MAATALOUDEN TALOUDELLISEN TUTKIMUSLAITOKSEN JULKAISUJA N:o 38
PUBLICATIONS OF THE AGRICULTURAL ECONOMICS RESEARCH INSTITUTE FINLAND, No. 38

THE ECONOMY OF BEEF PRODUCTION

THE THIRD FINNISH-HUNGARIAN-POLISH
SEMINAR ON AGRICULTURAL ECONOMICS,
FINLAND, JUNE 11-15, 1979

HELSINKI 1979

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Introduction

The third trilateral seminar of Finnish, Hungarian and Polish agricultural economists was held in Finland June 10-15, 1979. There were three participants from Hungary, six from Poland and nine from the host-country in the seminar. The topic of the seminar was the economy of beef production consisting of three different themes. One paper from every country dealt with problems of general aspects of beef production and consumption. The second theme was marketing and price problems, and under this item three papers were presented. The problems of efficiency and profitability of beef production were discussed in the last five papers.

This publication of the Agricultural Economics Research Institute in Finland presents results of the seminar by publishing all seminar papers. We can see that the agricultural production between these countries varies very much in practice but some problems of beef production are, in many respects, nearly the same in all participating countries. The Finnish hosts of the seminar would like to thank all the participants for their great activity and help in arranging this successfull seminar in Finland. We also wish that all the large material concerning beef economy prepared for the seminar, will be intensively used when planning beef sector in agriculture.

Helsinki, August 6, 1979

THEME I.

GENERAL ASPECTS OF BEEF PRODUCTION AND CONSUMPTION

PRODUCTION, CONSUMPTION AND FOREIGN TRADE IN BEEF IN FINLAND 1960-1985

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1. The position of beef in Finnish agriculture

In view of Finland's northern location, animal husbandry, i.e. milk and beef production, plays a central role in Finnish agriculture. According to the total calculations compiled by the Agricultural Economics Research Institute, cattle have in recent years accounted for about 75 % of the total return of agriculture, beef for a scant 20 %. The following figures demonstrate the significance of beef production for Finnish agriculture as a whole (see SILTANEN 1977, p. 65).

	% of beef in total agricultural output
1960/61	9.7
1964/65	10.5
1970	19.6
1978	19.8

Finnish agriculture has in recent years undergone a major structural change, both productional and regional. In consequence milk production has shifted northwards. Since beef is almost always produced jointly with milk, a similar shifts has also taken place in beef production.

In order to make production more or less equally profitable in different parts of the country, regional premiums are paid on beef. This regional premium is graded to that beef producers in the most northerly part of the country are paid a supplement, which at the moment amounts to 4 mk per kg. Some of the island regions are also eligible for premiums of beef production. It is difficult to draw any conclusions as to whether beef production

has shifted northwards specifically as a result of these production premiums. It would appear more likely that production of milk shifted first, and this in turn increased beef production in the same regions.

At the moment beef holds a special position in Finland's agricultural policy in that it is not subject to any measures restricting production. The present Farm Income Act lays down individual targets for milk, pork, eggs, cereals and fodder grain over the period 1979-81. Farming itself must finance the marketing of any surplus above the production limit. Beef, however, is subject to no limit, the reason being that the production and consumption of beef have been well balanced over the past few years. In practice the fact that there is no production limit means that the government is favourably disposed to increasing beef production. This is evident in the fact that the trend in the producer price of beef has been highly favourable compared with that of, for example, pork in recent years.

2. Production and its structure

In 1960 Finland produced about 70 million kg of beef. By 1978 production had risen to about 106 million kg (Figure 1). The rise in production was rapid in the '60s, but as the Figure shows, the rise in production has virtually come to a halt in the '70s. Quantitatively pork production overtook beef in 1971.

Between 1960 and 1978 the structure of production underwent a major change. In the early '60s about a third of production was veal. Nowadays about a third of the quantity produced is cow's meat and the remaining two thirds the meat of bulls, heifers and young bulls raised specifically for meat production. The proportion of veal has dropped to a few per cent. It may even be claimed that beef used to be a by-product of milk production. Nowadays production in Finland is becoming increasingly specialized, even though a large proportion of the beef is still produced jointly with milk. About 20 % of the beef at present produced is estimated as coming from farms specializing in beef production.

Since beef production in Finland is based on the combined production of milk and beef it is obvious that the number of dairy cows determines the extent of beef production. The connection between the number of cows and beef production has been clearly visible in the '70s (see Figure 2).

The breed distribution of Finnish cows is shown in Figure 3. Ayrshires are by far the most important breed in Finland. It is worth noting the marked reduction in Finncattle this decade. The increase in Frisian cows, especially in the latter half of the decade, has been noticeable.

There are very few beef breed cattle in Finland. Last year there were an estimated 2,500, distributed as follows:

Hereford	1 900
Aberdeen Angus	500
Charolais	100

In addition to these beef breeds there are also some crossbreeds of these and dairy breeds, the most important being Charolais and Hereford crossbreeds. In combined milk and beef production efforts are made to have dairy cows served almost without exception by some dual-purpose breed, most often Frisians. The Frisian crossbreeds are in fact among the most important from the point of view of beef production. This explains why the number of Frisians has risen rapidly in recent years (Figure 3).

One factor influencing the increase in beef production is the rise in the average carcass weight of cattle. In 1960 the average carcass weight of cattle excluding cows was about 40 kg. It is now already about 160 kg (Figure 4).

The main reasons why developments have been so rapid are the change in the breed distribution (Finncattle are much smaller than others), the reduction in the production of veal, and breeding for improvement. Due to these factors the average carcass weight has risen about 6.5 kg a year.

Efforts have been made in recent years to raise the producer price of beef (Figure 5). At the moment the producer price of beef is considerably higher than that of pork. The aim here is to increase producers' interest in beef. For the same reason a price supplement is paid for animals with a carcass of more than 160 kg. It is also evident from the Figure that even at the beginning of the '60s the producer price of pork was still higher than that of beef.

3. Consumption

Consumption of both beef and pork has developed very favourably in Finland in the '60s and '70s (Figure 6). In the first half of the '60s consumption of beef was greater than that of pork, yet in 1978 the consumption of pork was 27 kg per capita and that of beef 22 kg per capita.

The increase in the consumption of pork is explained in part at least by the trend in the retail prices of pork and beef. Chiefly because of the producer prices the retail price of beef has risen more rapidly than that of pork (Figure 7). Other reasons why the consumption of pork has risen, apart from the lower price, are the improvement in the quality of pork and the fact that certain cooking methods, such as grilling in the open air, have specifically favoured pork rather than beef. It is also plain that the consumption of poultry and elk meat have affected beef more than pork. Incidentally, the consumption of elk meat in Finland has in recent years been about 1 kg per capita and of poultry about 3 kg per capita. This, in addition to the other factors has presumably meant that consumption of beef has decreased in the last few years.

Finland has an established tradition of supply and demand studies concerning beef (e.g. KETTUNEN, 1968, PÖLKKI 1971). These studies and subsequent analyses prove that both pork and beef have a high

income elasticity (1.0). Consumers appear to react to changes in the retail price of beef much more strongly (price elasticity -0.5). than they do to changes in the price of pork (price elasticity -0.1). Pork seems to be a strong substitute for beef, whereas there do not seem to be any substitutes for pork.

4. Foreign trade

Finnish exports of beef were considerable at the end of the '60s and beginning of the '70s (see Figure 8). The reason for this was that at that time many cows were slaughtered in order to cut milk production. The chief export areas were the Nordic countries and the Continent. With the exception of last year, when 0.8 million kilos of beef were exported, beef has not been exported as such since 1974. The export quantities in the Figure 8 show the quantities of beef exported in processed meat products. These exports were to the Soviet Union only. As the domestic price was usually higher than the price received for exports, exporters were paid the difference out of public funds.

5. Future prospects

Obviously production of beef in Finland will be determined by the number of dairy cows in future, too, since the number of beef breeds is not expected to rise much. The bulk of the beef will thus continue to come from farms chiefly producing milk. In addition, beef production shows signs of increasing among part-time farmers. The reasons for this are that the labour requirement in beef production is very small, that even buildings in poor condition are suitable, and that straw can be used to advantage in beef production. Furthermore, beef production is less of an environmental hazard than pork.

As the number of cows decreases, beef production can be kept at its present level or be increased merely by raising the average carcass weights. In Figure 4 the rise in the average carcass weight is expected to have slowed down slightly by 1985, when it will be about 180 kg. This is based on the assumption that the present optimal carcass weight is about 160 kg (SIREN 1979, p. 434). It must further be noted that the influence of the earlier rise in average carcass weights due to the trend in breed distribution will diminish.

Over the long term merely raising average carcass weights is not, however, sufficient. Table 1 (HAGGREN & KETTUNEN 1976, p. 35) present one production alternative in which a further 60,000 bulls and heifers will be raised by 1985 by means of a heifer-raising programme. Their average carcass weights would correspondingly be 200 and 175 kg. This would yield 22.5 million kg more beef. The number of cows in 1985 is estimated at 600,000. All in all the meat output in 1985 would be 125.1 million kg. Note that last year the corresponding figure was 105.7 million kg.

The consumption of beef is expected to rise by 1985 to 23.5 kg per capita (KETTUNEN 1976, p. 391). The total consumption of beef would then be 110 million kg.

Assuming that the output of beef is increased by means of the heifer programme, it will be necessary to export 15 million kg in 1985. In the alternative production plan with no heifer raising it would be necessary to import 7 million kg of beef in 1985.

Table 1. Potential production of beef in 1985 when there are 600,000 dairy cows compared with the situation in 1978,

Species of animal	Carcass weight		No. of slaughter animals		Meat output million kg.	
	1978	1985	1978	1985	1978	1985
Young bulls	187	200	265,900	265,000		
Heifers	163	175	74,100	115,000		
Dairy cows	201	190	156,300	150,000		
Young bulls and calves	80	100	120,900	10,000		
Heifers-raising programme:						
More bulls		200		60,000		12.0
More heifers		175		60,000		10.5
Total meat output					105.7	125.1

Looking at the trend today, the above figures may be regarded as an extreme alternative. It seems that heifer-raising will not increase as much as assumed in Table 1. On the other hand, beef production in terms of average carcass weight alone may become greater. This being the case, it will hardly be necessary to export 15 million kg or import 7 million kg in 1985. It seems more likely that production and consumption will continue to be more or less balances in 1985.

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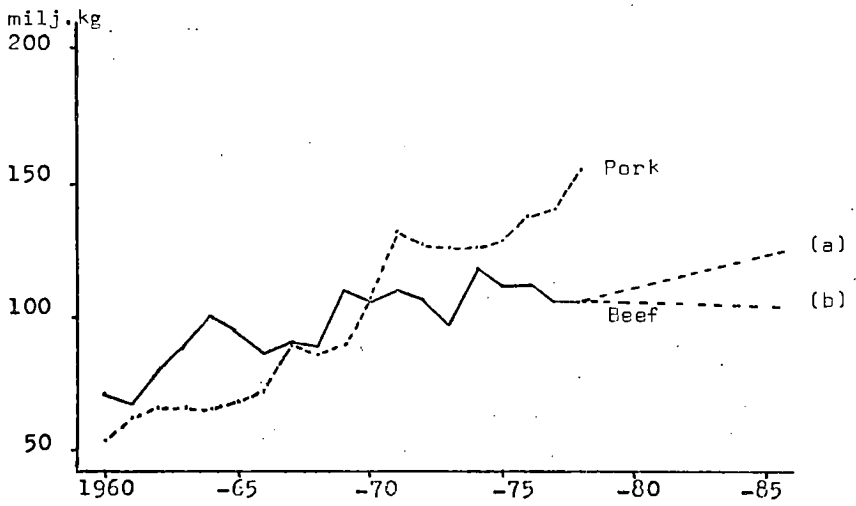
Figure 1. Beef and pork production in Finland 1960-78, with forecast on beef



(a) = production alternative with the heifer raising programme
(b) = -"- -"- without -"- -"- -"-

