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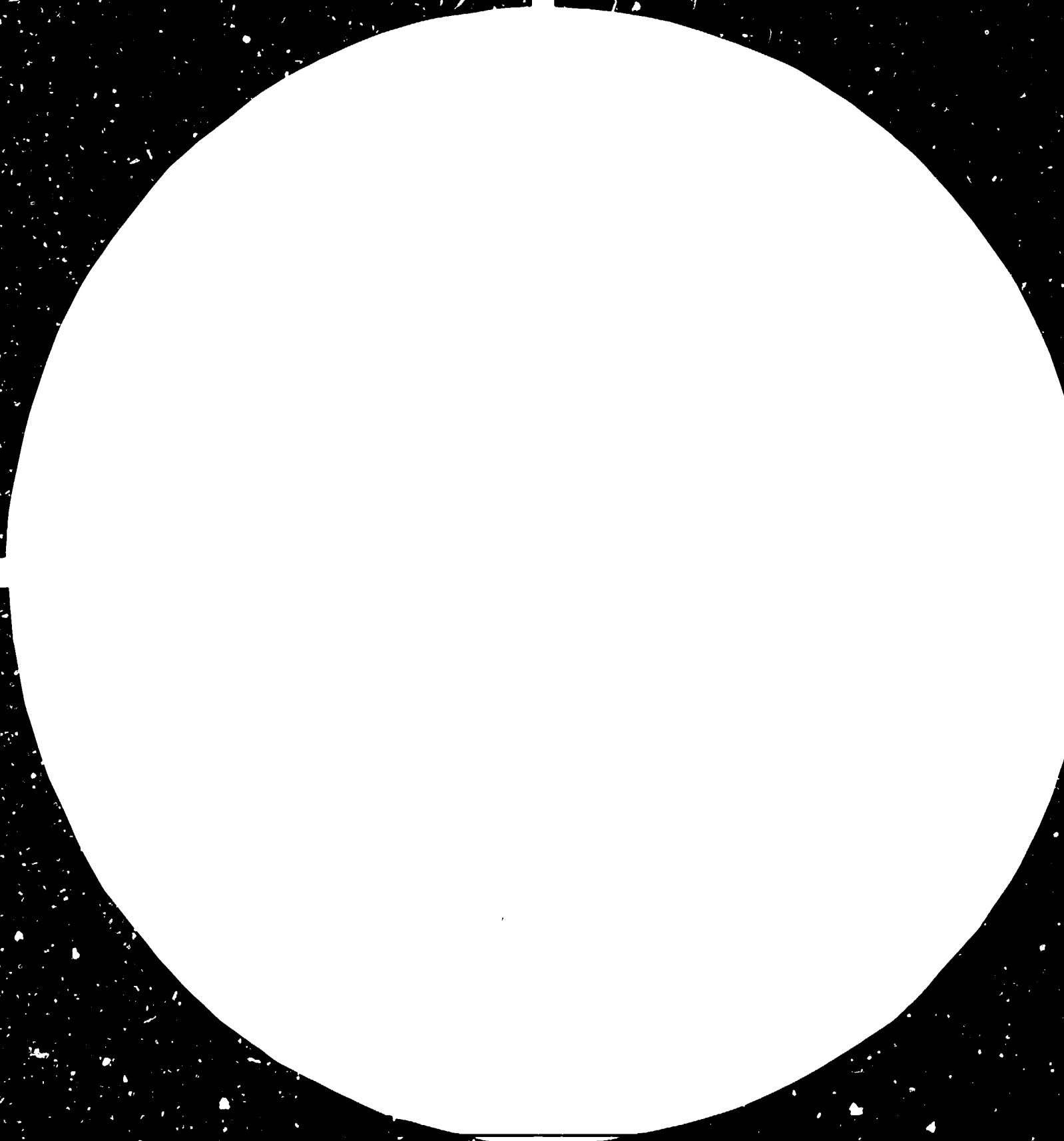

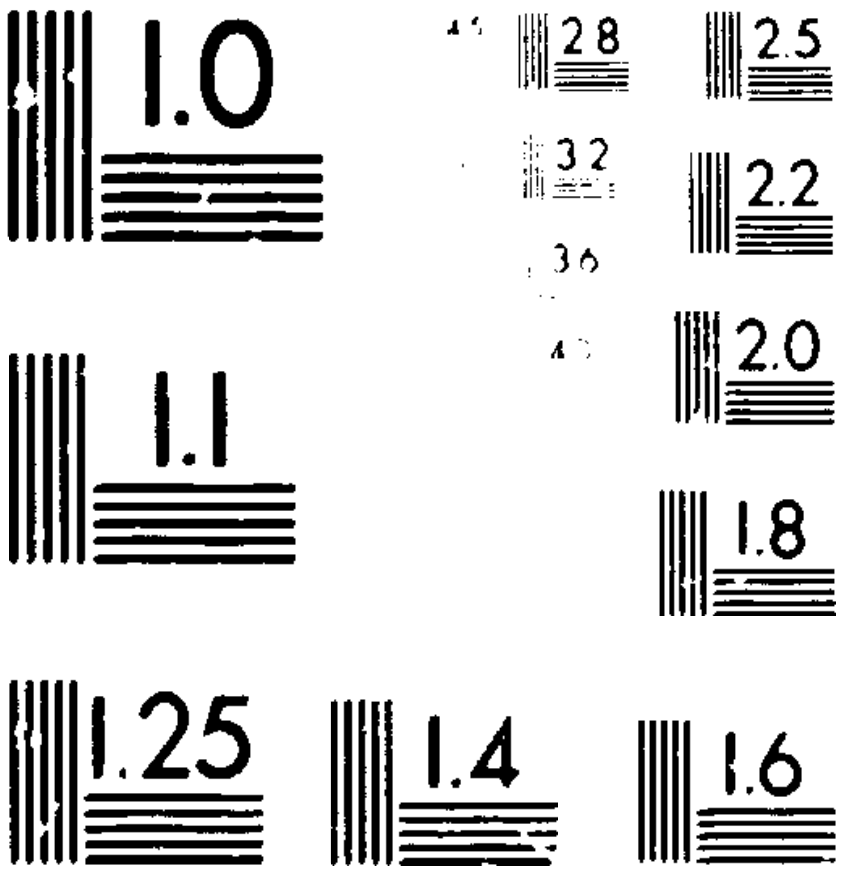

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SOME ASPECTS OF THE WORLD WHITE MEAT SECTOR */

Information Paper

by

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The views and opinions expressed in this document are those of the author and do not necessarily reflect those of the UNIDO Secretariat.

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CONTENTS

1. Principal points of the report

World meat production increased from 25.4 kg/inhabitant/year, on the average, during the period 1961-1968 to 31.6 kg/inhabitant/year in 1981.

This production is very unevenly distributed and is nearly five times greater in the developed nations than in the developing countries (76.1 kg/inhabitant/year in 1980 as opposed to 16.1), even if it has grown somewhat more rapidly in the developing countries during the last ten years (+ 21.2 per cent against + 18 per cent).

The increase in world meat production has been due, over the last 20 years, mainly to an increase in the production of white meat, as shown in the table below:

	Growth rate 1981/1961-1965
All meat	+ 70 per cent
Poultry	+ 145 per cent
Pork	+ 78 per cent
White meats	+ 96 per cent
Other meats (beef, mutton, goat, camel, horse)	+ 43 per cent

The fastest growing category is poultry meat production (section 2.1). There are no religious bans on the consumption of poultry meat.

The poultry meat sector is based throughout the world on a single standard technical model - maize/soya for feeding plus industrialized breeding - which is now in very wide use (section 2.2).

International trading accounts for 6 per cent of production and involves, in terms both of imports and exports, only a small number of countries. Volume in this area should remain stable during the next few years, with competition extremely tight (section 2.3).

The pace of technological advances in this area, as the result of the research and development programmes of a small number of developed countries, is extremely fast (section 2.4).

Co-operation among countries in poultry raising projects should, accordingly, take into account two essential considerations (section 2.5):

(i) The adaptation of the industrial model to local characteristics which differ markedly from one country to another;

(ii) The pursuit of a genuine transfer of know-how to make possible a better mastery of the tools of production.

Pork meat production is linked to the size of the pig stocks (section 3.1.1) and to the intensity of production techniques (section 3.1.2). The kinds of meat produced vary according to the production models in use (section 3.1.3). Pork meat is processed primarily in the industrialized countries (section 3.1.4).

The sectoral concept is essential in the pig-raising sector because of the co-ordination it implies between the various stages of this sector (feeding, breeding, slaughtering/jointing and processing) in both economic and technical terms. Industrialized production is on the increase, albeit with limitations in the case of the breeding stage (section 3.2).

The world market is geographically circumscribed and involves tonnages limited in their relative value (section 3.3). Techniques are rapidly developing at the different levels of the sector in the direction of greater complexity (section 3.4). International co-operation, which has already begun in the areas of genetics and feeding, should be more rapidly extended to the other stages of the sector, in the sense of genuine transfers of know-how (section 3.5).

2.1 World production of poultry meat

2.1.1 The products

Poultry meat production was estimated at 29.83 million tons in 1982 (30.73 million in 1983 and 11.71 million in 1961-1965). Of all meat products, this category has enjoyed the most dramatic increase, a trend which is continuing at the present time.

Broilers (chickens, generally weighing from 1.6 to 1.8 kg live, from 38 to 48 days old, with a consumption index 1/ ranging from 1.8 to 2.3 depending on the strains, the age at slaughter and the conditions of breeding) accounted for 65 per cent of production, or 19.5 million tons, in 1982; turkeys 2/ - for 7 per cent (2 million tons); while other chickens, ducks and battery-rejected chickens made up the remaining portion. On a world-wide scale, the production of geese, guinea-fowl, etc., is marginal.

Unlike pork, there are no religious prohibitions on the consumption of poultry meat. There is greater competence in the various phases of production, and post-slaughter processing techniques are straightforward: refrigeration, deep-freezing and jointing. In the case of industrial scale processing, automation is very advanced.

However, side by side throughout the world, one can find breeding operations which are more or less intensive, depending on the genetic strains involved, the kind of installation in use and the local climate.

