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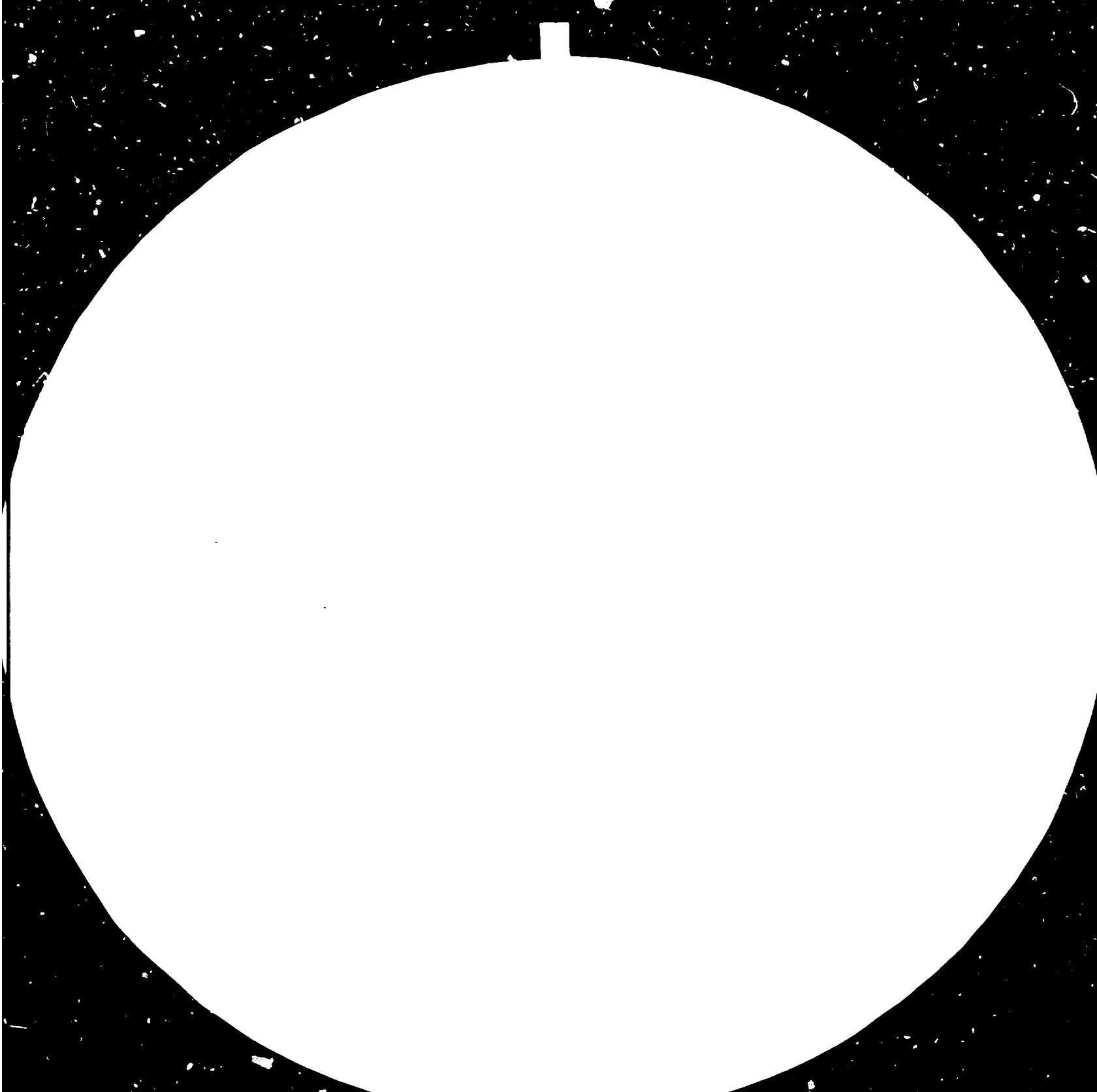
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THE RED MEAT INDUSTRY AND ITS PROBLEMS *

Background paper

prepared by

B. Julla
UNIDO Consultant

2639

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

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1. KEY FACTORS ASSOCIATED WITH THE GLOBAL DEVELOPMENT OF THE RED MEAT INDUSTRY

1.1 World production of red meat continues to grow and varies between regions

World meat production has risen over the last 20 years; in 1982, it amounted to 144.6 million tonnes.

The developing countries hold most of the cattle, sheep and goat stocks in the world, which means that they have a higher density of livestock per hectare of agricultural land than the developed countries. This discrepancy has become more marked over the last 20 years because livestock numbers in the developed countries have been stable. It is more noticeable in the case of cattle than in that of small ruminants. Sheep and goat rearing is not an exclusive feature of the developing countries.

The growth in world red meat production since the 1960s is due mainly to the expansion of production in the developing countries. Unlike livestock numbers, however, meat production is concentrated in the developed countries. There are thus considerable differences in the production of meat from the livestock in the two groups of countries. This situation has hardly changed over the last 20 years. The developing countries have increased their production mainly by expanding their herds of livestock, a factor which holds great potential for increased productivity.

The production of red meats has grown less rapidly than that of white meats. The share of red meats in world meat production has therefore fallen (annex I). According to FAO (Food and Agriculture Organization), it accounted for only 37.5 per cent of meat production in developing countries in 1982.

1.2 Stock-breeding for red meat production is poorly industrialized

There is a wide variety of production systems for red meat in the world in general and in the developing countries in particular. Many of these systems are not specifically oriented towards meat production, meat usually being a by-product of dairy farming. Because of this low degree of orientation of ruminant livestock farming towards meat production, there are virtually no industrial stock-farming systems. Only intensive battery farming for veal calves and feedlot farming for young cattle, mostly in the developed countries, are practically independent of farming land and can be termed industrial. Few industrial firms upstream (animal feed) or downstream (slaughtering, processing) from the farming stage have tried to incorporate this aspect of red meat production.

The productivity of these production systems is therefore low, and especially so in the developing countries. The basic features of red meat production systems account for the low penetration of the livestock feed industry in this sector of animal production.

Red meat production systems depend much less on the animal feed industry nowadays than the white meat or even milk production systems. This industry supplies nursing feed for veal-calf farms and produces feedlot feeds, mainly in the form of maize grain and soybean cakes. The range of industrial products for intensive livestock farming is thus likewise limited.

1.3 Processing industries in the red meat sector are still very poorly developed

As in the stock-breeding stage, the characteristic features of the slaughtering and processing stages of the red meat production chain all over the world are the large number of participants and a still very unsophisticated technology. In many areas of the world, animal slaughtering is not mechanized and carcass cutting tends to be quite crude, without regard for the organoleptic qualities of cuts. Slaughtermen and particularly butchers use very primitive cutting tools such as axes, saws and knives.

In the developed countries, the beginnings of industrialization in this sector has led to the establishment of large, completely mechanized slaughter-houses. Nowadays, their function extends to a second processing stage, namely carcass cutting and boning to produce vacuum-preserved muscles. A third processing stage has also developed but so far produces only a narrow range of products, mainly minced meat.

The sector is then typically based on small-scale businesses in developing countries and, to a large extent, in developed countries as well. It is however becoming industrialized in the countries of the southern hemisphere in particular, which still practise extensive animal farming on the basis of natural resources and are developing industrial slaughtering and international marketing, and also in the developed countries of Europe and North America.

1.4 Per capita consumption of red meat is increasing but still varies greatly between the regions of the world

The world's meat consumption has increased and is expected to increase still further. Thus, according to FAO projections, the demand for animal

products in the developing countries should grow at a rate of 4.5 per cent per annum up to the year 2000 as a result of both population growth and rising incomes.

It is in particular the world consumption of red meat that has risen substantially over the last 20 years.

Despite increases in their production and imports, however, the developing countries have not managed significantly to increase the level of consumption of their populations. Although, today, consumption in the industrialized countries seems to have levelled off, their per capita consumption of red meat is still five times as high as in the developing countries.

1.5 Possible industrial co-operation for the development of the red meat sector

Despite the low degree of penetration of the beef production industry by the animal feed industry, there is an increasing trend towards international co-operation in feed formula development and factory design in the developing countries. Attempts should be made to develop compound feeds for which by-products of local food and agricultural industries are used and which are manufactured in small-scale production units within those industries. Any research along these lines should take into account that the feeding system used in industrial cattle farming in North America, based on maize and soya cake silage, cannot be transposed to all developing countries.

It should also be possible to increase industrial co-operation in the introduction of industrial slaughtering and processing equipment, especially with a view to setting up a co-ordinating centre for the red meat sector in many developing countries. The scale of investment in such equipment, however, should be determined with due regard to regional production conditions.

2. KEY FACTORS GOVERNING SUCCESSFUL DEVELOPMENT OF THE RED MEAT INDUSTRY IN DEVELOPING COUNTRIES

2.1 Realistic assessment of the role to be assigned to red meats and the corresponding animal species, and determination of the agricultural and pasture systems which are best suited for promoting them, as part of the formulation of a food strategy and a development policy for national food and agricultural resources.

A. Very few countries formulate a development policy for their food resources on the basis of a precise knowledge or even an approximate assessment of:

Primary biomass production, the nature of its components, its particular features and its originality;

The obstacles to using it for animal husbandry (physical environment, social constraints, collective rights, traditions and customs, etc.);

The most suitable forage plants for increasing the potential of this primary biomass within plant and animal production systems that either already exist or could be established in the country.

The main factors associated with breeding and hygiene which limit the development, in the country concerned, of each animal species already present or likely to be introduced, and the importance that can reasonably be attached, in that country, to a given species as a food resource for man.

B. Very few policy-makers have been trained to draw up coherent national development strategies for food resources. When specialists from different disciplines meet to prepare a plan, they very often come up with no more than an incoherent and unstructured juxtaposition of sectoral development schemes. To a considerable extent, this fact accounts for the transfer of technologies and production systems which are effective in the developed countries but are not adapted to the developing country which attempts to apply them.