Figure 2. Development of beef production and number of cows

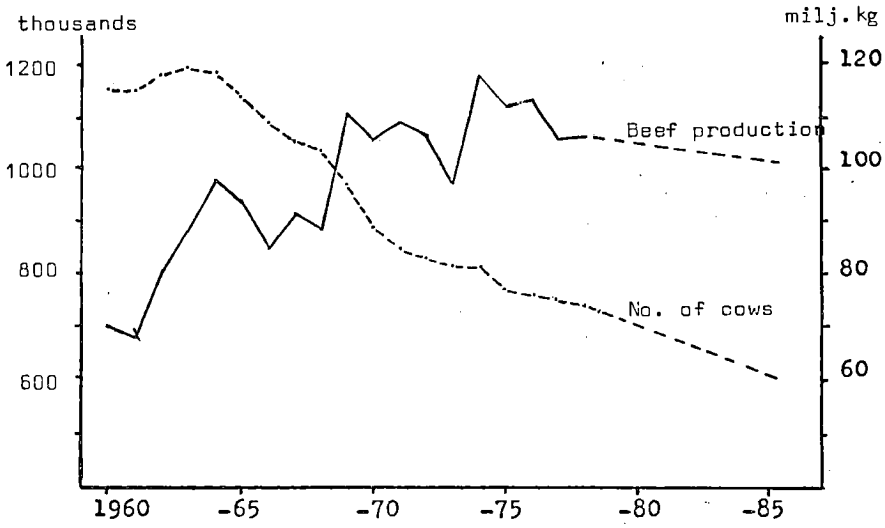


Figure 3. Breed distribution of Finnish cows 1969-78

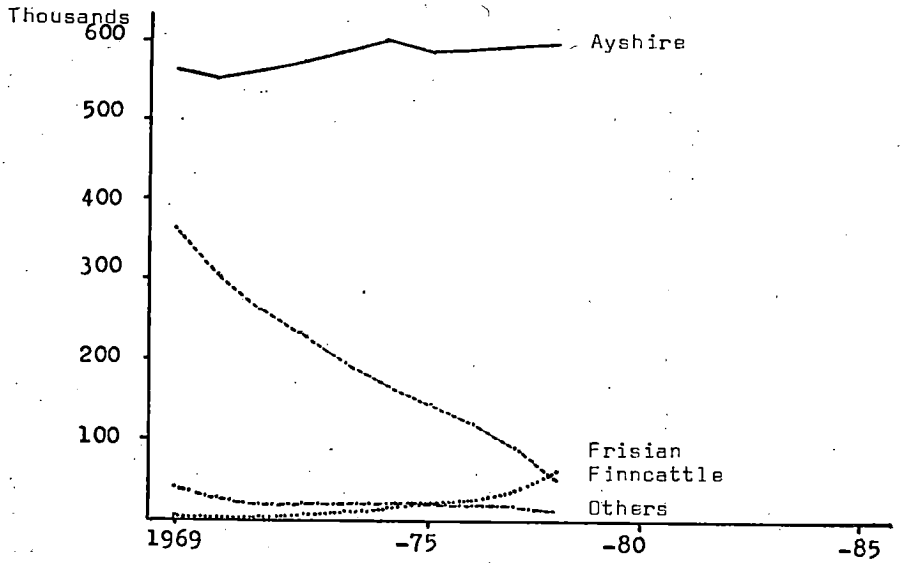


Figure 4. Development of average carcass weight

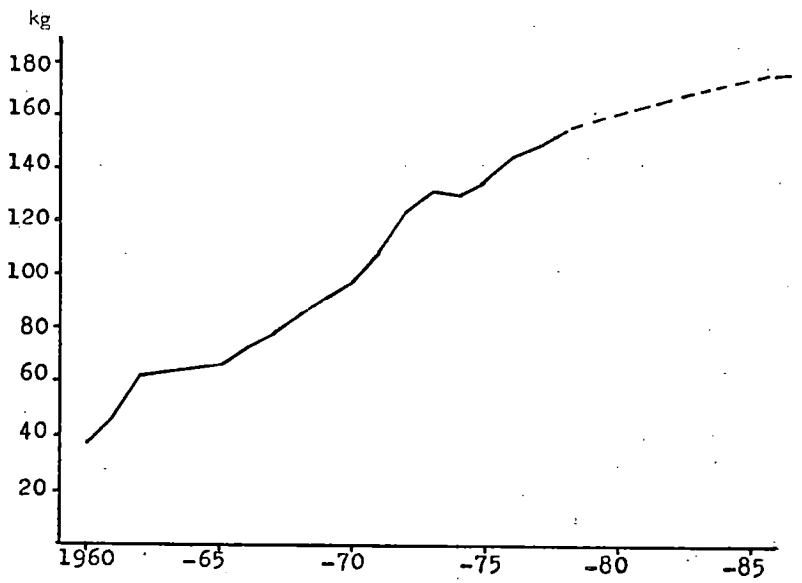


Figure 5. Development of producer price of beef and pork

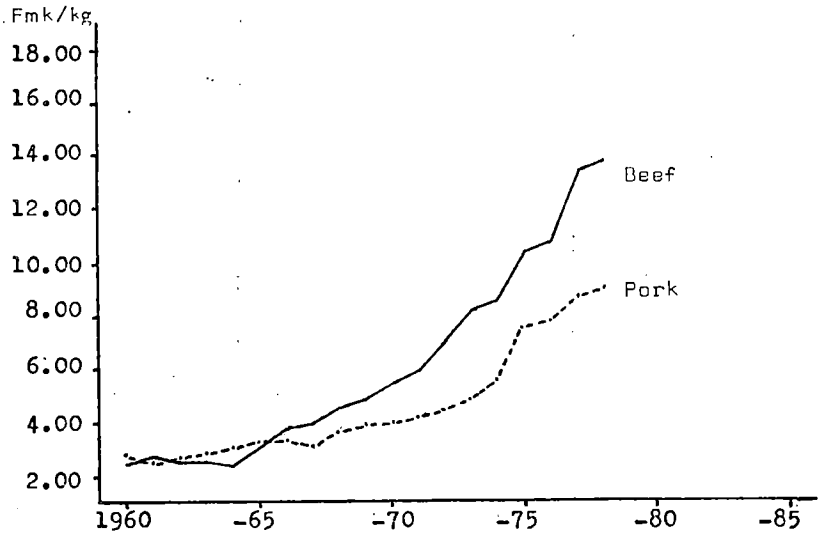


Figure 6. Per-capita consumption of beef and pork

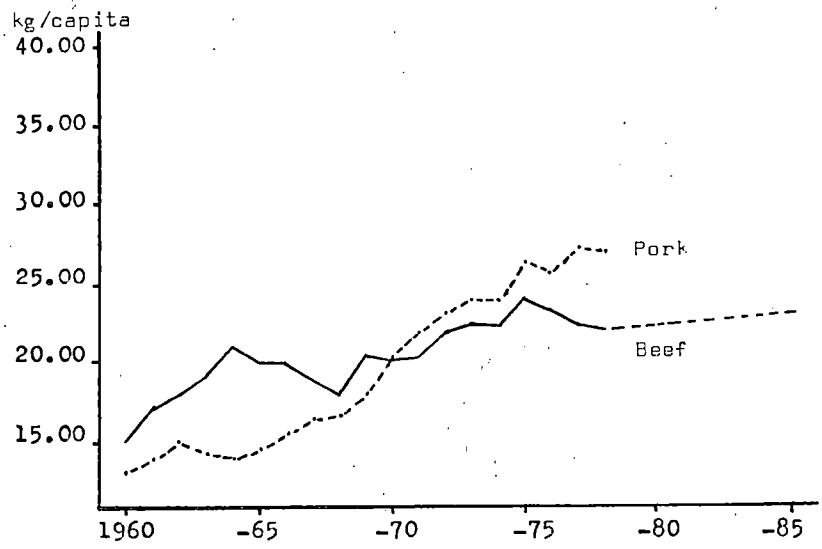


Figure 7. Development of retail price of beef and pork

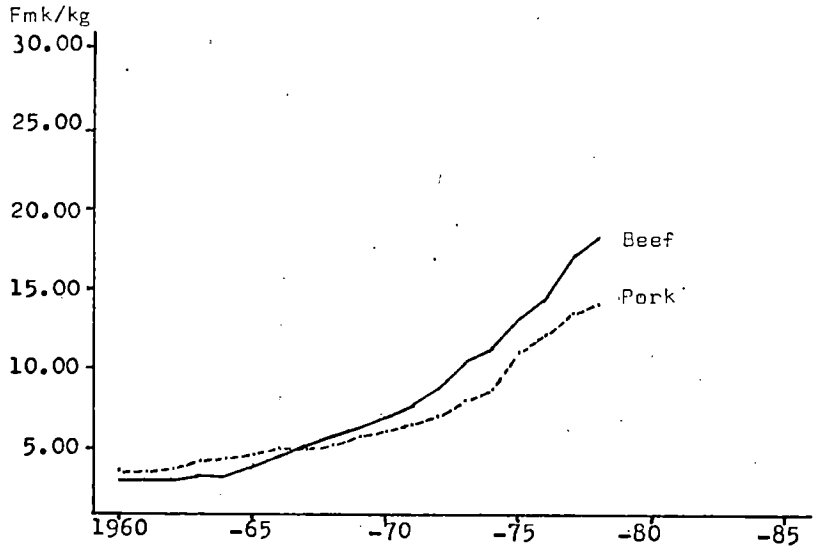
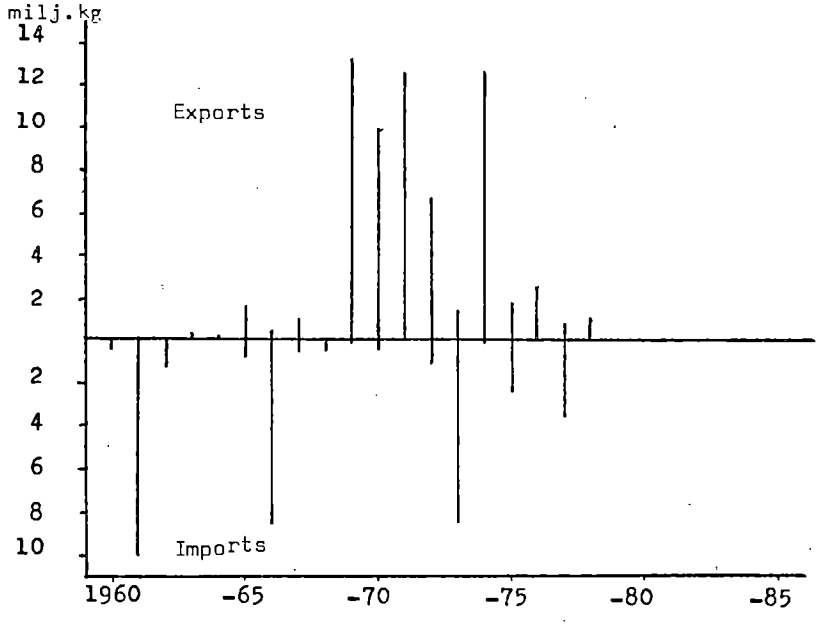


Figure 8. Foreign trade of beef



BEEF PRODUCTION IN POLAND

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1. Poland lies in a region where natural conditions for cattle breeding are inferior to those of many European countries, especially ones in the northwest part of the continent. As compared to the climate of those countries the climate of Poland is much colder and precipitation less abundant with the distribution throughout the year less favorable for agriculture. These conditions influence in an important way the economics of cattle breeding. Longer and colder winters necessitate construction of much more substantial barns for the animals which are as a result more costly. Also the possible grazing period on pastures is shorter. In the years 1970-1977 the average grazing period was 182,5 days long, varying from 176 days in 1970 to 190 days in 1972. The rather low average precipitation in turn means practically in whole Poland a deficit of water; most of the meteorological stations record precipitation below 600 milimeters annually. The low level of precipitation influences yields all the more since out of a total 4.1 million hectares of meadows and pastures presently only about 1.9 million hectares, i.e. 45 % is irrigated and drained. Thus the water economy of the remaining 2.2 million hectares is not managed nor regulated. Another factor responsible for poor yields in green fodders production is the low quality of soils. The soils in Poland are grouped according to a six class scale; thus only 2 % of meadows and pastures are found in the first and second classes /of highest quality/ with over 45 % of meadows and pastures on soils of the poorest fifth and sixth classes. As result of this the productivity of meadows and pastures in Poland is rather low. Evidence of this are for inctance yields of meadow hay which in the years 1971-1975 reached an average of 6.0 tons per hectare.

2. The second decisive factor determining beef and veal production potential, aside natural conditions, is the existing stock of cattle. All four breeds found in Polish cattle production, the Lowlands Black and White/ about 75 % of the total cattle population/, the Red Polish breed/ about 18 % of the population and its share is decreasing gradually/, the Lowlands Red and White and the Simenthal/ up to 5 % each/, are dual purpose i.e. meat and dairy production, breeds. In this situation as all cows are used for milk production, beef and veal are in Poland, similarly to that in most European countries, a by-product in character only. However this circumstance does not always mean difficulties for meat production. It is a recognized fact that through fattening of many dual purpose breeds calves it is possible to achieve high final weights and slaughter productivity as well as good quality meat. At the same time the amount of feedstuffs used in rational breeding calculated per one kilogram of live weight and per one kilogram of meat does not differ considerably from the amount required when fattening meat breeds. The calves of cattle breeds represented in Poland are characterized by these traits. Various feeding trials show explicitly, as well as agricultural practice proves, that the fattening of Lowlands Black and White, Lowlands Red and White and Simenthal calves yields very good results[1/]. Only the trials with fattening Red Polish calves brought significantly less favourable results. The research done shows that calves from 80 % of the cow population in Poland can be suitable material for fattening. The value of these calves as fattening animals may be further improved through commercial crossings. Performed experiments in inter-breed crossing of Polish breed cows with bulls of various meat breeds have shown that of special value are crosses with the Charolais.

1/ The Lowlands Black and White breed, the dominating one in Poland has been classified in an FAO study on meat and dairy cattle breeding in Europe among breeds well suited for fattening /in the study it is termed as Friesian/.

3. A characteristic of cattle breeding is its long production cycle. For this reason in order fully present the current state of beef production in Poland it is necessary to briefly analyze some trends in this field of animal production. This is necessary already when comparing the production possibilities with actual production.

From about the middle of the 1960's little importance was attached in Poland to development of beef and veal production. Evidence of this are figures in Table 1. Such characteristic traits as a high share of cows in the cattle population, a low share of at least one year old bulls and steers, a high ratio of calves slaughtered compared to the number born and low slaughter weight of calves meant that cattle breeding in Poland at that time may be described as close to only dairy-oriented, when speaking in terms of the whole agriculture. This orientation in cattle breeding in its pure form means that cows are for milk production and calves are slaughtered after birth. Only those bull and heifer calves are left for breeding which are to replace animals aremoved from the stock in the future.

A result of this orientation in cattle production was a low level of beef and veal production in general when calculated per one cow, a large share of veal and small of beef in meat production, the beef usually of poor quality. The meat of slaughtered dairy cows basically may be used only for canned meat products.

4. So it appears that only ten or fifteen years ago the available beef and veal production potential in Poland was employed only to a small extent. Although as the figures in Table 1 for the years 1970, 1975 and 1977 show, the situation has considerably improved during the past years, nevertheless beef and veal production in Poland compared to the possibilities cannot be found intensive. This opinion is confirmed by a comparative study of the production possibilities in Poland and in sixteen European capitalist countries and effects in terms of beef and veal production, prepared for the year 1970. The study shows that in this year Poland utilized its production potential the least in the analyzed group of countries. The progress made in the 1970's could not yet eliminate the existing differences.

Table 1. Basic indexes characterizing the level of beef and veal production intensity

Index	Unit	1960	1965	1970	1975	1977
1. Beef and veal production per one cow	kg	57	73	90	122	123
2. Share of veal in beef and veal production	%	29.4	20.4	15.0	7.6	5.5
3. Average weight of grown animals slaughtered under veterinary supervision	kg	338	325	341	387	407
4. Average weight of calves slaughtered under veterinary supervision	kg	48	55	62	64	66
5. Number of slaughtered calves[a/]	thousand head	3073.6	2365.7	2070.2	1714.0	1280.7
6. Ratio of calves slaughtered to number born[b/]	%	70	53	45	37	28
7. Share of cows in cattle population	%	68	60	56	46	46
8. Share of cows in purchases of grown slaughter cattle	%	52	34	26	25	
9. Share of one year and older young bulls and steers in cattle population	%	1.0	3.4	4.4	8.0	9.1

[a/] Under and without veterinary supervision

[b/] Assuming a 75 % calving ratio

Source: positions 1 through 7 and 9 from Rocznik Statystyczny Rolnictwa i Gospodarki Zywnosciowej 1978, GUS, Warszawa, Statystyka Polski Nr. 103. /The Statistical Yearbook of Agriculture and the Food Economy 1978, Polish Statistics Series No. 103, the Polish Central Statistical Office, Warsaw 1978, p. 258, 259, 285, 287, 292/, position 8 from Meat Industry Central data /Centrala Przemysłu Mięsnego / quoted after: Mańkowski J. Regulowanie rozwoju produkcji zwierzęcej w Polsce. PWRiL, Warszawa, 1978. /The Policy of Animal Production in Poland by J. Mańkowski. Warsaw, 1978. PWRiL./.

5. The rather poor natural conditions discussed in part one cannot be the basic reason for the low utilization of the genetic potential in Polish cattle breeding. In 1970 such countries as Portucal, Spain, Italy and even Greece better used their cattle stock for production than Poland, although the Mediterranean climate is less suited for cattle breeding than Polish. The present state should then be explained through structural and economic phenomena and influence of such factors.

The basic barrier limiting rapid development of this livestock production is the agrarian structure of private farms where in the years 1960-1977 85 % of all cows were found. These farms in general are small in area. Available statistics for the years 1960-1977 show that the average area of a farm, in the group over two hectares, was between 6.5 to 6.7 hectares. In 1960 only 385 thousand private farms had more than 10 hectares of land. The number of these farms increased by 1977 only to 420 thousand. Cattle fattening with roughage feedstuffs in small farms in Poland, produced on the farm itself, brings less revenue than other areas of production. This is a general rule observed also in other countries. In Poland the competition for beef cattle breeding, in terms of feedstuffs and manpower, are dairy cattle breeding and swine production. The latter two directions of livestock production are both labor-intensive, however both require less land in order to bring in a certain revenue than meat cattle fattening. Therefore they are better adapted to the production inputs available on small farms, i.e. considerable manpower resources and little land.

Thus the decision to slaughter or to sell the calf soon after birth is, from the point of view of a small farm, rational considering its economic goals, as it permits moving the available feedstuffs resources or labor to production bringing the highest revenues. That such decisions were made on a mass scale is evidenced by the almost strictly dairy oriented livestock production, in private farms up to 5 hectares. In 1960 the share of cows in the total cattle population was almost 80 % and remains high until today.

6. The State is able to change the relative profitability of respective directions of production through different measures. Especially effective price regulation is possible when the State controls the agricultural products market. This is the situation in Poland. The majority of private farming market production and most of market production in the State and cooperative farming sectors flow through socialized purchasing organizations, and the prices paid are set by the State. Trade between the private farmers themselves or sales by farmers to consumers account for a small part of the agricultural products turnover. The State purchase prices of agricultural products make up an interrelated system. To change one element means changes of price relations in respective parts of the system and may result in various effects in other areas of production. These widely recognized facts have been brought up here because of certain characteristic traits of the model of consumption in Poland and the demand and supply balance in agricultural products. In the Polish way of food consumption milk and dairy products, pork and pork products are much more important than beef and veal. The supply of the former group, except for short periods of excessive milk production, as rule did not keep up with the demand and during the last few years keen deficits appear on the meat market.

Research conducted has shown that in Polish conditions milk production and commercial production of beef and veal were competitive[1/]. Starting in the 1960's competition between beef and veal production and pork production became more apparent.

7. If various tupes of production are competitive in the farming economy there exists a possible menace of disruption in milk and pork supply if "strong" measures would be effected in order to increase beef production. This dependence must be considered in agricultural policy.

The price policy effected since a dozen years or so is based on searching for a compromise between the better employment of potential beef production possibilities and the necessity for maintaining incentives for further growth of pork and milk produc-

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1 As measured by correlation coefficients between market production of analized livestock orientations.

tion. This policy is all the more difficult as a large portion of the calves for further breeding was found in the mentioned small farms which because of their production inputs structure are not fit for meat cattle production. The system of slaughter cattle purchase prices and competing types of production price relations, being a compromise of contradicting requirements once set, was rather stable /see Table 2./. Since 1958 when the low prices for beef producers, not yielding a profit, were increased, the relations slaughter beef: slaughter pork and slaughter beef: milk varied only slightly. This stable relation appeared also in the 1960's when no considerable price changes were introduced and in the 1970's when prices were moving up more rapidly.

One may conclude then that during this whole period efforts were made to maintain the existing profitability equilibrium between respective types of production. Of special importance to development of meat cattle production is the structure of prices paid for slaughter cattle. The current price lists offer higher prices for heavy animals[1/] and for those belonging to the Lowlands Black and White breed, the Lowlands Red and White, Simenthal and interbreed crosses. The State policy in this field is very plain; breeding of heavy weight cattle breeds ensuring good feedstuffs transformation and quality meat is strongly supported.

In general one may say that the price policy in Poland did not present strong incentives for rapid development of beef cattle breeding. Indirectly such a conclusion may be drawn from a comparison

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1/ For instance young bulls to be included in the first three classes must be over 450 kilograms net liveweight /That is after possible weight decrease as result of excess fattening, heifers and steers in these classes over 400 kilograms of net liveweight. For young bulls of the sixth class the farmer will get about 65 % of the price for a first class animal/ the latter being of special quality over 450 kilograms of net liveweight, the former well-fleshed over 250 kilograms/. In some weight classes higher prices are paid for interbreed crosses, while the animals in the first two classes must be Lowlands Black and White, Lowlands Red and White, Simenthal or interbreed. See: the Kieszonkowy Cennik Skupu Zwierząt Rzeźnych, CZSR Samopomoc Chłopska / A Pocket Price List of Slaughter Animals. CZSR Cooperatives and Meat Industry Central/ Warsaw, 1977.

of prices paid to farmers for cattle and for swine in Poland and in some West European countries. For example in the EEC countries the market price of one kilogram of beef liveweight is as a rule higher than of one kilogram of pork. The conditions for cattle breeding in the Community, except for Italy are recognized to be superior to the natural conditions in Poland.

Table 2. Purchase prices of some livestock products

Year	Contract price for livestock		Livestock price for calves, non-obligatory purchase	Milk price
	beef	pork/final price/		
	in zlotys per kilogram			in zlotys per litre
1957	9.11	18.95	6.85	2.30
1958	13.01	17.94	10.68	2.31
1963	14.19	20.17	12.90	2.38
1964	14.20	20.81	14.88	2.58
1970	15.06	22.87	17.60	2.64
1973	19.77	27.94	23.37	3.46
1975	23.57	29.42	24.37	3.69
1977	29.70	41.12	33.66	5.13

Source: J. Mańkowski. Regulowanie rozwoju produkcji zwierzęcej w Polsce. PWRiL, Warszawa 1978, p. 145 and 157 / The Policy of Animal Production in Poland by J. Mańkowski. Warsaw 1978.
and Roxznik Statystyczny Rolnictwa i Gospodarki Zywnosciowej 1978. Statystyka Polski Nr 103, GUS, Warszawa 1978, p. 440 /The Statistical Yearbook of Agriculture and the Food Economy 1978, Polish Statistics Series No. 103, The Polish Central Statistical Office, Warsaw 1978.

Table 3. Relations of purchase prices of selected livestock products

Year	Price of 1 kilogram of beef liveweight, expressed in:			Price of 1 kilogram of calf liveweight, expressed in:		
	kilograms of pork liveweight	kilograms of calf liveweight	litres of milk	kilograms of pork liveweight	kilograms of beef liveweight	litres of milk
1957	0.48	1.33	3.96	0.36	0.75	2.98
1958	0.72	1.22	5.63	0.59	0.82	4.61
1963	0.70	1.10	5.96	0.64	0.91	5.42
1964	0.68	0.95	5.50	0.72	1.05	5.79
1970	0.66	0.85	5.70	0.78	1.18	6.71
1973	0.71	0.84	5.71	0.85	1.19	6.90
1975	0.76	0.97	5.88	0.78	1.03	6.06
1977	0.72	0.88	5.79	0.82	1.14	6.58

Source: Malkowski J. Regulowanie rozwoju produkcji zwierzęcej w Polsce, PWRiL, Warszawa 1978, p. 160, and Rocznik Statystyczny Rolnictwa i Gospodarki Zywnosciowej 1978, GUS 1978, p. 440. Op.cit.

Prices are only one, though very important factor effecting production profitability[1/]. Changes in price relations, although they took place within narrow limits, caused in combination with other factors, variations in price relations between the products discussed and influenced the production decisions of private farmers. As result of changes implemented during the years 1970-1975 from the three types of production discussed, in private farms meat cattle breeding became the most profitable. In this situation many private farmers are interested in meat cattle breeding. A sign of this is the drop in the share of cows in the cattle stock from almost 70 % in 1960 to about 52 % in 1975 and 54 % in 1977. At the same time the share of young animals increased, first of all young bulls and steers, i.e. animals earmarked for fattening[2/].

1/ With a given structure of inputs and constant transformation coefficients decisive for profit calculation are price ratios between feedstuffs and livestock products.

