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A BRIEF STUDY OF THE USE AND PRODUCTION OF THE ADDITIONAL SYNTHETIC AND SEMI-SYNTHETIC CATTLE FEED

FOR THE

REPUBLIC OF MADAGASCAR

id.68-1358

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REPUBLIC OF MADAGASCAR

A brief Study on the Use and Production of the additional Synthetic and semi-synthetic Cattle Feed.

I. GENERAL

The Government of Madagascar has embarked on an ambitious programme of so-called "big operation" among them a great importance is attached to the increased output of livestock products. Outlined targets expect a value added by livestock to grow at a rate of 4.5 percent a year over the next several years.

Taking into account about 10 million cattle population in Madagascar and other climatic and pasturage conditions there, it is recommendable to use urea not only as a fertiliser, but directly for the increase of the output of livestock products. This could be achieved by means of the application of complex synthetic cattle feed. The underlaying principle of this method is the ability of ruminants to synthesise by their rumen microflora the non-proteinous nitrogen based compounds, i.e. primarily urea, into a biologically valuable protein.

The main source of energy is cellulose of the ballast material which serves, at the same time, the purpose of mechanical satiety.

The available energy is provided by molasses, or raw sugar enriched by a certain quantity of urea and other materials.

The proposed breeding method showed encouraging practical results in several countries.

II. ADVANTAGES OF THE COMPLEX SYNTHETIC AND SEMISYNTHETIC CATTLE FEED.

A characteristic feature of the climate in Madagascar is shorter or longer dry periods having a substantial influence on the cattle breeding. During the dry season, cattle lose weight and sometimes even perish. In the course of the rainy season, the meager cattle must first put on the lost weight and only after that get a weight

increase. The application of the synthetic feed combined with the utilization of until recent time, almost wasted ballast feed raw materials, may help to overbridge the bad effects of the dry season and provide the balanced cattle feed all year round. Even the overall time of cattle fattening is shorter.

The mineral and vitaminous value of the fodder from Madagascar pasture is very low. This fodder is deficient in phosphorus, potassium and calcium. The synthetic feed, on the contrary, contains the aforementioned substances in sufficient quantities, contributing thus in an important way to the improvement of cattle health condition.

The considered ballast component materials for making the complex synthetic feed show a sensible price advantage in Madagascar because they have handly been used for cattle feeding before.

The use of the complex synthetic cattle feed would enable to increase milk production in Madagascar, which is presently deficient (milk products are imported for the value of FMG 800 million annually, equalling to about 20 million litres of milk). The substance fodder presently used as a fattening fodder, could in such a case be shifted to the stepped-up milk production instead. The complex synthetic cattle feed, contrary to the present pasturage system, enables to concentrate the cattle into feeding centres, which will contribute to the improvement of the breed, to the rationalisation of work and will bring better results.

III. DEMONSTRATION PLANT FOR THE PRODUCTION OF SYNTHETIC CATTLE FEED

It is recommended to conceive the Demonstration Plant in two stages:

(a) Demonstration Plant for the production of additional synthetic cattle feed;

(b) Moderate expansion of the plant, to be able to produce additional semi-synthetic cattle feed.

The first stage Demonstration Plant will have the capacity of 10,000 tons of additional synthetic cattle feed per year, in one shift, at 250 stream days, i.e. 5 tons/hour. This capacity is a minimum one,

also from the point of view of the size of the equipment.

The second stage Demonstration Plant will have the similar capacity of additional semi-synthetic cattle feed, the production of which will be secured by a second shift.

The Demonstration Plant should be located somewhere in the centre of the synthetic feed consumption market, having convenient connexion to the raw materials and utilities supply.

(1) Description of the Demonstration Plant

The first stage Demonstration Plant will consist of the following units:

(a) Mixing unit;
(b) Storage facilities for raw materials and final products;
(c) Laboratory;
(d) Physiological Stable;
(e) Administrative building including the bridge weighing machine.

Raw materials for production are the following:

(a) Carbohydrate components: maize, barley, broken rice, molassis, raw sugar, sirok-grain, millets, cassava, meal, arrowroots, potato flour etc.

(b) Protein components: Shred of oilcake, peanuts, sunflower, palmkernel etc.

(c) Nitrogenous synthetic Components: urea

(d) Mineral Trace Components: Calcium as microground limestone or chalk;
Phosphorus as finely ground bone meal;
Sodium as feed salt;
Iron as $FeSO_4 \times 7\ H_2O$;
Copper as $CuSO_4 \times 5\ H_2O$;
Manganese as $MnCO_3$
Zinc as ZnO;
Cobalt as $CoSO_4 \times 7H_2O$;
Jodine as KJ etc.

(e) Biological factors: Vitamins A and D_3, chlorine tetracycline etc.

The recommended recipes are shown in the Annex 1 to this Study. The ultimate selection of raw materials for production of additional synthetic feed will depend on their availability in Madagascar and will be contained in the Report, resulting from the preparatory mission's study.

(2) Process Description:

The batch system for the production of additional synthetic cattle feed is recommended. Incoming raw materials are stored in a groundfloor storage, either in bags or in silos. The handling of stored raw materials will be carried out by means of forklift trucks. The raw materials used for the production of synthetic feed are fed into the intake hopper (2). Due to the fact that it is not possible to add the trace components and the biological factors (see recipes) directly to the prepared mixture, they are mixed separately as a pre-mixture in the mixer (3). The mixed principle components of synthetic cattle feed are filled in sacks whereas the pre-mixture is conveyed directly into the dosing bins. For the transport of the raw materials into the dosing bins a bucket elevator (4) with remote controlled circular distributor (5) is used. For the dosing process there are six dosing bins, the capacity of which correspond to the mimimum output per day, and to the percentage of components used in the produced mixutre. The bins of the dosing step are provided in the outlet with a worm conveyor (6) leading into a dosing weighing machine (7). The dosing weighing machine, in line with the programme, controls the perfomance of each worm conveyor either automatically or semi-automatically. The dosed batches are then discharged ti into a buffer bin (8) from where they are fed by weight into two hammer mills (9). The ground mixture is subsequently conveyed pneumatically (10) into a subsequent buffer bin (11) located near the mixer (12). The mixed batches are discharged into a bin located under the mixer, from where the mixture is brought by a feeder (13) to a continuously working molasses mixer (14). The molasses is stored in a tank (15). The so produced mixture is lifted pneumatically into two storage bins, the capacity of which has to be determined according to the volume of sales. It is possible to supply the mixtures either in bags or in bulk. The weighing machine (17) of the bagging

unit (18) can be used also for weighing of the mixtures to be supplied in bulk. The mixtures are then stored in the same way as the raw materials.

The process flowsheet of the production of additional synthetic cattle feed is shown in Annex 2.

(3) Description of the Workshops

(a) Mixing Unit

The mixing room is a two-floor steel structure building. The hammer mills and the tank for molasses are situated under ground whilst the other equipments are in the groundfloor and the first floor. The dosing and storage bins are located in the first floor. An integral part of the mixing unit is the control room.

(b) Laboratory

The laboratory is attached to the mixing unit. Except for laboratory tests it prepares mainly the mixtures of trace components and biological factors.

(c) Storage facilities for raw materials and final products

The storage facilities are common for raw materials and final products. It is a simple light steel structure groundfloor building. Principally it should be proposed for 3 months storing of raw materials and final products.

(d) Physiological Stable

To check the biological quality of the product a physiological stable (5 cattle)) has to be installed close to the plant. The stabling has to be done under conditions similar to those encountered in the farms.

(e) Administrative building including the bridge weighing machine

The building is located at the entrance of the plant. The weighing machine has a weighing capacity of 5 tons. The administrative building is a groundfloor structure.

IV STAFFING OF THE DEMONSTRATION PLANT

(one shift operation)

Plant Manager (1)	Office (2)			3
Maintenance and Safety (1)	Production (1)	Laboratory (3)	Commercial (4)	9
Workshop (1)	Operators (2)	Physiological stable (1)		4
	Storing (2)			2
				18
			Daily Labour	22
			Total Staffing	40

V. Second Stage Expansion of the Demonstration Plant for Production of additional semi-synthetic feed.

If the additional semi-synthetic cattle feed produced in the second stage (see Annex 4 - Recipes for production of synthetic and semi-synthetic cattle feed) of the Demonstration Plant development, the process equipment has to be completed and new storage capacities built. Five dosing bins, according to the number of mixing components used, and a granulation line (19) has to be added. The granulation line would consist of a granulation press, cooling column, classifier etc. (See Annex 2 - part marked as second stage).