C. While this problem may affect all types of food production, it is particularly important and difficult in connection with the production of red meats.

When they are exploited solely for meat production, the animal species used to furnish these meats (cattle, sheep, goats, horses and camels) are much less efficient converters of primary biomass into energy and proteins for man than other animal species which produce white meat (pigs, poultry, rabbits, etc.) and, of course, than plants which yield fruits that can be directly consumed by man (table 7).

These species do, however, offer major advantages in the efficient production of food for human consumption on account of:

- Their physiological characteristics;
- The genetic variability of each species, developed either naturally or by selection;
- Their ability to supply food for man in the form of both milk and meat, which increases the yield of a herd in comparison with one raised only for its meat.

D. There is no need to elaborate on the fact that dietary conditions and development potentials vary considerably between different countries, whatever their present level of development.

2.2 The second key factor governing the successful development of red meat production is control of feeding, at both quantitative and qualitative levels.

A. The basis of the feeding system can change considerably depending on the resources, development potential and environmental characteristics to be found in each country. Great hopes have been founded on the improvement of pasture resource management in semi-arid areas and on the development of intensive feed production in wet tropical areas. A good deal of research has been devoted to these subjects.

B. Unlike animal farming for the production of white meat, where the compound feeds industry has played and continues to play a determining and central role, the role of animal feed industries here is considerably more modest. A special effort at innovation ought, however, to be made in this sector. This should be undertaken in two ways:

In the formulation of feeds. Traditionally, the basis of compound feeds throughout the world has been a combination of cereals and oil-cakes. Most countries, however, do not have enough grain to nourish their human population, to provide extra rations for their draught animals, or to feed monogastric animals and poultry, let alone to feed red-meat-producing species.

The possibility of using cakes as nitrogenous feeds is still more uncertain in most countries. In the 1981-1982 agricultural year, production of protein-rich substances in relation to population, in kilograms of soya cake 44 equivalent per capita, was:

195 kg for the United States, 138 kg for Argentina and 69 kg for Brazil;

20 kg for the world as a whole;

148 kg for the first three countries above, which produced two-thirds of the world's supplies (the United States accounting for 50 per cent), while the other countries together have 8 kg per capita.

In the developing countries, compound feeds for ruminants can only be based on by-products of food and agricultural industries other than oil mills; production of these feedstuffs in such countries should make maximum use of simple nitrogenous forms.

In factory design. The new conception of industrial plants would represent a radical departure from tradition. Compound feeds for ruminants should normally be manufactured in, and distributed from, workshops or

factories integrated in the agric-industrial complexes that furnish the main by-products required.

2.3 The third key factor is to be found in the control of breeding factors other than feeding which would improve the meat output of livestock.

2.4 The fourth key factor is a change in production systems and product types through the introduction of downstream co-ordination of the production chain.

A. The inadequacy of production systems in many countries is due to the fact that the production cycle is often too long, with insufficient carcass weights.

B. A significant and lasting change in that situation can only be achieved through the activity of a downstream co-ordinating centre (meat industry) which would determine, together with the appropriate research and development bodies, the range of younger products which it would be feasible and worthwhile to develop in the country, and would ensure the promotion of such products by guaranteeing markets and contractual relations with the producers. These contractual agreements would define the type of product, the delivery schedule, and the technical and financial assistance (loans) to be made available to producers.

C. Such progress can only come about by promoting the division of labour or, in any case, by encouraging a clear distinction between production cycles, i.e. between:

- Rearing centres (breeding herds, herdsman); and
- Fattening centres (pasture fattening or finishing units).

D. Many development experiments have been attempted on this basis, but always using industrial feedlots on a greater or lesser scale. These experiments have often failed, owing to a lack of feedstuffs that can be produced industrially (the feedlot has been developed on a large scale primarily in the United States because of the country's cereal and oil-cake resources), to the heterogeneous nature of the local livestock and difficulties in organizing supplies, or to problems in the administration and management of the units.

E. Development based on small farm fattening units, as an integral part of the agricultural system, in order to make more efficient use of crop by-products, to process energy-producing feedstuffs cultivated

specially in situ (tropical roots and tubers, leguminous shrubs), and to restore to the system the organic fertilizing needed for establishing the process of intensified cultivation and for preserving soil characteristics, should prove more promising. In many countries, farmers are not stockbreeders. However, various experiments lead to the conclusion that such farmers can readily absorb the techniques used in pasture fattening, particularly when they perceive how these relate to their own plant cultivation systems and how useful it is to take this factor into account.

F. A meat industry that applies these principles will invest more in industrial plants (abattoirs) than in the production stage. Moreover, it has a greater role to play as a focus for organizing the development of production within small-scale, low-cost units, controlling and co-ordinating the supply of lean animals and regulating marketing. The policy objectives of such agro-industrial complexes should be:

- To encourage stockbreeders, whose customers they are, to increase the numbers of their female breeding animals by separating out the young from their herds at a relatively early age; it then becomes easier to promote genetic progress by means of appropriate cross-breeding formulae;
- To find settled farmers as partners in order to develop the fattening process.

The same pattern of division of labour could be developed around dairy herds when the species in question is used for milk production in the country concerned.

- 2.5 The marketing policy of these centres of development is conditioned by a country's economic situation with regard to meat. In some countries, particularly in Africa, organization of the production chain as a whole is only feasible at the level of two or more countries because of differences in stock farming and consumption.
- 2.6 All technological developments in the meat industry are conditioned by the existence or development of the cold chain.
- 2.7 Areas of international co-operation for the promotion of red meat in the developing countries.

An analysis of the key factors reveals the priorities for action: other considerations will also need to be taken into account.

2.7.1 As a matter of priority, a major training campaign should be developed along two lines

(a) Training of decision-makers, at the individual country level, in preparing policies and strategies for developing food and agricultural resources. These would take into account all the characteristics, specific features and potential of a country in order to define the objectives which it is possible and reasonable to assign to an animal species for the purpose of an overall improvement in food resources.

(b) Training managers of formal production, organization and distribution complexes or units in the meat industry.

The role of this type of development promoter is strategically important. Only a few training courses along these lines are at present being conducted.

2.7.2 Research programmes should be encouraged or developed, principally along the following lines:

(a) Greater knowledge of forage plant material available throughout the world;

(b) A comparative study, from both the stockbreeding and the economic points of view, of alternative meat production systems based on the marketing of younger animal types;

(c) Attitudes and behaviour of stockbreeders/rearers with regard to the earlier sale of animals not intended for breeding; effects on their economic performance;

(d) Technological research into the effects that lowering the age for slaughter would have on the quality of meat and its suitability for preservation, in the light of local conditions;

(e) A study of the requirements for least-cost development of the industrial and commercial infrastructure, and of the cold chain in particular, is relevant to, and decisive for, the development of fresh meat but is not a specific problem of red meats.

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Figure 1. Trend in the share of red meat in world meat production

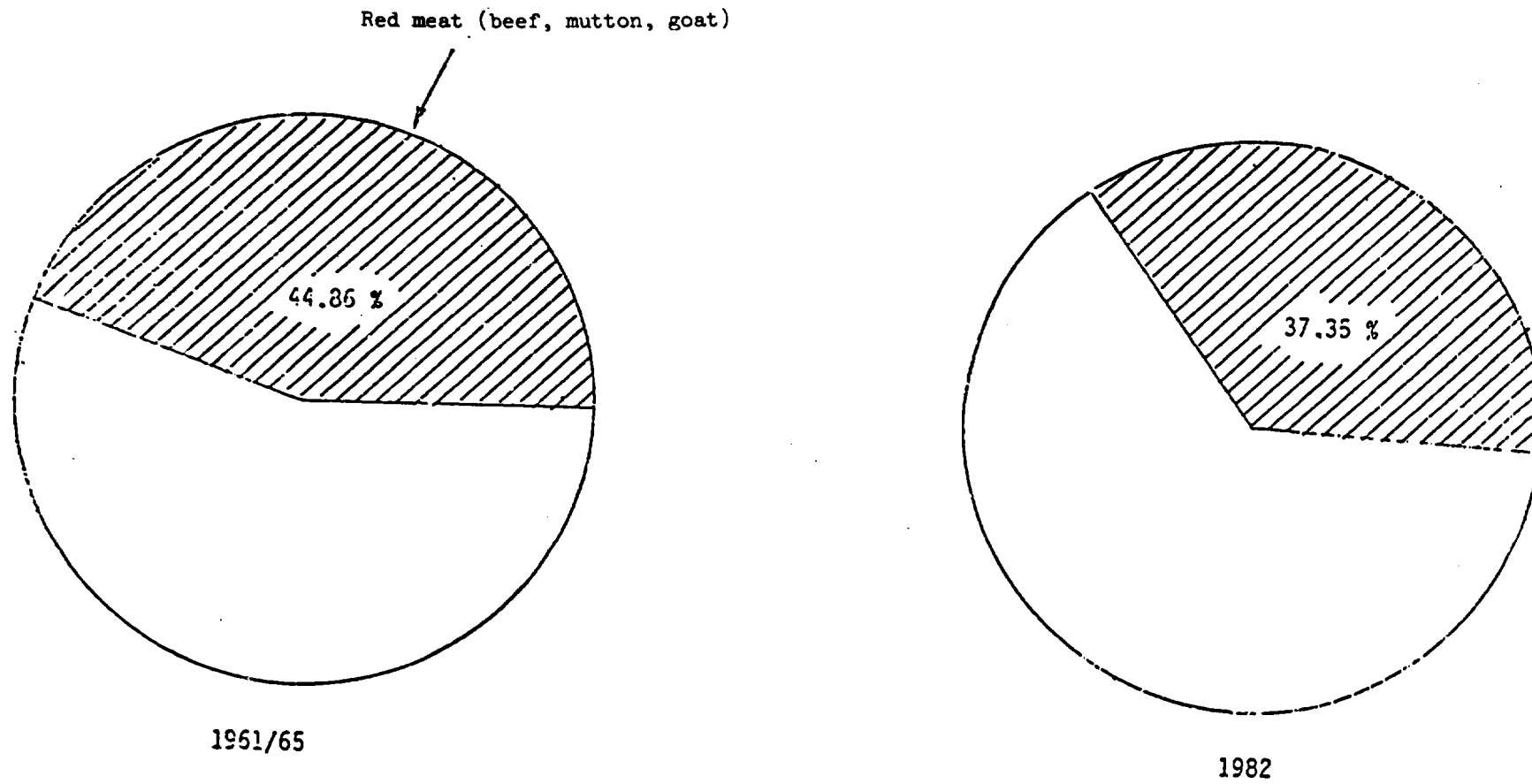


Table 1. World trend in stocks of red meat-producing animals between 1961-65 and 1982