2/ The share of animals less than 6 months old increased from 13.3 % in 1960 to 20.2 % in 1975 and 19.8 % in 1977. For bulls aged between 6 and 12 months the respective figures are 0.6 %, 4.5 % and 4.3 % and for young bulls and steers over 12 months respectively 0.7 %, 4.4 % and 4.7 %,

Important changes were observed in calf breeding. Although the slaughter carried out without veterinary supervision did not undergo significant changes /about 1,200 thousand head in 1960 and almost 1,100 thousand head in 1977/ purchased figures show that calves previously sold now remain on the farms to be fattened. The purchases of calves for slaughter in the first half of the 1960's fell rapidly from about 1.8 million head to about 900 thousand and since then nears the level of 800 thousand to 1 million.

As an effect of the growing interest supply of young fattening cattle of good guality from private farms increased. In 1960 private farms and production cooperatives sold about 410 thousand head of young slaughter cattle, while in 1976 the private farms alone supplied about 1,385 thousand head.

A large number of calves earmarked for slaughter fit for fattening was the reason for organization of fattening operations in state farms and cooperative farms which had good conditions for livestock breeding but were located in regions where further growth of milk production was not required.

The growth of cattle fattening operations was also based on export possibilities of live cattle to the EEC countries opening in the beginning of the 1960's, first of all to Italy. Exports of cattle to EEC countries in the middle of the 1960's reached 100 thousand head of heavy and other cattle per year, thus becoming and important export position.

For export sales big shipments of uniform animals were required. This requirement was difficult to fullfil in a situation where the animals for exports are produced in a large number of varied farms. The organization of big fattening operations with uniform stock and production meant that better export production would be available. A large fattening farm is capable of supplying at a chosen time a large batch of uniform animals.

A link was needed to tie the small private farm without possibilities of calf fattening and the State and cooperative farms. For this purpose the existing organization for slaughter calves purchase was used. Since over ten years ago calves purchased by the meat industry which are fit for further breeding are not slaughtered but sold to state, cooperative organization and private farms. The number of animals gained this way has been increasing systematically and has reached about 450 thousand head in 1975 which was almost 50 % of the total number of slaughter calves purchased that year. As the purchase of calves for the past ten years or so has remained steble the basic reason for the growing number of selected calves / and earmarked for further breeding / are changes in selection criteria. A second possible reason may be improving quality of the purchased animals, indirect evidence would be the increased average weight of calves slaughtered. /see Table 1/.

The second general development in further calf breeding since 1974 is cooperation between State farms, cooperatives and private farmers. The breeding is divided into two parts. The first, when very careful and painstaking work is required is placed on the private farm. The second, when the animal is much better fit for breeding in feedlot conditions, takes place in a State or cooperavite farm. The second phase should start when the animals are about 6 months old and have reached a weight of about 150 kilograms. This organization provided in the years 1976-1977 over 170 thousand head annually.

How many calves from the total available will be bred further depends to a large extent on the prices paid to farmers for the calves sold. Meanwhile the purchased prices for slaughter calves cannot be considered an incentive encouraging sales. During the discussed period these prices were always lower than the average prices of pork production. /see Tables 2 and 3/. Proof that farmers evaluate the price relations in this way is the large volume of calves slaughtered without veterinary supervision.

9. It is difficult to give any clear-cut opinion of the policy implemented so far. It the years 1960-1977 the production became much more intensive. In this period the production of beef and veal calculated per one cow increased more than twofold, the share of veal in total veal and beef production fell more than fivefold, the average weight of mature animals slaughtered under veterinary supervision increased by 20 %, and that of calves / also under supervision / by almost 40 %. Finally, the number of calves slaughtered dropped almost 2,5 times.

Neverthelsess, despite the significant improvement the intensity of meat cattle breeding is not great. The production of beef and veal per one cow is still below the potentially possible figure, the number of calves slaughtered in low weight classes is still too high, the same as the share of veal in the total beef and veal production. Finally, the average weights of mature cattle and calves slaughtered should be higher.

It is difficult to determine whether considering the necessity for simultaneous development of milk and pork production the progress in meat livestock breeding could have been greater. The level achieved today justifies stating that the livestock potential in Poland today certainly permits an increased production of some more 500 thousand tons od meat. Its full utilization requires:

1/ Increasing average slaughter weights,
2/ Decreasing the number of calves slaughtered.

10. This existing extra production potential should be fully utilized but certain reasons may render this difficult.

First of all there is the problem of feedstuffs for cattle to be considered in the overall balance of concentrate feedstuffs in Poland. As not enough roughage feedstuffs are harvested from the meadows and pastures considerable quantities are grown as result on arabale land. Fodder crops were planted in 1977 on almost 2.5 million hectares that is almost 17 % of the total crop area.

The fodder crops grown most often are root crops, papilionaceous perennials and corn for silage, i.e. crops which are first of all fodder for cattle. The fodder crops occupy especially a large area in State farms / about 28 % in 1970 and about 35 % in 1977 / where the area planted of corn for fodder grew rapidly. These changes are usually explained by the necessity for increased fodder production for cattle and it is believed that this was the reason for the drop in the share of grains in the total area under cultivation in State farms.

These facts prove that the competition for land between grains and fodder crops appears at least in the beginning of the 1970's. So far a result of this competition was the mentioned decrease of the share of the area under grains. At the same time Poland became in the 1970's one of the biggest importers of grains and protein feedstuffs in the world. This import which is a serious burden to the national balance of payments should drop considerably in the coming years. One of the most important means to achieve this / aside from the improvement of feeding efficiency / is a growth of domestic grains production, among others through planting a larger area to this crop. A result of the competition for land between grains and fodder crops in the coming years will rather be a reduction of the area planted to fodder crops than its expansion. This may mean a necessary revision of the prepared programs for development of beef production and their adaptation to the possibilities of a limited fodder base. Thus the idea is put forward that "..." the size of production / beef production / should be limited to those fodder resouces which come from pastures and meadows and from those crops on arable land which are necessary from the point of view agrotechnics /croup rotation /...".
Another reason why the potential available for further growth of beef and veal production may not be fully employed is the situation on the domestic meat market. The keen deficit forces solutions which bring the most rapid production growth possible in order to cover the present demand. Pork production will permit reaching this goal earlier. These conditions speak for introducing incentives which will encourage and stimulate swine production. This may cause in effect a worsening of the relation of beef and

pork livestock prices and as a consequence some producers may give up meat cattle breeding. In addition to this during the past few years many of the smallest farms gave up swine breeding and this is believed to be a development from which there is no return. Part of this production will have to locate in larger private farms which will also require creating proper production incentives. Today also, the export markets offer no encouragement for meat cattle breeding. Export possibilities of live animals and of beef turned for the worse in 1974. This situation continues until today and will most probably last for the next coming years. Polish young cattle is still sold on the EEC market and beef on other markets but the volume dropped significantly. These sales also are much less profitable. As result of this livestock produced in feedlot type operations, started some years ago with exports in mind are today directed to the domestic market. From the point of view of the feedstuffs balance and costs involved this is not a good solution, as these animals, originally earmarked for exports are intensively fattened or at least partly intensively fattened using relatively large quantities of concentrate feedstuffs. The same quantity of meat could be supplied to the domestic market produced by extensive methods. To sum up the above, in the coming years an acceleration of the rate of growth of beef and veal is not to be expected. Rather more probable is a reduction of the present long-term rate of growth.

STATISTICAL ANNEX

Table A. Production of meat /together with fats/ and offals. /in thousand tons/.

Year	1960	1965	1970	1975	1977
Total production	1,755.5	2,015.1	2,186.7	3,076.0	2,890.8
in this total meat:	1,646.2	1,881.6	2,031.5	2,867.0	2,708.2
in this:					
beef	235.5	345.8	464.6	695.4	698.5
veal	98.2	88.5	82.2	57.1	40.6
beef and veal	333.7	433.5	546.8	752.5	739.1
Share of beef and veal in total meat production	20.3	23.0	26.9	26.2	27.3
Share of veal in total beef and veal production	29.4	20.4	15.0	7.6	5.5

Source: Rocznik Statystyczny Rolnictwa i Gospodarki Zywnościowej 1978, GUS, Warszawa 1978, p. 292. /The Statistical Yearbook of Agriculture and the Food Economy 1978, The Polish Central Statistical Office, Warsaw 1978 /.

Table B. Livestock according to age groups. /in thousands head, state registered June of each year /.

Year		1960	1965	1970	1975	1977
Cattle		8,685.1	9,947.2	10,843.5	13,254.3	13,019.2
in this:	below 6 months	1,183.7	1,633.6	1,970.1	2,746.2	2,710.0
	from 6 to 12 months	668.6	963.3	1,145.2	1,948.1	1,704.1
	heifers	613.4	772.3	842.6	1,177.6	1,007.6
	young bulls	55.2	191.0	302.7	770.5	696.5
	one year and older	6,842.8	7,350.3	7,728.2	8,560.0	8,605.1
	heifers	873.8	1,094.1	1,166.7	1,352.9	1,416.8
	young bulls and steers	84.3	335.9	479.7	1,061.5	1,180.7
	cows	5,884.7	5,920.3	6,081.8	6,145.6	6,007.6

Source: Op.cit. p. 258-259.

STATISTICAL ANNEX

Table C. Livestock structure, in per cent, according to age groups

Year		1960	1965	1970	1975	1977
Cattle		100.0	100.0	100.0	100.0	100.0
in this:	below 6 months	13.6	16.4	18.2	20.7	20.8
	from 6 to 12 months	7.2	9.7	10.6	14.7	13.1
	heifers	7.1	7.8	7.8	8.9	7.7
	young bulls	0.6	1.9	2.8	5.8	5.3
	one year and older	78.7	73.9	71.3	64.6	66.1
	heifers	10.0	11.0	10.8	10.2	10.9
	young bulls and steers	1.0	3.4	4.4	8.0	9.1
	cows	67.7	59.5	56.1	46.4	46.1

Source: Author's calculations basis Table B.

Table D. Livestock structure, in per cent, according to age groups in the socialized farming sector.

Year		1960	1965	1970	1975	1977
Cattle		100.0	100.0	100.0	100.0	100.0
in this:	below 6 months	16.0	20.9	25.6	22.5	23.7
	from 6 to 12 months	9.0	11.9	13.2	17.8	16.2
	heifers	8.2	7.9	6.4	7.3	7.7
	young bulls	0.8	4.0	6.8	10.5	8.5
	one year and older	75.0	67.3	61.2	59.7	60.1
	heifers	17.7	17.0	61.9	14.2	15.3
	young bulls and steers	2.7	9.1	9.1	20.3	21.8
	cows	54.6	41.1	35.2	24.6	23.0

Source: As in Table C.

STATISTICAL ANNEX

Table E. Livestock structure, in per cent, accordint to age groups in the private sector.

Year		1960	1965	1970	1975	1977
Cattle		100.0	100.0	100.0	100.0	100.0
in this:	below 6 months	13.3	15.6	16.7	20.2	19.8
	from 6 to 12 months	7.5	9.3	10.0	13.8	12.0
	heifers	6.9	7.7	8.0	9.3	7.8
	young bulls	0.6	1.6	2.0	4.5	4.3
	one year and older	79.2	75.1	73.3	65.9	68.2
	heifers	9.1	9.9	9.5	9.1	9.4
	young bulls and steers	0.7	2.4	3.5	4.4	4.7
	cows	69.4	62.7	60.3	52.4	54.1

Source: Author's calculations basis Rocznik Statystyczny...op.cit. p. 260-261.

Table F. Cattle slaughter, in thousand head.

Year	1960	1965	1970	1975	1977
Mature cattle	1,344.1	2,101.2	2,626.5	3,286.1	3,246.9
Calves	3,073.6	2,365.7	2,070.2	1,714.0	1,280.7
in this under veterinary supervision					
Mature cattle	1,209.5	1,829.1	2,261.5	2,694.8	2,980.1
Calves	1,870.7	895.5	877.3	476.7	201.7
in this outside veterinary supervision					
Mature cattle	134.6	272.1	365.0	601.3	266.8
Calves	1,202.9	1,470.2	1,192.9	1,237.3	1,078.0

Sources: Rocznik Statystyczny...op.cit. p. 285 and 287.

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THE SITUATION OF MEAT PRODUCTION IN HUNGARY AND SOME ASPECTS OF THE DEVELOPMENT OF BEEF PRODUCTION

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Abstract: Main characteristics of meat production and consumption. Trends and methods of the development of beef cattle production. The task of furnishing with beef and milk the national economy. Development of the cow herd; role of single and dual purpose milk and beef races. Strategy for augmenting production and reaising the profitability of cattle farming.

1. Main characteristics of meat consumption and meat production

Production of meat - excluding fish - is permantly much higher in Hungary than domestic requirement; consumption is meat by 70-80 percent of the output while 20-30 percent is exported. Volume of export of every meat was each year since 1970 much higher than import. Meat import was rather an exception, if there was any, not because a shortage but by reason of economic policy, and the volyme was small.

Meat consumption is high; rather as a result of favourable production opportunity, than the level of economic development of the country.

Volume and structure of per capita meat consumption in the period 1965-1977 changed in the following way:

Meat consumption

/kg per capita/

	1965	1970	1975	1976	1977	1978
Pig meat	27.3	29.8	41.4	37.1	40.3	..
Beef	9.2	10.1	7.4	10.1	8.6	..
Other meat	1.5	0.9	0.6	0.4	1.0	..
Total red meat	38.0	40.8	49.4	47.6	49.9	..
Poultry meat	11.0	14.2	15.3	16.5	15.0	..
Edible offal	2.6	2.6	3.3	3.4	3.1	..
Fish	1.6	2.3	2.7	2.7	2.5	2.5
Total meat	53.2	59.9	70.7	70.2	70.5	74.5

Structure of meat consumption

/percent/

	1965	1970	1975	1976	1977	1978
Pig meat	51.3	49.7	58.6	52.8	57.2	..
Beef	17.3	16.9	10.5	14.4	12.2	..
Other meat	2.8	1.5	0.8	0.6	1.4	..
Total red meat	71.4	69.1	69.9	67.8	70.8	..
Poultry meat	20.7	23.7	21.6	23.5	21.3	..
Edible offal	4.9	4.4	4.7	4.8	4.4	..
Fish	3.0	3.8	3.8	3.9	3.5	3.4
Total meat	100.0	100.0	100.0	100.0	100.0	100.0

Consumption is characterised by permanent dynamic growth and at the same time a high stability of the proportion of different meats. Pork and poultry are still outstanding: these two furnished 70 percent already in 1965 and more than 75 percent of total meat consumption in 1977, other meats being rather complementary.

This consumption structure is the outcome of a policy aiming at self sufficiency and the utilization of domestic resources. Beef and lamb production is rather destined for export.

The task of furnishing domestic consumption helped to shape the structure of export. In the last years export amounted/in carcass weight/ to more than half of beef, 3/4 of lamb, 2/5 of poultry production but only marginal in pig meat. Cattle, sheep, and poultry were the sections with promising export market in the last years, while pig meat production was mainly destined to cover the rapidly rising domestic consumption.

The structure of Hungarian meat production is resembling the most important meat exporting countries /Denmark, Netherlands/, i.e. the high share of grain consuming animals /pigs and poultry/, approaching 80 percent.

Structure of meat production+/
/1970 - 1977/

/percent/

	1970	1975	1976	1977
Pigs	51.5	58.0	55.4	58.7
Cattle	24.1	20.5	20.0	17.0
Poultry	20.9	19.2	22.1	21.8
Sheep	2.8	1.9	2.1	2.2
Other	0.7	0.4	0.4	0.3
Total	100.0	100.0	100.0	100.0

+/ live weight

No fundamental transformation of the production structure is to be expected in the coming years. Pigs will remain the main source of meat production. There will be no great change of beef production volume, as slow changes are characteristic of the cattle sector. Size of the development of poultry meat production will be determined by the export outlook.

Only pig- /73 percent/ and poultry meat /58 percent/ showed in the past nearly ten years, a strong expansion of production. Expansion of lamb was discernible only in the last one- two years, and this growth did not change the production structure of meat as lamb has only a marginal share.

Beef production had in the last 8 years a slightly rising trend. Average production in 1970-1975 was 313 thousand tons and average rate of growth yearly 3,5 percent; this became somewhat higher after 1975.

Growth of meat production was not restrained in case of any animal by biological characteristics, the prolificness. But a much more important limit of growth was caused by the sectoral composition of the animal herd.

Sectoral composition of all meat producing animal stocks is characterised by a high share of the household plots and other small, so-called complementary farms. In the period 1975-1978 for example 53-57 percent of pig meat production /live-weight/ and 38-42 percent of poultry meat came from this sector.

The situation is quite different in cattle farming. Economic and social development of the last two decades /urbanization , growing age of peasants, lack of forage area/ which shaped cattle farming on household plots and small farms, continues, even the strengthening of these trends must be taken into consideration.

Small farms has 33-46 percent of the total stock of cows and supplied 19-26 percent of beef cattle production in 1970-1977.

Change of sectoral composition and meat production is shown by the following figures:

		1965	1970	1975	1976	1977
Cows total	1000 head	782	763	760	766	781
from this						
large scale farms	"	378	412	482	502	521
Small farms	"	505	351	278	264	260
Meat production/live weight/ total	1000 tons	..	324	379	346	326
from this						
large scale farms	"	.	260	292	256	255
small farms	"	.	64	87	90	71

The main task of agricultural policy with respect to cattle husbandry in the small-farm sector is the restriction of the decline of the cow stock. Failure to achieve this would cause an abrupt growth of investments from the state budget of unbearable size and at the same time production capacity would be further curtailed.

Production policy aims at reducing the decline of the number of animals on the small farms with state resources by applying subvetions and credit and with instruments of the large farms /transport, organization, delivery of forage, organized milk and beef cattle marketing/. But we know well that to halt the decline, is impossible and even senseless because of the quickening pace of changing production forces and relations.

Tasks for the future can be derived from this realization. There must be a timely and gradual preparation on the large scale farms of milk and beef cattle production capacity necessary to cover the total need of the country.

2. Trends and methods of the development of beef cattle production

The size of milk and beef production, the two main production lines of the cattle sector, must have a relation conforming the needs of the country. Milk production should meet domestic consumption and its growth rate should be if possible in conformance with the augmentation of consumption. Beef production should furnish meat not only for inland consumption but provide beef of export quality growing at a much higher rate.

Twice in the past 8 years, in 1972 and 1976 there were resolutions of the government for the shaping of the main lines of profitable cattle farming.

Both resolutions indicated the separation of milk and beef production the most important tasks ahead. A considerable increase in the efficiency of production and of foreign market competitiveness must be achieved in milk production with higher yields and in beef production by the utilization of cheaper forage.