The existing storage bins from the First Stage Development are to be completed by another bin for granulated mixture. For moving of granulate from the outlet of the granulation line, a bucket elevator has to be added. The area of the storeroom for finished products has to be doubled.

Capital Costs

Plant Capacity 10,000 tons/year of additional synthetic cattle feed in 250 stream days, i.e. 5 tons/hour, in a single shift operation.

Kind of Costs	Foreign Currency US $	Local Currency US $	In Total US $
1. Land Improvement (1 ha of flat land without obstructions above and below surface)		2,000	2,000
2. Fencing, roads, sewers		6,000	6,000
3. Foundations, Buildings and Storages		40,000	40,000
4. Engineering and Equipment	160,000		160,000
5. Freight and insurance	20,000		20,000
6. Construction and erection		17,000	17,000
7. Utilities supply and distribution system		15,000	15,000
8. Spare parts	10,000		10,000
9. Safety, laboratory and Office equipment	15,000		15,000
Report	205,000	80,000	265,000

	Kind of Costs	Foreign Currency US $	Local Currency US $	In Total US $
	r port	205,000	80,000	285,000
10.	Moving Handling and Maint nance equipment	10,000		10,000
11.	Consulting Services	6,000		6,000
12.	Expatriated Experts	216,000		216,000
13.	Fellowships	10,000	8,000	18,000
14.	Personnel		95,000	95,000
15.	Oth r miscellaneous	10,000	115,300	125,300
	Total Fixed Capital Cost	457,000	298,300	755,300

Note: (1) Second stage expansion would require about US$ 70,000 additional fixed capital cost.
(2) In the abovementioned estimated costs, the local salaries for 1 year plant operation are capitalised.

VI. Economic Features

The main factor influencing the production cost of synthetic and semi-synthetic additional cattle feed are the prices of raw materials available in Madagascar. However, it is necessary to establish the composition of the most convenient ballast material obtainable in Madagascar with its pertaining price. This would be the objective of a preparatory mission of consultants which is envisaged as a part of the estimated investment cost. Nonetheless, it is reported from the experience of countries using these cattle feeding practices, that the pay-out time of capital cost invested in a Demonstration Plant working at one shift is about 4 years. This figure could be brought down if the second shift is introduced, and the production programme complemented as recommended for the second stage of Demonstration Plant Project Development.

Application of the additional synthetic and semi-synthetic feed in cattle breeding

The use of synthetic and semi-synthetic feeding practices is to be developed gradually, and should be preceded by intensive extension work among the cattle breeding establishments and farmers. When introducing this method, it is essential to respect the natural and economic conditions prevailing in the respective country. Principally, three fundamental methods could be considered:

(a) When farms located in places where at least for a certain period of the year, a suitable protein-rich pasture is at disposal:

Rainy season : grazing on grass pasture as then in the shortest way.

Dry period : feeding with reduced out-door stay and using synthetic or semi-synthetic feed.

(b) In case of farms where during the whole year the cattle is bred on pastures of low quality:

Use of complete semi-synthetic mixtures in form of granules, supplied to troughs directly on the pasture ground.

(c) In case of farms where the pasture is deficient or is not possible (concentration of cattle population around cities etc.):

Application of synthetic diet as such or with addition of a carbohydrate green fodder and semi-synthetic feed.

Cattle feed and its dosing in Annex 5 and 6 mention the feed doses for application of:

(a) synthetic feed;

(b) synthetic feed in combination with green carbohydrate fodder;

(c) semi-synthetic feed.

The doses have to be adjusted according to the specific farming conditions, race of cattle, and ballast material existing in Madagascar. As ballast material applied simultaneously for the mechanical satiety of the cattle, the following is recommended to use:

Maize straw
sugar or grain sorck straw
sudani n gr ss
mill t straw
beans straw
barley straw
cotton linters
grain chaff
rice hulls

In case the bove mentioned ballast material has not a suitable quality, it may b ground to shred.

It is known from Spain and United States of America that "bagasse", a residual from sugar cane processing is a very appreciated ingredient used as ballast material.

VII. The routine and technology of feeding

(a) Application of synthetic cattle feed

This feeding supplement is distributed as powder.

The bred cattle is kept in hedges or in hedges with sheds or in open stables. The necessary dose of molasses is diluted with water at a rate of 1:1. In this solution one half of the synthetic feed dose is dissolved. The obtained solution is used for the damping of the ballast feed material. This to give a better taste to the fodder, and, at the same time, to soften its hard edges. The remaining half of the solution is filled into the troughs for licking.

(b) Application of the synthetic cattle feed in combination with feeding green carbohydrates:

The feeding routine is the same as mentioned above, but nevertheless it is recommended to put into the troughs the green fodder after the ballast fodder had been consumed. The combination with green fodder makes economy of used molasses and improves the intake of urea. Sugar contained in carbohydrate fodder gets free more slowly than the sugar contained in molasses. Consequently, when using the green fodder as well, the cattle puts on additional 0,2 - 0,3 kg per head per day.

As green fodder, the green parts of maize corn, millets etc. could be used advantageously.

(c) Application of semi-synthetic cattle feed

In this case ballast material is mixed and improved by a solution of molasses. At the end of the feeding time granules of semi-synthetic feed are added. This all has to be put into spacious troughs.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The agricultural sector is counting for 35 percent of the overall value added to GDP in Madagascar. About one fifth of this value added is contributed by the output of livestock products. That is why the Government of Madagascar attaches great importance to the development of livestock production, which should increase by 4.5 percent a year over the next several years. Consequently, the following conclusions and recommendations are given:

(1) To use the existing, well performing regional and central organisation of the agricultural sector for promotion of synthetic cattle feeding practices, especially within the big cattle breeding farms envisaged as one of the targets of so called "big agricultural operations".

(2) To establish a Demonstration Plant for the production of additional urea based synthetic cattle feed, in the first stage, and semi-synthetic cattle feed in the second stage. The production capacity of such a plant is conceived at 10,000 tons/year of additional synthetic cattle feed, at 250 stream days/year, in one shift operation, i.e. about 5 tons/day in the first stage.

The setting-up of Demonstration Plant and the subsequent application of the additional synthetic cattle feed would assure:

a) A supplementary proteinous diet to about 33,000 cattle population, at a consumption of 0.8 kg per head/day, if a minimum increase of weight of 0.60 kg per head/day is considered;

b) The improvement of the mineral and vitamineous value of the fodder resulting in a better health condition of the cattle;

c) The use of cheap and mostly wasted ballast material for cattle feeding;

d) The expansion of feeding basis, regular increase of weight

of fed cattle, decreasing, at the same time, the number of perished cattle from undernourishment;

e) The economy of substantial fodder, contributing thus indirectly to the higher production of milk.

(3) The project will help to introduce urea in the Madagascar's agriculture not only as a fertiliser, but also as an important cattle feed element. The required quantity of about 3,500 tons/year of urea had to be imported for the operation of the envisaged Demonstration Plant in Madagascar, until a proposed urea plant is established at a later date in Madagascar. As a matter of fact, the use of urea for feeding purposes would provide an additional market for surplus urea produced in Madagascar.

(4) The multiplying effect of the proposed Demonstration Plant should involve:

a) The subsequent, second stage production of additional semi-synthetic cattle feed;

b) The stimulation of the setting-up of further larger scale plants in Madagascar and in the East African Sub-region;

c) The development of better cattle breeding practices including the pertaining facilities in Madagascar and other East African countries.

(5) The overall investment costs of the first stage Demonstration Plant Project are estimated to be US$ 755,300 out of which US$ 457,000 is a foreign component.

This foreign component of the cost includes the exploratory mission, 5 expatriated experts proposed to spend altogether 9 man-year in Madagascar, 4 fellowships for 2 man-years, imported laboratory, workshop and office equipment and travel expenses of the experts and fellows outside the country. The main item of the foreign component of the cost is the setting-up of the Demonstration Plant to be sub-contracted on turn key basis.