	1961-1965 (average)		1982		
	10 ⁶ head	Index	10 ⁶ head	Index	head/ha
Cattle and buffalo	1,100.5	100	1,348.5	122	≈ 0.103
Sheep and goats	1,395.5	100	1,630.5	117	≈ 0.125
TOTAL	2,494	100	2,979	119.4	0.228

Source: FAO

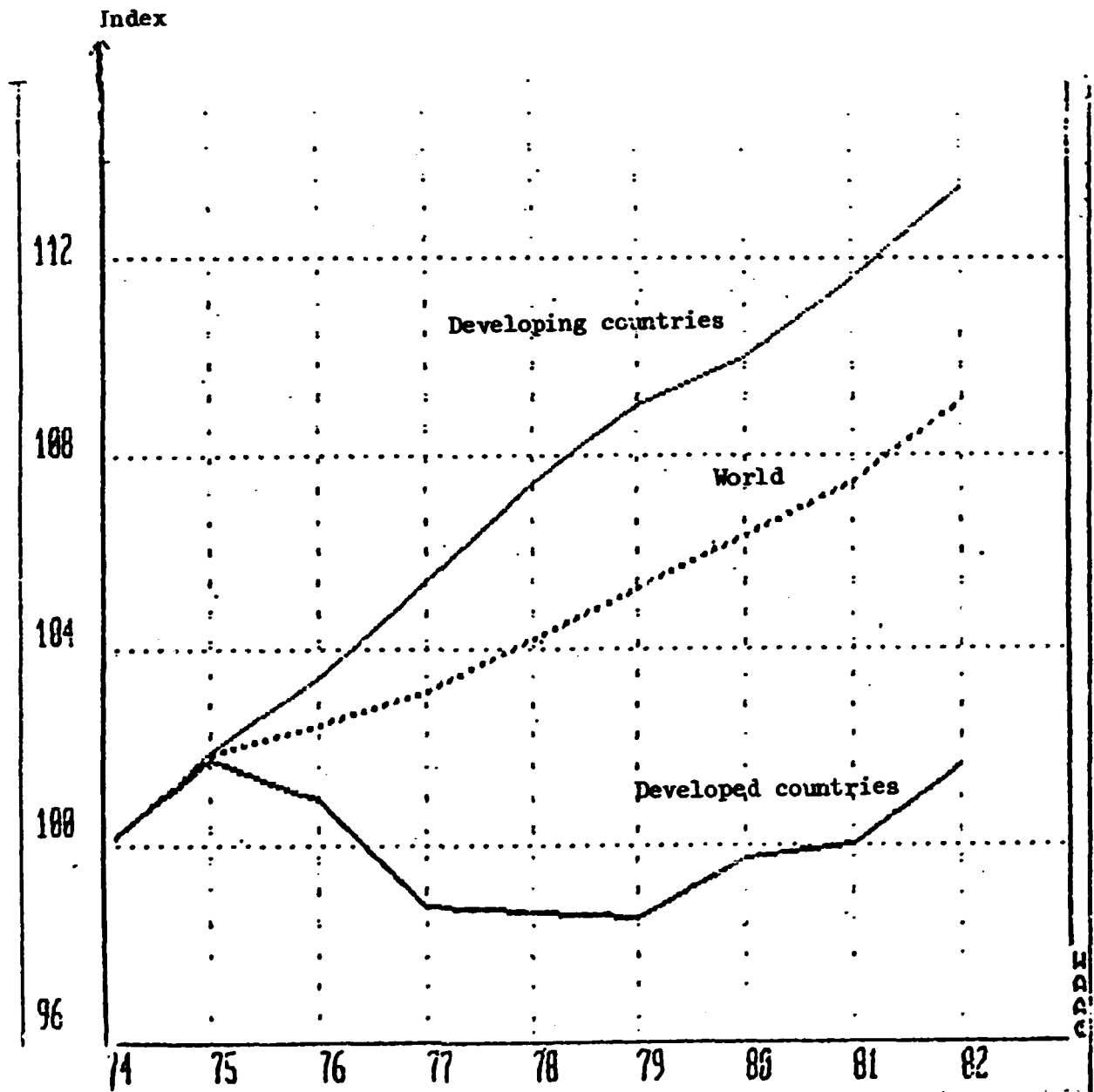
Table 2. Trend in stocks of red meat-producing animals in industrialized and developing countries between 1961-65 and 1982

		1961-1965 (average)			1982			
		10 ⁶ head.	%	Index	10 ⁶ head	%	Index	head/ha
Cattle and buffalo	Industr. countries	357.6	32.5	100	428	31.7	119.7	0.078
	Developing countr.	742.9	67.5	100	920.5	68.3	123.9	0.121
Sheep and goats	Industr. countr.	579.9	41.6	100	568.6	35	98.1	0.104
	Developing countr.	813.7	58.4	100	1,061.9	65	130.5	0.140

Source: FAO

ha (hectare): farmland

Figure 2. Trend in stocks of ruminants in different parts of the world
(1974 = base 100)



Source: FAO

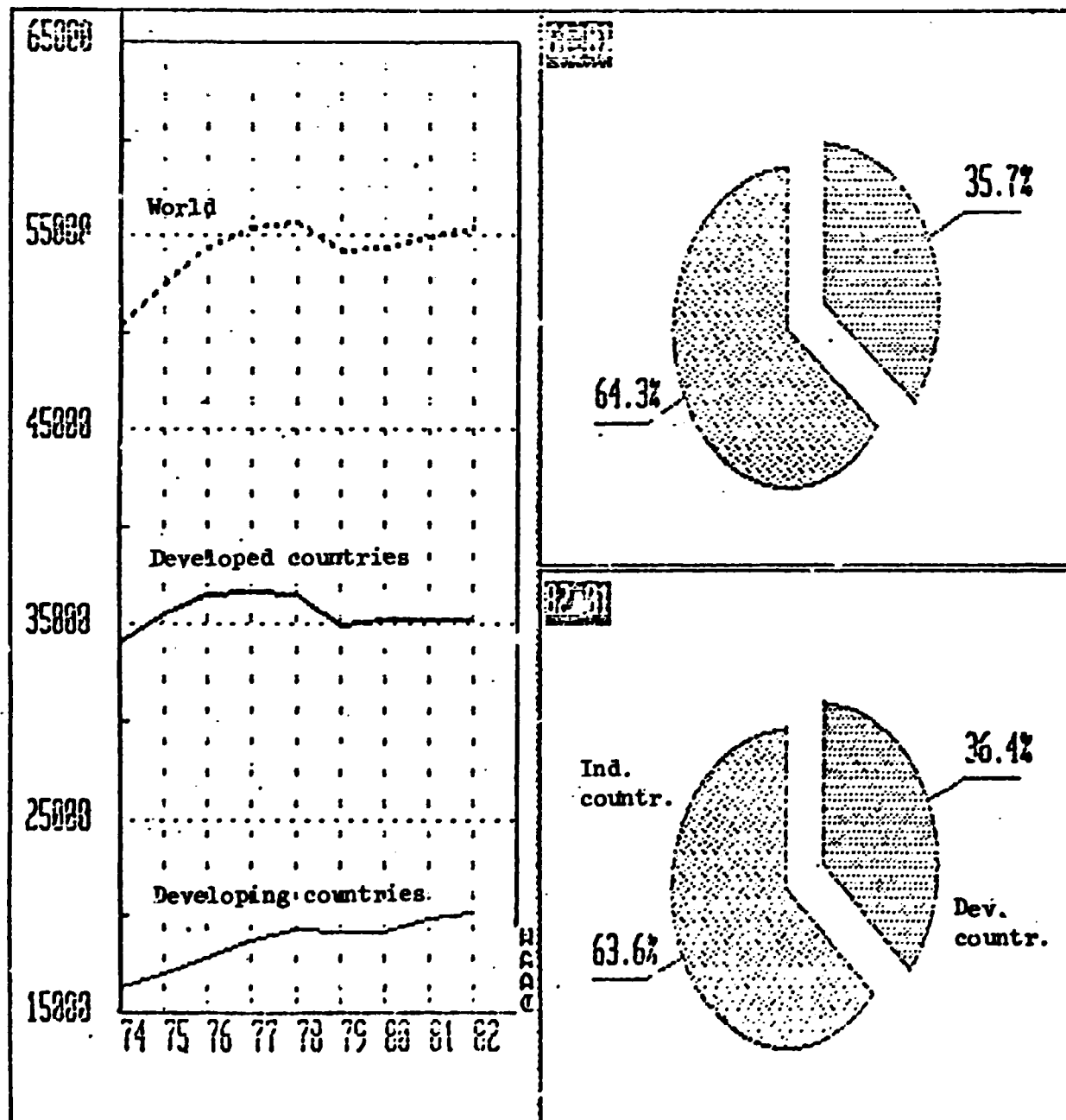
Table 3. Trend in world red meat production between 1961-65 and 1982