Most cattle in Hungary are of a dual-purpose race /76 percent/. These partly belong to the Hungarian spotted race, partly are cross-breeds of Holstein-Friesians x Hungarian spotted have spread with the purpose of augmenting the milk yield of the Hungarian spotted race. Animals belonging to a single-purpose milk race have a share of 13, and those belonging to single purpose beef races a 10 percent share.

The realization of a two-line /extensive and intensive/ development is a very complex task the execution of which uncovered problems of production policy breesing, feeding. animal health management - and in case of beef /mainly export/ - quality.

Raising of milk prices in 1977 improved profitability of milk and calf production of the dual-purpose herd only a little, but the situation of farms with intensive milk-herds advanced considerably.

Figures of the considerable growth of milk production per cow and per population:

/litres/

	1970	1975	1976	1977	1978
Milk yield per cow	2.420	2.411	2.706	2.937	3.082
Per capita milk production	175	168	177	195	206

As a result of economic measures of the state, per capita milk production exceeded in 1978 even more /with 155 litres/ consumption than earlier. Utilization of the present surplus is by a no way cheap dry-milk production. This problem could find a solution in the future with rising consumption.

Characteristics of growing beef production are quite different:

/kg/

	1970	1975	1976	1977	1978
Beef production per cow	435	482	457	421	436
Per capita beef production	31.5	35.9	32.7	30.6	32.0

As a general conclusion, it may be stated, that while it was possible in a comparatively short time, with an intensification of milk production, to meet consumption with a virtually unchanged herd, production of beef is closely linked to the number of cows, and can be augmented only in relation to this. The decline of beef production is therefore very alarming, because it is in contrast to all targets; this would denote that more cows will be necessary for the same volume, and more for an augmentation of beef production.

The biological base of beef production was so far furnished by domestic Hungarian spotted cows and cross-breeds of this race with Alpine-spotted animals. Excellent beef quality, very good forms for meat production and fattening respectively are advantageous for the foreign market.

Fattening rate is, expecially when using the traditional Hungarian intensive concentrate feeding system, very good. Bulls have a fattening rate of 1200-1300 gr/day, heifers about 960-1100 gr/day. With intensive feeding a live weight of 480-550 kilogrammes is attained at the age of 14-16 months. This is one reason why beef production per cow is so high in Hungary.

Unfavourable world market development of the past years, the rising of the price of imports, has affected production in Hungary. Costs of beef cattle production have risen and there was at the same time a decline of animal product prices. Competitiveness of our production decreased because of unfavourable trends of both

the world market price and domestic inputs. Comparison of beef price and the price of feed used revealed many inconsistencies in the practice hitherto applied but it will be no easy task to correct these.

All these economic considerations lead from the somewhat narrow sphere of efficient beef production to the wider problems of the structure of production or the relation of export and import from the point of view of the national economy.

A desirable relation of production and requirements /milk, beef/ is a cardinal problem on the level of the national economy and the structural relation of milk - or beef - purpose cattle respectively necessary for a profitable covering of this, takin into consideration natural and economic conditions and the quality requirements of the export markets. This problem raised greatest dispute among specialists in the last few years.

In Hungary as well as in other countries - expecially in case of products destined mostly for export - the requirement of fixed and revolving funds, the input of labour and energy, the efficiency of feeding and the land necessary for agricultural production the relation of imported inputs to inputs of domestic origin, the assessment of the gross and net foreign currency earnings of the different products from the view of the national economy are all prominent questions.

According to our wiev - taking into consideration the criterions of development - the structure of the cow-herd is determined from the aspect of milk production by how much the milk yield of dual-purpose cows can be raised profitably. The size of the milk-purpose cow herd necessary for a stable and profitable milk and dairy product supply depends on this. /The profitability of calf production of the dual-purpose cattle herd is much enhanced with rising milk yields/.

The size of the beef-purpose cow-herd is shaped by a quite different consideration, exclusively by the demand for beef.

Targets of the middle term plans aim at a moderate rate of specialization of the cattle-herd. One of the foremost factors of raising efficiency is, besides higher yields/more milk, calves, less death of animals etc/ a better utilization of feeds as this makes more than 60 percent of the production costs.

In the past decade the use of a great volume of concentrated feeds became universal practice in both milk and beef production. As a result of using feed-mixes with a high amount of concentrates feed consumption per increase of weight rose considerably. Large farms used per 1 kilogramm of weight increase the following feeds in 1977:

/kg/

concentrates	hay	forage	silage
5.50	2.10	1.80	6.10

One reason of the unfavourable trend of the feeding structure is the extremely low yield of forages produced in arable farming and on the meadows and pastures. The fact that techniques and organization of labour of beef fattening weremuch simplified by this method, made this a tempting proposition for the management of production also. Technical solutions used in harvesting machinery for cereals, maize, sugar-beet etc. contributed to this development as by-products that could have been used in animal-husbandry were partly burned or ploughed in.

Cutting of the feed use per weight increase to a desirable level /3.0-3.5 kilogrammes/ requires a comprehensive transformation of the structure of feed production and a complex development of forage production and preservation. It would be important that higher yields, the utilization of by-products, and methods with lower costs should support in the future the raising of efficiency.

The basic task of profitable beef production is efficient calf production, the application of production methods saving implements and the use of much forage.

An important source of producing cheaper calves by dual-purpose cows is the augmentation of milk production - a favourable relation of milk and calves in supporting the costs - to the limit of profitability.

There is no tradition of single-purpose beef cattle production in Hungary. We are at the stage of exploring the possibilities, but in quite a lot of large farms there is, for some years, a production with changing - but not good - results- despite a state support of 5100 Ft/cow given on the basis of the average number of the herd.

Efficient production of calves can be achieved by a completely extensive husbandry, using by-products of arable plants and grass.

Experience of the past years shows, that in farming practice it was not yet possible to find those extensive forms of keeping and feeding the animals, where the rate of reproduction would reach more than 90 percent, and calves would reach when separated at the age of 7-8 months a weight of 240 kilogrammes. Such parameters would guarantee calf production without loss.

But such production parameters are still difficult to achieve. /There are many unexplored isses; veterinary problems, synchronization of the oestrous cycle, calving once or twice per year, summer and winter feeding, organization of production, the still undecided mode of reconstructing the race etc./. But the most difficult task under Hungarian conditions is keeping feeding costs of cows to the minimum.

A good many problems of regulation, breeding and rearing must find a solution in order to large scale farms with the best results should reash efficient production without state support.

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THEME II.

MARKETING AND PRICE PROBLEMS

BEEF MARKETING AND PRICE QUESTIONS

Juhani Keränen
The Finnish Farmers Meat Marketing Association, TLK, Finland

1. Groups

The share of co-operation in Finnish commercial and industrial life is quite considerable and in the food industries its extent is especially large. Meat makes no exception is this respect.

Meat is mainly put on the market through four different channels:
- TLK and the co-operative slaughterhouses, on producers' side
- OTK, co-operative wholesale, on consumers' side
- KARJAKUNTA, belonging to the SOK group
- PRIVATE ENTERPRISES

Of these the three first mentioned are co-operative enterprises, as the names imply too. TLK's share of the total beef quantity put on the market is a good 50 % and the remainder is divided between the three other enterprises giving one-third to each of them. Thus the share of beef supply of co-operatively run enterprises is round about 82-84 %. Last year about 103 million kilos beef was brought into the market, the share of the co-operative slaughterhouse organization being roughly 54 million kilos (Appendix 1).

2. TLK and the co-operative slaughterhouses

As this short introduction surely already shows you, I am representing this co-operative slaughterhouse organization. I am working for its central organization, TLK - The Finnish Farmers' Meat Marketing Association, where I am in charge of the meat section.

Our main activities are to organize the purchases from the member slaughterhouses and the procuders as well and to handle the mutual - that is the nationwide - wholesale trade.

In this connection I think it would be correct to tell you a little about our co-operative slaughterhouse organization. It is owned by the farmers - that is the breeders. There are round about 125 000 members on the organization today. They first establish a first degree co-operative association - the co-operative slaughterhouse. At present there are eight such slaughterhouse units in the organization. Together they own TLK which is their central organization. TLK owns among other things a large meat processing plant, which is a very important marketing channel. It processes almost 25 % of all meat purchased by the organization. Another assignment of TLK is to undertake the foreign trade for the whole organization. The enclosed table (Appendix 2) shows the present situation. The co-operative slaughterhouses cover the total area of the country. You can also see the location of the 8 slaughterhouse units possessing 14 meat processing plants and 23 slaughterhouses. It may also be mentioned that the average capacity, pork included, is round about 7 million kilos. Our competitors - by which I here mean the OTK group, Karjakunta and the private enterprises - own totally 34 slaughterhouses with an average capacity of 3 million kilos annually. Now I think it would be interesting to study the development a bit. Here we have a map (Appendix 3) from 1963 showing that the organization then had 14 co-operative slaughterhouse units and that in last five to six years the development has run so quickly that the number today is only eight. At present there are no plans on carrying out any larger fusions.

3. Integration

The beef marketing work of the co-operative slaughterhouses starts at the producers - the breeders. The slaughterhouses deal with calves, undertake consultative and all kind of training activities concerning animal husbandry and breeding - some slaughterhouses even sell fodder. Each slaughterhouse collects the animals ready

for slaughtering from its members at the current market price. Part of the meat is used by the slaughterhouse's own food industry, part of it is delivered to the meat processing plant owned by TLK. Part of the meat is also sold to the industry of our competitors. We are of course also selling carcase and cut meat to retailers. Meat is sold to retailers - to private enterprises as well as to co-operative enterprises - and it takes place in a completely commercial way.

The co-operative slaughterhouse organization does not have any retail chain of its own nor retail shops, except for so called branch shops working in connection with the slaughterhouses. There are roughly a dozen such shops at present. On the contrary KARJAKUNTA and OTK are very closely collaborating with large retail chains. OTK forms direct a part of the E-group - that is the consumers' co-operative chain - and Karjakunta is co-operating with another chain of co-operative retail trade, so in this respect they are integrated direct from producer to consumer. The integration of the co-operative slaughterhouses ends before the retail trade.

As you have surely noticed, I have several times mentioned the food industry. We Finns, as you perhaps know already, are passionated sausage eaters and that is why it has been mentioned so often. About one half of all meat produced is devoured by the Finnish consumers in form of sausages. It may be interesting to see some pictures (Appendix 4) about the shares in sausage sales showing that the co-operative slaughterhouse organization controls about 55 % of the total meat processing industry and trade (Appendix 5).

4. Pricing and price

Before starting to tackle the price questions I would like to show you a table about the essential factors which have affected our beef production. The main factors increasing beef production have been the price policy, the decrease of calf slaughterings and as a result of that an increase of the average weights (Table 1.).

As next matter I would like to tell you about our pricing system. I will do it in a very simple way closely following our every day meat business. I will not show you any complicated charts or talk about price, income adjustments and so on.

Table 1.

	Beef	Production mill. kgs	Bullocks/ Heifers average weight/kgs	Slaughtering of immature calves pieces	Self-support %
1960		72	55.9	192 000	95
1962	Target price for bullocks/ heifers was introduced				
1964	Target price for all beef, production subsidy				
1965	Cow meat exports started	95	69.4	137 000	101
1966	Beef price exceeded pork price				
1969	The packing up of cultivated ground began				
1970	Average weight over 100 kgs for first time. Slaughtering bonus for cows	106	107.1	30 000	110
1973				10 600	
1974	Production bonus was introduced				
1975		112		12 400	98
1976			146.0	27 200	
1977			149.0	20 200	
1978		106	155.0	18 800	101

With us the basis of all pricing is the target price, which is fixed for given periods once or twice a year. On the enclosed picture you can see the target prices of beef and pork during the

last few years (Appendix 6 a). When assessing the target price the production costs are in general used as basis, but also other factors are taken into consideration and thus the production costs sometimes play a smaller role. Some years ago for instance we were worried about getting short of beef and thus the beef price was raised quite considerably within a year. In general only one price is fixed for beef and then it applies to the whole beef production. At present it is FIM 14.40. On the enclosed table (Appendix 6 b) you can see how it is divided between various qualities and how much in percentage of each carcase category has been put on the market. This dividing up between various carcase categories is based on the prices obtained during the previous pricing period, but also some considerations have been carried out.

In recent times was we have for instance made efforts to rise the price level for bullocks and heifers in percentage more than for other carcase qualities. The purpose of this rise has been to stimulate beef production. There are already clear signs of its effect. The mentioned prices are meant for payment direct to the producer by the slaughterhouses. Apart from this the state supports beef production in different ways. There is for example a price supplement to be paid for all bullocks and heifers weighing over 160 kilos. This bonus is FIM 1.30 a kilo at present. In addition regional premium for various carcase types is paid. The aim of the target price is that the producers are to get them during each pricing period and if these prices are not obtained, meat is exported. If the prices are exceeded - that is to say that there is a shortage, meat is imported.

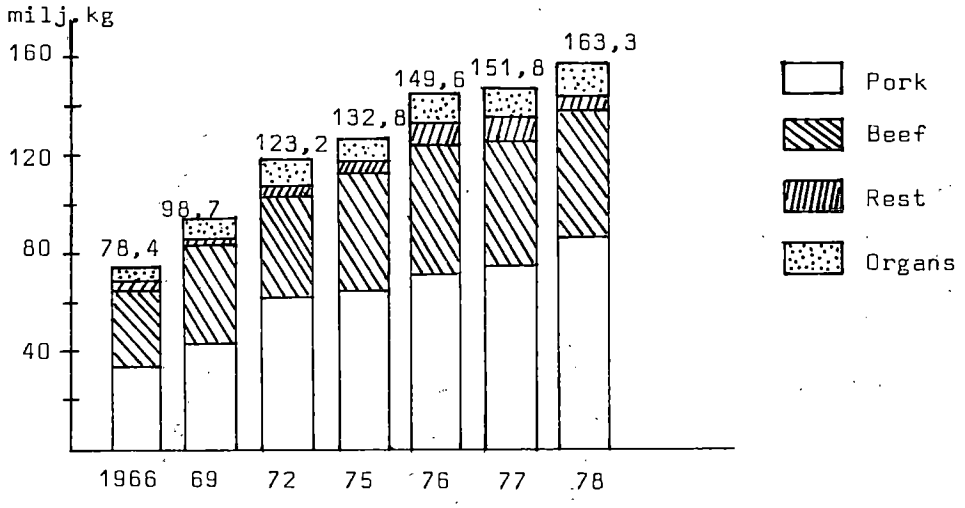
Now we talk about beef exports. There are some difficulties in obtaining the given target prices. As already said, I mean the pricing period during which the given prices are to be obtained, but during this period there may also occur deviations in these pices, if only the prices on average are obtained during the given time. Although it has to be admitted that during times of continuous overproduction the target prices cannot even theoretically be obtained.

Then I would like to tell you in a very concrete way how we in the co-operative slaughterhouse organization make the price decisions. As help we use prognoses. These prognoses are drawn up in collaboration with the Agricultural Economics Research Institute, the state - that is the Ministry of Agriculture and Forestry - and the Pellervo-Seura. Further short-range prognoses are drawn up also in our own organization. Every three months a prognosis of beef and pork quantities put on the market is drawn up separately for each slaughterhouse, each purchaser and then it is observed how it is fulfilled. This prognosis is further checked from week to week - how much meat is put on the market during the coming week. On the appendix you can see how prognosis for this year is draw up for beef production and consumption. This also serves as a quidance for us when making price decisions and when deciding whether to import, export of store meat in order to keep up the price level (appendix 7).

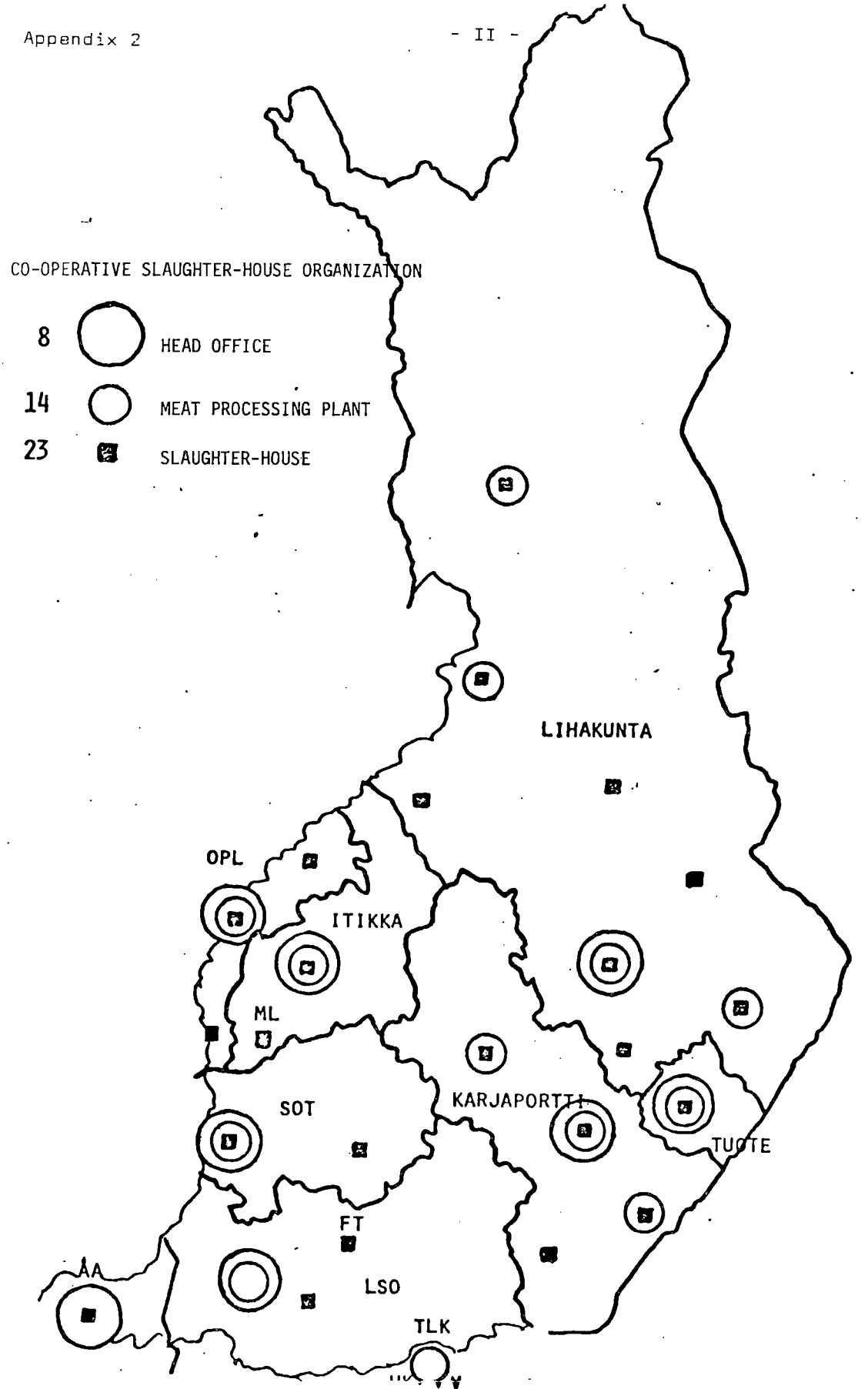
Every Thursday a price negotiation is held at TLK. In practise this is carried out as a telephone negotiation, which is conducted by the representative of the meat group. The slaughterhouses prepare themselves for this negotiation by giving their storage data - how much has been bought, how muc has been slaughtered during Monday-Wednesday the same week and how much will be put on the market during the coming week. These data are delivered to us by telex by 11.30 a.m. when a summary at TLK is drawn up. During the telephone negotiation, in which representatives of all slaughterhouses participate, the market situation is drawn up as well as the demand and supply in various parts of the country. Also the need of the central organization TLK is calculated - how much we will need during the coming week. At the same time it is also planned how a possible surplus has to be disposed of - shall it be stored or exported.