(6) The proposed Government Counterpart Contribution in the amount of US$ 298,300, local currency, would include the local component of the overall cost, namely the local salaries of fellows to be trained abroad, local professional and other salaries during the start-up operation of the Demonstration Plant and its further operation for about 9 months; foundations, buildings and other local civil engineering and erection works, office supplies, transportation and domestic travel as well as Government's assistance for housing of experts. Also included is the contribution of the government towards the local operating costs of the project.

(7) The production cost and profitability of the Demonstration Plant are largely dependable on the cost of raw materials available in Madagascar to be applied with additional synthetic cattle feed to make a complete synthetic cattle diet. These economic features should be established as a result of the three preparatory consultants' mission recommended within the frame of this Project. Nevertheless, based on experience from countries already using these feeding practices, the pay-out time of the fixed investment plant cost is believed to be 4 years.

(8) If the Government of Madagascar attaches a big priority to this Project, it may request the assistance of UNDP - Special Fund in the introduction of a synthetic cattle feed application practice and the setting-up of the Demonstration Plant in Madagascar. A tentative draft of such an official Request is enclosed to this Report as Annex 7.

ANNEX 1

RECIPE FOR ADDITIONAL SYNTHETIC CATTLE FEED

32 %	urea
5 %	microground limestone, chalk
15,25%	bon phosphates
2 %	feeding salt
45 %	grain shred
0,5 %	biological factors
0,25%	trace elements
100 %	

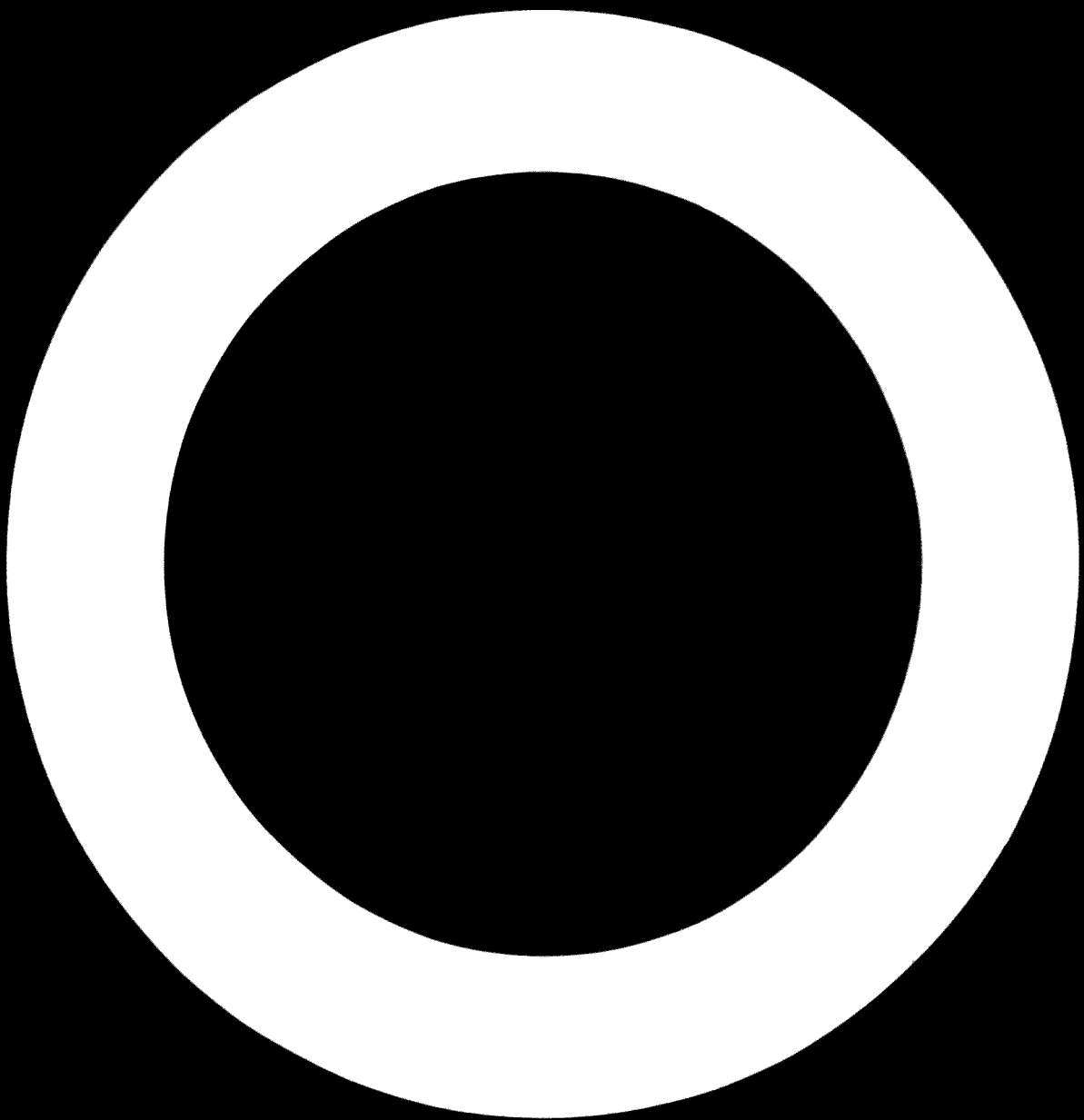
Note: 2-3% out of grain shred may be replaced by molasses.

Contents of specifically active biological factors in 1 kg

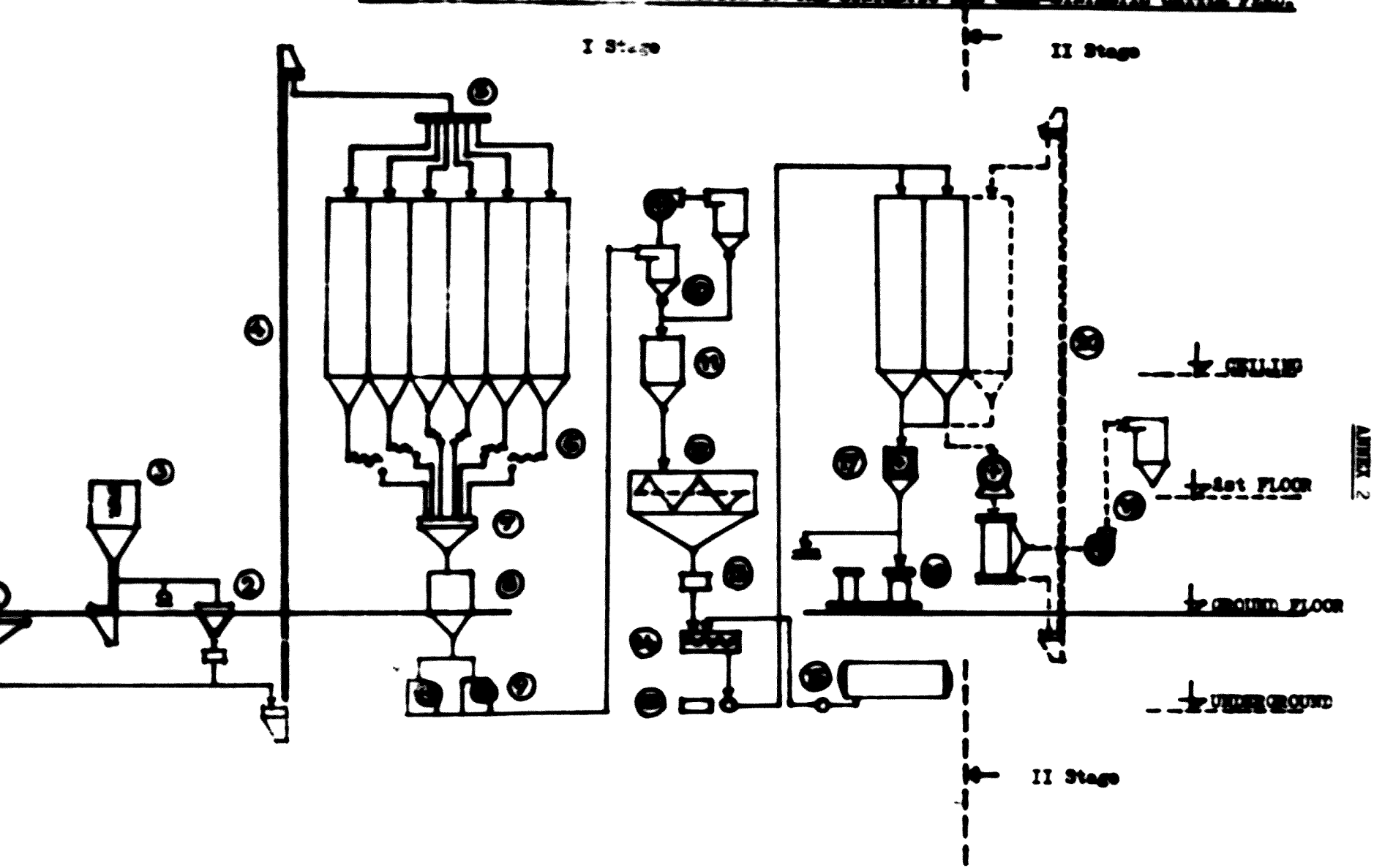
100 mg	chlortetracycline
30,000 units	vitamin A
5,000 units	vitamin D_3
10 mg	fungicidine
300 mg	butylhydroxytoluene, etc.