	1961-65 (average)				1982			
	10 ⁶ tons	%	Index	Kg/ head	10 ⁶ tons	%	Index	Kg/ head
Industrialized countries	24.7	64.3	100	26.3	35.15	63.6	142.3	35.3
Developing countries	13.8	35.7	100	8.9	20.15	36.4	146.0	10.2
World	38.5	100	100	15.4	55.3	100	143.6	18.6

Source: FAO

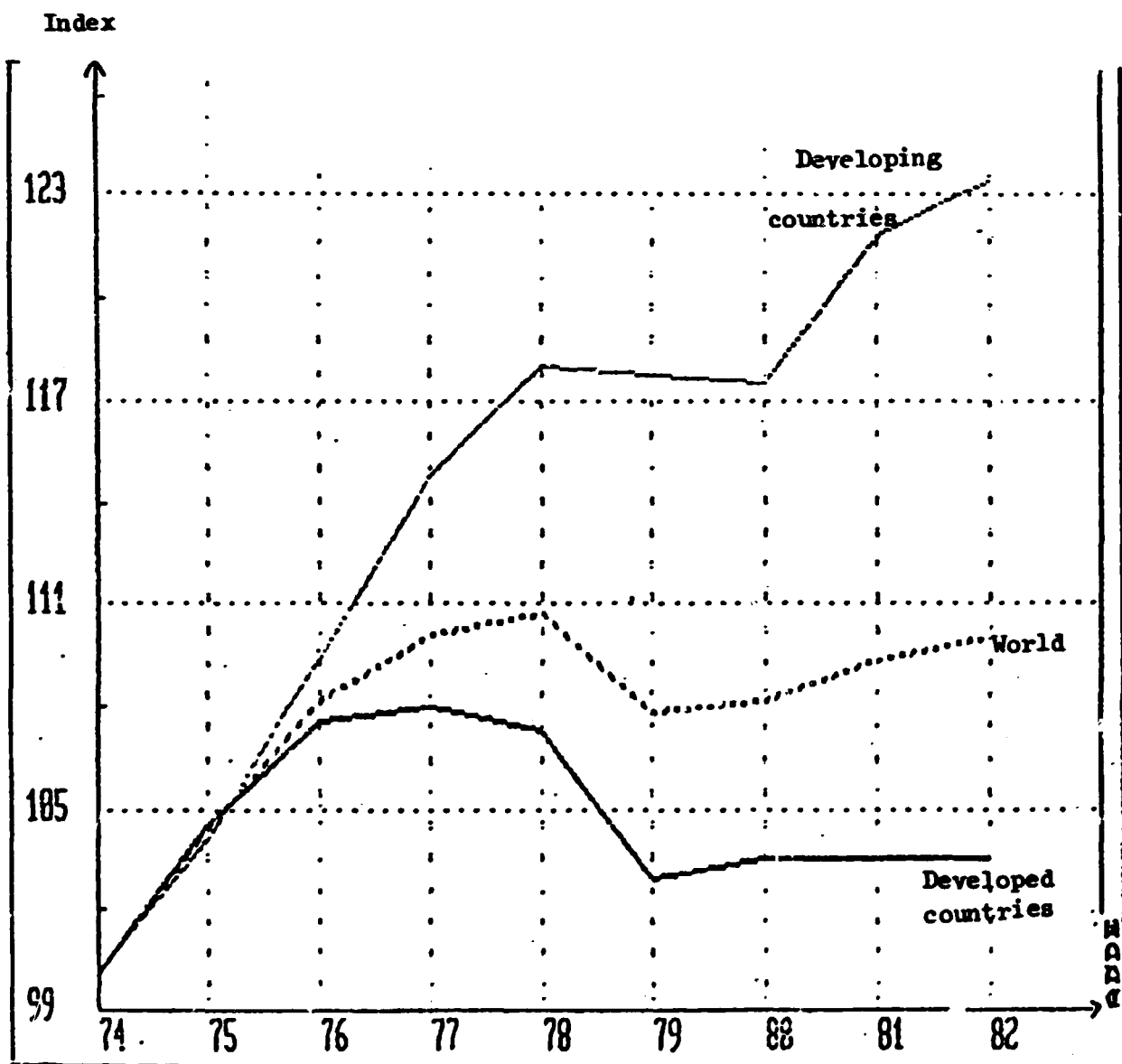
Figure 3. Trend in world red meat production

10³ tonnes



Source: FAO

Figure 4. Trend in red meat production since 1974
(1974 = base 100)



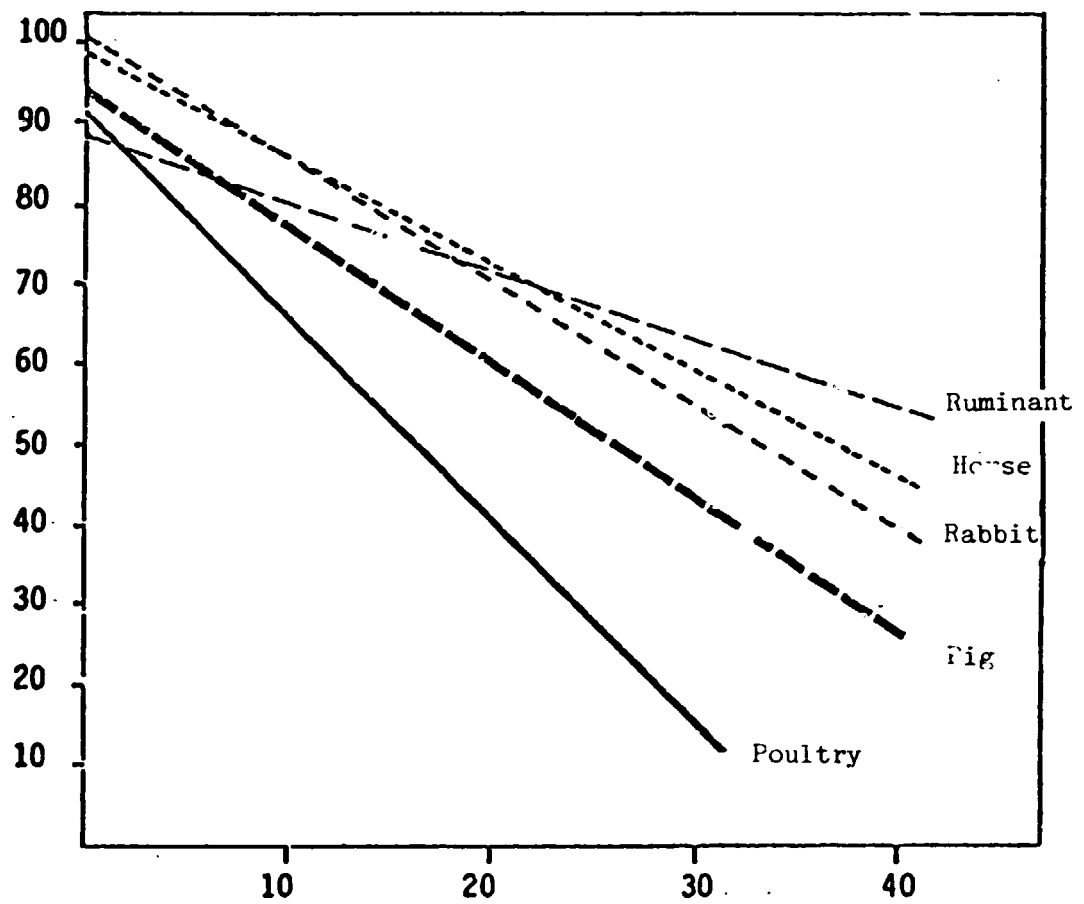
Source: FAO

Annex II

COMPARISON OF THE EFFICIENCY OF VARIOUS ANIMAL SPECIES

Figure 5. Variations in digestibility of organic matter according to the cellulose content of the ration for various animal species

Digestibility of organic matter (in %)



Raw cellulose as percentage of dry matter

- Other experiments suggest that the rabbit is in fact more sensitive to variations in cellulose content of the ration than the pig.

Source: AXELSSON, 1939

Table 4. Comparison of efficiency of certain animal species
(per cent of ingested proteins and energy)

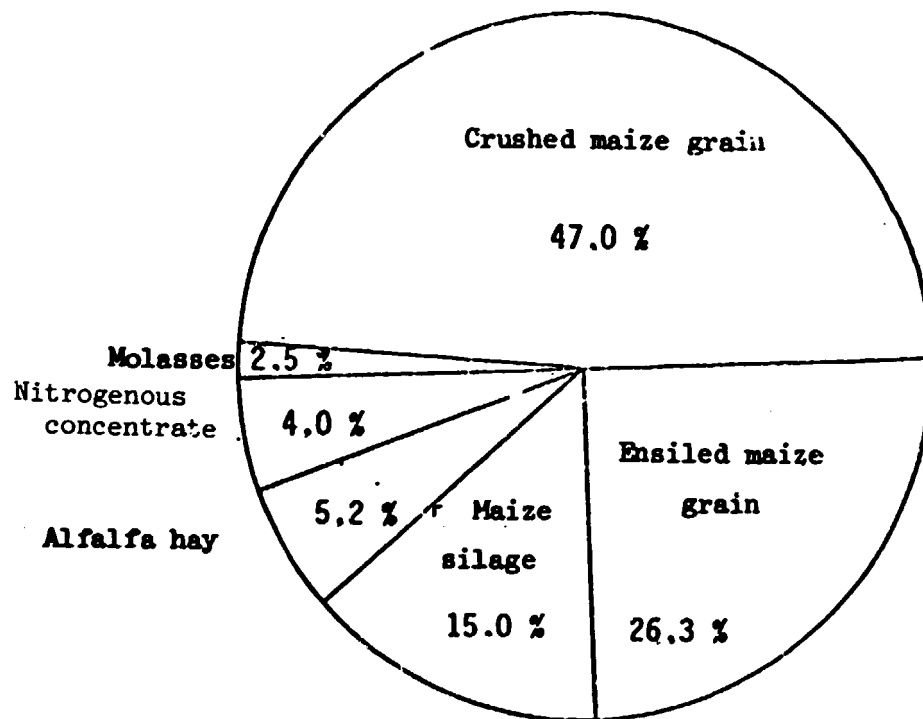
	Proteins	Energy
Layer chicken	26	18
Dairy cow	25	17
Chicken (meat)	23	11
Turkey (meat)	22	9
Pig	14	14
Beef cattle	4	3
Mutton sheep	4	