1/ Amount of feed necessary to produce 1 kg of live animal ready for slaughter.

2/ The consumption index for turkey is slightly higher, but its carcass output is greater and it can be more easily jointed.

2.1.2 Geographical distribution

Poultry meat production grew much more rapidly in the developing countries, especially those with a market economy, than in the developed nations (+ 130.8 per cent from 1970 to 1980 as opposed to + 65 per cent). Available annual per capita production increased throughout the world from 3.5 kg in 1961-1965 to 6.3 kg in 1981.

However, world poultry meat production is very unevenly distributed:

- North America, and in particular the United States of America, is the main production zone: it accounts for 23.5 per cent of world production, and in 1983 consumption stood at 29.9 kg per inhabitant/year (22.5 kg in Canada);
- The second largest producer is China (11.8 per cent);
- Soviet production for 1982 was estimated at 2.4 million tons, i.e., 8 per cent (this estimate may be too low);
- Brazil, France, Japan and Italy each produced over 1 million tons in 1982.

The United States, China, the USSR, Brazil, France, Japan and Italy between them account, on their own, for 59.5 per cent of world poultry output.

A zone-by-zone review shows just how low production is in the market-economy countries of the Far East (with the exception of Japan), in Africa and in the Middle East. It is in these groups of countries that the development possibilities for industrial poultry raising have the greatest potential. At the present time, a portion of the demand is covered by imports, at least in those countries which have the necessary foreign exchange.

Among the developing countries, Brazil stands out for having quintupled its poultry meat production (mainly chicken) over a ten-year period (1970-1980) and, in this way, for having become the world's fourth-largest producer and second-largest exporter in 1983 (after France).

2.2 The poultry meat sector

2.2.1 A single technical model

Industrial production in the poultry meat sector is based on a single standard model, which includes:

(i) The feed industry, which is essential for this kind of non-free-range production. The availability of grains (maize) and of oleoprotein products (soya oilcake), either in the form of local production or through imports, is indispensable;

(ii) Chick production:

- Firms which supply the reproducer strains ("grandparents") and which carry out the selection of the poultry stock;
- Farms at which the "parents" of the chicks are raised;
- Incubators.

(iii) Chicken-raising;

(iv) Chicken slaughtering and packaging.

The poultry meat sector is a major buyer of industrial supplies and equipment;

- Chicken-raising installations and equipment;
- Slaughtering, packaging and refrigeration equipment;
- Transport equipment;
- Equipment and devices for the recovery and processing of production and slaughter waste and for the treatment of effluents;
- Veterinary products and services.

The technical results, nevertheless, vary very substantially from one poultry operation to another (see annexes).

2.2.2 Organization of the sector

The industrial production of broilers and turkeys is an integrated undertaking. The breeders, relatively few in number, work as sub-contractors for the central slaughterhouse, which supplies or controls the supply of chicks and feed and monitors the breeding operation. The group which owns the slaughterhouse has the necessary decision-making authority and power to control the entire sector.

There are two variants to this situation, which is the most frequent:

(i) Integration through the animal feed companies, which have sufficient financial means for ownership of all the downstream links (with the exception of production, which is carried out on a contract basis);

(ii) Integration through the slaughterhouses, which in this way gain control of the upstream (feed) and downstream operations.

Normally, the firms responsible for the selection of the poultry strains are outside this scheme and retain their independence. The incubators rarely perform an integrating role (except in the Federal Republic of Germany).

Juridically, the enterprises are structured more often on the private than on the co-operative model. There are a number of enterprises in the Netherlands and in certain countries with centrally planned economies which operate on a co-operative basis.

2.3 The international poultry meat market

2.3.1 Main features

An analysis of international poultry meat trading over the last 20 years reveals three major periods:

- 1960-1966: Inter-European trade, mainly involving cross-border sales from the Netherlands to the Federal Republic of Germany;

- 1967-1975: Opening up of the Middle East market: Arabian Peninsula, Iran, Iraq and South-East Asia (Japan, Hong Kong). Hungarian, American and French sales expanded over this period;

- 1975-1981: A trebling of world trade: astonishing growth in exports to Middle-Eastern countries from the United States, France, Hungary and Brazil, which made its first appearance as an exporting nation.

Over the last two years the overall volume of trade has evened out. The end of the expansion period has been accompanied by a heightening of competition among the firms involved, with the leadership passing to those companies which are most export-oriented and have the strongest financial structure.

It should be stressed, however, that world trade in white meat is negligible in comparison with production: 5.9 per cent in 1982 and certainly less in 1983 (2.6 per cent in 1961-1965 and 3.8 per cent in 1978).

2.3.2 The countries concerned

Exports in this sector are in the hands of a "club" consisting of five countries: France, Brazil, the United States, the Netherlands and Hungary, which together in 1982 accounted for 75 per cent of world exports. The other exporters are the Eastern European countries (Bulgaria, Romania and Poland), Denmark, China and, more recently, Thailand.

Imports go to a fairly limited number of countries: the USSR, the Federal Republic of Germany, Saudi Arabia, Iraq, and Japan were together responsible for 53 per cent of purchases in 1982, and two-thirds of sales were made to countries purchasing more than 40,000 tons a year.

2.3.3 Medium-term trends

The situation in this regard is rapidly evolving, in terms both of imports and exports, for three reasons:

(i) There may be further changes in the Brazilian export credits or EEC restitutions (compensation for the difference between grain prices on the world market and the price within the Community) to the detriment of the specialized poultry-exporting industries of these countries;

(ii) The dollar may fall, thereby restoring a certain competitiveness to United States exports (at present minimal in comparison with domestic production);

(iii) The purchasing countries are developing their own production, albeit with less advantageous prime costs, and are experiencing fluctuations in their economic situation.

A company's ability to gain a solid foothold in the international market is linked to its financial structure and to the commercial network which it controls. These requirements should make it difficult to join the "club". It may be noted, however, that there has been an expansion of Thai sales in the Singapore and Japanese markets - offset by Brazilian and American sales - and that, within the

system of the Council for Mutual Economic Assistance (CMEA), there has been a steady trade flow between Eastern Europe and the USSR.

A certain build-up in the sales of deep-frozen chickens at low prices, or on very favourable credit terms, may signal a partial trend in international trading towards a kind of food aid favouring those countries which have not yet succeeded in achieving self-sufficiency in this area.

In quantitative terms, it is not expected that there will be any major increase in international trading over the next few years. Competition among exporting firms will be extremely keen, holding the prices at a low level.

In qualitative terms, and in specific markets (particularly those within Europe), there may be greater advances in the product sector, with a larger volume of jointed parts and processed products, particularly of turkey, being offered for sale.

2.4 Development of techniques

The technical advances in this sector have occurred at the level of genetic strains, equipment and methods of breeding.

2.4.1 Genetic engineering

The world market for poultry strains is in the hands of a small number of selection firms: Arbor Acres and Hubbard in the United States, as well as Cobb, Ross, Peterson, Shaver, ISA, Euribrid, etc. These companies never own an entire production chain, even if they do belong to financial groups which also hold interests in animal feeds, veterinary products, incubators, etc.

The high degree of competition that exists among these companies leads to a certain standardization of their products and contributes to steady technical progress. The firms have numerous production affiliates (in order to avoid the occurrence of health-related problems in connection with the transfer of breeder stock) and an ability to adapt their procedures to the specific requirements of their customers (in terms of climatic conditions, types of feed, etc.).

These firms do not, strictly speaking, dominate the branch, but they do have a monopoly control over access to technical advances in the area of genetics. For this reason, they perform an essential function.

2.4.2 Breeding techniques

Progress in the area of breeding techniques is of three kinds:

(a) Adaptation to climatic conditions

The expansion of production in hot regions has led to improved techniques in the ventilation/climate control and insulation of buildings;

(b) Adaptation to food conditions

Poultry have a real ability to adapt to different diets, although there are limitations here posed by considerations of profitability. Without excluding the possibility of certain substitutions, grain and soya are indispensable feed ingredients.

(c) Improvement of sanitary protection

The safeguarding of the health of the poultry is an imperative requirement in industrial-scale breeding. Very often, the cause of failure in a breeding operation can be traced to sanitation factors. The dispersal of the poultry breeding farms, the strict observance of disinfection programmes and adequate personnel training reduce substantially the risks in this area. There has also been major progress in veterinary medicine (prevention, profilaxis and pharmacopoeia).

2.4.3 Equipment for the sector

Research, in the industrialized countries, is concerned with the automation of the equipment for slaughtering, plucking, cleaning and jointing. Automatic processes are at the present time highly developed, as the industry seeks to reduce its labour costs and to lighten the nature of the work. The quality of automated cleaning and jointing is not yet always equal to that achieved manually. Certain operations, such as the collection of the poultry at the farm and their attachment to hooks at the beginning of the production line, have not yet been automated, while significant progress has been achieved in the packaging of the offal and carcasses.

Although it is still a small one, the poultry meat processing industry has undergone some expansion: the production of processed products, such as turkey roasts and preparations (Western Europe and the United States) and the recovery of jointing waste with mechanically deboned meats, which, after deep-freezing and pasteurization (and soon irradiation), provide the basis for a large number of food products (sausage meats, soups, baby foods). At the present time, the necessary expertise for these sophisticated technologies has been acquired by only a small number of firms.

2.5 Prospects for industrial co-operation

The general trend is towards the industrialization of poultry meat production. This requires feedstuffs (grains and vegetable proteins) locally produced or imported and the ability to finance infrastructure, production, slaughtering and distribution equipment - in a word, a thorough mastery of the different but interconnected links of the sector. All too often, one or several of these links may be missing: an inadequate support network, an unreliable electrical supply,

frequent disruptions in the availability of water, a malfunctioning telephone system, feedstocks of irregular quality and quantity, occasional shortages of gasoil and replacement parts - not to mention the lack of the foreign exchange with which to purchase the chicks that cannot be locally produced. In other cases, the shortages are in the area of refrigeration equipment, thereby making it impossible to stock during peak seasonal production periods.

The normal operation of an industrialized sector requires, from the very earliest planning stage, that all of these factors be foreseen and effectively provided for. To accomplish this, co-operation is essential.