Contents of trace elements in 1 kg

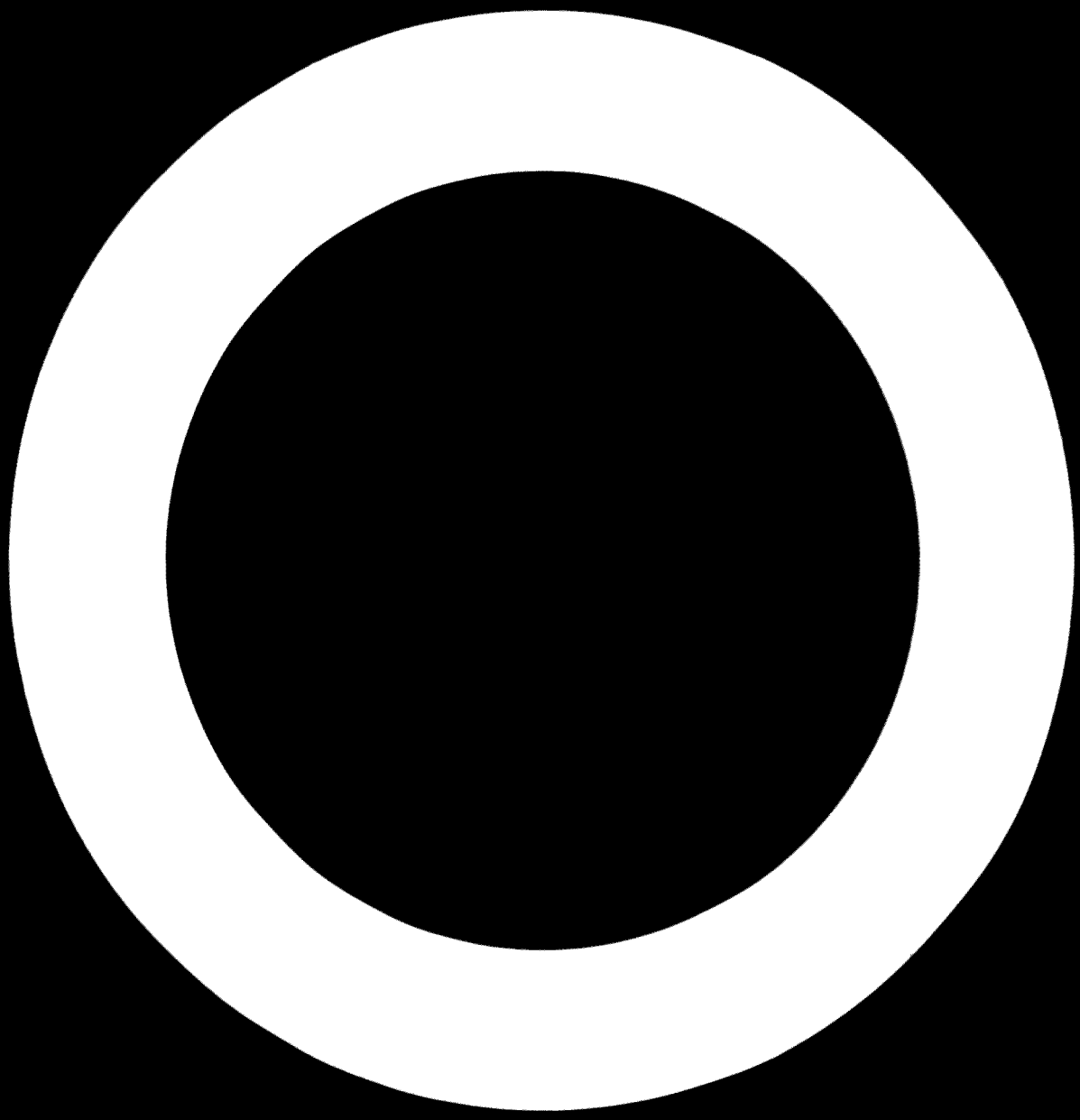
480 mg	$FeSO_4 \times 7H_2O$
160 mg	$CuSO_4 \times 5H_2O$
80 mg	$MnCO_3$
48 mg	ZnO
24 mg	$CoSO_4 \times 7H_2O$
8 mg	KJ



PROCESS FLOWSHEET OF THE PRODUCTION OF THE SYNTHETIC AND SEMI-SYNTHETIC CASTOR FEED.



ANNEX 2



ANNEX 2 (continued

TECHNICAL SPECIFICATIONS OF EQUIPMENT (See ANNEX 2 page 1)

I. STAGE

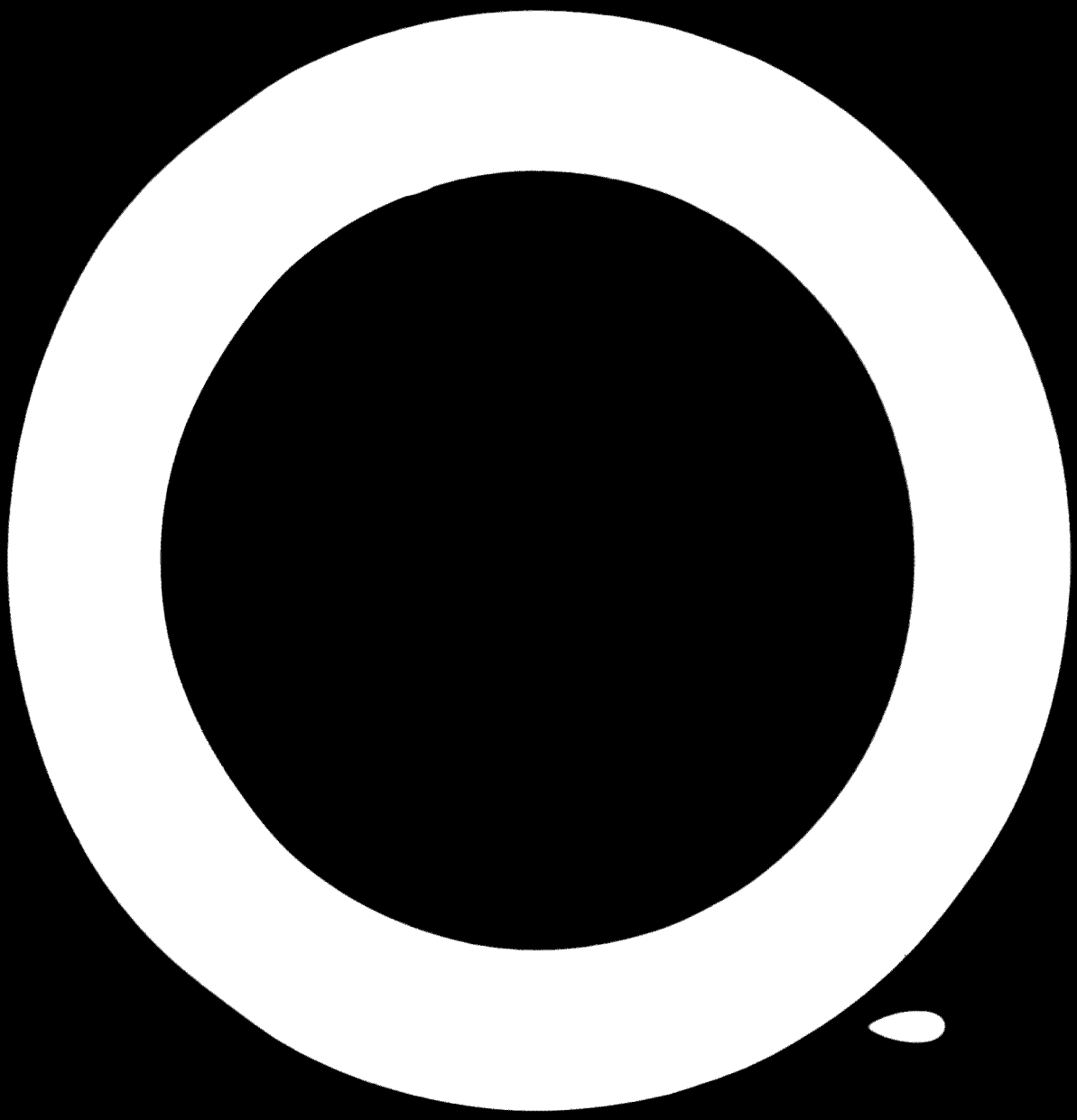
(1) Intake hopper (from covers)
(2) Intake hopper (from open cars)
(3) **Mixer** - 1m^3
(4) Bucket Elevator
(5) Circular Distributer
(6) Worm Conveyor
(7) Weighing Machine
(8) Buffer Bin - 4m^3
(9) Hammer Mills
(10) Suction line including the ventilator and cyclones.
(11) Buffer bin 4 m^3
(12) Mixer 2 tons
(13) Feeder
(14) Molasses mixer
(15) Molasses Tank including the pump
(16) Pressure pneumatic line (output 7 tons/hour)
(17) Weighing machine in the bagging unit
(18) Bagging Unit