Source: WEDIN et al (1975)

Annex III

SOME DATA ON THE FEEDING SYSTEMS USED

Figure 6. Example of a feed regimen in an American feedlot



Source: E. MEISSONIER (40)

Table 6. Estimated annual feed requirements for livestock and poultry production, by socio-economic group, 1977-78

Type of Livestock	Socioeconomic Group	Grain	Protein meal	By-products	Forage and Other	Total Feed Use
----- billion Mcal -----						
Poultry	Developed	170.0	52.5	19.6	0	242.2
	Centrally Planned	143.0	22.0	29.0	41.8	235.8
	Developing	74.9	16.6	24.8	9.8	126.1
	Total	387.9	91.1	73.4	51.7	604.1
Sheep and Goats	Developed	11.4	3.3	8.3	276.2	299.2
	Centrally Planned	10.2	2.0	17.1	207.0	236.3
	Developing	2.0	0	10.4	510.7	523.1
	Total	23.6	5.3	35.8	993.9	1058.6
Cattle and Buffalo	Developed	272.1	24.9	55.1	1055.8	1447.9
	Centrally Planned	187.2	7.0	105.4	676.5	975.1
	Developing	48.0	10.9	43.7	2329.0	2431.6
	Total	507.3	42.8	204.2	4101.0	4855.5
Swine	Developed	263.5	38.1	37.4	0.5	339.5
	Centrally Planned	173.6	14.0	144.7	96.0	428.3
	Developing	23.8	3.9	31.0	60.7	119.4
	Total	460.9	56.0	213.1	157.2	887.2
Draught Animals	Developed	27.0	5.1	6.0	352.4	490.5
	Centrally Planned	26.6	0	8.6	265.2	300.4
	Developing	4.3	0.8	8.9	897.3	911.3
	Total	57.9	5.9	23.5	1214.9	1302.2
All Livestock	Developed	744.0	123.9	126.4	1424.7	2419.0
	Centrally Planned	540.6	45.0	304.8	1286.5	2176.9
	Developing	153.0	32.2	118.8	3807.5	4111.5
	Total	1437.6	201.1	550.0	6518.7	8707.4

Source: Winrock International

Annex IV

OUTLINE OF THE ORGANIZATION OF THE RED MEAT PRODUCTION
CHAINS IN DIFFERENT PARTS OF THE WORLD

Figure 7. The red meat production chains in developing countries

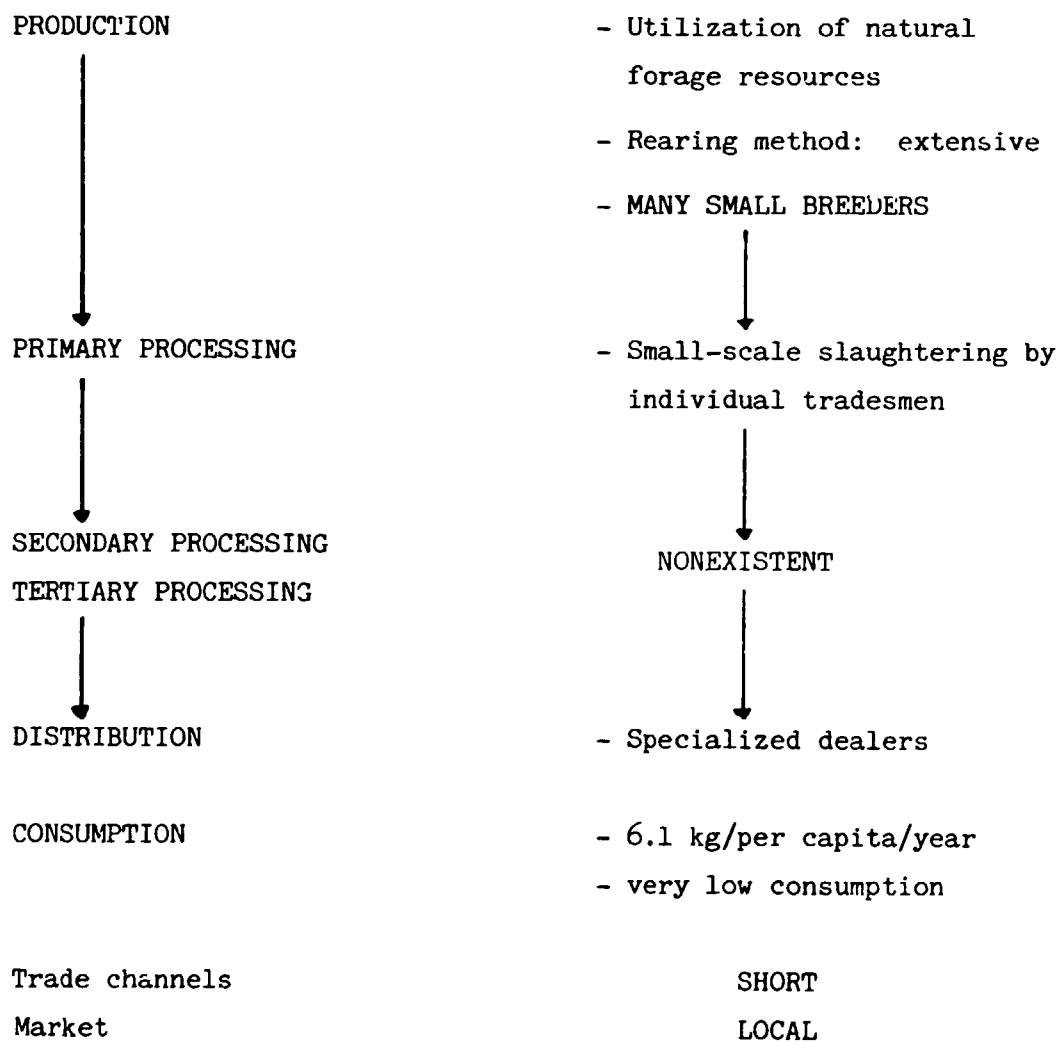
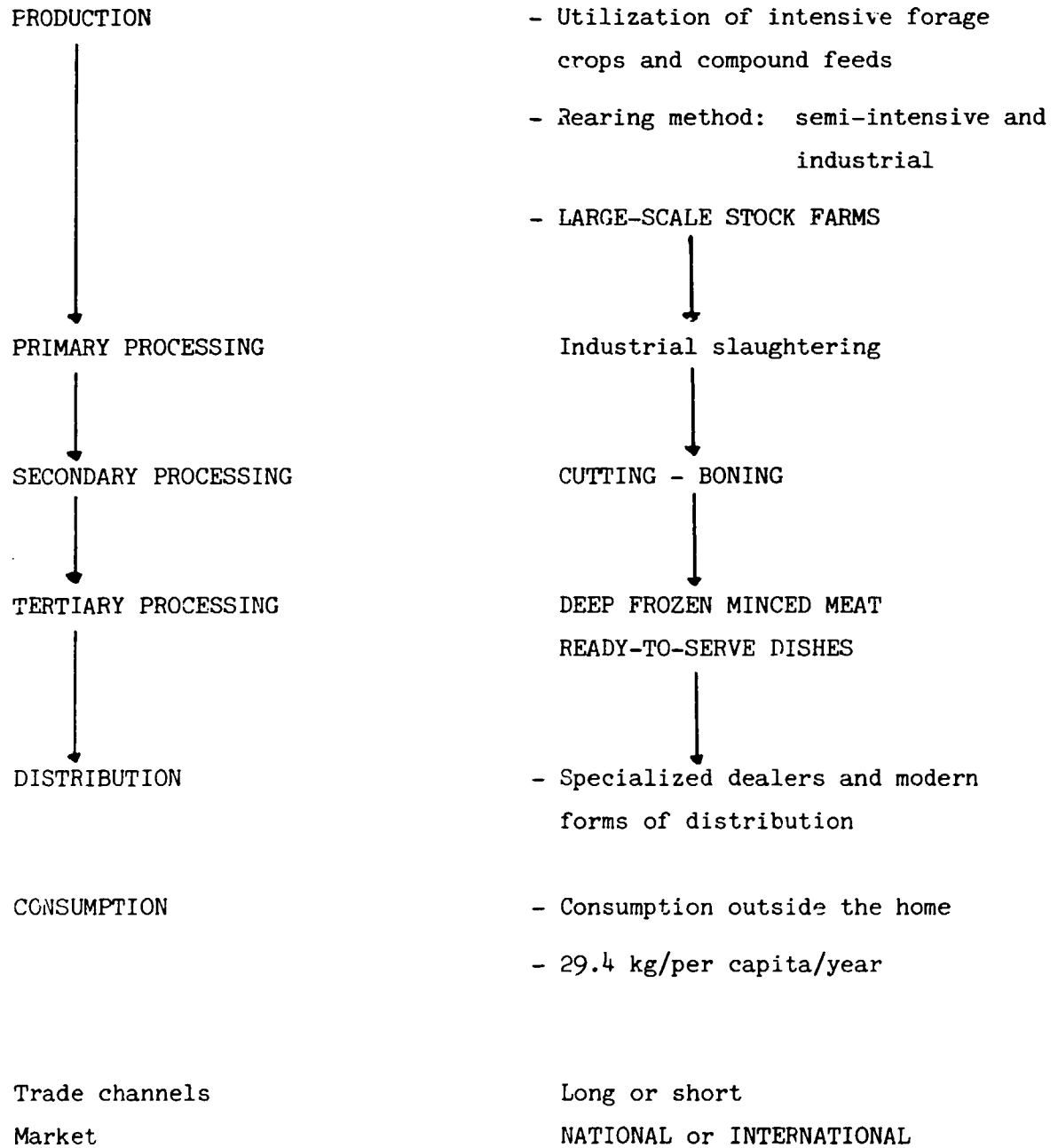