The industrial production model for poultry meat is a single model, involving possibilities for adaptation to the particular constraints present in each situation: climatic conditions, the feedstock situation and the availability of financing.

For these reasons, great attention must be paid to the way in which operations are adapted to local conditions. The kind of co-operation which is limited to the simple delivery of turnkey facilities - the classic situation - does not provide a basis for a genuine dialogue. What are needed are co-operation formulae involving real transfers of know-how. While there are no prospects for this happening in the area of genetic strains, the situation is different with respect to breeding facilities, the simplification of slaughtering techniques and the feed production units. A number of developing countries (Brazil and Thailand) have been so successful in this area that they are now in a position to offer for export engineering services more or less on a par with those available from the developed countries.

One interesting approach that might be tried calls for an association with a medium-sized production enterprise which would be asked to participate in a local investment for production and processing by contributing its know-how and a portion of the necessary financing. The advantages would be shared between the firm, which in this way would secure its export position, and the country, which would acquire a reliable processing and production asset.

3.1 World pork production

3.1.1 Geographical distribution and principal developments in pig stocks

World pig stocks rose fairly steadily from 455 million head in 1958 to 763 million head in 1979, stabilizing at this level. There has been a faster increase since 1975, due to the expansion in Chinese herds.

Pig farming is concentrated in non-Moslem countries and in those where this religion is not extensively practised; accordingly, there is very little pig

breeding in a large number of African countries (the Mahgreb and certain Black African countries), in the Middle East and in Pakistan, Bangladesh and others.

Asia is the foremost region in terms of the size of its pig herds (47 per cent of world stocks in 1982). Most of these animals are located in China, where stocks increased from 160 million to 298 million head during the period 1958-1982. There has also been an increase in certain other countries, such as the Republic of Korea.

Over the last 20 years, Eastern Europe has regularly accounted for 18 per cent of world stocks (89 million head in 1955 and 136 million in 1979). More than half of these are located in the USSR, whose stocks became the second largest in the world during the 1960s (73.3 million head in 1982).

Western Europe has 15 per cent of the world's pig stocks (the EEC has 11 per cent).

In 1982, pig stocks exceeded 20 million head in only five countries (as opposed to six in 1976-1978, the figures for Poland having decreased). Nine countries had pig stocks of between 10 and 20 million head in 1982, as opposed to three in 1976-1978 (Mexico, France and the German Democratic Republic). In recent years, therefore, a group of countries has substantially increased its pig stocks, for widely varying reasons: government decisions, solvent consumer markets and a balance between the growing demand and taste for pork, on the one hand, and the know-how of the breeders, on the other.

3.1.2 Production techniques

Pork production is non-free range and can be undertaken on an industrial basis. There are several pork production methods, which differ according to:

(i) The breed of pig used: various local breeds, not carefully selected; Chinese-type breeds, which are selected for their good breeding properties and their ability to consume crude feeds, but which produce a high level of fat and have fairly poor consumption factors; 3/ high-productivity European and American hybrids with particular dietary requirements;

(ii) The breeding methods: extensive methods, using crude feeds (Chinese model, to develop the pig's stomach); intensive breeding, using hybrids and rich feeds (grain, cassava, etc.) in Eastern and Western Europe and in North America. This method is also used in certain Asian countries (Japan, Korea, etc.) and in Latin America (Brazil) in operations ranging from small-scale free-range breeding to breeding in large production facilities.

3/ The quantity of feed necessary to produce 1 kg of live animal ready for slaughter: on the average, 3.35 for intensively-raised hybrids brought to 90-100 kg of weight, but far more in this case. The prolificacy of the Chinese sows permits the raising of 25 to 27 weaned piglets per sow a year, as opposed to 20.5 in Europe.

Intensive breeding calls for a relatively high level of investment in breeding buildings and in systems for automatic feeding (to reduce stress) and for waste material disposal.

Moreover, health-related problems are of particular importance in pork production. Because of this, there tends to be very little movement of live animals and meat from one continent or from one country to another in order to avoid the spread of any infectious diseases.

Finally, production must be so organized as to ensure the proper operation of the pork sector (selection of animals, feeding, veterinary care, husbandry, collection and slaughter, jointing, processing, storage and distribution).

3.1.3 Pork production

In qualitative terms, it is not possible to compare the pork production of the various production zones:

(a) Lean pork

- Lean carcasses of 60 to 65 kg, intended for the production of bacon (Denmark, Netherlands, Great Britain);

- Medium carcasses of 90 to 100 kg, two-thirds of which are used to produce sausage/salt-meat preparations and for the sale of fresh meat (the most typical situation in the industrialized countries);

(b) Fatty pork

- Traditional pigs with a light carcass, fed waste material and intended for meat production;

- Improved Chinese pigs, fed crude fodder, with carcasses of 90-100 kg.

China is the world's leading producer of pork, followed by the United States, the USSR, the Federal Republic of Germany and France.

Production is sharply rising in the Far East, Eastern Europe and the USSR, and Western Europe; this increase is less marked in North America and Latin America and only very slight in Africa.

3.1.4 Processed meats

The processing of pork, first on a small-scale basis and then using industrial methods, is a phenomenon of the industrialized nations. In the international arena, this has led to such standardized products as ham, sausages, luncheon meats, in either the fresh or the tinned form. There is very little international trading of the traditional products.

The proportion of processed products in pork consumption is directly related to the standard of living and to food habits. This proportion is in the order

of two-thirds in the industrialized countries, but is far lower in the developing countries (occasionally below 10 per cent). 4/

The industrial production structures are generally of the small to medium-scale variety. The trend away from small-scale individual production to industrial breeding is, in effect, a recent development.

3.2 The pig-raising sector

It is possible to recognize the existence of three major models in the pig-raising sector:

(a) Traditional model

The pig, which has been subject to only slight improvement, consumes waste material. This animal produces a poorly developed and fat carcass, which is used for fresh meat and, in part, for family or small-scale processing.

This model persists in Africa and the Far East. It is limited to the production stage, and makes use of neither industrial services nor equipment.

(b) Intensive Chinese model (breeding based on crude fodder).

This model involves four levels:

- Feeding (for the concentrated feed part);
- Production;
- Slaughter/jointing;
- Processing.

This model has resort to veterinary services (personnel and products) and is gradually becoming industrialized through the adaptation of traditional techniques and equipment.

(c) Traditional industrialized model

The four levels mentioned above are highly industrialized, except for the production stage, which has generally remained semi-industrialized. Veterinary services are also important here. Among the annexes there is a description of the international trading in specialized equipment.

It is important to emphasize the complex nature of the technology used in the processing of pork meat. The raw material must be very carefully controlled with respect to sanitary and qualitative standards (something which implies expertise with respect to the strains and feeding procedures and the existence of "good breeders"), after which it must be treated under optimal conditions: slaughtering with minimum stress, jointing, processing, preservation and, in the case of fresh products, distribution by means of a closely monitored cold chain - all conditions fairly difficult to bring together at the present time in many countries.

4/ The absence of a real processing sector results in a major waste of animal protein, which is better preserved and utilized in the developed countries.

3.3 The international pig market

The international pig market actually consists of several sub-markets, which are independent of one another.

3.3.1 Live pigs

The world market is from 9 to 10 million head (2 million in 1960): 3 million are sold by China to Hong Kong (for slaughter) and 5.5 million are internally traded within Western Europe. The Netherlands and Belgium export, respectively, 2.5 million head and 0.74 million head to France and Germany, while Hungary exports to the USSR and Great Britain to Ireland.

The animals are sold on the hoof when the buyer, having lower slaughtering costs, finds this an attractive option. In terms of weight and quality, it is not really possible to compare all these pigs. This trading accounts for about 1.2 per cent of world production.

3.3.2 Pork (fresh, refrigerated and deep-frozen)

In 1982, FAO estimated the growing world market at 1.49 million tons for imports and 1.66 million tons for exports. Of these figures, 80 per cent of the exports and 75 per cent of the imports are carried out by the European countries. Eastern Europe's share in this trading has declined substantially against that of Western Europe. Africa, South America and the South Sea Islands are virtually absent from the market, while in Asia only China, Japan and Hong Kong play any role. The main exporting nations are the Netherlands, Denmark, Belgium, Canada, Hungary and China.

The principal importers are the Federal Republic of Germany, Italy, France, Japan and the United States.

There are numerous obstacles to the international pork trade, due mainly to health requirements. The poor sanitary conditions which exist in most countries in fact exclude them from the list of potential exporters, except perhaps for trade with their immediate neighbours.

3.3.3 Processed products

International trading in processed pork products is dominated by the European countries:

(i) Salted, dried and smoked meats: bacon purchases by Great Britain from Denmark and the Netherlands represent 80 per cent of world trade (280,000 tons in 1982 out of a total of 373,000 tons), the remainder being accounted for by ham purchases, primarily in Western Europe. Half-carcasses of bacon (60-kg light carcasses, cured and cut in two) could in fact be covered under the heading of fresh meat.

(ii) Sausages of different types. The European pork-butchers' sector includes numerous special items. Trading in this sector amounted to 128,000 tons in 1982, 115,000 tons of which were accounted for by European exports (salami, wurst,

sausage, etc.), of which 74,000 tons were sold in Europe. These products, estimated at $3.13 per kg as opposed to $2.27 for pork meat, are relatively expensive and represent, in the main, specialty items enjoyed selectively as part of dietary traditions.

(iii) More significant in terms of volume is the market for prepared and tinned items, consisting essentially of canned goods (ham, luncheon meat, pâtés, etc.). These items are sold primarily by Denmark and the Netherlands.

It is not likely that there will be any major changes in trade flows in coming years. EEC surplus pork production ought to induce some growth in exports.

It is altogether probable that new exporters will emerge, specifically in South-East Asia (the Republic of Korea and Thailand).