Appendix 1
TLK

MEAT QUANTITY DELIVERED TO THE CO-OPERATIVE SLAUGHTER-HOUSE ORGANIZATION IN 1966 - 1978

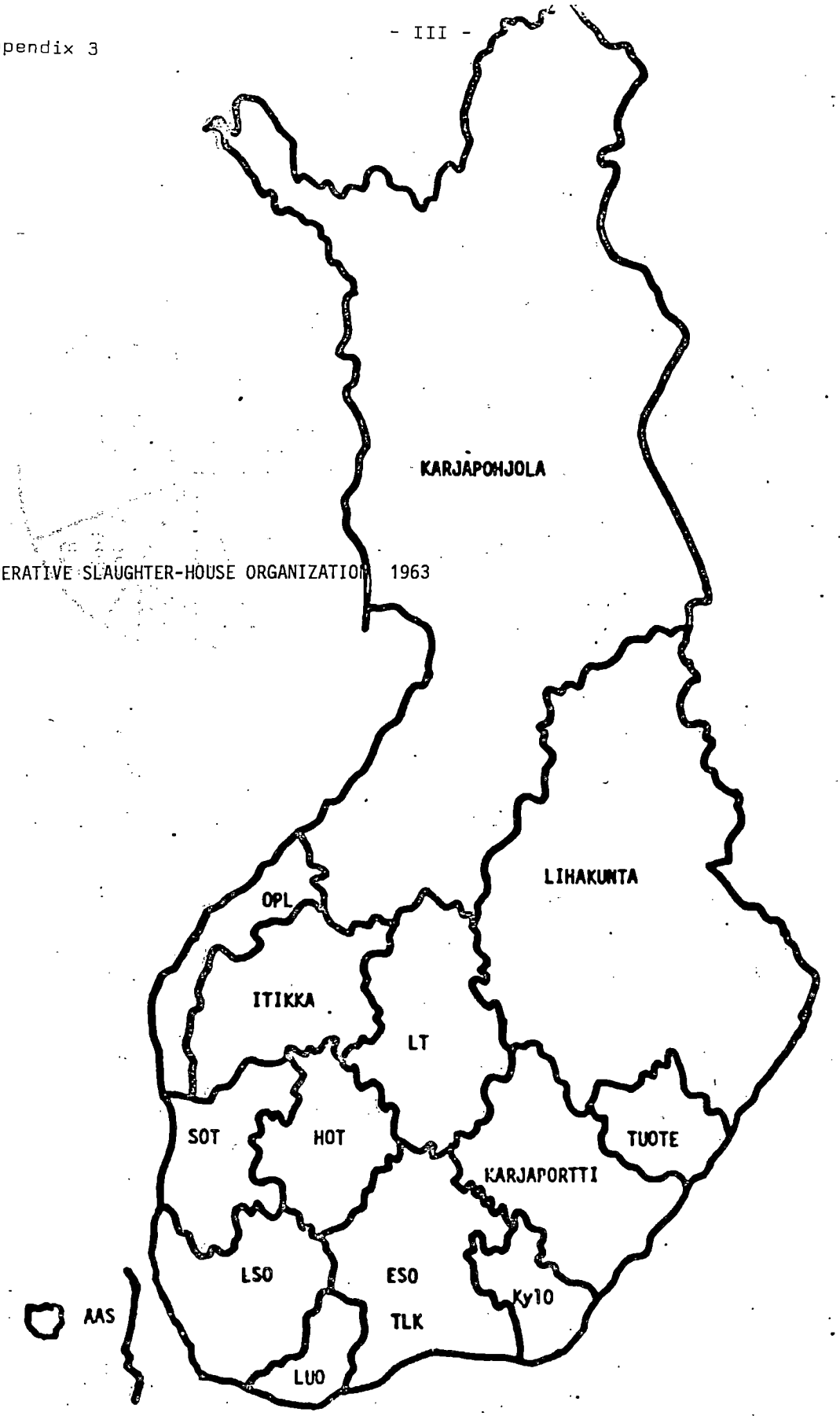


	1966	1969	1972	1975	1976	1977	1978
Pork	36,1	45,1	64,4	66,0	74,6	78,2	88,2
Beef	32,0	41,6	43,4	49,6	54,4	52,5	54,1
Rest	3,5	3,2	4,7	7,0	7,6	7,9	6,8
Organs	6,8	8,8	10,7	10,2	13,0	13,2	14,2

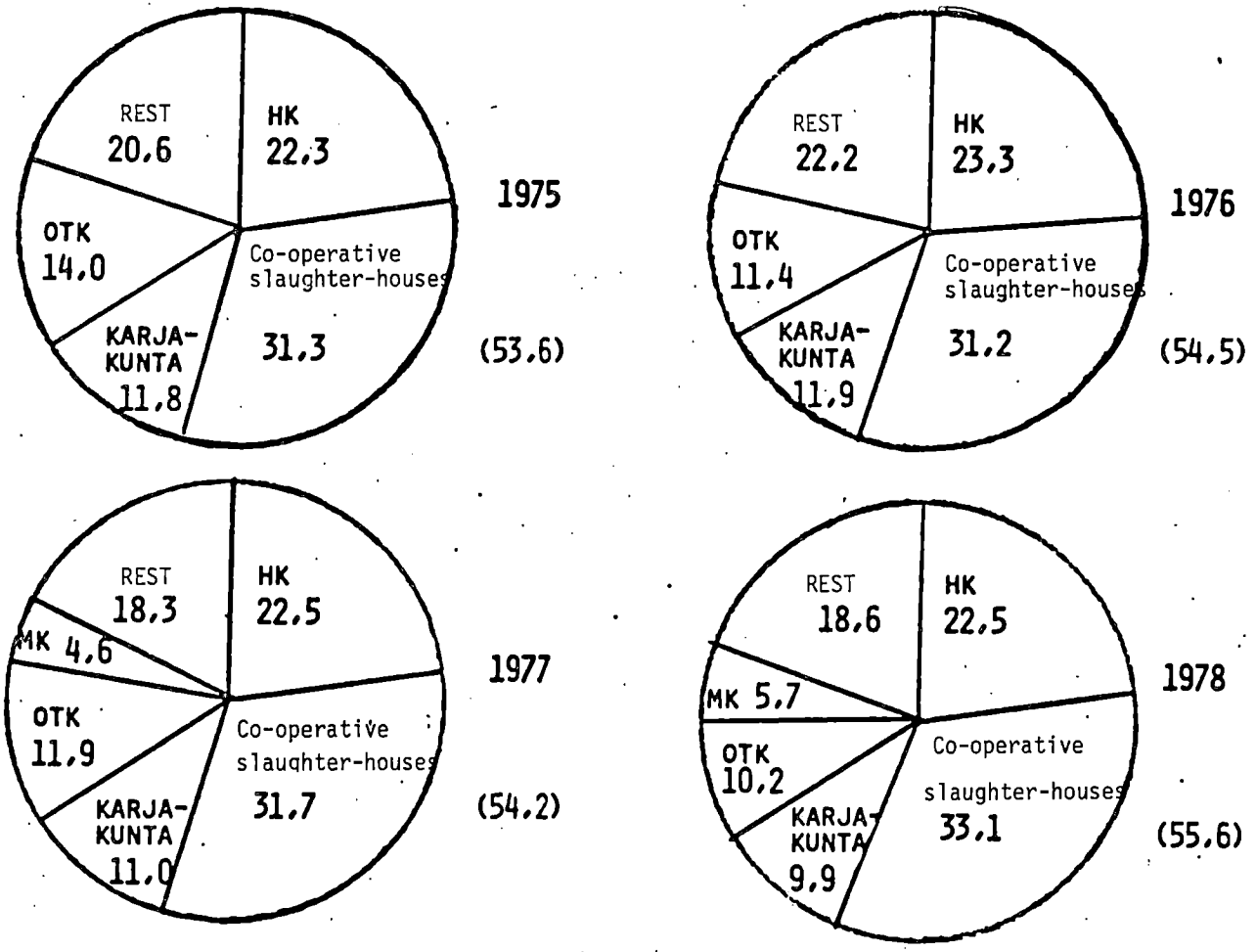

CO-OPERATIVE SLAUGHTER-HOUSE ORGANIZATION
8 HEAD OFFICE
14 MEAT PROCESSING PLANT
23 SLAUGHTER-HOUSE
LIHAKUNTA
OPL
ITIKKA
ML
SOT
KARJAPORTTI
TUOTE
FT
LSO
TLK
AA

Appendix 3

CO-OPERATIVE SLAUGHTER-HOUSE ORGANIZATION 1963

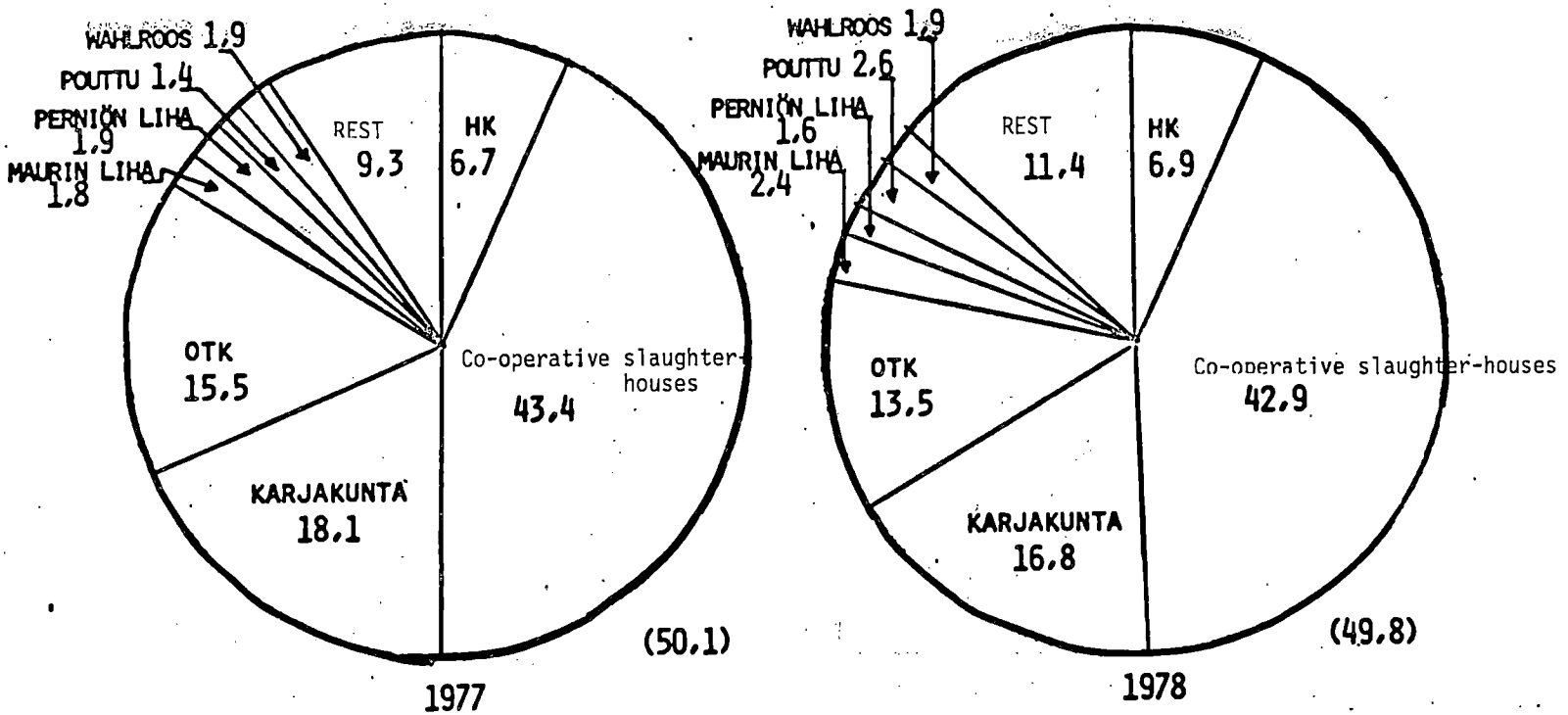


MARKET SHARES OF PROCESSED FOOD PRODUCTS 1975-1978 (%)



The shares are calculated on basis of year average values
in accordance with Markkinaindeksi Oy´s studies

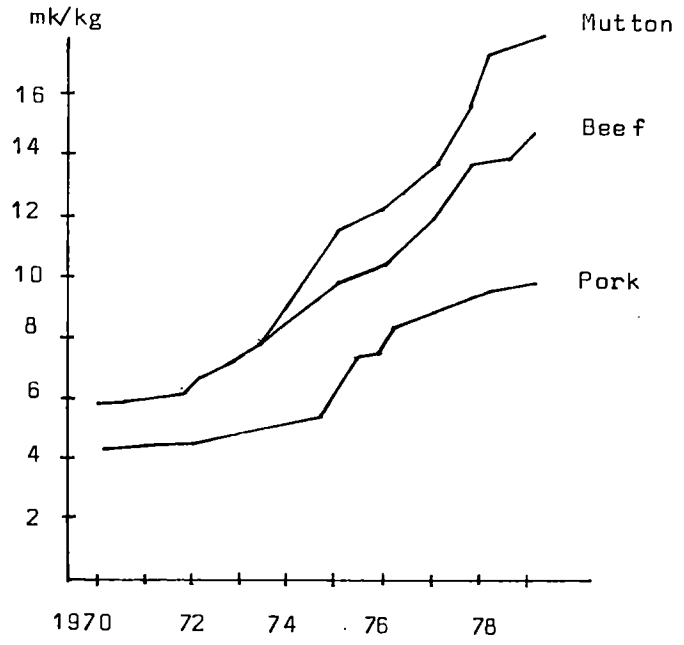
MEAT MARKET SHARES 1977 AND 1978 (%)



Sources of information: Markkinaindeksi Oy
Studies in September 1977 and 1978

Appendix 6 a

TARGET PRICES OF MEAT IN THE 1970'S



Appendix 6 b

TARGET PRICES OF VARIOUS BEEF CATEGORIES CALCULATED ON BASIS OF TARGET PRICES VALID FROM 12.02.1979 ONWARDS

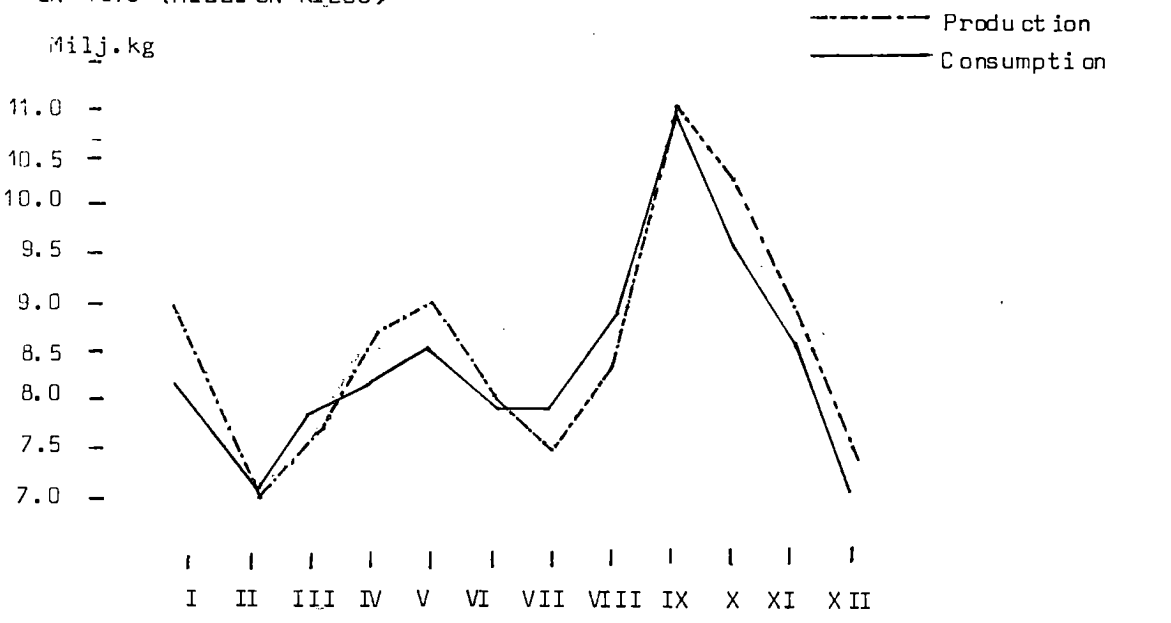
TARGET PRICE 14.40 MK/KG

	MK/KG	CHANGE P/KG	SHARE IN PERCENTAGE OF QUANTITIES PUT ON THE MARKET 1.11.77-31.
COWS AND HEIFER COWS	13.40	+25	31.3
BULLS 130 KG AND MORE	15.15	+40	47.3
HEIFERS 130 KG AND MORE	14.20	+30	11.4
YOUNG OXES/BULLS (1-2 years) 80-120 KG	14.40	+25	8.4
IMMATURE BOVINE ANIMALS (under 12 months) chiefly fed on roughage AND VEAL CALVES UNDER 80 KG	13.25	+25	1.6
BEEF ON AVERAGE	14.40,06		100.0
BULLOCKS AND HEIFERS (others than cows and heifer cows) ON THE AVERAGE	14.86		68.7
BULLS AND HEIFERS	14.97		58.7