Figure 8. The red meat production chains in developed countries



Annex V

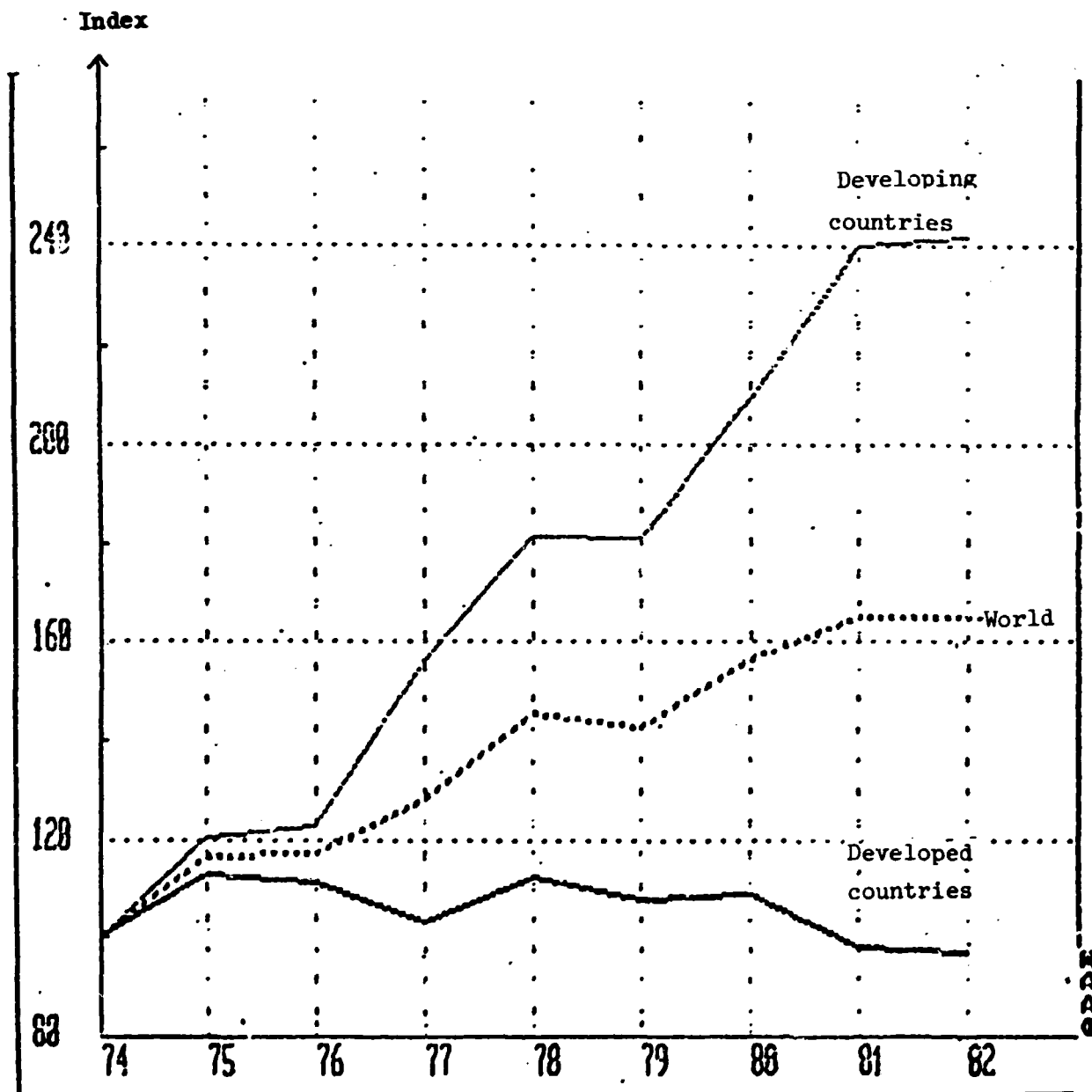
TABLES AND FIGURES ON WORLD TRADE IN RED MEAT

Table 7. Trends in foreign trade in live animals in industrialized and developing countries between 1965 and 1982

	1965			1982		
	10 ⁶ head	%	Index	10 ⁶ head	%	Index
IMPORTS						
Industrialized countries	5.25	47	100	8.0	31	152.4
Developing countries	5.92	53	100	17.8	69	300.7
EXPORTS						
Industrialized countries	3.16	27.3	100	15.9	60.6	503.2
Developing countries	8.43	72.7	100	10.34	39.4	122.7

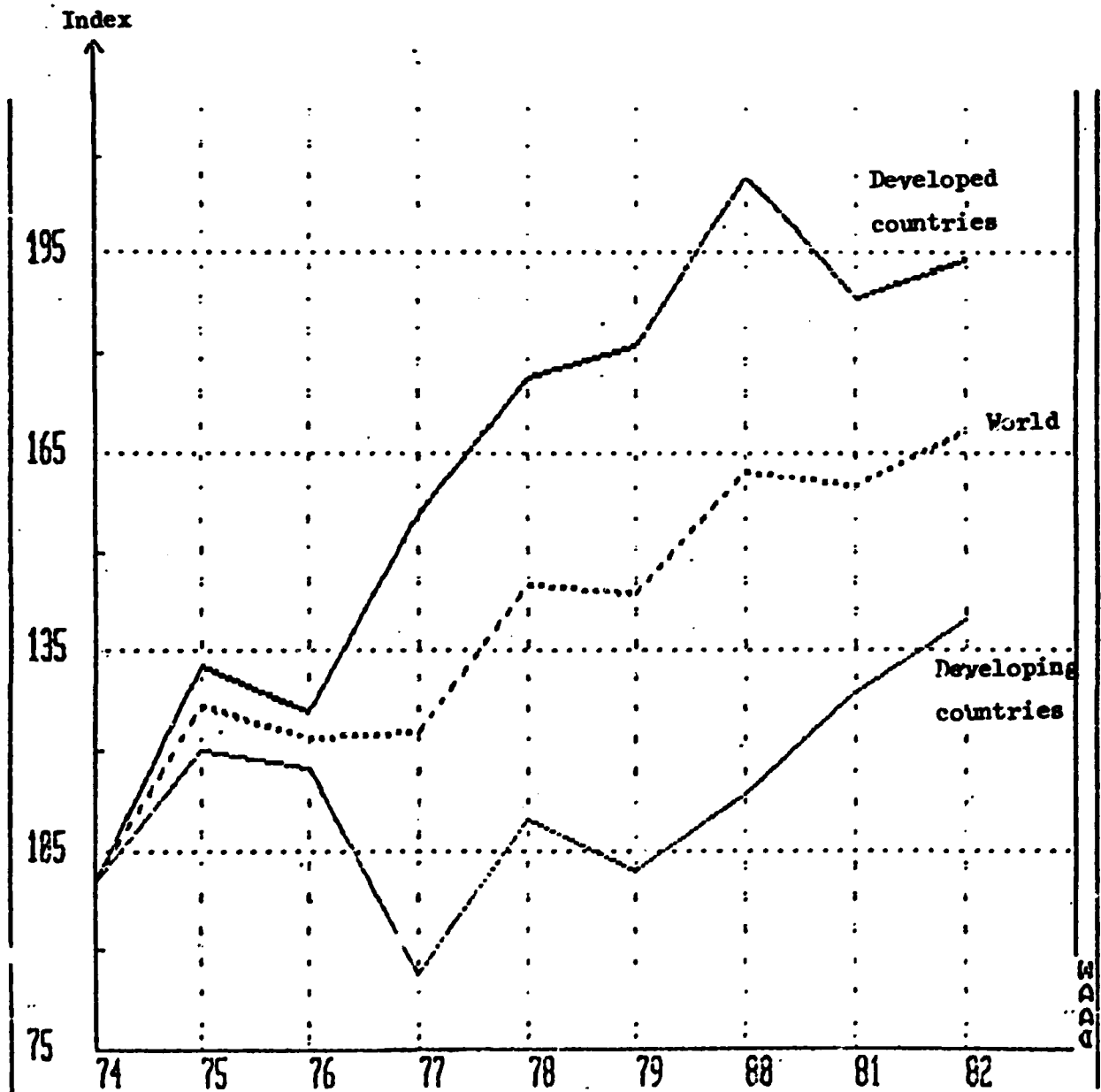
Source: FAO

Figure 9. Trends in imports of live cattle, sheep and goats between 1974 and 1982
(1974 = base 100)



Source: FAO

Figure 10. Trends in exports of live cattle, sheep and goats between 1974 and 1982
(1974 = base 100)