3.4 Advances in techniques

(a) Feeding. Research into formulation so as to adapt rations to available raw materials (industrial waste and partial-substitution products for grains); development of feed production units;

(b) Genetic strains. Development of strains intended for hybrid production; progress in improving the sanitary conditions of the breeding stock;

(c) Production organization. The co-operative forms with advisory services for producers are being developed in a very large number of countries, to the detriment of the integration of the sector by the feed producers and, above all, at the expense of traditional production. The quality of production organization has a direct effect on the quality of the meat, in both technical and health-related terms;

(d) Slaughtering. There is ongoing research into the automation of slaughtering operations with a view to increasing their speed and improving the conditions of sanitation;

(e) Processing. Progress is being made in the equipment area, but also with respect to production techniques (procedures, product composition, food additives, etc.). The quality of the raw material is the determining factor at this stage (fat content, pH, etc.).

All of these developments are exerting pressure on the processing sector to define more precisely what it requires of the upstream stages (solutions to the problems of stress, improvements in the area of sanitation, problems of body configuration, experimentation with hot deboning methods, etc.).

3.5 Prospects for industrial co-operation

The different links present in a pig sector are closely interdependent. From the point of view of industrialization, it is essential that projects be properly co-ordinated with upstream and downstream operations, since any error or oversight in this connection will rapidly be found to involve high costs. Co-operation, provided it is effectively pursued, can contribute to greater reliability in an undertaking of this kind.

The general trend towards the industrialization of the sector is certain to continue and grow stronger in the years ahead, thus reinforcing the need for industrial co-operation at various levels:

(a) Feeding. The search for feed formulae in line with locally available raw materials and the development of the corresponding manufactured equipment;

(b) Breeding. Genetic strains, breeding equipment, breeding management know-how (development of management data-system techniques), veterinary services and products;

(c) Slaughtering/jointing. Equipment and facility design;

(d) Processing. Expansion of this sector (sausage meats, tinned pâté, etc.), which is severely underdeveloped in the developing countries; valorization of waste materials; work with grits.

The area for co-operation is, therefore, particularly wide open, all the more when one considers that health-related concerns are greatly inhibiting the expansion of international trading. Priority attention should be given to the processing sector, bearing in mind, however, that this will inevitably create problems at the upstream stages; it is, in fact, impossible to conceive of the creation of a processing industry which is not based on a system of smoothly functioning slaughterhouses, a highly developed cold-storage potential, and production that is healthful and standardized, i.e., well organized. A number of developing countries (Republic of Korea, Brazil, etc.) are already making good progress in this direction, whereas others are facing obstacles because of specific problems in establishing a fully co-ordinated sector (slaughtering difficulties in Thailand, sanitation problems in Africa, and so on).

The animal feed producrs and certain engineering consultancy firms are currently playing a predominant role in the formulation and implementation of projects. Countries must pay close attention to the quality of the calibre of the know-how transferred along with the sale of equipment, since this is an absolutely essential condition if investments are later to bring a good return. Because the exploration of specific approaches (e.g., the combination of aquaculture, for fishmeal production, with pig breeding) may even result in the transfer of additional know-how in the opposite direction, collaboration of this kind should be regarded as profitable for both parties.

One approach to be pursued, in the case of the processing sector, is through co-operation with medium-sized companies (large enough, however, to permit the sharing of the time of technically qualified personnel), taking care, however, to ensure that the project is invested with sufficient political and economic authority to guarantee that the technical organization of the sector is appropriate to genuine needs. In certain cases, this kind of co-operation, entered into with the affiliates of European companies, can produce good results.

For all of this, it must be remembered that the imitative transfer of organizational and production methods from developed to developing countries always involves a major risk of failure. Accordingly, these models must be reconsidered and adapted to particular local conditions.

ANNEXES

Note

Much of the statistical information on which these annexes are based comes from the United Nations Food and Agriculture Organization (FAO), a particularly valuable source for this kind of analysis. However, because of the need for some amount of revision, the series are non-uniform over longer periods. The reader is therefore invited to direct his attention more to the general trends expressed than to the detailed variations.

The definitions used are those of FAO, with respect both to product nomenclature and to geographical terms.

List of Annexes

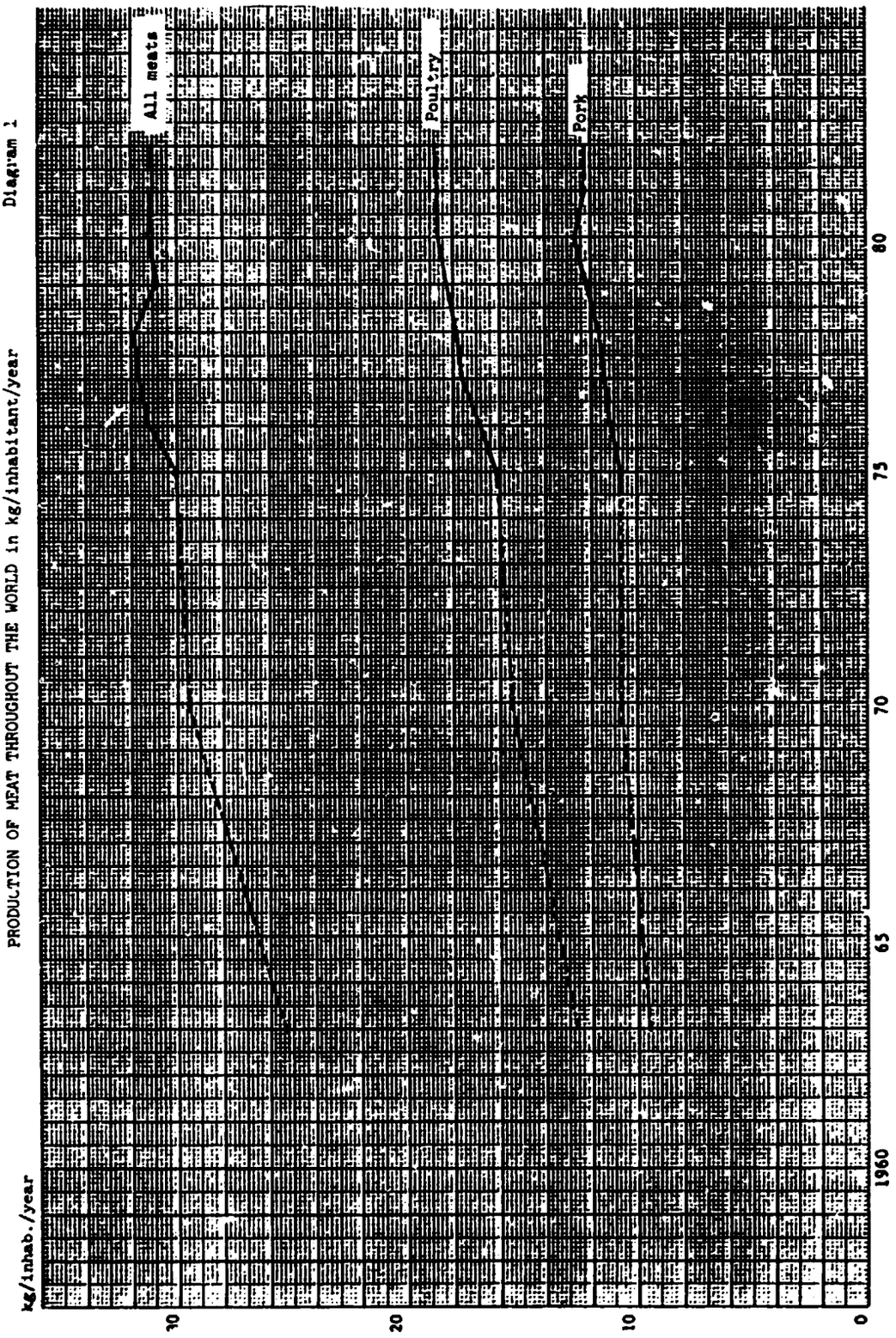


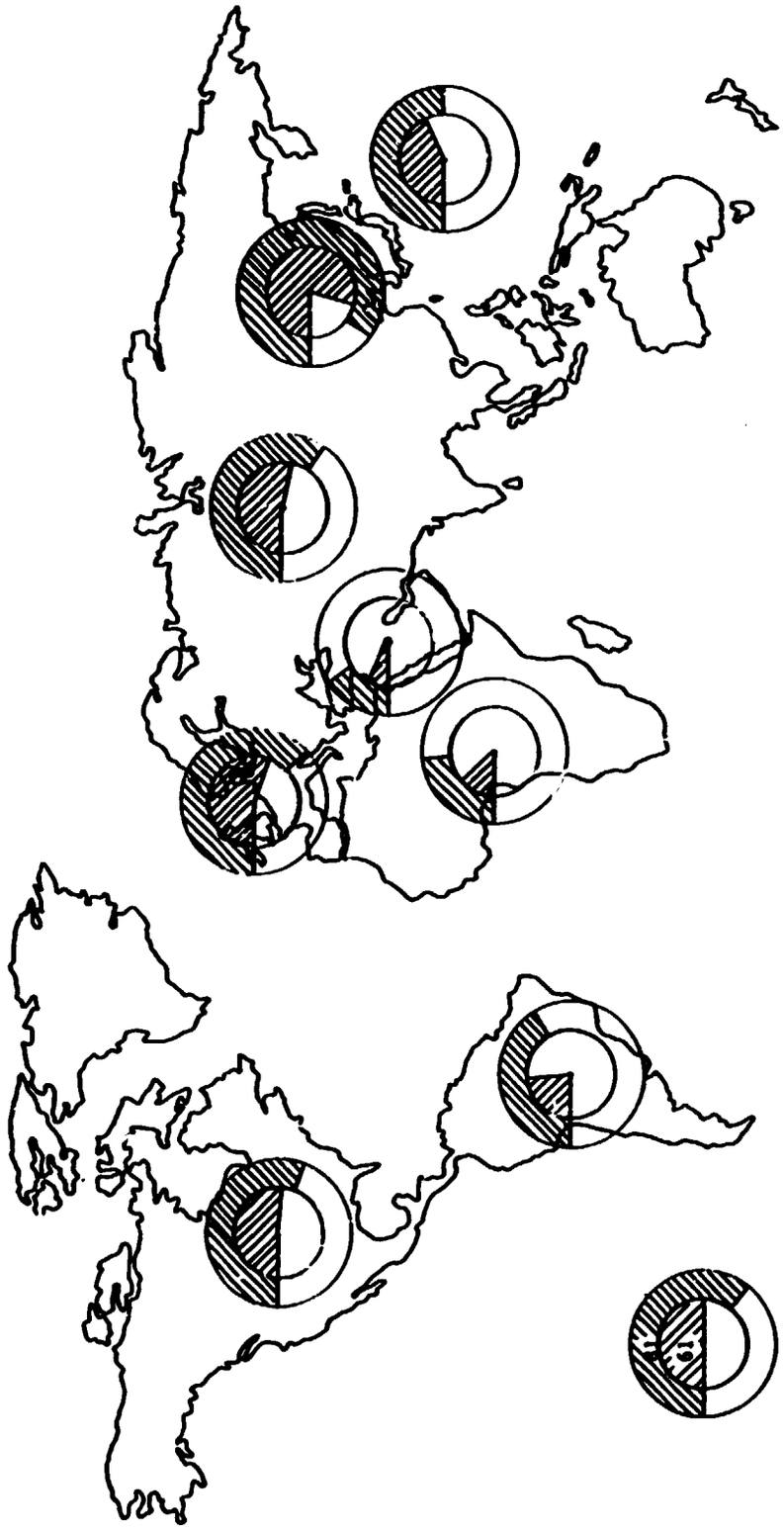
Diagram 1

The evolution of meat production in the world, expressed in kg per inhabitant per year, is based mainly on the expansion in the production of industrially produced white meat. The proportion of poultry meat is on the increase.