Appendix 7

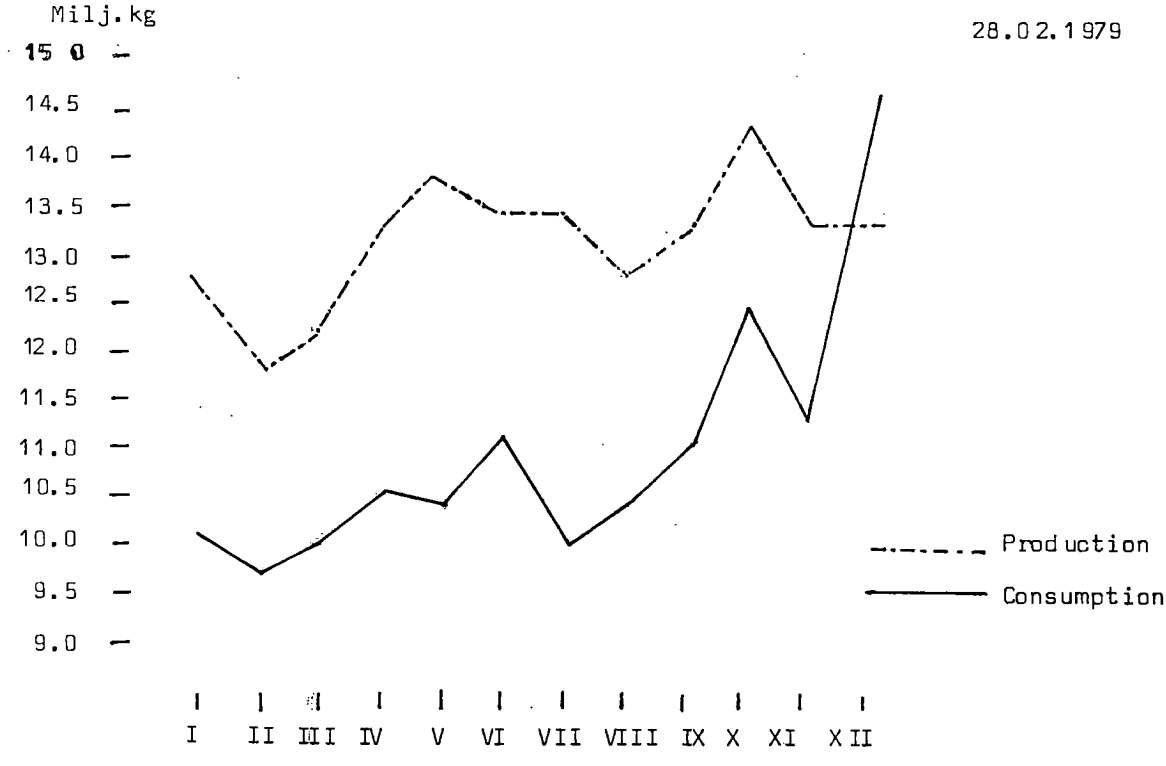
28.02.1979

PROGNOSIS OF BEEF PRODUCTION AND CONSUMPTION IN 1979 (MILLION KILOS)



PROGNOSIS OF PORK PRODUCTION AND CONSUMPTION IN 1979 (MILLION KILOS)

28.02.1979



At present a surplus is in our thoughts. On basis of the data received the price decision is made - whether to increase or decrease the next week's prices by ten, twenty or possibly thirty penny. This price decision is definite as to the transfering price between the slaughterhouses and the central organization. If need be, also exact instructions about producer's pricing are given. When assessing the producer price the slaughterhouses normally have the right to deviate from the made decision - it need not exactly reflect from the centralorganization on the producers. An exception is when due to some special market situation the producer price just has to have a given trend.

This price game is tried to be kept as tight as possible. The objective is to increase the purchasing and marketing shares. At last I will give some figures showing the development of our purchasing share during past few years.

Purchasing share in %	1975	1976	1977	1978
Beef	46.0	49.9	51.4	52.5
Pork	53.3	56.2	57.9	58.9

In our opinion this development is satisfactory. We do not expect any quick changes.

HUNGARIAN LIVE CATTLE AND BEEF EXPORT AND THE NEW WORLD MARKET TRENDS

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Abstract. A remarkable change has taken place on the foreign markets of the Hungarian cattle sector in the last five years. This short paper gives an outline of the transformation that led to a profound reorientation from the traditional Western European markets to the Soviet Union and to Near Eastern and North African countries. Some effects of this change on the commodity structure, the augmentation of beef compared to live cattle are briefly referred to also.

The export of beef-cattle is a traditionally important outlet of the cattle sector. Due to profound changes of the preferences, price relations and demand structure of the main markets some conclusions arise on the export-led development strategy of the whole Hungarian meat-complex. There is a modification of the foreign market appraisal of the beef, lamb, pork and poultry sectors.

1. Introduction

The development of the cattle sector was always strongly influenced by the foreign markets for beef cattle and beef. The existence of big and expanding markets with comparatively easy access in Austria, Germany and Northern Italy established a firm base for the development of an export-led strategy of cattle farming. This issue had an important consequence on the structure of export; preference of these markets - interest of trading partners, veterinary provisions etc, - was very strong for beef cattle. Easier transportation made this more attractive for the exporting partners also, thus enhancing beef cattle against beef. This had important consequences on the regional set-up of

the infrastructure. Slaughtering facilities were set up at the consumer markets in the importing countries, freezing and storing establishments and cold-chains serving the short distance inter-country movement of beef from slaughter-houses to the consumer while long distance transport between countries was carried out largely in the form of live cattle+/.

All the main components of this firm marketing pattern were five years ago abruptly changed. Though it is still difficult to establish many important factors of the future, there is no doubt that the market of beef cattle and beef will be never as it was before the Common Market closed its frontiers to traditional suppliers.

By the opening of new markets, beyond the usual marketing sphere it was possible to find an outlet for the Hungarian output of beef-cattle and beef, largely in excess of the inland consumption. Thus grave consequences were avoided at the farms and income of the cattle sector was maintained. Effects on the trade balance of the country could be held also on a tolerable scale though trade with some countries was seriously affected, where the importance of cattle sales in paying for import was high.

It was a remarkable accomplishment of all those concerned - agriculture, food industry, transport, foreign trade - to redirect the big flow of beef cattle and beef to countries largely unknown as beef markets. Some of these new markets were just now developing a taste for higher meat consumption and starting to expand their markets. Infrastructure, facilities for beef cattle and beef trade were in no way to compare with the highly effective trading channels of the traditional importing countries. Knowledge about the consumer, experience of the buying and eating habits, tastes and preferences were all far short of the requirements for the development of a marketing strategy.

+/ Cf: Tamás UJHELYI: The Hungarian Cattle Sector and the World Market
2nd Finnish-Polish-Hungarian Seminar for Agricultural Economics, Walzbrzych, 1978.

The past half - decade of the new beef world market situation may be classified as "transitory-permanent". It was transitory as there was no sign of an emergence of a stable group of exporting and importing countries which would determine the novements of the world market which was a characteristic of the past. And it was permanent, as the view persists that the market would never be as it was before.

What are the main features of the new situation, the new preferences, price structures and the volume of the market, and how do all these affect Hungarian export, the proportion of live cattle and beef. And how does the foreign currency income achieved by the new/structure influence the competitiveness of the cattle sector with other lines of development, other animals, arable farming etc. Does the previous big foreign trade advantage of the cattle persist, justifying an export-led development strategy or would it be rather more reasonable to use our resources for the development of other sectors.

export

These are all pressing and grave problems. This short paper tries to give an outline of the problems of the last years and shows something about the way agriculture reacted.

2. The role of the export-outlet for the cattle sector

The export of beef cattle is a longstanding outlet of the cattle sector with great importance. Meat output of the sector - beef production and the carcass beef equivalent of the export of beef cattle - had in the 1970s a volume of 170-200.000 tons with an average of 180.000 tons and export - in beef equivalent - 80-90.000 tons/average 85.000 tons/. Thus export reached almost half of the output of the sector /average 1970-1977 47 percent/. As beef production per 100 hectares of arable land was about 4 tons, export of beef per 100 hectares arable land reached 2 tons, a very high figure.

Hungarians are not really beef consumers. Big quantitites of fresh pork and many prepared products were always consumed and in the last decades this preference became even more predominant. Chicken and other poultry has also a well established place in the diet. Consumption of beef on the other hand is only percapita 13 kg and is among the lowest in Europe. Beef has a more important standing in the export than for supplying the Hungarian consumer.

The export importance of beef cattle was in the last decades progressively enhanced. There was a permanent augmentation of the beef cattle and beef import of traditional West- and South European markets, because of the slower progress of the cattle herd. Importance of the cattle sector grew as a consequence of this, in relation to other agricultural production lines. At the beginning of the 1970s the cattle sector earned already half of the foreign exchange income of the total live animal and meat export. Growth of the flow of young cattle of Northern Italian markets was particularly strong because of an enormous upswing of Italian beef consumption in the 1960ies and the first years of the 1970ies.

Moving the greatest possible number of beef cattle to export markets had a very high priority and production of cattle was stretched to the utmost. Figures of the Economic Comission for Europe show that in 1969-1971 and 1975-1977 Hungarian beef and veal production per 1000 head of cattle reached 96 tons[+/]. As maximum productivity which can be achieved under normal European conditions seems to be situated somewhat close to 100 tons this is a very high figure. Productivity of the Hungarian cattle herd was in the 1970ies the highest in Europe, one-third higher than the average of the continent. This is very considerable the average European level being very high, approaching gradually maximum productivity, as defined above.

[+/] The European market for meat and livestock in 1977 and 1978, ECE, Geneva, 1979.

3. World market situation and Hungarian export

Hungarian export of beef cattle and beef from 1970 to 1977 developed as follows:

Hungarian export of beef cattle and beef

	Beef cattle	Beef	Total[1/]
		1000 tons	
1970	112.9	23.7	88.2
1971	110.5	20.9	80.6
1972	111.7	16.7	77.0
1973	120.3	22.7	87.7
1974	89.7	19.3	67.8
1975	105.0	56.9	113.6
1976	89.0	36.5	84.5
1977	90.4	38.8	87.6

1/ Carcass equivalent

Source: Foreign Trade Statistical Yearbooks of Hungary

Western European market for beef cattle existed for a very long time and had a profound influence on the exporting countries. Germany - in the post 2dn World War period Western Germany - and Italy were the most important customers of Hungary, Switzerland buying only small quantities. This situation gradually changed to Italy buying in 1971-1973 70-80 percent of the Hungarian beef cattle and beef export, Western Germany dropping to 6-7 percent, reaching with the remaining EEC countries /Netherland, France/ 15 percent. Thus 90-95 percent of Hungarian export went to the Common Market, small quantities remaining for other destinations.

The big quantities of beef imported from third countries by the Common Market had an importance because of the rapidly growing consumption. The growth rate of consumption exceeded production and as a consequence import rose to hitherto unknown size. The first projection of the Common Market foreign trade, made for the year 1965 indicated beef trade with third countries to reach 50-100.000 tons export or import depending on changes in the milk and beef sector of France, whereas in the beginning of the 1970s import from third countries exceeded 1 million tons.

This marketing situation changed in 1974 abruptly. Italy, outstanding importer of the last years, buying the overwhelming majority of beef cattle entering the markets of the European continent and taking also big quantities of beef, closed its frontiers in May 1974 to third countries and this ban was soon followed by all Common Market countries.

The transformation of the world market situation came as a result of a coincidence of different factors, affecting both supply and demand. There was an interaction of a great number of factors, growing difficulties in the smooth development of world trade, abruptly rising energy prices, a high rate of inflation, unemployment, deteriorating foreign trade balances. All these led to measures of the governments trying to achieve savings on foreign exchange. Customers reacted to the unfavourable economic climate by restraining consumption. Many guest-labourers returned home to diets containing much less beef than their consumption in the past years and those remaining try to economize on the most expensive item of the diet, beef.

Effect of some random factors, declining birth rate with slackening effect on the consumption of some importing countries and widening of the Common Market with new members having highly developed, export oriented cattle sectors augmenting beef supply contributed to the adverse situation also.

All the factors causing the abrupt downturn of the market are going to have permanent depressing effects; there is no reason to expect a change to the former favourable situation. Hungarian experts expect some improvement of the Common Market demand, but nothing like the earlier volume and stability.

The situation was saved by the opening of new markets beyond the traditional range of Hungarian beef cattle exports. The Soviet Union was the most important of these. By starting a new big volume beef cattle import from Hungary and by raising beef import to a much higher level than earlier the Soviet Union created a new and solid outlet for Hungarian cattle.

The Soviet Union did not import beef cattle from Hungary earlier, but on the terms of a new long-term agreement fuel and raw materials are exchanged for beef cattle, beef etc. Export was about 55.000 tons of beef cattle and 20.000 tons of beef in the years 1976 and 1977. As a comparison, import of the Common Market countries reached at its highest level in 1971-1973 107-120.000 tons of beef cattle and 13-17.000 tons of beef from Hungary. Thus the combined Hungarian import of the Soviet Union of beef cattle and beef in the yrears 1975-1977 was 90 percent of the quantity sold to the Common Market in 1971-1973. At the beginning of the 1970s the Soviet Union had a share of only 2-3 percent in the Hungarian cattle and beef export; this rose to 60-70 percent in 1975-1977 while the share of the Common Market dropped from 91-93 to 16-22 percent.

The opening of a new beef cattle and beef market in the Near East and North Africa was an other important development of the last years. A completely new market was created by the combined effect of a strongly growing population and booming oil income in some countries. Because of the closure of traditional outlets, Hungary had some beef cattle and beef to sell, though most of the output was already covered by contracts with the Sovien Union. The opening of new markets has of course always an importance but because of many adverse factors this particular market has only limited importance as an outlet for Hungary. Populations of oil-rich countries is comparatively small and because of the largely under-developed infrastructure only a small fraction of even these consumers can be supplied with perishable products regularly. Practical experience with these markets is vague and there is no knowledge about the consumer that could serve as a base for the development of marketing strategies. There are special problems of business with these countries too. Because all this, there are many risks with these markets and they can be of secondary importance only.

Fluctuation of the Hungarian export to these countries shows some of these uncertainities. Average beef cattle and beef export to the Near East and North Africa in 1975-1977 was 6.000 tons beef equivalent. Ratio of the three years was 1:0,26:1,7 i.e. the volume dropped to one-fourth and rose more than sixfold from one yaar to the other. All this largely diminishes the importance of these markets that seem at first glance very promising.

Following figures show the changing importance of the different countries for Hungarian export:

Hungarian export of live cattle and beef by main destinations[+/]

	Average			
	1971-1973	1975-1977	1971-1973	1975-1977
	1000 tons		percent	
Soviet Union	2.0	61.7	2.4	64.8
Other COMECON	1.0	6.7	1.2	7.0
Total COMECON	3.0	68.4	3.6	71.8
Italy	62.9	14.5	76.9	15.2
Western Germany	5.3	0.6	6.5	0.6
Other EEC	7.6	2.7	9.3	2.8
Total EEC	75.8	17.8	92.7	18.6
Other Western Europe	2.2	3.1	2.7	3.3
Near East- and North Africa	0.8	6.0	1.0	6.3
Total	81.8	95.3	100.0	100.0

[+/] Carcass equivalent

Source: Foreign Trade Statistical Yearbooks of Hungary

The shifting importance of the different markets had its effect on the export structure, the proportion of beef cattle, carcass beef and cuts respectively. The new situation is characterised by a much higher part of beef than earlier:

	Live cattle[1/]	Beef	Total[1/]
	percent		
1971-1973 average	75.5	24.5	100.0
1975-1977	54.1	45.9	100.0

[1/] Meat equivalent

Source: Foreign Trade Statistical Yearbooks of Hungary

As a consequence of a very strong preference of the traditional importing countries for live cattle- supported by rigorous veterinary regulations not always in conformance with developments of the meat trade - Hungarian export was strongly biased for beef cattle. Beef export remained far behind the great number of live cattle moving to slaughterhouses in Western Europe.

With the opening of new markets, this situation somewhat changed. A number of different, sometimes conflicting factors caused some augmentation of beef export in relation to live cattle. Close economic and trading links tend to make a tight coordination of veterinary regulations possible - including mode of control - and this can ease expansion of beef against live cattle. Requirements of veterinary meat inspection are at present the most important obstacles preventing a shift of the foreign trade structure from live cattle to carcass beef or cuts. The opening of the Soviet Union as a new market enhances the importance of beef export against live cattle this could be the base of a shift towards processed forms of meat due on economic considerations for a long time.

Growing importance of distant markets causes usually a shift towards beef as it is easier and more economic to send it to great distances and there is even a limit beyond which it is impossible to ship live cattle. But in the case of Near Eastern and North African countries this is offset by regulations of the Mohammedan religion permitting only consumption of animals slaughtered with strict observance of Mohammedan rules. Thus export of beef is practically excluded to some of the biggest Arabian countries.

Beef-cuts have only minor role in foreign trade at present. It is a basic characteristic of foreign trade of meat that commodity structure is much more "unprocessed" than in consumer trade. A very high and growing proportion in the developed countries of the supply reaching customers is made up of deboned, cut and packaged meat. This development was not or not whole - heartedly - by sponsored by the consumer, wanting to economize on house-work but by commerce trying to lower its costs. It is evermore difficult and expensive in developed countries to have somebody cutting, deboning etc. carcass meat in the shops. There is a universal effort to make all this the task of the meat industry, at the slaughterhouses. In this case it is also much easier, to distribute different cuts according the demand of particular markets.

Foreign trade of meat shows - with the exception of poultry - no sign of a shift toward cuts. World trade of meat is as "unprocessed" as it was decades ago, while in consumer trade there is a profound change. Lack of veterinary confidence is the cause of this as authorities require the inspection of the whole animal and make only an exception is case of full veterinary-confidence if veterinary realiability of the authorities of the exporting country is accepted by the importing country. At present this is rather exceptional and this prevents the development of the export structure.

4. Some consequences of the altered world situation

The overwhelming importance of the production of beef cattle was because of its great export importance a universally accepted basic proposition of development strategy. According to the firmly held view - and because of no evidence to the contrary - foreign markets of beef cattle are much more stable, less frequently adversely affected by cyclical movements and temporal gluts than pigs and poultry.

The importance of cattle for export was a justification for the very high investments necessary for the expansion of the cattle herd. As there is practically no way of expanding beef production by a more intensive use of the calf crop, a bigger herd is necessary.

Because of the heavy investments there is a permanent demand for beef production methods saving investments, a difficult problem for researchers. Returning to the traditional Hungarian extensive, permanently grass-fed cattle farming and thus saving much of the investments on barns and feeding facilities is a tempting proposition. But things have changed in the past 150 years and because of an extensive draining of the plains, very little of the grass land remained and yields are even there low. Cattle races are not well suited for this form of farming and the adaptation of cattle races with good grass-feeding results to the Hungarian climate is time consuming with many difficulties.

The altered world-market situation has greatly diminished the price advantage of beef compared with other meats. In the past, merits of producing beef cattle and beef for export would show in the comparatively good price relations to other meats and feedstuffs, but because of the transformation of the world market hardly anything of this remained.