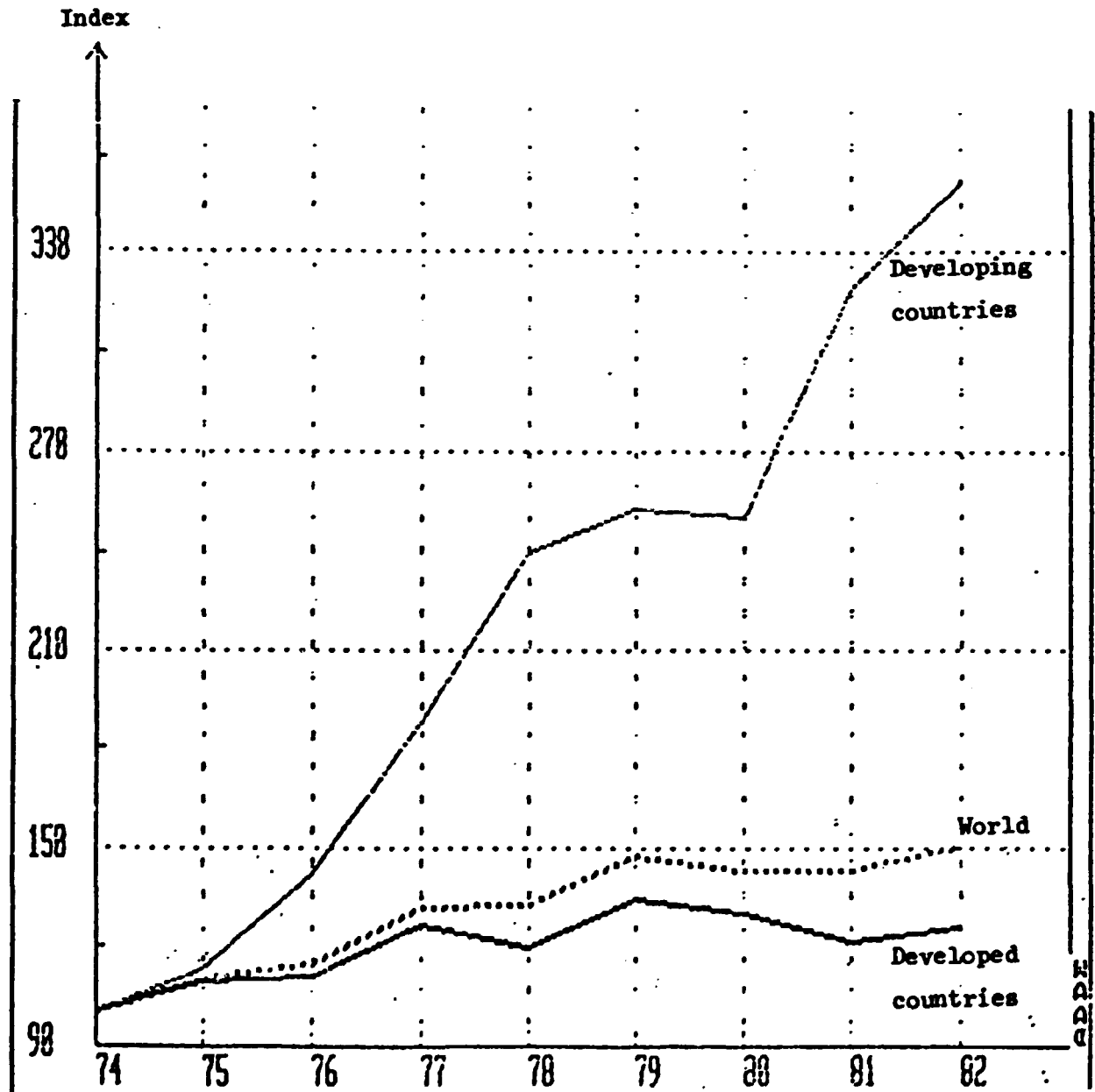
Source: FAO

Table 8. Trends in foreign trade in red meat in industrialized and developing countries between 1965 and 1982

	1965			1982		
	10 ⁶ tons	%	Index	10 ⁶ tons	%	Index
IMPORTS						
Industrialized countries	1.790	99.5	100	3.2	74.8	179
Developing countries	0.091	0.5	100	1.08	25.2	1200
EXPORTS						
Industrialized countries	1.416	70.7	100	3.351	80.7	236.6
Developing countries	0.586	29.3	100	0.8	19.3	136.5

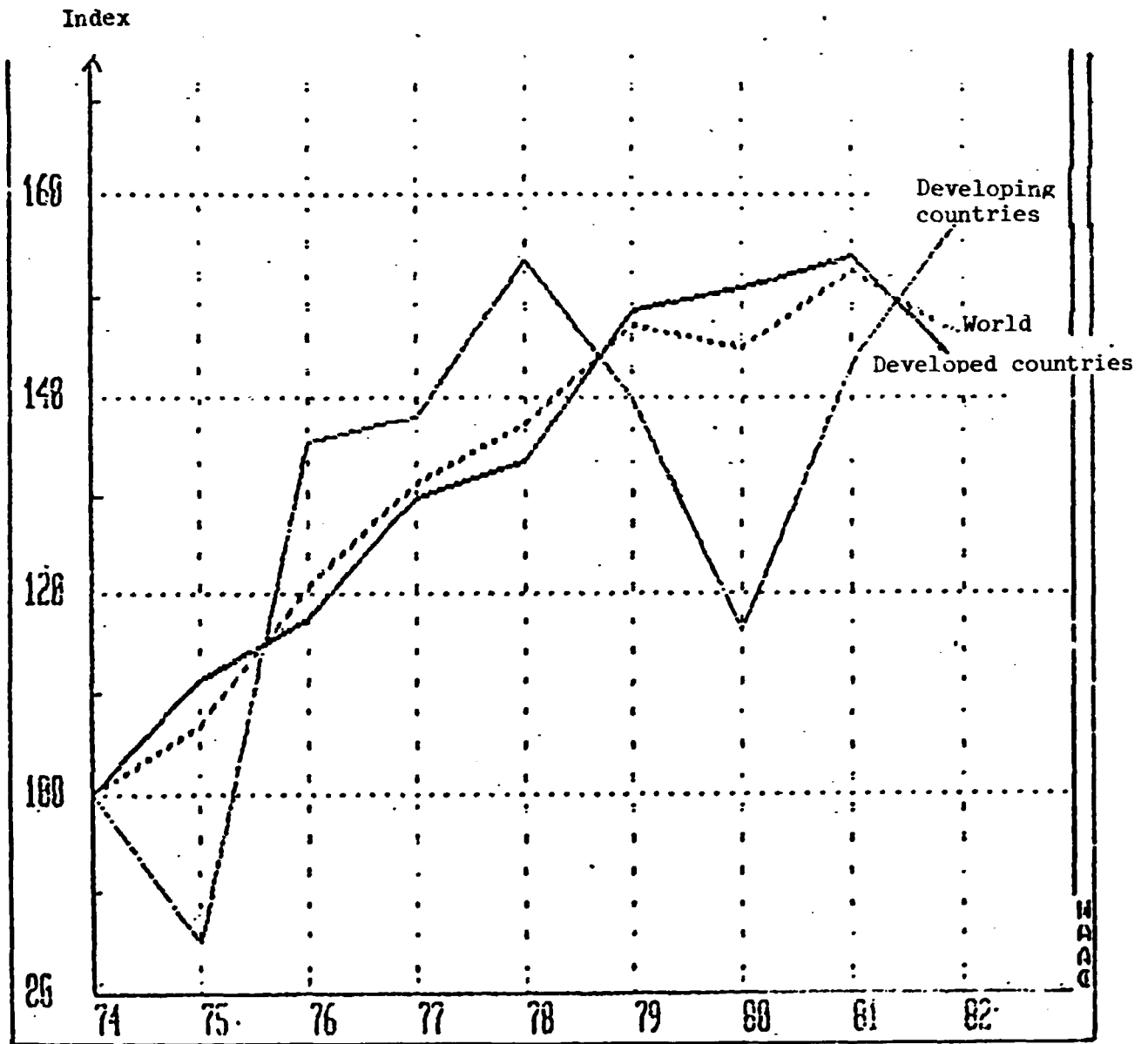
Source: FAO

Figure 11. Trends in world imports of red meat between 1974 and 1982
(1974 = base 100)



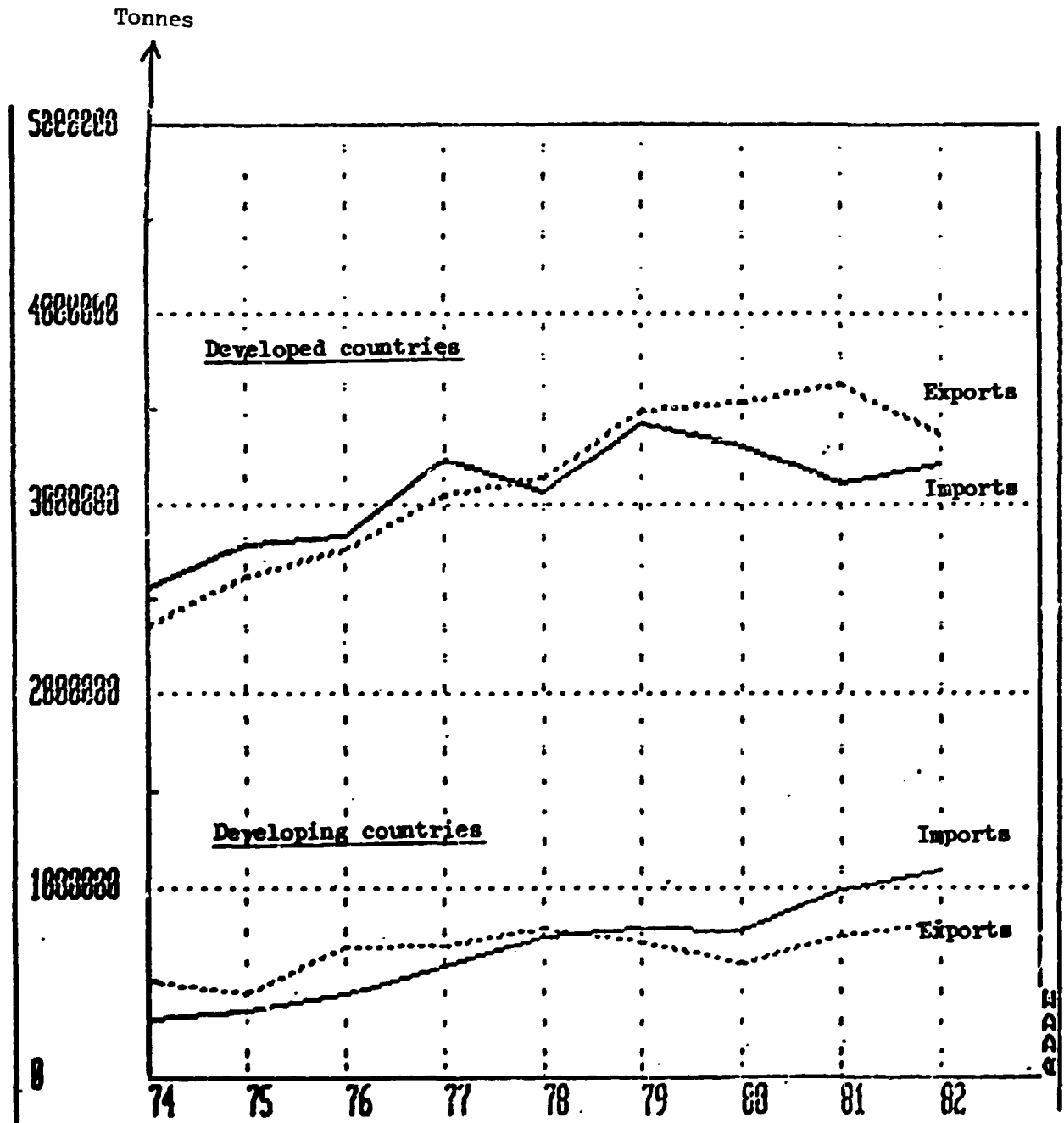
Source: FAO

Figure 12. Trends in world exports of red meat between 1974 and 1982
(1974 = base 100)