See the Note with respect to the uniformity of the statistical series.

Diagram 2

PROPORTION OF WHITE MEAT IN TOTAL MEAT PRODUCTION (in percentages)
(1961-1981)



Source: FAO/Centre Français du Commerce Extérieur (CFCE)

Diagram 2

Growth in the proportion of white meat in meat production is a worldwide phenomenon. It is particularly evident in South America (Brazil) and Western Europe. This map does not reflect the increase in poultry meat production in the countries of the Middle East subsequent to 1981.

Diagram 3

POULTRY MEAT PRODUCTION PER INHABITANT (in kilograms)
(1961-1981)

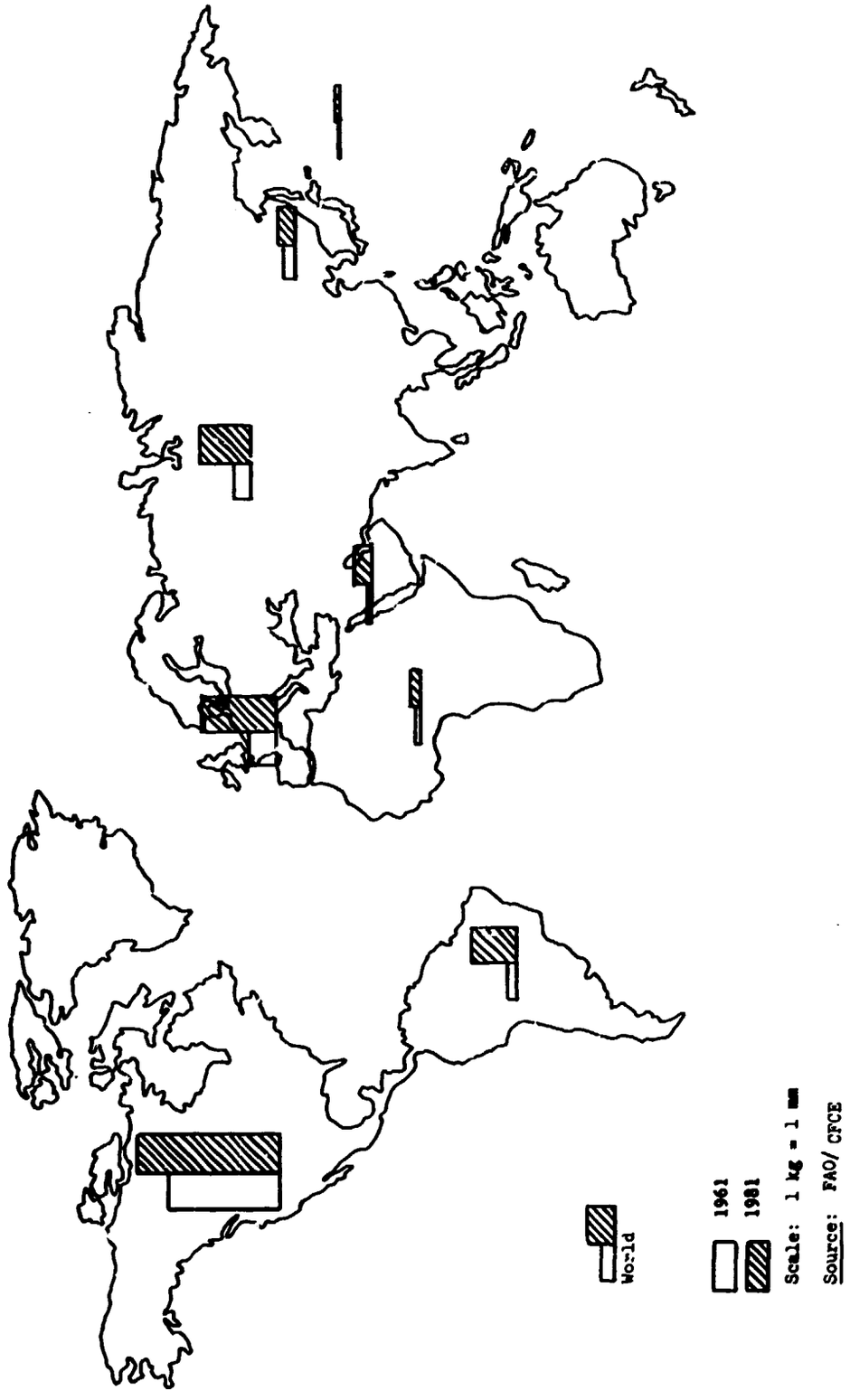


Diagram 3

Poultry meat production per inhabitant is exceptionally high in the United States of America. Very substantial growth in this area has been observed in South America, Western Europe, the Eastern European countries and the USSR and, quite recently, the countries of the Middle East.

Diagram 4

VARIABILITY OF TECHNICAL RESULTS: RESULTS OBSERVED IN VARIOUS PROJECTS

	Industrialized countries	Trinidad	Philippines	Egypt	Mexico	Haiti	Turkey
Egg production per parent hen	170	160	170	160	135 2/	n.d.	170
Hatching rate (%)	85	77	73	84	79	-	n.d.
Chicken's age at slaughter (kg)	7-8	9	7-8	7.5	8.3	6.0	7.5
Live weight at slaughter (kg)	2	1.7	1.35	1.45	1.9	1.4	1.7
Chicken mortality rate (%)	5	13.1	4.5	5.0	3.0	3.0	5.0
Consumption factor 1/	2	2.8	3.2	2.5	2.6	2.1	2.3

Source: Thomas Chinloy, I.F.C. (Hannover Symposium, 1983)

1/ Kilogram of feed needed to produce 1 kg of live animal ready for slaughter.

2/ The hens lay for 35 weeks instead of 40.

Diagram 4

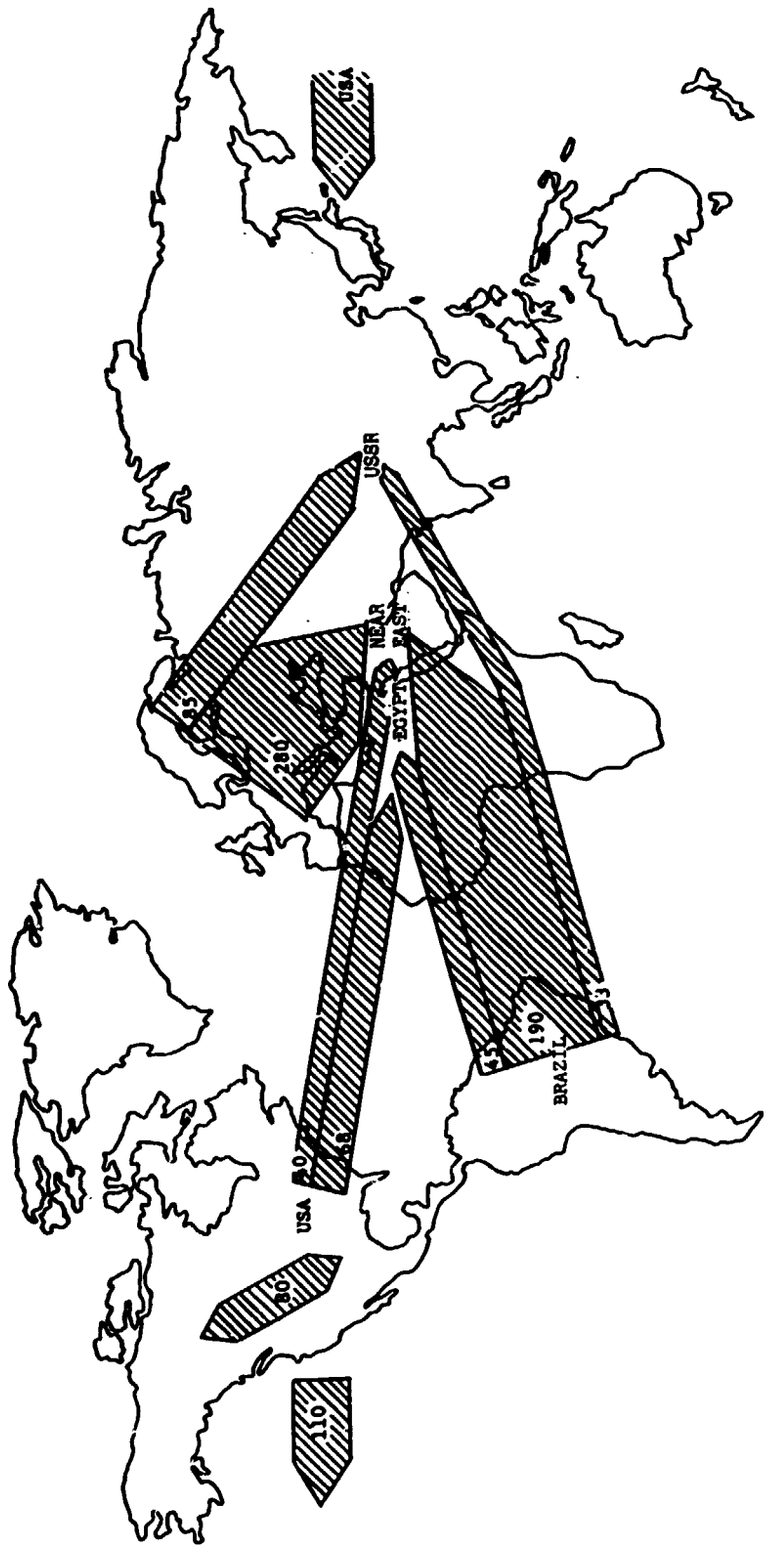
Good average performance is observed for the parent hens, although with problems in the case of the Philippines project.