The fact that beef is mainly consumed in fresh form, processing and preserving being rather an exception, is an unfavourable characteristic. Pork is more suitable to curing, smoking and other modes of preservation and with these (seasoning etc.) it is possible to influence the products. This is not only a way of lenthening the storage-life of the products but it is also possible to get different products for very different tastes and customers. With a greater range of products, higher prices can be achieved and the market stability could be also enhanced. Poultry is more suitable for freezing, shipping is much easier, cuts are well established in foreign trade and the short production cycle makes a flexible control of supply comparatively easy.

All the propositions outlined above do not imply a new ranking of animal sectors in the development strategy. But there is a growing number of facts leading to new ideas and induce a profound consideration of the development strategy. It is the common task of research and practice, to find the answers to these difficult problems.

Budapest, May 1979.

Sources: Tamás UJHELYI: The Hungarian Cattle Sector and the World Market
2nd Finnish-Polish-Hungarian Seminar for Agricultural Economics, Walzbrzych, 1978.

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THE FORMATION OF BEEF PRICES IN FINLAND

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Abstract. The producer prices of agricultural products are determined according to the Farm Income Act. Representatives of the State and agricultural producers negotiate over changes in farmers' income and on the basis of these negotiations the Government decides on increases in the target prices of the major products and the State subsidy to be paid to farmers. In the case of meat the implementation of the target price depends on the balance between supply and demand, in which foreign trade plays an important role. Beef producers receive price supplement out of public funds outside the target price system, and some parts of the country also receive regional premium.

The retail price of beef is not regulated by price control measures; it is made up of the producer price and the share going to the slaughterhouse and the retail levels. Competition at the slaughterhouse and wholesale and retail levels regulates the price margin. About 2/3 of the retail price of beef goes to the farmer. About 1/3 of the total margin between the producer and retail prices goes to the slaughterhouse and the wholesale level and 2/3 to the retail level, privided the meat is cut up by the retailer. The partial shift in the cutting up and packing of meat away from the retailer to the wholesale and the slaughterhouse is gradually changing the distribution of the margin between the various levels.

1. The formation of agricultural producer prices in general

Decisions concerning farmers' income are based on the Farm Income Act. Under this Act representatives of the state and agricultural producers negotiate over the changes in farmers' income. On the basis of these negotiations the Government decides on changes in the target prices for the most important agricultural products and the subsidies to be paid to agriculture out of

public funds for the following pricing year. To assist these negotiations total calculations are made of the change in agricultural revenues, costs and farm income. In principle compensation is paid for rises in costs according to the calculations, and the increase in farm income (the return on the farmer's labour and his own capital) is decided by means of necotiations. The pricing year starts at the beginning of March. Should the negotiations fail to reach agreement by this date they are continued until the agreement is reached, and this comes into force at the beginning of the next month. In the case of meat the new price may, however, come into force as soon as the agreement is signed. The target prices for grains take effect at the beginning of August.

In addition to the negotiations conducted in February, talks are held in August over whether the target prices should be adjusted as a result of rises in costs during the first half of the pricing year. The subject of raising the farm income is not then necotiated.

Farm income is increased and the compensation for rises in production costs is paid by adjusting both the target prices of agricultural products and the subsidies paid out of public funds. The distribution of the total increase in target prices over different products is agreed on in the negotiations. Allowance is then made for the domestic production and consumption and the world market situation of each product and how the production costs of different products have risen.

The following products are included in the target price system: rye, wheat, fodder barley, fodder oats, milk, beef, pork, mutton and eggs. The priced of products outside the system are determined either by agreements for individual items (e.g. sugar beet and oil plants) or on the basis of supply and demand.

The target price is the price farmers should on average receive for their products during the pricing period. Should the average producer price for all target price products be more or less than the average target price, this is allowed for in the following price decision. The special price board makes calculations for the negotiations and makes proposals to the Ministry of Agriculture and Forestry on necessary measures if the target prices do not appear to be implemented. In the case of meat, exporting usually begins if the producer price drops below the target price; in the reverse case meat is imported. The decisions on the import and export of agricultural products are made by the agricultural marketing board, which operates according to plans ratified by the Government. There is a special clause for meat and eggs stating that if the price paid to farmers is five per cent higher or lower than the target price, measures must be taken to eliminate the difference.

The export prices for agricultural products are usually lower than the domestic prices. To prevent the low export prices from lowering the producer price the difference between the domestic and export prices or part of this difference is paid out of public funds. The Farm Income Act at present in force lays down the government's responsibility in handling exports of agricultural products for the period 1979-1981. Should the amount of milk received by the dairies in 1979 exceed 2,710 million litres, agriculture will have to account for the surplus export costs by means of various payments. Correspondingly, if pork exports exceed 14 million kilos, eggs 15 million kilos, cereals 105 million kilos and fodder grain 210 million kilos, farmers will receive only the world market price for the surplus that exceeds the ceilings. These limits will probably be exceeded this year with the exception of cereals. There are no separate regulations concerning the financing of beef exports because in recent years domestic production and consumption have been approximately equal and this state of balance will apparently continue.

The average producer price of products under the target price system usually corresponds to the target price fairly well over the year. The annual deviations for beef have been slightly larger than for other target price products in recent years.

In order to reduce the retail prices of agricultural products some of the price paid to farmers is paid out of public funds. This extra price is at present paid on milk, beef and mutton. Regional subsidies as well as special subsidies for small farms are also paid out of public funds. These forms of subsidy outside the target price system bo not affect the retail price of products. The subsidies paid out of public funds amount to slightly more than one tenth of the total agricultural return.

The authorities responsible for the general supervision of prices follow the retail prices for agricultural products and the margins between the producer and retail prices. Fairly strict control of retail prices is considered necessary for certain foodstuffs, such as milk, butter, certain meat products and the main types of bread. The National Board of Trade and Consumer Interests or the Government determines the maximum retail prices permissible for these products. Before a price is raised the manufacturer (e.g. the dairy industry) must prove that his costs have risen and that the increase is therefore justified.

2. Producer price of beef

The target price of beef is fixed as an average for the total volume of meat. The average price paid to producers for beef may deviate somewhat from the target price. In recent years producers have usually been paid a higher rate than the target price. Last year, however, when beef output slightly exceeded domestic consumption, the producer price was lower than the target price. The following table shows the average annual target price and producer price for beef in the '70s. The prices are calculated per kilo of carcass. Before beef is weighted the entrails, head, hide, tail and hoofs are removed. The value of these offals is included in prices[1].

[1] Source: SILTANEN, L. 1978. Tavoitehintojen toteutuminen. Agricultural Economics Research Institute. Publications 37, p. 51.

	Target price	Producer price	Deviation from target price	
	mk/kg	mk/kg	p/kg	%
1970	5.55	5.51	-4	-0.7
1971	5.98	5.92	-6	-1.0
1972	6.38	6.96	+58	+9.1
1973	7.20	8.12	+92	+12.8
1974	8.27	8.43	+16	+1.9
1975	9.56	10.40	+84	+8.8
1976	10.27	10.58	+31	+3.0
1977	12.31	13.29	+98	+8.0
1978	13.79	13.60	-19	+1.4

The target and producer prices above do not include any regional premium or price supplement. The purpose of the supplement paid for beef is to increase the carcass weights and thus the output of beef. Nowadays the rate is 1.30 mk/kg for cattle weighing more than 160 kg, except for cows. The supplement is the same throughout the country.

The target price of beef that came into force in January of this year is 14.40 mk/kg. The corresponding target price for pork is 9.66 mk/kg and the target price for fodder barley is 0.84 mk/kg as of 1.8.1979. The price of beef has clearly been raised more than that of pork in recent years. The change that has taken place in price rations shows that until the mid '60s the price of beef was lower than that of pork, whereas now the target price of beef is 1.5 time that of pork.

The price of beef paid to farmers varies according to the cattle group. The purposes of pricing cattle are divided into five groups, each with a recommended target price. The following table shows the relative target price for various cattle groups and the proportion of the total beef coming onto the market for one year beginning on 1st November, 1977.

	Relative target price	Percentage of total
Cows and heifers	93	31.3
Bulls of 130 kg and more	105	47.3
Heifers of 130 kg and more	99	11.4
Young ox 80-120 kg	100	8.4
Calves of less than 80 kg	92	1.6
Beef, average	100	100.0

Through pricing by cattle group and the supplement system introduced in 1974 it has been possible to raise carcass weights. Between 1970 and 1978, for example, the average carcass weight of cattle (excluding cows) rose from 111 kilos to 161 kilos.

Every carcass is classified according to quality and the quality grade influences the price paid to the farmer. The classification is made on the basis of the consistency and colour of the meat and the fat content of the carcass. The aim of this classification is to promote the production of good-quality meat.

3. Regional premium

The natural conditions for agriculture are poorer in central and north Finland than in the southern parts of the country. The costs of agricultural production are thus greater in the north of the country. In order to compensate for the higher production costs regional premium is paid on e.g. beef in the central and northern regions. Seven regions have been formed for the premium payment. In the two most southerly regions premium is paid only for cattle of over 160 kg (except for cows). In the other regions the premium is graded so that it is highest for cattle weighing more than 130 kg and lowest for cow's meat. Regional premium is paid for cattle of less than 80 kg only in the two most northerly regions and the archipelago. The attached map (appendix) shows the premium regions and rates in different regions as of the beginning of May 1979.

4. Formation of the retail price of beef

The retail price of meat comprises the price paid to the farmer, the cost of collecting and slaughtering the cattle and storing, transporting and retailing the meat. Meat is marketed by a farmer to a slaughterhouse and further to a retail or wholesale dealer, who then sells it to the retailer.

The retail price of different parts of the carcass in relation to the price for the whole carcass in determined according to their consumer value. The relative prices for different parts of the carcass vary somewhat according to demand. In order to determine the margin between the retail price of the meat and the producer price it is essential to calculate the average retail price of the carcass. In the margin calculations made by the Agricultural Economics Research Institute the retail price of a whole beef carcass is calculated by means of the retail price for four parts of the carcass and mince, and the value coefficients corresponding to them. The value coefficients represent the ratio of each part to the average price of a whole carcass. The carcass price is calculated from each of the five retail prices and the arithmetical average is the average retail price for the carcass. Changes in the price relations of the various parts add some uncertainty to the result because has not been possible to adjust the value coefficients annually. The following table shows retail prices to the calculations concersing the year 1977 and the value coefficients used.

	Retail price mk/kg	Value coefficient
Young ox steak	29.08	1.75
Beef steak	28.82	1.57
Shoulder of young ox	20.39	1.23
Mince	19.63	1.15
Breast of young ox	15.22	0.93
Carcass average	17.00	

The producer and retail prices for beef and the total margin between them can be determined relatively precisely. On the other hand, the distribution of the total margin between the slaughterhouse, wholesale and retail levels can be calculated only approximately. The slaughterhouse share includes the costs of animal collection and slaughtering and also the costs of storing and transporting the meat. Some of the meat is cut up at the slaughterhouse, some at the wholesaler's and some at the retailer's. Thus the break-down of the margin partly depends on the stage at which the meat is cut up. The margin calculations show that about one third of the total margin on meat cut up at the retail level goes to the slaughterhouse and the wholesaler and two thirds to the retailer.

The producer price for beef is calculated on the basis of carcass weight. The value of the offal (other than meat) also affects the price formation. The income for offal received by the slaughterhouse roughly corresponds to the costs at the slaughterhouse level. The margin calculations are made on the carcass weight basis and value of the offal is taken into account to that the producer price is divided according to the values of meat and the offal. Calculated on this principle the retail price of beef in the '70s has been as follows:

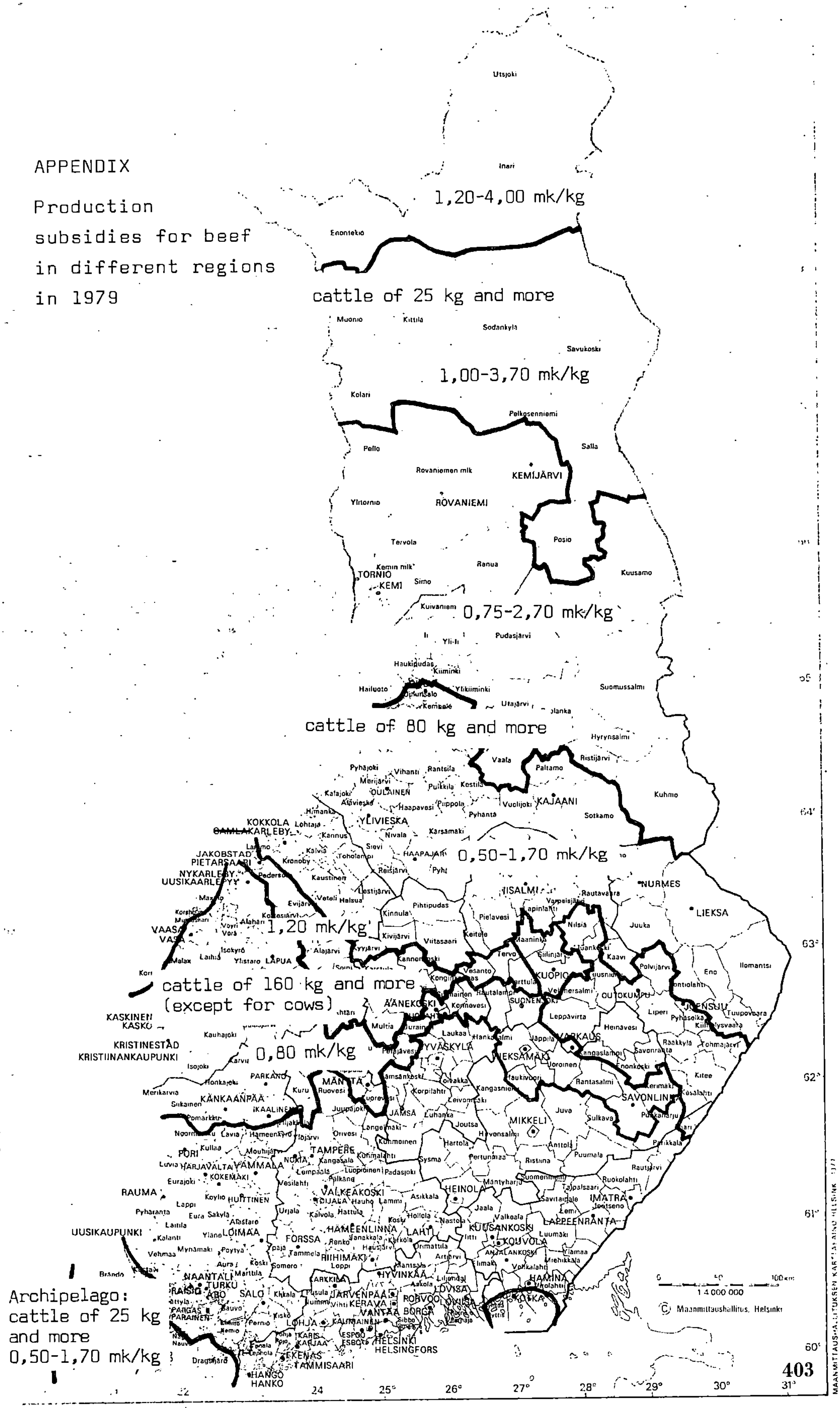
	Producer price mk/kg			Total margin	Retail price
	meat	offal	total	of meat mk/kg	of meat mk/kg
1970	4.81	0.70	5.51	2.28	7.09
1971	5.24	0.68	5.92	2.51	7.75
1972	6.12	0.84	6.96	2.78	8.90
1973	6.80	1.32	8.12	3.67	10.47
1974	7.11	1.32	8.43	3.96	11.07
1975	9.24	1.16	10.40	4.14	13.38
1976	9.23	1.35	10.58	4.95	14.18
1977	11.66	1.63	13.29	5.34	17.00

The price of some of the most important foodstuffs are controlled by stipulating a maximum retail price. In the case of meat this has not, however, been considered necessary, because price control is difficult to enforce and because it is assumed that competition at slaughterhouse and retail levels will keep the margin between the producer and retail prices reasonable. Furthermore the margin is affected by the structure at the slaughterhouse level. More than half of all meat purchases are made by the cooperative slaughterhouse organization owned by farmers, which aims to keep the margin as small as possible and thus promote a domestic demand for meat. About half of the meat output is used for various processed meat products, such as sausage. The farmer's share of the price of highly-processed meat products is naturally far smaller than that of meat. The price formation of certain meat products is controlled, which means that their retail prices may be raised only with the permission of the National Board of Trade and Consumer Interests.

The producer price for beef has been about 2/3 of the retail price since the early '60s. During this time it has been possible to cut costs by rationalizing slaughterhouse operations. On the other hand, the costs of the slaughterhouses and retailers have risen, due, for instance, to the introduction of refrigerated vehicles and storage. If we also examine meat products, it appears that price formation has changed because consumers have shifted to more processed products, i.e. some of the work earlier done in the kitchen has been transferred to the meat processing factories. The significance of processing has also increased, because the cutting up and packing of meat has partly shifted from the retail level to factories connected with slaughterhouses.

APPENDIX

Production subsidies for beef in different regions in 1979



THEME III.

THE EFFICIENCY AND PROFITABILITY OF BEEF PRODUCTION

ECONOMIC RESULTS ACHIEVED BY THE CO-OPERATIVE INTEGRATION OF DAIRY FARMING IN HUNGARY

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Abstract: Reasons for the establishment of co-operative milk processing and commercialization. The role of co-operative dairy-farming in the dairy production organizational integration in dairy farming. Input-output and income in co-operative dairy farming. Labour productivity in the dairy plants.

1. Historical antecedents

According to early written records, co-operative dairy farming movement first started to develop in North America and was implanted to Europe, only later and slowly after 1855, first to England, France and Germany following the success achieved overseas by co-operative dairies.

In order to improve the safety of milk marketing, co-operative dairies were generally adopted in Hungary from 1880 by the dairy farmers: by small and middle peasants as well as by feudal medium-size and large estates.

While the institutional system of co-operative dairies based upon the producers' concern remained operating in many European countries and even gained ground and became general all over Europe after the 2nd World War, production means of co-operative dairies were taken into public ownership in Hungary in 1948-1949 when the means of production were generally socialized. Thus this institutionalized system became disintegrated.

Co-operative dairies were replaced by a state owned dairy industry and this remained the most important manager of production and commercialization of milk and dairy products in Hungary.

At present 15 state owned dairy enterprises and 64 milk processing plants belong to the dairy industry operating as a trust-type organization. The Trust of Dairy Industrial Enterprises is one of the biggest horizontal organizations in food industry, with nation-wide competence and respondibility.