II. STAGE

(19) Granulation Line (output 5 tons/hour)
(20) Bucket Elevator (output 5 - 10 tons/hour)

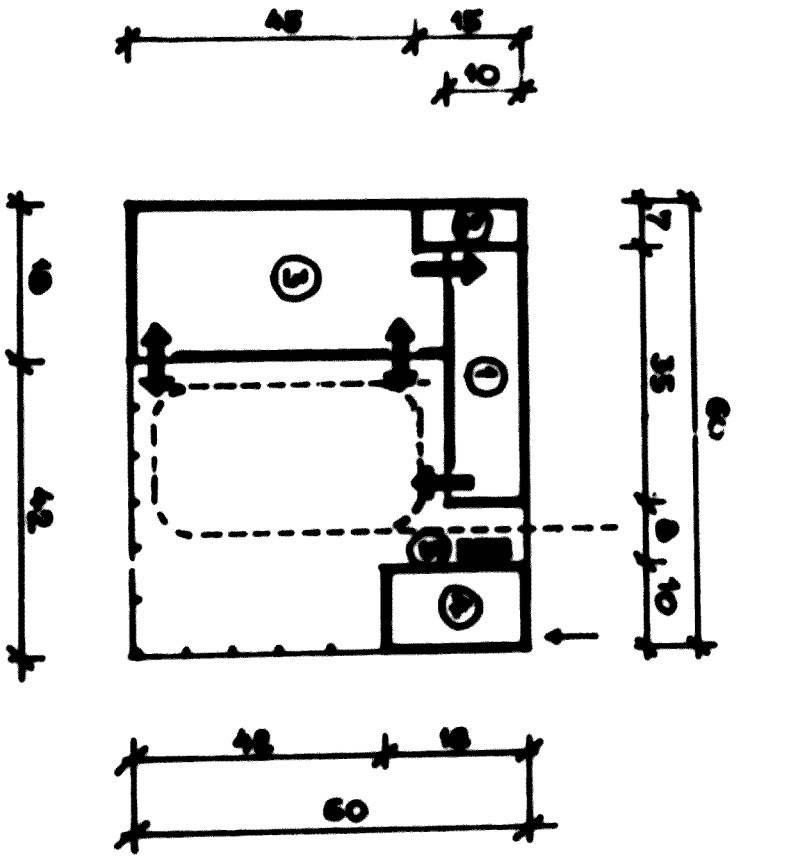
Note: In addition to the aforementioned equipment, 2 forklift trucks will be needed for raw materials and finished products handling and 1 bridge weighing machine (5 tons).

In the flowsheet are not shown the tower silos for storing of raw materials and final products.



