workshop equipment

Standard workshop equipment for maintenance and repairs of the poultry farm equipment and vehicles.

6.3 CARCASS INCINERATORS (see drawing Annex 6/19)

No. 3 carcass incinerators are foreseen each with an output of 60-80 kgs/h.

6.4 HIGH PRESSURE AND HOT WATER HYDROCLEANERS

No. 3 high pressure and hot water hydrocleaners are foreseen with three plunger pumps three-phase 220/380 V, and automatic nozzle with piping. Each one having a water consumption of 15 lts/min and pressure at 100 atm.

6.5 FUEL DISTRIBUTION POINT

A distribution point is foreseen for gasoil and fuel for the poultry farm vehicles :

- no. 2 tanks
- no. 2 fuel distribution pumps

6.6 FURNITURE FOR GENERAL MANAGER AND STAFF ACCOMODATION

A standard furniture supply is foreseen for each house for married couple with children.

6.7 WEIGHING POINT

A weighing point is foreseen (mainly for feedmill incoming-out - going) capacity 15 T.

7. INFRASTRUCTURES AND EXTERNAL WORKS PLANNED

7.1 GENERAL

Although reassuring information has been collected from the competent Ministries and Public Offices regarding the improvement and completion of the infrastructures, it has been thought advisable at this stage of the previsions - and so as not to condition the settin up of the poultry farm by external factors - to foresee what is necessary to make the farm self - sufficient, in particular, with regard to water and electricity supplies.

7.2 WATER COLLECTION SYSTEM AND DISTRIBUTION EQUIPMENT (see drawing Annex 6/16)

The available data lead to the belief that the requirement needed will be amply ensured with the sinking of two wells sited 100 to 200 m apart and going down to a depth of about 100-130 m each. These wells will be equiped with submerged electrically-driven pumps, which will deliver the water into a concrete tank having an available capacity of about 1,000 m^3. The water will be distributed by a 2,550 m supply network in 50-100-mm diameter underground pipes in steel or PVC, and will be kept under pressure by a system of pumps and pressure tanks.

7.3 ELECTRICITY SUPPLY AND ELECTRIC DISTRIBUTION SYSTEM

While awaiting for the farm to be connected up to the public grid, provision has been made for the installation of diesel electricity generating sets matched to the requirements of the various sectors, with possibilities of interchange, for an overall power of about 3,375 KVA. The following stand-by generators are foreseen :

- n. 1 174 KVA for layer farm
- n. 1 250 KVA for broiler farm

- n. 1 250 KVA for parent-stock installations
- n. 1 500 KVA for processing plant
- n. 1 200 KVA for hatchery plant
- n. 1 1,000 KVA for feed mill
- n. 1 1,000 KVA for air conditioning processing plant
- electric distribution system : mts 2,550 (V 230-400; quadripolar, pole-mounted).

When the connecting up to the main grid has been completed, these generating sets will be used as stand-by plant. In fact, the various utilizations foreseen do not allow interruptions to the service.

The electricity will be distributed at a voltage of 230 and 400 V with four-pole lines on wooden poles and the lines will have an overall length of 2,550 m.

7.4 ROAD SYSTEM

As to the road system, the previsions have been limited to one main longitudinal road about 2,600 m long from which the service roads to the various sectors branch. The width of the carriageway will vary between 5 and 6 m, according to the importance. The overall area of the roads and aprons will be about 47,500 m^2.

7.5 SEWAGE SYSTEM

The liquid discharges will consist of washing water and the outflows from the staff facilities. A waste water treatment plant of prefabricated type is provided at the slaughter house. This plant will be connected up also to the sewage conduits coming from the other sectors, which will have an overall length of about 1,500 m.

7.6 FENCING

Each sector will be fenced with 2-m high wire-netting supported on metal stakes. The aim of the fences is to prevent both for safety and health reasons the entry of persons and animals unconnected with the farm activities. The overall length of the fence will be about 4,200 m.

8. CONSIDERATION ON CIVIL WORKS IMPLEMENTATION

The process carried out in the Poultry Farm, if it is to be successful, calls for equipment and prefabricated items with high technological content, thus covered by patents and coming from abroad, which are described in Chapter 2 of this Annex.

Care has been taken, moreover, to adapt all those provisions of works not covered by the previous category to the availability of materials and to the entrepreneurial capacity of the country.

As to the bird raising and processing sheds, the works concern essentially the foundations, the outside walls and the system of conduits contained therein, as illustrated in the attached drawings. Depending on the cases, the foundations will be of plinth type or in reinforced concrete strip.

The floor slabs will be in reinforced concrete, with iron mesh where stresses are greatest, on hardcore of rolled gravel or laterite.

The conduits, according to the shape and dimensions, will be in reinforced concrete or prestressed concrete or in PVC.

The buildings to be allocated for accommodation will be single-storey and in line with the types used in the country. The walls are planned to be in hollow concrete blocks with plaster covering. The roofs will have wooden rafters and the covering will be of corrugated metal or asbestos sheets. The false ceiling will be in flat asbestos sheets. The doors and windows will be in painted wood. The floors of the living premises will be in concrete while the bathroom and kitchen will be in ceramic tiles, similar to the linings. Wall-mounted air conditioners are planned in some of the premises.

The sheds for the generating sets, vehicles, etc. will be of metal structure, covered with corrugated metal sheets, with foundations and other works on the ground in concrete.

Local equipment and enterprises will, obviously, be used also for the clearing and levelling operations over a total area of about 231,000 m^2.

ANNEX 6

UNIDO
UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

FEDERAL REPUBLIC OF NIGERIA
RIVERS STATE

13233
(8 of 8)

INTEGRATED FOOD INDUSTRIES COMPLEX

UNIDO PROJECT: US/NIR/80/069

DRAWINGS OF CIVIL WORKS, PREFABRICATED BUILDINGS AND INSTALLED EQUIPMENTS OF THE SELECTED AGRO-INDUSTRIAL PLANT

December 1983

IFAGRARIA s.p.a.
ROMA

SOME FIGURES
OF THIS DOCUMENT
ARE TOO LARGE
FOR MICROFICHING
AND WILL NOT
BE PHOTOGRAPHED.

4.04.02