The relationship between the time spent in raising the chicken and its live weight at slaughter is also poor for this same project, along with the consumption factor, which is exceptionally high.

The high rate of mortality observed in the Trinidad project merits particular attention.

Diagram 5

WORLD TRADE IN POULTRY (1981)



Source: CFCE

Diagram 5

In order to simplify the map, trading within the EEC has not been reflected.

This map, prepared according to data for 1981, requires substantial modification on the as yet incomplete basis of the world-wide statistics for 1983: there was a sharp reduction in the United States - Middle East trade flow to the advantage of sales by the EEC and Brazil; there was some sales volume on the part of the EEC and Brazil to the countries of the Far East.

Diagram 6

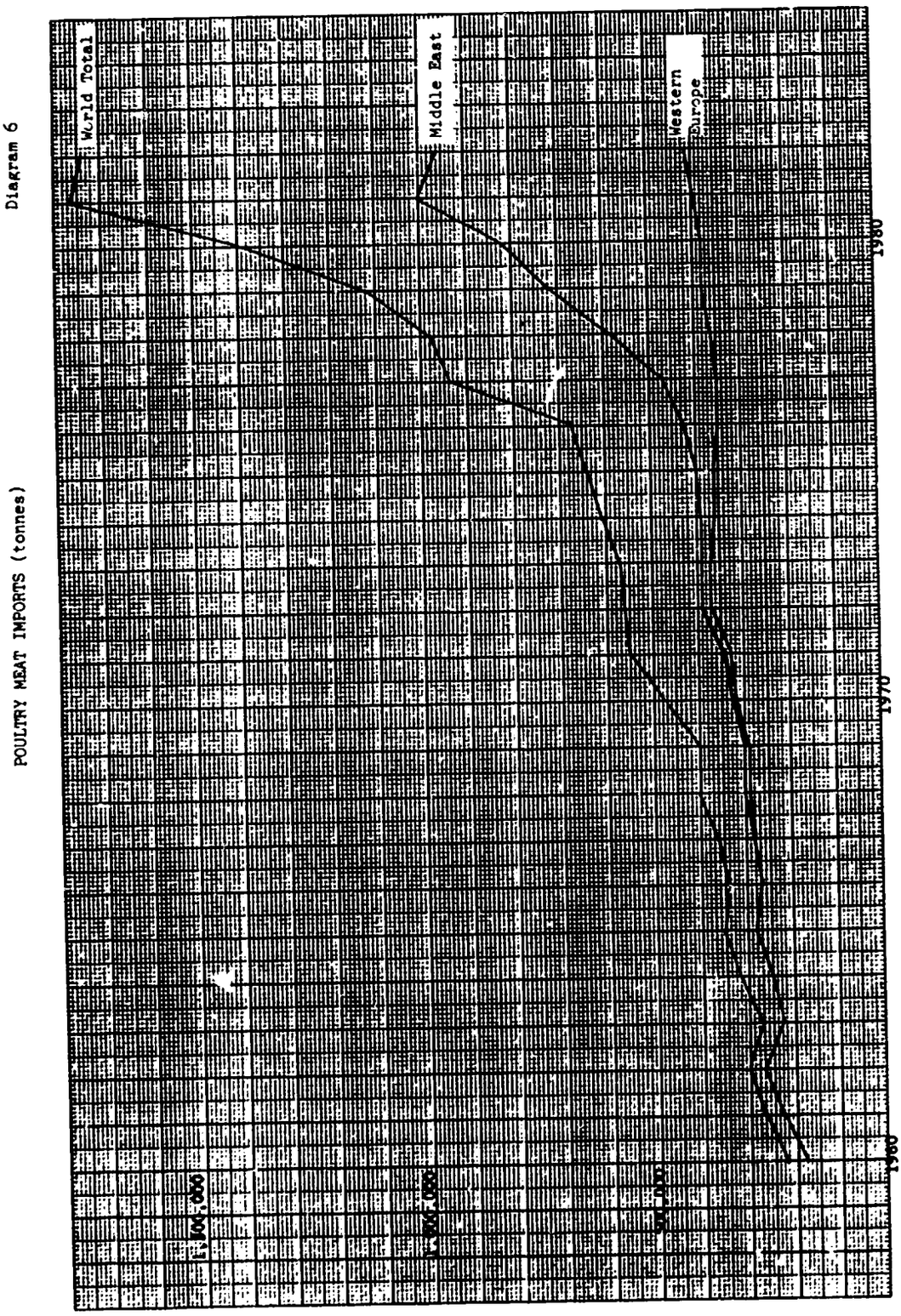


Diagram 6

The importing of poultry meat is a phenomenon mainly limited to the countries of Western Europe (intra-EEC cross-border trading), the Middle East (growth during the period 1976-1981) and the Far East (trade flows United States/Japan, Hong Kong and Singapore).

Diagram 7

INVESTMENT COST LEVELS FOR SIX POULTRY-RAISING PROJECTS
(in 1981 US dollars)

	Trinidad	Philippines	Mexico	Haiti	Egypt	Turkey
Project date	1978	1979	1979	1981	1979	1982
Annual production (millions of chickens)	10	17	11.7	1.8	12.4	5.1
Parent farm ($ per place)	36	33	-	-	29.5	32.1
Chicken raising ($ per place)	-	-	6.35	5.81	10.66	-
Slaughterhouse ($ per chicken/hour)	1236	1023	-	822	758	1411
Incubator ($ per egg/week)	6.2	5.3	-	5.3	6.1	4.3
Feed plant ($ per tonne/hour)	-	-	145	-	165.8	-
Total cost ($ millions)	4.7	24.5	45.2	5.9	27.4	4.7

Source : Thomas Chialoy, IFC (Hannover Symposium, 1983)

Diagram 7

Production conditions differ markedly from one project to another, a fact which explains the discrepancies that may be noted in the investment costs.

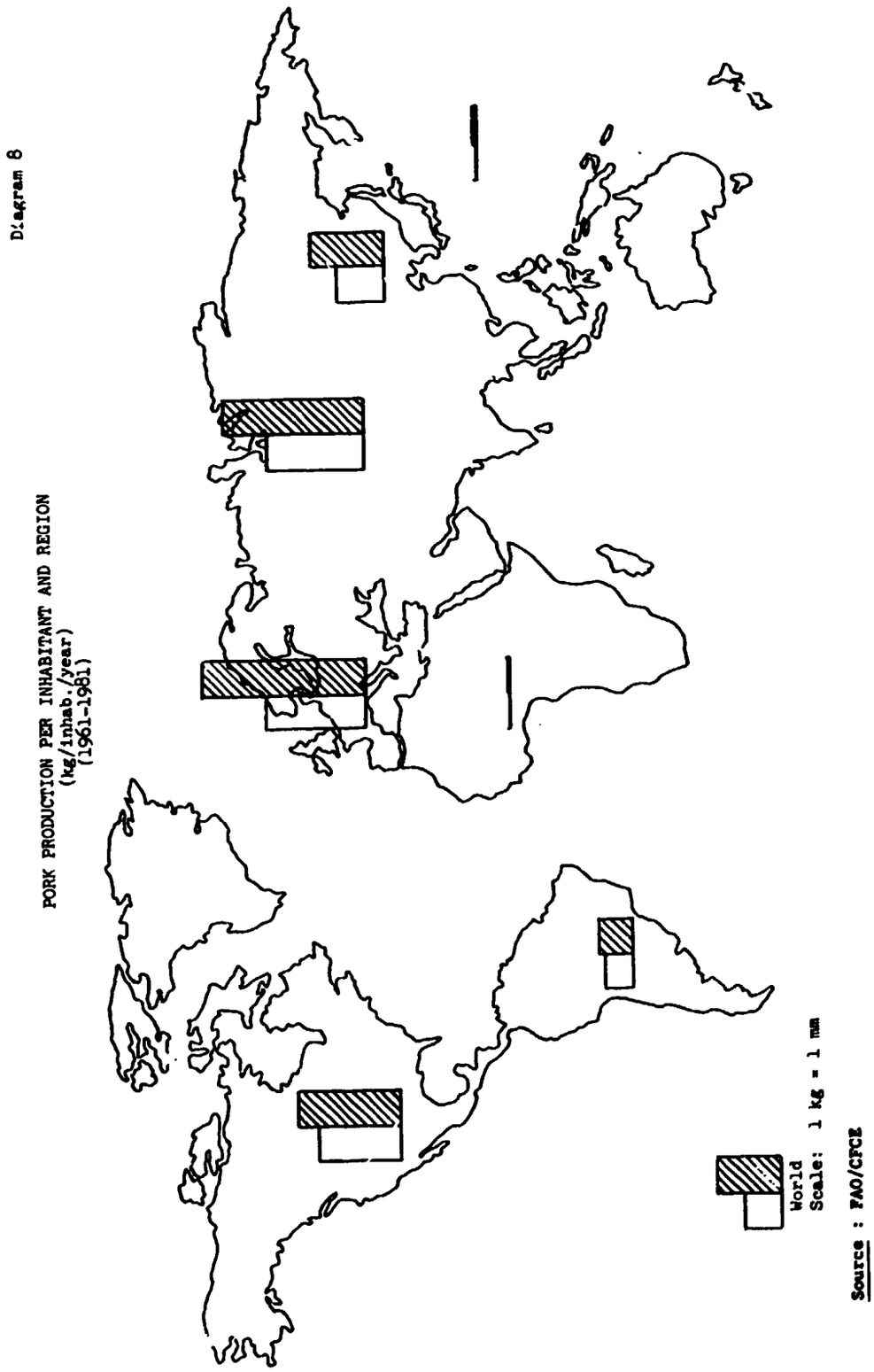


Diagram 8

Pig-raising is confined to the northern-hemisphere countries, with the exception of Brazil. This activity has expanded rapidly in the countries of Europe (East and West) and the USSR. It is also on the increase in China (the world's leading pig producer).