ANNEX 3

LAY-OUT OF THE PRODUCTION OF THE SYNTHETIC AND SEMI-SYNTHETIC CATTLE FEED



MIXING PLANT

LABORATORY

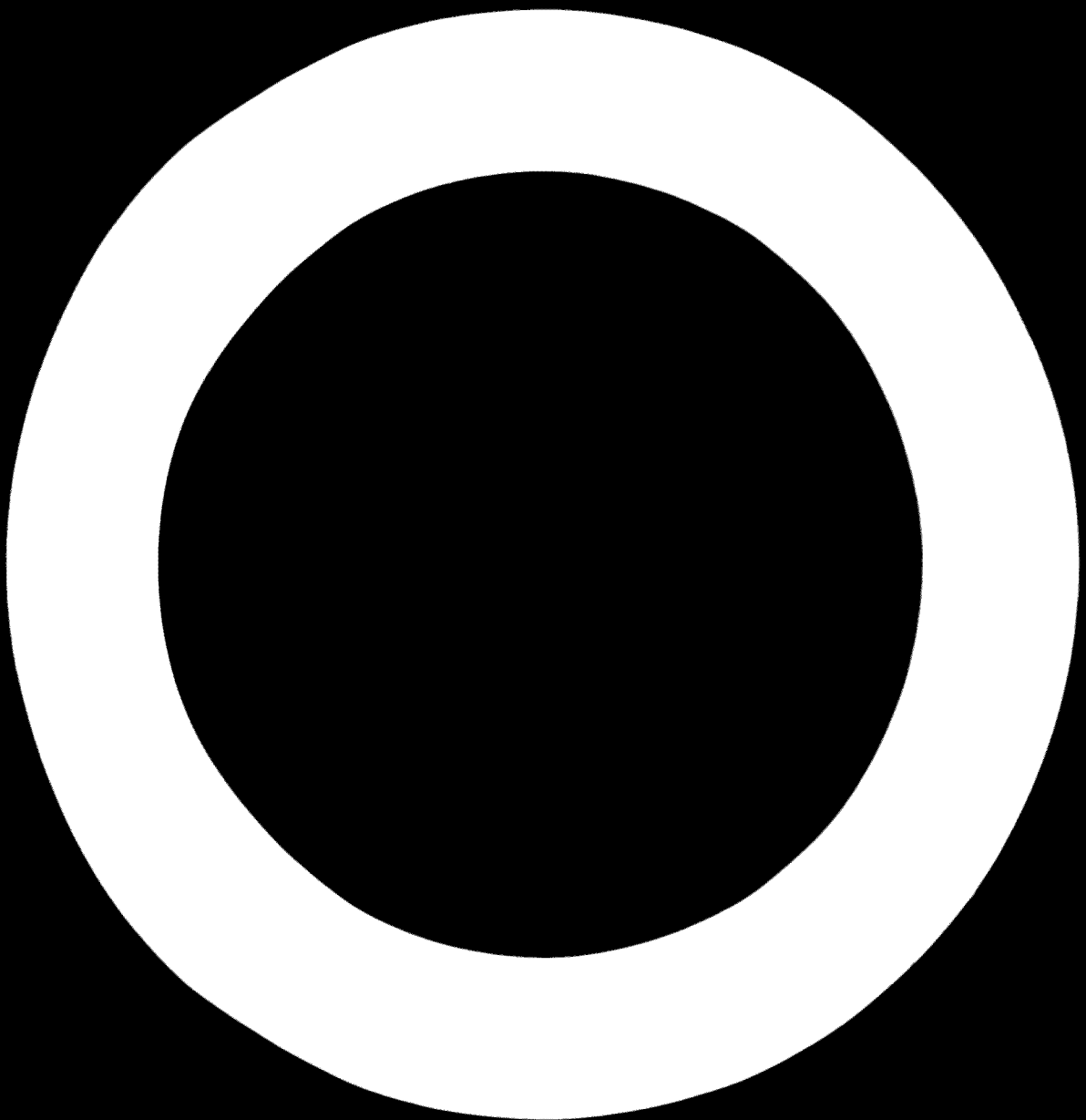
STORAGE FACILITIES

ADMINISTRATIVE BUILDING

SILOS MIXING MACHINE

PRODUCTION FLOW

TRANSPORT LINES

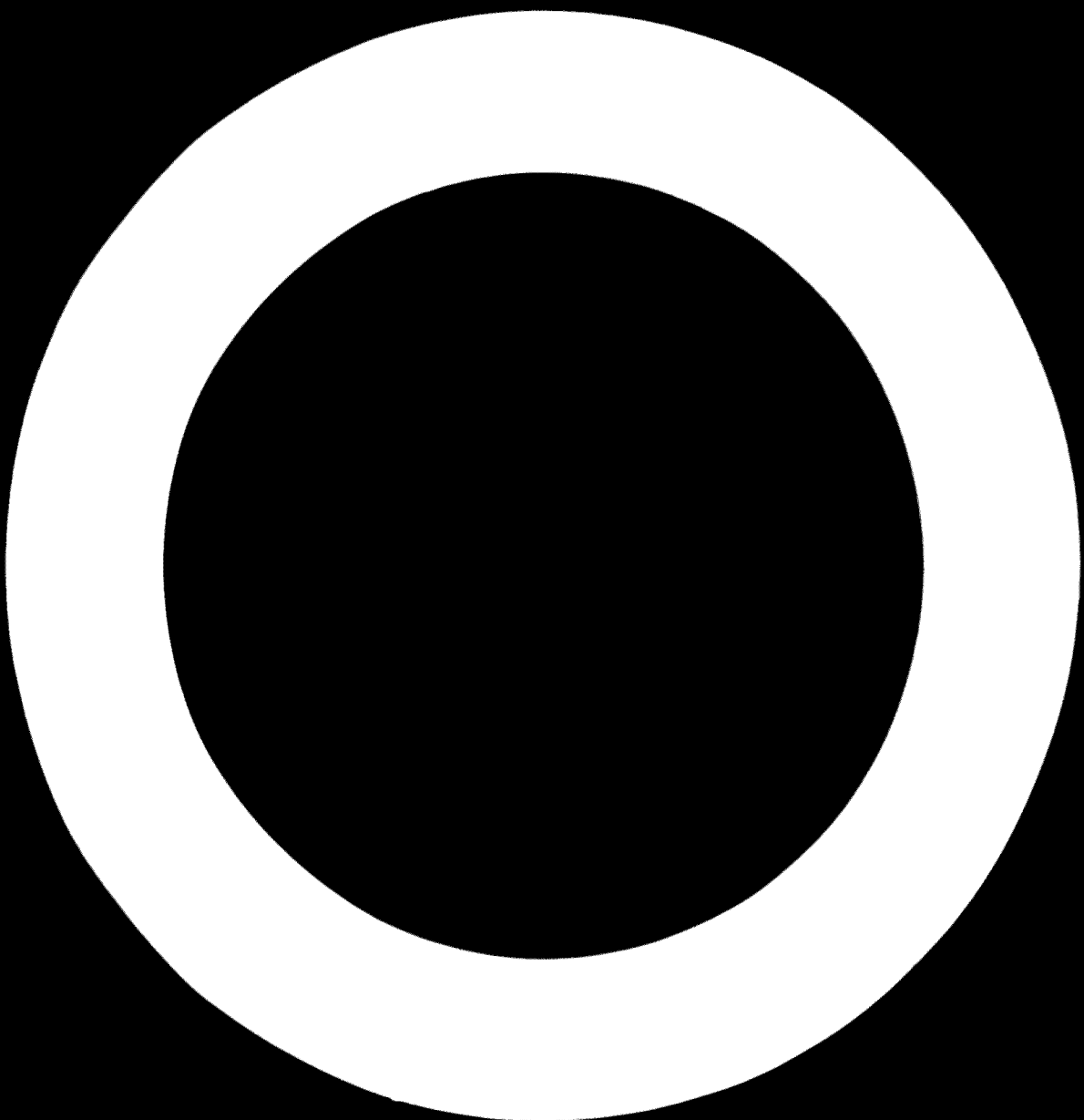


ANNEX 2

RECIPE OF THE COMPLETE SEMI-SYNTHETIC CATTLE FEED

12	%	shred of oilcake
78	%	grain shred (maize, barley, rice etc.)
4	%	molasses
2	%	feeding salt
3	%	urea
0,5	%	microground limestone (chalk)
0,45	%	bone phosphate
0,05	%	trace elements (as in ANNEX 1)
100	%	

Note: No biological factors are added.



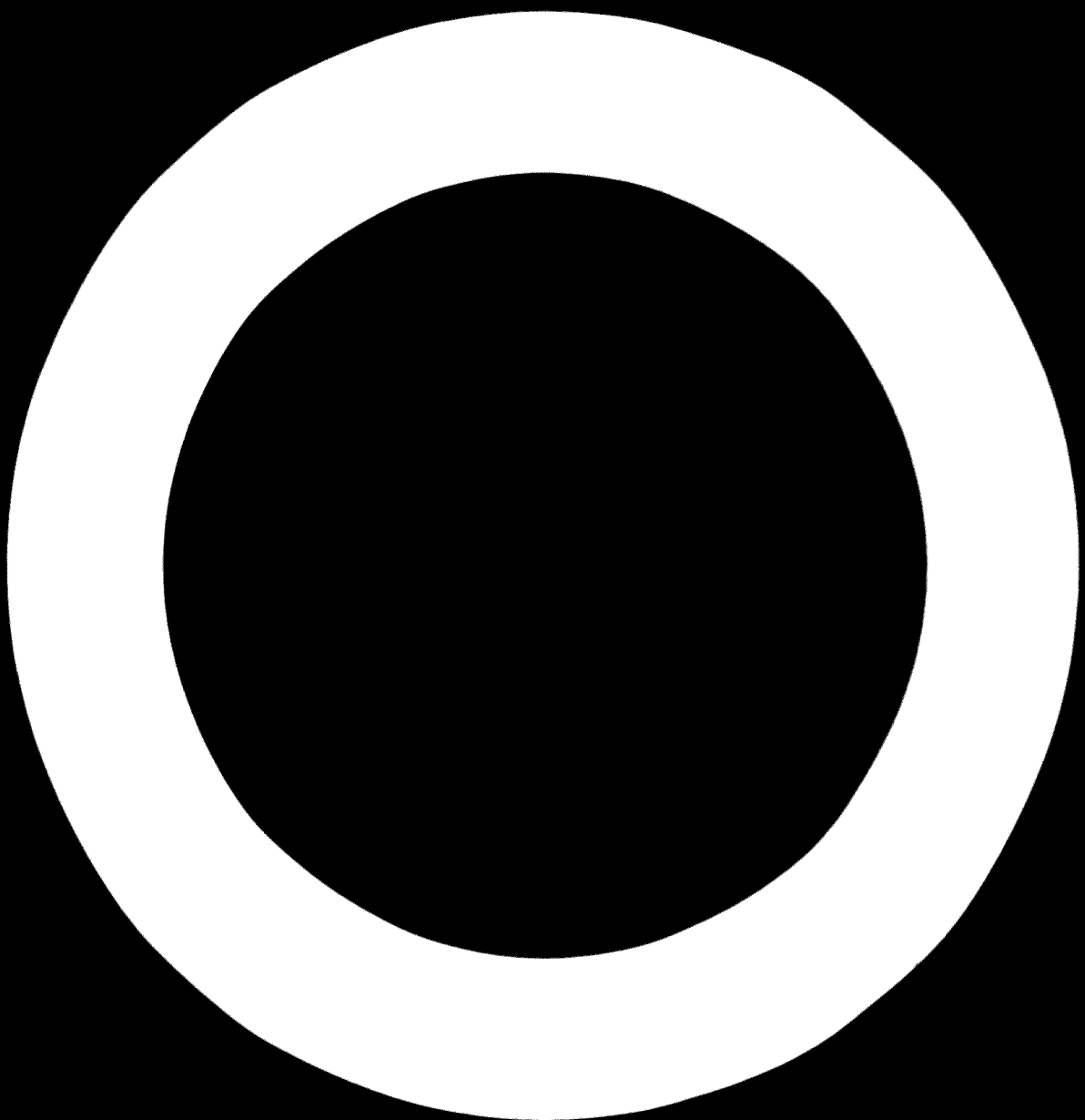
ANNEX 5

FEEDING DOSES OF THE SYNTHETIC AND SEMI-SYNTHETIC CATTLE FEED

Weight Category kg	Ballast Material kg	Molasses kg	Additional Synthetic Feed kg	Grains kg
151 - 200	4,5	1.8 -2.25	0.45	10 - 20 % from the daily dose of additional synthetic feed
201 - 250	5,0	2.0 - 2.50	0.50	
251 - 300	5.0	2.0 - 2.50	0.50	
301 - 350	7.0	2.80- 3.50	0.70	
351 - 400	8.0	3.20- 4.00	0.80	
401 - 450	8.5	3.40- 4.25	0.85	20 - 30 % from the daily dose of additional synthetic feed
451 - 500	9.0	3.60- 4.50	0.90	