Source: FAO

Figure 13. Trends in foreign trade in red meat in industrialized and developing countries between 1974 and 1982



Source: FAO

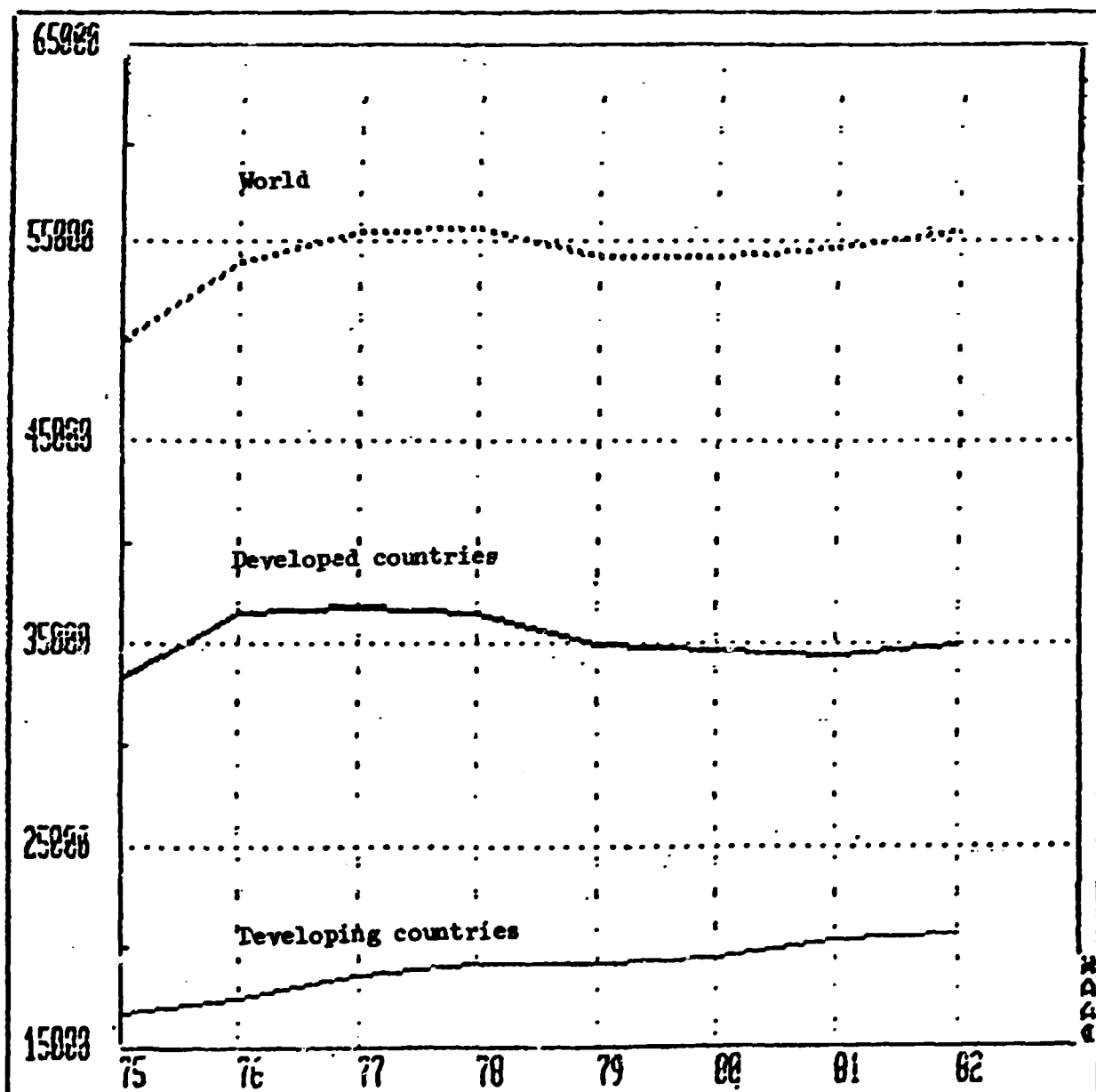
Table 9. Trends in the consumption of red meat over the last 20 years

	1961-1965 (average)				1982			
	Consumption 10 ⁶ tons	%	Index	Per capita consumption in kg	Consumption 10 ⁶ tons	%	Index	Per capita consumption in kg
Industrialized countries	25.07	65.3	100	24.5	34.84	62.8	139	29.4
Developing countries	13.31	34.7	100	5.9	20.65	37.2	155	6.1
World	38.38	100	100	11.7	55.49	100	144.6	12.1

Source: FAO

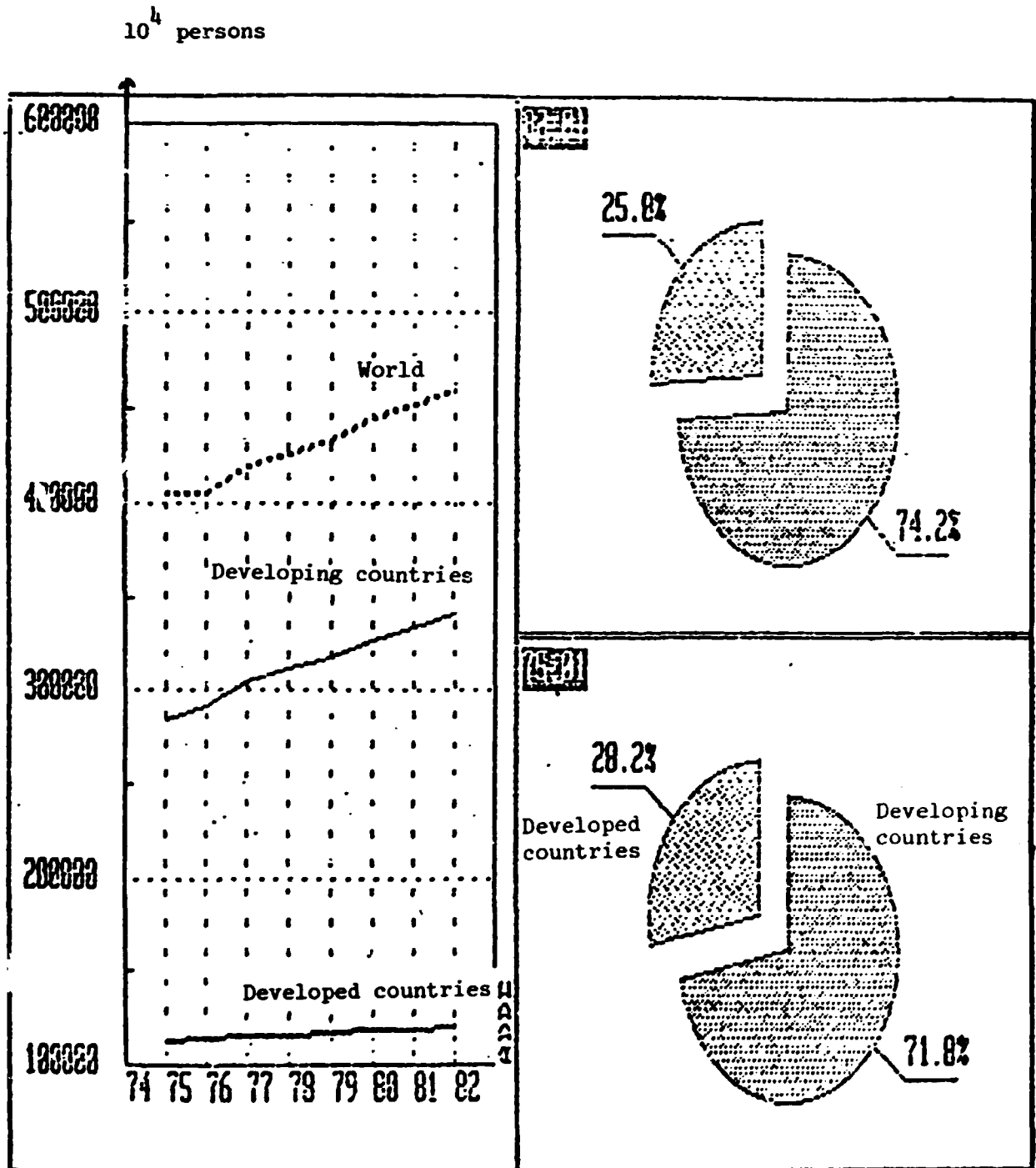
Figure 14. World trend in red meat consumption

10^3 tonnes



Source: FAO

Figure 15. World population trend



Source: FAO