Diagram 9

Pig stocks compared with pork production in the major countries in 1982

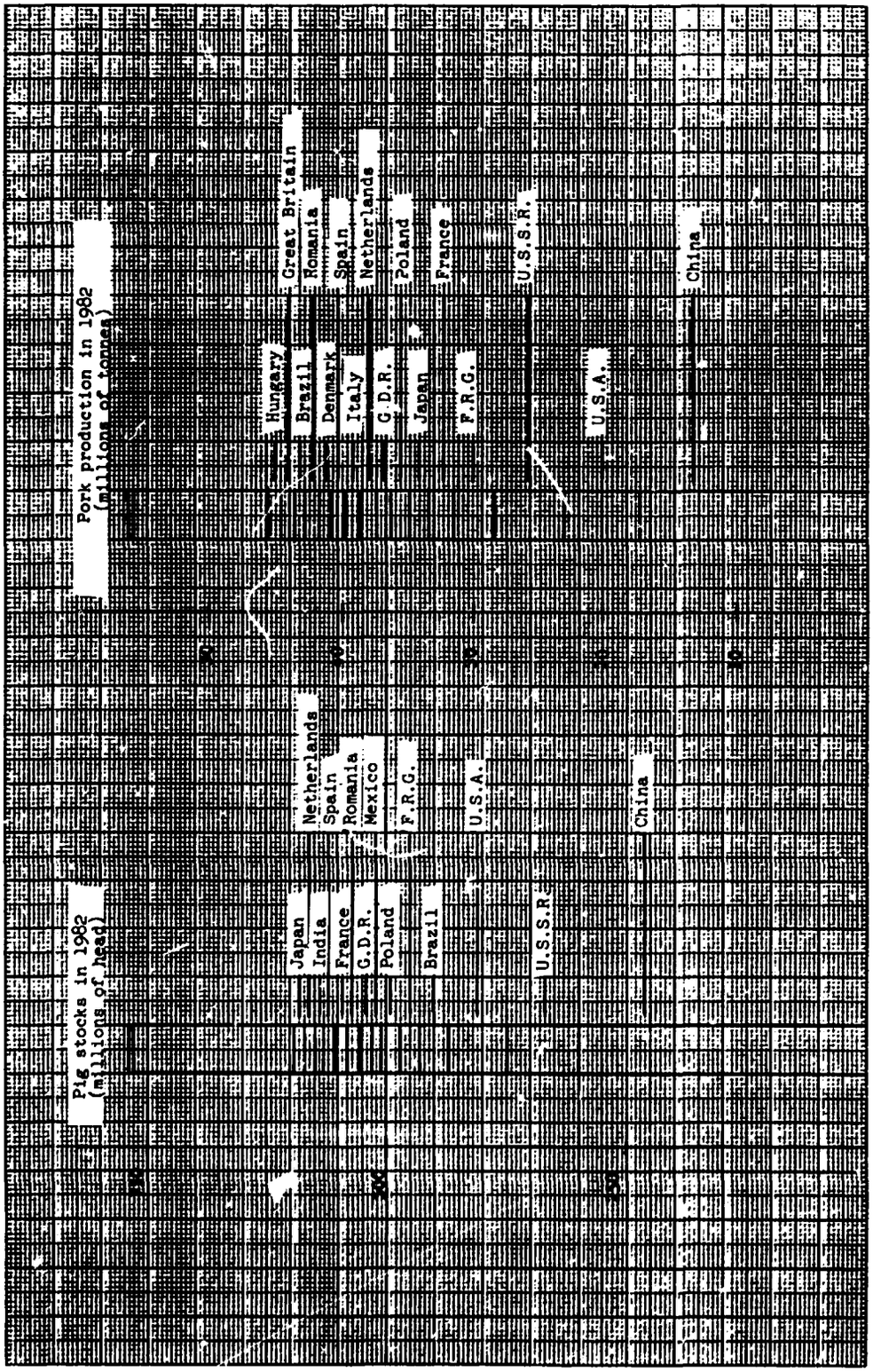


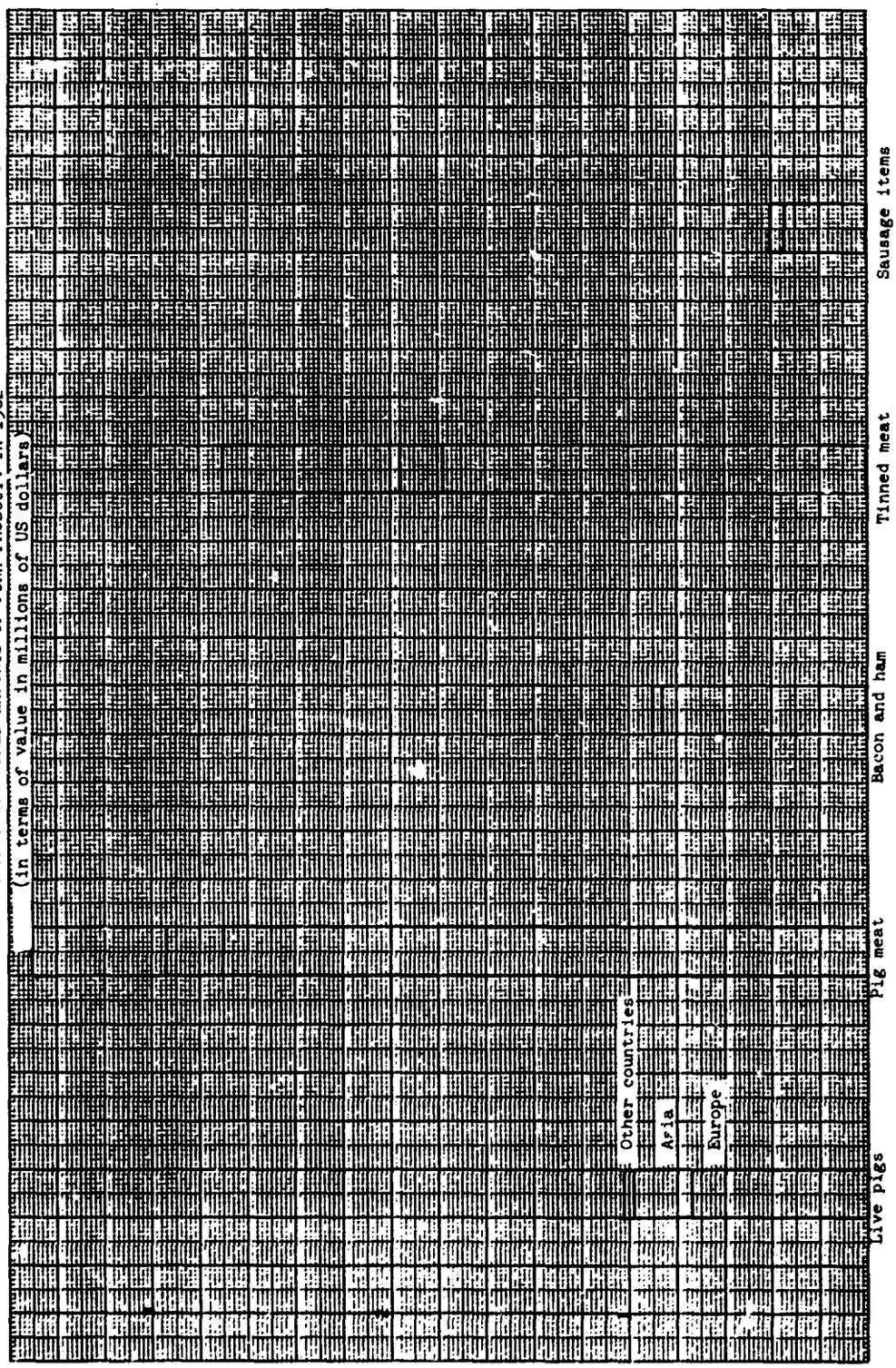
Diagram 9

The comparison, in relative terms, between the distribution of world pig stocks and pork production reveals the discrepancies in pig-raising yields between countries: certain herds, in the industrialized countries, produce particularly high productivity results, gaining a place for these countries in the classification.