Complete synthetic feed

Complete semi-synthetic feed



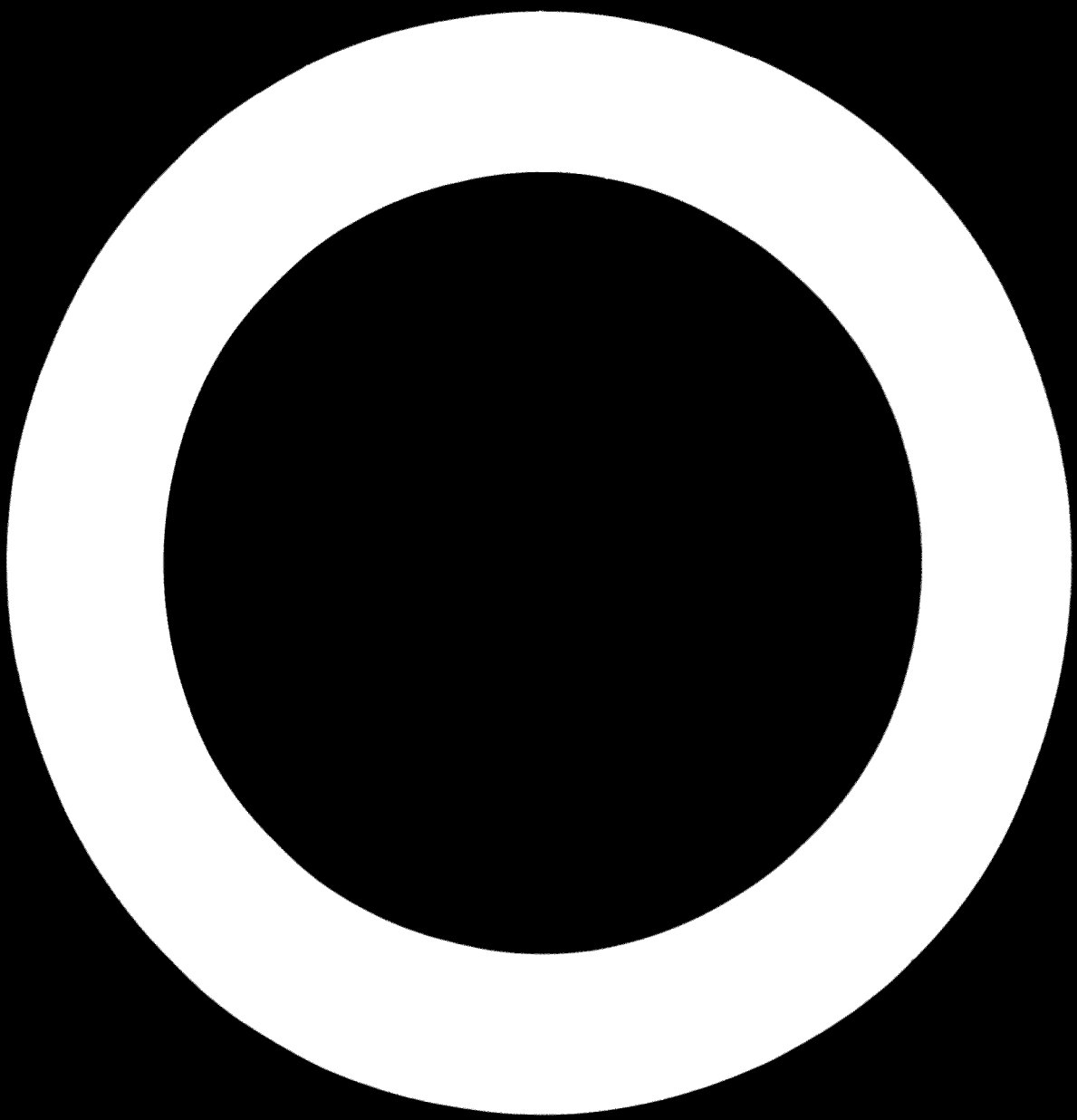
F[illegible]

COMBINED WITH F[illegible]DING ON GREEN C[illegible]R-

[illegible]TRATE PO[illegible]R.

Weight Category	Ballast Materials	Gr[illegible]	[illegible]	[illegible]
kg	kg	[illegible]	[illegible]	[illegible]
151 - 200	3.0	[illegible]5	2.25	0.[illegible]
201 - 250	3.5	20	2.25	0.40
251 - 300	4.5	25	[illegible].50	0.[illegible]
301 - 35[illegible]	5.0	35	3.00	0.5[illegible]
350 - 400	5.0	35	3.00	0.64
401 - 450	5.0	35	[illegible].00	0.[illegible]
[illegible]51 - 500	5.0	35	3.00	0.[illegible]2

Note: To improve the fluidity of the li[illegible] f[illegible] [illegible] the insects, it is recommended to add [illegible]ther [illegible] acid or ethanol.



ANNEX I

UNITED NATIONS DEVELOPMENT PROGRAMME

(Special Fund)

Official Request from the Government of Madagascar for assistance in Establishing a Demonstration Plant for the production of Synthetic Cattle Feed.

S U M M A R Y

Date Request Received:	
Proposed Duration:	3 years
Amount Requested from the UNDP (Special Fund) :	US $ 457,000
Proposed Government Counterpart Contribution:	US $ 258,000
Local Operating Costs:	US $ 40,300
Proposed Government Co-operating Agency:	Ministry of Agriculture

ANNEX 7 (continued)

I. BACKGROUND

1. The Government of Madagascar has embarked on an ambitious programme of so-called "big operations" among them the foremost place is assigned to the development of agriculture. This sector accounted for 35 percent of the gross Domestic Product in 1966 and is expected to grow to achieve 3 percent annual increase of the Value Added to G.D.P. in the five years from 1966-1971.

2. Subsistance crops, which make about half of the value added by this sector, are projected to increase by 4 - 5 percent. All this is dependent on continued successful efforts of the government to carry out launched programme to increase the output of paddy. The principal target is to step up paddy production by 400,000 tons at the 1971/72 harvest, i.e. about 30 percent increase over average production in recent years.

3. Madagascar has got about 10 million cattle population. The Government is striving for increased output of livestock products, which account for about 20 percent of value added by the agricultural sector and is considered at the same time, as a potential foreign exchange earner. Outlined targets of "big operations" are aimed at improvements of pasturage, cattle breeding and construction of government owned slaughter-houses. Value added by livestock production is expected to increase by 4.5 percent a year over the next several years.

4. The application of fertiliser is one of the most important impacts conducive to the development of the agricultural sector of economy. That is why the production of urea in Madagascar was recommended by UNIDO expert as soon as the market for urea will develop satisfactorily.

5. Taking into account the conditions in Madagascar, it is recommendable to use urea not only as a fertiliser, but also as an addition to cattle feed for the increased production of livestock products. This is achieved by means of application of synthetic complex feed. This is based on the fact that the ruminants are able to synthesise by their rumen microflora the non proteinous nitrogen based compounds, i.e. primarily urea, into a biological valuable protein. The main source of energy is cellulose of the ballast material, which serves at the same time for the purpose of mechanical satiety. The available energy is

ANNEX I (continued)

provided by molasses or raw sugar enriched by a certain quantity of urea and other materials.

6. A typical climatical characteristic prevailing in Khuzestan is shorter or longer dry periods having a substantial influence on the cattle breeding. The cattle loses weight and sometimes even perishes. In the course of the rainy season, the meager cattle must first put on weight and only then are able to achieve a weight increase. The application of the synthetic feed, combined with the utilization of raw material t .ilest feed, which till now is almost wasted, may help to overbridge the bad effects of the dry season and safeguard the balanced cattle feed all year round. Even the overall time of cattle fattening is shortened.

7. The mineral and vitaminous value of the fodder from Khuzestan natural pastures is very low. This fodder is deficient in phosphorus, potassium, and calcium. The synthetic feed, on the contrary, contains the aforementioned substances in sufficient quantities, contributing thus,in a very important way, to the improvement of cattle health condition.

The considered ballast feed material for making complex synthetic fodder, shows a sensible price advantage in Khuzestan, because it has hardly been used for cattle feeding before.

8. The use of complex synthetic cattle feed would enable to increase milk production in Khuzestan, which, at present, is deficient (milk products are imported for the value of FRF 800 million annually equalling to about 80 million litres of milk). The substance fodder could, in such a case, be shifted to the stepped up milk production instead. The complex synthetic cattle feed, contrary to the present pasturage system, enables to concentrate the cattle into feed centres which will contribute to the improvement in the breed, the rationalization of work, and finally, will bring better results.

9. To remedy the actual situation in cattle breeding and to attain the ambitious goals set forth in government's plans, the establishment of a Demonstration Plant for the production of additional synthetic feed mixtures is believed to be the best measure to take. A very elaborate, regional and central organization set up in Khuzestan to carry out all kinds of agricultural promotion and extension service, could,

ANNEX 7 (continued)

after minor additions, be used for introduction of new feeding practices. The government is therefore requesting the assistance of the Special Fund in setting up and operation of the aforementioned Demonstration Plant.

II. THE PROJECT

10. The purpose of the project, the duration of which is 3 years, is to set up a Demonstration Plant for the production of additional synthetic feed mixtures and to introduce the respective cattle feeding practices in Madagascar.

11. The Demonstration Plant would perform the following functions:

Production of additional synthetic cattle feed, about 10,000 t/year in one (first) shift operation, 250 stream days, using the following raw materials:
- 32 percent urea,
- 15 percent bone phosphates
- 2 percent feed salts
- 45 percent grain shred
- vitamins, trace elements etc.

The aforementioned production capacity would enable to apply 0.8 kg of additional synthetic feed per cattle head per day, providing thus this additional diet for 33,000 cattle population/year at an average weight increment of 0,6 kg per cattle head and day.

The Demonstration Plant would consist of the following units:

(a) Mixing plant, storage facilities for raw materials and final products;
(b) Laboratory, physiological stable (5 pieces) for testing and demonstration purposes, administration building.

The Demonstration Plant will be operated by 40 skilled and semi-skilled Madagascar nationals at a one shift operation.

12. The UNDP (Special Fund) is requested to provide the foreign component of the equipment of the Demonstration Plant, the services of

ANNEX 7 (continued)

a project manager and 4 other internationally recruited experts in the fields of application of additional synthetic cattle feed, for a total of 6 man-years; 4 fellowship to enable national counterparts to study abroad for a total of 2 man-years; imported laboratory, workshop and office equipment; and expenses for travel of experts outside the country.

13. The Government proposes to provide the land, foundations, administration and store buildings, other civil and erection works, the services and salaries of national specialists counterparts totalling 18 man-years and remunerations for them while being trained abroad; secretaries, chauffeurs and maintenance staff; transportation; locally available office equipment; expenses for domestic travel and other miscellaneous expenses.

14. The Demonstration Plant would be organized as an autonomous body under the authority of the Ministry of Agriculture.

III. - FINANCIAL DATA

A - Contribution requested from the UNDP (Special Fund)

Item	Man-years	US $
Project Manager	3	72,000
4 Specialists in synthetic cattle feed application practices (4 x 1 1/2 man years)	6	144,000
Consultant Services	Man-months	
Making out of the Feasibility Report	2	6,400
Fellowships	Man-years	
4 x 1/2 man-years	2	10,000
Equipment		
Imported laboratory, workshop and office equipment		15,000
Miscellaneous		
Purchase, freight of the equipment [illegible]		

ANNEX 7 (continued)

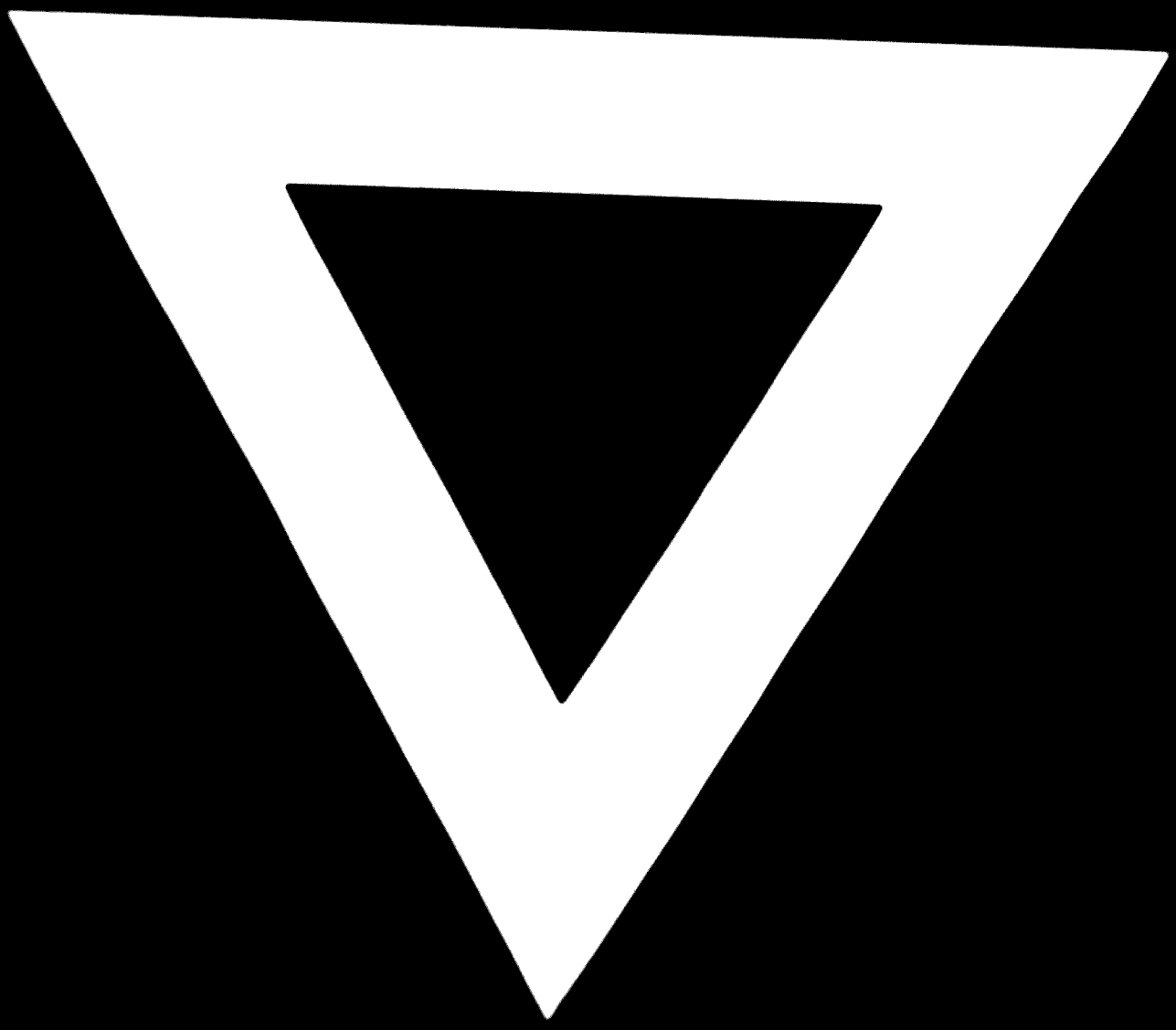
		US $
	report	447,000
Travel Expenses		
For travel outside the country		10,000
TOTAL AMOUNT REQUESTED FROM THE UNDP (SPECIAL FUND)		US $ 457,000

B - Proposed Government Counterpart Contribution

		US $
Professional Salaries	18 man-years	65,000
Remunerations to Fellows		8,000
Other salaries		30,000
Foundations, buildings, erection and other civil engineering work		70,000
Office supplies		20,000
Transportation		15,000
Domestic travel		20,000
Housing for Experts		30,000
	TOTAL	US$ 258,000

C - Local Operating Costs

The Government proposes to pay an amount estimated at US $ 40,300 as a cash contribution towards the local operating costs of the project.



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