Diagram 10

PORK SECTOR: WORLD EXPORTS OF PORK PRODUCTS IN 1982

(in terms of value in millions of US dollars)



Source: FAO

Diagram 10

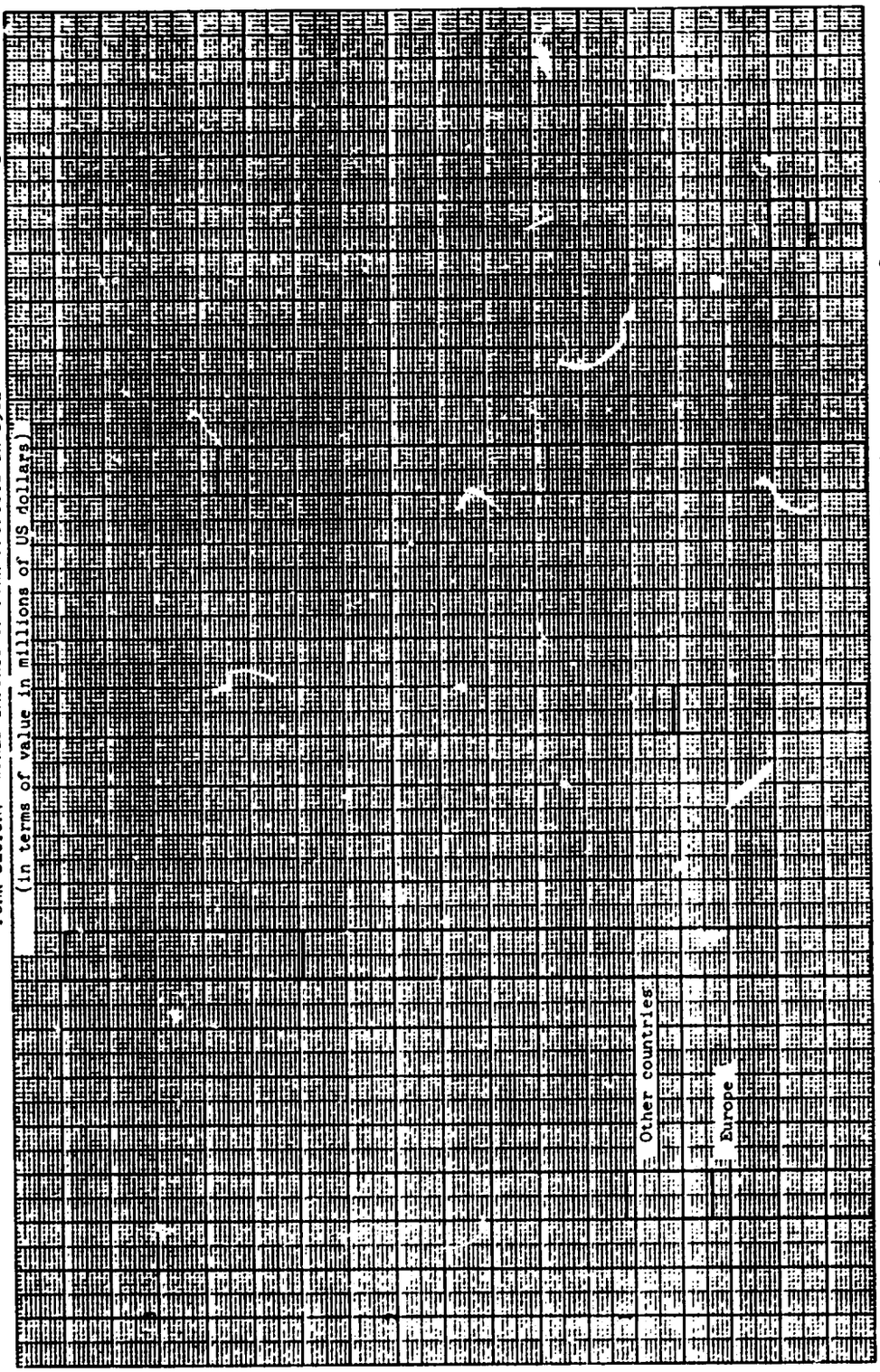
The presentation, in terms of value (millions of dollars), of world exports reveals:

- The substantial volume of pork meat and tinned meat exports;
- The predominance of intra-European (an intra-EEC) trading and the limited nature (considering the size of the stocks) of Asian exports.

Diagram 11

PORK SECTOR: WORLD IMPORTS OF PORK PRODUCTS IN 1982

(in terms of value in millions of US dollars)



Source: FAO

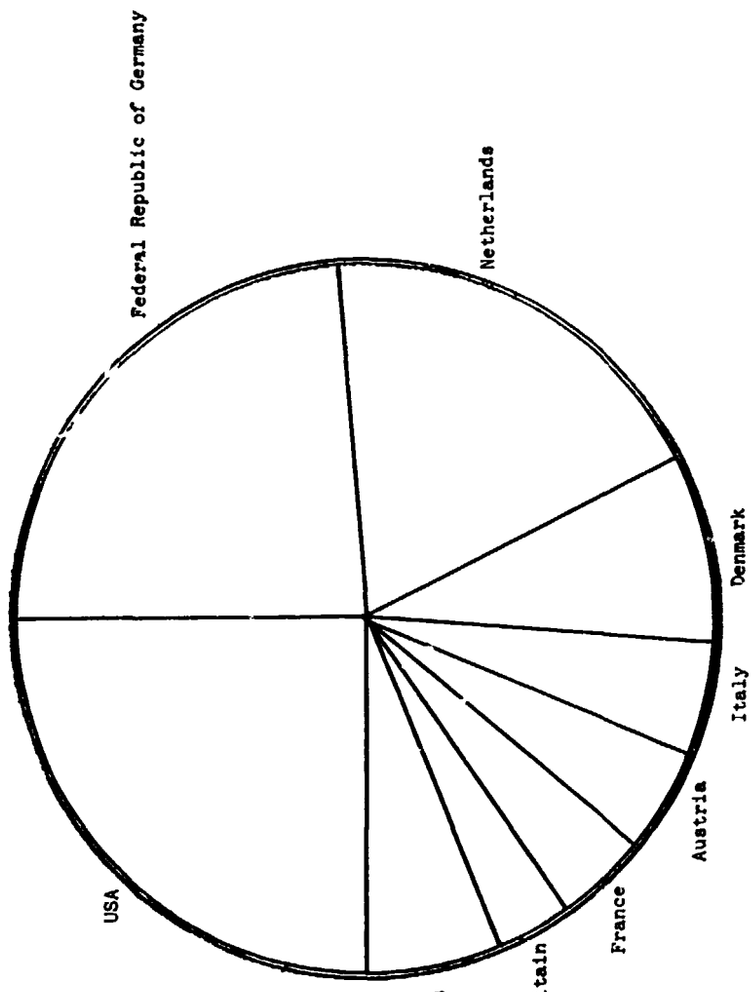
Diagram 11

This table of world-wide imports (in value terms) of pig-sector products shows that processed products occupy a position equivalent (in value terms) to that of unprocessed products (slaughtered or live animals).

Intra-European (intra-EEC) trading is predominant.

Diagram 12

INTERNATIONAL SUPPLY OF MEAT-PROCESSING EQUIPMENT (1981)



Source: CFCE/SYGECAM

Diagram 12

The international supply of meat-processing equipment is, for the most part, limited to the developed nations, four of which - the United States, the Federal Republic of Germany, the Netherlands and Denmark - control three-quarters of the market. The companies of these countries, in addition to furnishing this equipment, are frequently associated with the formulation of projects in this area.

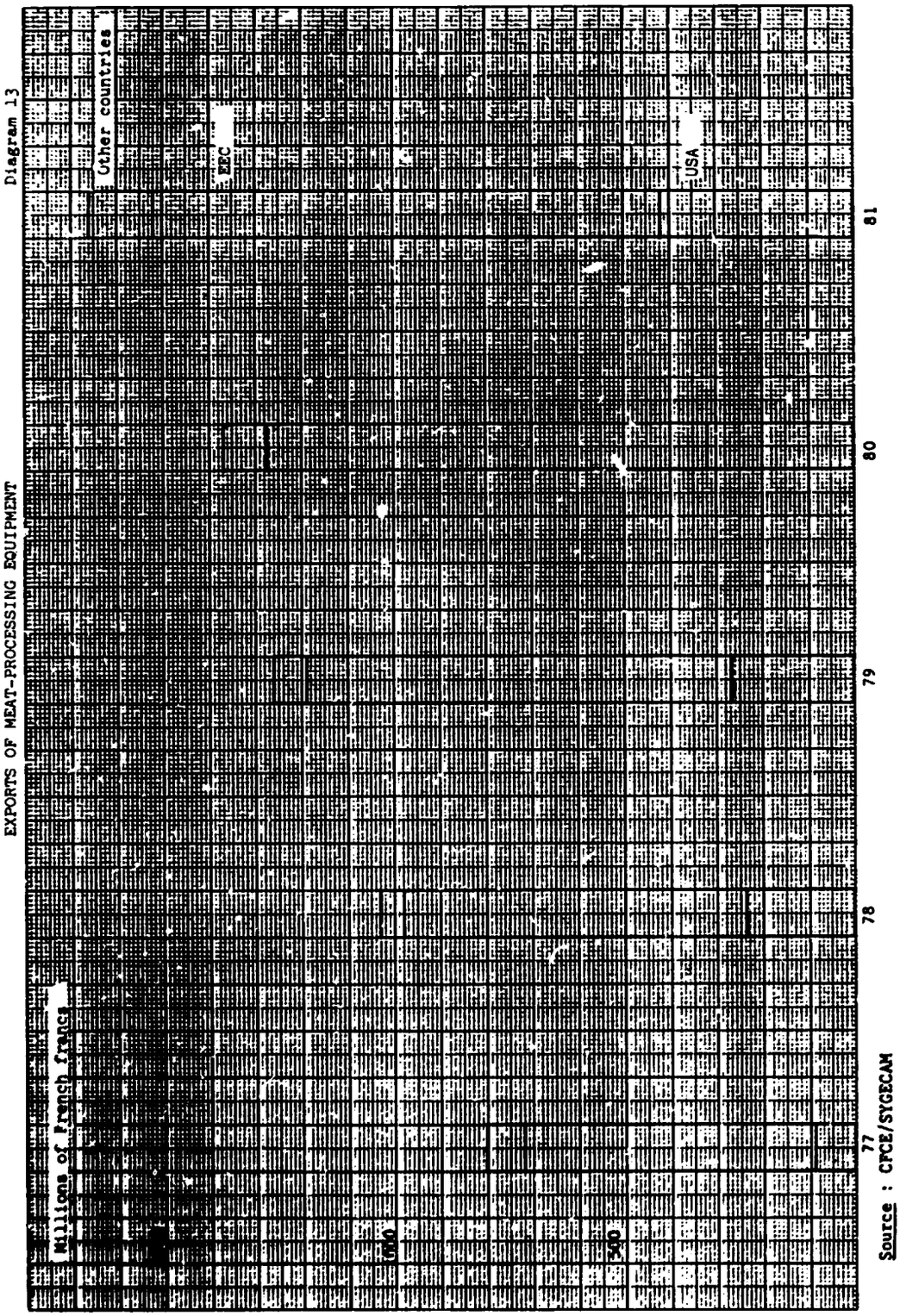


Diagram 13

The value of exports of meat-processing equipment is increasing. The dominant role, in this area, of the EEC countries, alongside that of the United States, is illustrated in this diagram.