There was a new opportunity for the establishment of an integrating organization including production, processing and commercialization of milk within a vertical structure by the Co-operative Law anacted in 1967, i.e. about 6 years after the socialist reorganization of agriculture. Thus co-operative vertical integration of dairy farming is a consequence of the organizational development of socialist large-scale farms, a product of purposeful management based upon co-operative tradition and implemented by the voluntary participation of large-scale socialist enterprises as a result of their increased independence.

2. Reasons for the establishment of co-operative milk processing and commercialization

Manyfold and complex factors played a role in the establishment of co-operative milk processing and commercialization that can be outlined as follows:

- Social and economic character of Hungarian villages fundamentally changed in the years after collectivization. The means of production owned in the past by the peasantry individually went under group ownership. Co-operative peasant families could only manage a very restricted household farming. Consequently changes took place - in line with the modification of production relations - also within the structure of the consumers' market. Small producers

who provided so far milk and other basic dairy products for their family and close neighbourhood became to an increasing extent participants of an organized market supply.

- Neither the state dairy industry nor the state owned and co-operative commerce /consumers', co-operatives/ was prepared and able to satisfy the increasing demand of the great number of customers and so it came to the paradox situation, that the rural population could hardly obtain hygienic milk and dairy products while at the same time industry had to struggle in cities and urban districts often with difficulties of realization.

- Centralization and concentration started in the state owned dairy industry immediately after the nationalization of dairy enterprises. We do not think however, this being a case of natural evolution but rather the result of purposeful labour, accompanied by success in production, marketing, organization and productivity. Conveying of milk and dairy products in small lots with long routes of transportation was against the economic interest of the relatively overconcentrated state enterprises.

- Co-operative farms, having great cow-herds became progressively more able to process and independently commercialize milk.

As a conseqence of mechanization and chemicalization of agricultural production in the basic production process a relatively important volume of labour became redundant with no solution for continued employment.

- A division of labour to an unreasonable extent developed between co-operative farms of increasing size, food-industry and commerce and this resulted in addition to those mentioned before in certain cases costs and damages by disrupting without any reason the unity of the food production process: raw material production and processing was carried out in an insufficiently co-ordinated organization. The interruption of the production process became a reason of unjustified social inputs and of losses for both the enterprises and the national economy, as a result of

an increase of transportation costs, a value reduction or even deterioration of agriculrural products.

Summarizing the conclusions there were enough reasons and suitable conditions from 1967 in dairy farming as in other vertical food-industrial production lines, prompting the government to principal consent, to grant legan opportunity and to support co-operative farms to perform so-called subsidiary activities in addition to agricultural activity defined so far very strictly.

Co-operative farms received not only principal and legal assistance from the government but also financial aid. Co-operative dairy plants received at the outset a state support of 70 percent for their investments. Co-operative farms highly needed such support because the shortage of co-operative financial resources - and an increasing demand for assets of their basic activities - seriously limited shifting even a small part of their development resources to processing industries.

3. The place and role of co-operative dairy farming in Hungarian dairy production

At present 27 co-operative milk producing, processing and marketing organizations exist in Hungary which buy, process and sell 5,7 percent of milk production sold on the market. 5 co-operative milk processing plants perform their activities independently, 9 in co-operation with the state dairy industry and 13 with the Dairy Co-operation Bureau of Farmers' Production Co-operatives[+/].

[+/] The Bureau is the co-ordinating agency of the co-operative integration of dairy farming. Its operation will be treated in Chapter 3.1

The share of the co-operative dairies is 29,7 percent of all milk processing plants and this is much higher than the 5,7 percentage share in total processing and commercialization. This is because the average processing capacity of the state dairy industry plants in 80.000 litres while that of the co-operative dairies only 17.200 litres daily. There is a significant /4,7-fold/ difference between the average capacities of the two sectors. The smaller capacity of the co-operative dairies can be explained with their fundamental task, to provide rural supply of milk and dairy products.

Conforming the demand of rural consumers, the overwhelming majority of the co-operative dairies prepare dairy products for daily consumption /polipack milk, sour and sweet cream, curd, butter, ewe cheese and processed cheese, etc./ and their products are marketed only domestically. Taking the present average milk and dairy product consumption into consideration, they can satisfy the full demand of 1-1,2 million people. The co-operative dairies provide dairy industry products for one tenth of the total population.

In course of processing, a considerable quantity of by-products /whey, buttermilk, etc./ is produced. These by-products are sold by the co-operative dairies in fresh form to producers with household plots, mainly as pig feed. Thus there is no milling of by-products in small plants, no loss of biological value and conversion to meat is more efficient. /In case of dairy plants with a great capacity, milling is indipensable to avoid losses although the purpose of the same i.e. production of feed/.

Summarizing the conclusions, dairy processing is a parallel and simultaneous but not independent activity of the state dairy industry and the co-opetarive dairies. The economic significance of small and medium-size co-operative enterprises is to reduce considrably the purchasing and marketing expenses of the large enterprises; at the same time they benefit from extra advantages deriving from their optimumal plant-size adapted to their tasks and conditions.

It is a basic requirement, however, that dairy processing and marketing must be productive and profitable in the small and medium plants, since only if this is fulfilled can these activities smoothly fit both with the dairy processing system and the milk producers interest. This problem will be subsequently examined, on the basis of experience of the activities of co-operative dairies and independent joint ventures adhering to the Dairy Co-operation Bureau of Farmers Production Co-operatives.

3.1. Organizations and some organizational characteristics of integration in dairy farming

Processing and commercialization of milk is a new activity in the Hungarian producers co-operatives where professional knowledge in needed; this existed so far only in broad outlines. There is a need for this knowledge mainly at starting new plant by the basic units of co-operative dairy farming; the farmers' co-operatives, the simple economic co-operations and the independent joint ventures. But even in the preceding phases, from the idea of establishing a new plant to its implementation a lot of inpredictable problems arise. Only experts with a good basic dairy training can find an optimal solution for these.

A smooth co-ordination of the different activities and of the product-mix of an existing enterprise and the selection of an adequate organization have a similar significance also. Organized purchasing, repair and planning servides are needed also for a profitable operation and with increasing plant size; that the necessary technological equipment should be available and a stop in the operation of the plant could be avoided in case of a defect of the macinery. Co-ordination is required in market research and marketing also.

In order to assist the implementation, organization and co-ordination of all these, the Dairy Co-operation Bureau of Farmers Production Co-operatives was established in April 1969 by farmers' production co-operatives which started such activities and joined in economic associations of diverse types. /Its membership is at present about 100 farmers' co-operatives and joint ventures/.

The partnership contract establishing the Dairy Co-operation Bureau of Farmers Production Co-operatives specifies multifarious activities and reflects the increased tasks which go with the estension of activities. Some of the most important are advisory service fot the organization and investments of dairy plants, the elaboration of technologies, taking part in the supply of experts, market research, price calculation, supervision of the production accounts of the dairy plants, co-ordination of marketing etc.

The Bureau being a "higher link" of mainly existing integrations is a so called tertiary organization of integration. At the time of its establishment the role was not at all abvious which it has in the development of the productive forces of co-operative dairy farming now and its function to safeguard economic interests in the system of economic interests interpreted in the broadest sense.

This task on a dominant place of the cattle sector on the "strategic point" of the dairy vertical line means the safeguarding of the sectors interests. This is expected by its founders and its maintainers.

Neither the comprehensive alliance system, nor the co-operative movement can dispense with a sectoral safeguard of interests. This is particularly so when the development of the sector is implemented by vertical extension which means the spreading of already established monopolistic effects.

As it was already mentioned, co-operative dairy plants have a modest place in the national commercialization of milk and dairy products. Their importance is, however greater since with their extablishment many new developments started in one of the most difficult and most critical sectors of the Hungarian food economy:

- A multi-channel system of milk processing and dairy product commercialization,
- socialist competition on the market,
- common interest and new labour division based upon the independence of the enterprises,
- finding of gaps in supplying the consumer /shortage of goods, deficient assortment, quality, etc./ as a result of aiming at higher incomes,
- establishment of an up-to-date internal mechanism of the enterprises.

The concentration of co-operative milk production, processing and commercialization within the framework of a unified organization fulfilled the hopes of both the enterprises and the national economy as it is demonstrated by the economic indexes of the co-operative dairies also.

3.2. Input-output-income relations in co-operative dairy farming

Founders expected from the organization of dairy processing and marketing in the framework of agriculture a better exploitation of their opportunities and resources and an improvement in the rentability of large-scale farming- irrespective whether this is performed as a subsidiary activity of the farmers' co-operatives or in economic associations established with common financial effort of several farmers' co-operatives.

This task, however, is only fulfilled if there is return on dairy processing and marketing activities. It is also important how big this return is and what is the relation to the inputs and to the value of investments into production equipment necessary for the activity i.e. how rapid is the return on invested assets.

The farmers co-operatives which operate as independent enterprises cannot disregard this important criterion signifying the whole level of their economic activity, although there exist other important economic and social targets of their activity. Before dealing in more detail about these features, it is necessary to make certain remarks about the general economic setup of dairy processing and marketing in Hungary:

- Dairy industrial activity includes in both sectors three part-activities; purchasing, processing /manufacturing produce/ and commercialization;

- Indentity of the whole system of activities in state and co-operative dairy industry respectively, does not mean that there are no significant differences between the sectors in important spheres of enterprise management. Some of the most important of these are according to our view the following.

- Co-operative dairy processing plants have no particular task in respect to foreign trade, no research tasks in technology and product development of the sector and are also exempt from the troubles of national stockpilling. Situation of the co-operative sector is in this respect more advantageous.

- Producers' prices for dairy products are fixed by the state on the basis of national standards of dairy raw materials, expenses incuring under average conditions and a reasonable income.

- Inputs of dairy activity surpass on the national level returns from sales of milk and of dairy products on officialy fixed prices. Producing enterprises receive therefore a consumers' price subsidy from the budget which they may use for operative purposes. The amount is considerable. State owned dairy industry and co-operative dairies get the same treatment in this respect. Operation of the enterprises would not be profitable in neither sector otherwise. Enterprises therefore reckon with consumers' price subsidy i.e. it is planned by the enterprises and plants performing dairy industrial activities. We consider, that more

realistic opinion can be formed about the rentability in co-operative dairy processing and commercialization. /Table 1.= .p./

These figures showing rentability for a long period demonstrare the viability of co-operative dairy industrial activity in small and medium-scale plants. But 7-11,4 percent rentability shows considerably more if cimpared with figures, of the enterprises of the state dairy industry which produce in 4,7 times larger units. In 1976 e.g. average net income per 100 litre milk was in the state dairy industry 50-52 Ft with 5,7 percent rentability. All these facts prove that economic efficiency of co-operative dairies whith small and medium capacity does not impair but even improve global efficiency of the sector. Competitiveness of small and medium-scale co-operative dairies with large-scale enterprises is the result of their time-gaining position and co-operative characteristics.

Table 1. Rentability of co-operative dairies on enterprise level

/Ft/100 litres/

Year	Return from sales	Production costs	Net income of the enterprice	Net income of the enterprise per 100 Ft of production	
				costs	value
1969	441	392	49	12.5	11.1
1970	594	451	43	9.5	7.2
1971	544	482	62	12.9	11.4
1972	509	461	48	10.4	9.4
1973	654	602	52	8.6	8.0
1974	685	635	50	7.9	7.3
1975	684	636	48	7.5	7.0
1976	737	673	64	9.5	8.7
1977	717	658	59	9.0	8.2

Such are the following:

- area of milk purchasing is smaller, with a consequently smaller deterioration of milk quality,

- transport routes are shorter and therefore transportation costs are smaller,

- the quality of raw milk delivered to the plant is better and as a result production output is higher,

- in favourable cases delivery costs of milk even disappear when milk arrives through pipeline to the dairy plant.

In such cases investment cost of the milk-house on the dairy farm may be, of course, also spared and the considerable refrigeration costs are not imposed on the raw material;

- management, control and supervision of small and medium-scale dairies can be efficiently implemented by a staff consisting of only a few persons while large-scale enterprises have sophisticated tasks of management, control and supervision and these are expensive also;

- co-operative dairies perform transport with their own equipment calculated as their own activity while a considerable part of the transport of the state industry is made for a tariff containing the earnings of the transport firm also.

Considering the efficiency of their assets, co-operative dairies are also in a favourable position is spite of the fact that investment costs are steadily and significantly increasing. Some information of this may be found in Table 2.

Table 2. Returns of co-operative dairies pro rata with the fixed assets

Year	Fixed assets		Returns		Returns pro rata with fixed assets percent	Refunding time of fixed assets years
	total 1000 Ft	Ft/100 litres milk	total 1000 Ft	Ft/100 litres milk		
1970	25 338	135.5	8 074	43.2	31.9	3.2
1971	60 539	227.6	16 373	61.5	27.0	3.7
1972	113 452	217.5	25 026	48.0	22.1	4.5
1973	144 327	185.4	40 337	51.8	27.9	3.6
1974	180 444	226.4	40 048	50.3	22.2	4.5
1975	236 231	293.9	37 801	47.0	16.0	6.3
1976	202 339	325.7	72 023	80.3	24.6	4.1
1977	299 488	292.7	62 559	61.1	20.9	4.8

No detailed explanation is necessary about the level of returns pro rata with the assets and on the role this has in stimulating undertakings. Growing assets and returns of the co-operatives reflect this. A comparison of the pro rata returns of fixed assets in co-operative and state industry dairy plants shows very clearly the high level the co-operatives reached in managing their fixed assets. Pro rata returns of fixed assets in the state dairy industry /returns 100 Ft fidex assets/:

1971	10.02	1974	12.73
1972	10.12	1975	8.73
1973	13.64	1976	15.20

3.3. Labour productivity problems of the co-operative dairy plants

Labour productivity was repeatedly of great importance when assessing the role of industrial activities generally in the sphere of agriculture. The same is true in respect of small and medium capacity dairy plants working in agriculture.

The raising of this problem is partly explained by the experience that efficiency of live labour in the small and middle-scale plants is generally less advantageous and partly by the fact that labour shortage becomes more and more pressing in Hungary. From the aspect of the national economy it is therefore partigularly important how efficiently the most important production force, human labour is used.

According to different estimates the employment of men will reach the demographic maximum in 1980 and the employment of women will reach at the same time the "social upper limit" i.e. such a stage when it is impossible to draw a significant number of people into production without creating thereby socially important shortage elsewhere. Solution can be therefore sought only by improving the efficiency of live labour see Table 3.

Table 3. Some important data on labour productivity in co-operative dairies

Item		Independent joint ventures /1/	Co-operative dairies /2/	Co-operative dairy processing total /1 + 2/
Average number of personnel,	heads	831	106	937
Amount per 1 head of average personnel of				
raw material processed	1000 litres	89	152	96
production value	1000 Ft	733	1 118	777
returns	Ft	74 635	94 349	76 866
wages and returns	Ft	110 028	126 217	111 859
wages	Ft/year	35 393	31 868	34 993
wages	Ft/month	2 949	2 656	2 916
working staff of the plants	heads	446	58	504
Amount per one worker of the plants of				
raw material processed	1000 litres	165	277	178
production value	1000 Ft	1 366	2 049	1 444
returns	Ft	139 063	172 431	142 903
Value of the fixed assets				
gross	1000 Ft	591	492	580
net	1000 Ft	507	348	489
Amount per 100 Ft wage of				
production value	Ft	2 071	3 518	2 220
production costs	Ft	1 860	3 222	2 000
returns	Ft	211	296	220

According to data presented in the table, efficiency of labour is surprisingly high in small and medium-scale co-operative plants. Our calculations show that they are below the level of large-scale enterprises and much higher than in the basic agricultural activities. Considering the fact that in co-operative dairies the greater part of the working staff consists of local women redundant from basic agricultural activity, and taking into consideration that there is scarcely any other industrial employment in the countryside, it is easy to understand why the state supports the develppment of the co-operative dairy vertical production lines.

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ECONOMIC AND TECHNICAL ASPECTS OF SLAUGHTER BEEF PRODUCTION IN STATE FARMS

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Development Trends in Beef Production

1. Beef production on a large scale was started in state farms in the early sixties. Its development was very rapid. While in 1960 57 thousand tons of slaughter beef were produced, in 1970 the figure was 182 thousand tons and in 1978 - 422 thousand tons. Beef production in this period grew at a rate of 11.6 % per year. This was a rate of growth higher than that of the total final production of state farms, i.e. 7.2 %, and higher than the 4.5 % per annum growth of beef production in all of agriculture. As result of the above this field of production became more of importance in the overall activities of the state farms; the share of beef production in the state farms total final production increased between 1960 and 1978 from 7.1 % to 14.5 %, the respective share in state farms final livestock production increasing from 13.8 % to 24.1 %. At the same time the role of state farms in supplying the national beef market changed accordingly. The state farms supplied 9 % of beef in 1960, 17 % in 1970 and 30 % in 1978. Their share however in the supply growth was, in the mentioned period, almost 50 %. This trend is expected to continue in the near future, although it is foreseen that the rate of beef production growth will drop significantly, to about 8 % in the years 1980-1985.

Table 1. Indices of Beef Production Development in State Farms in the Years 1960-1978.

Year	1960	1965	1970	1975	1978
Beef production in thousand tons.	57	126	182	385	422
Share of state farms in national beef production in per cent.	9	15	17	26	30
Purchased of young animals in thousand tons.	4	2	26	64	74
Cattle population, non-dairy, in thousand head.	200	441	670	1 315	1 407
Share of non-dairy cattle in total cattle population, in per cent	22	35	41	52	50
Weight of one slaughter animals in kilograms.	357	340	363	427	403

2. The growth of beef production in state farms was based principally on increasing the number of slaughter animals. In the discussed period this population increased from 160 000 to 1 050 000 head, which means average annual growth of about 11 %. Only a small share of this growth was due to better meat productivity of the cattle. The average weight of slaughter animals increased from 347 kilograms in the period 1960/61 - 1964/65 to 412 kilograms in the years 1975/76 - 1977/78 which means an increase per annum of 1.2 %. It is then obvious that such a rapid growth of beef production in state farms was possible only due to utilizing extensively reserves of young cattle earmarked for slaughter in the private sector. Purchases of young cattle by state farms from private farms indeed did increase from about 40 000 head in 1960 to 430 000 in 1970 and 1 000 000 head in 1978.

3. Many of the factors which previously encouraged a dynamic development of fattening cattle breeding in state farms are today losing their impact. The market conditions of calves for future fattening purchase have worsened significantly. The export

possibilities for young cattle have decreased. Difficulties became apparent in balancing the demand for cattle feedstuffs, both concentrates and roughage. Investment outlays for cowsheds were decreased. Finally the ratio of beef prices to outlays prices grew worse. The production of slaughter beef lately is less profitable than that of pork. All these factors affected adversely the development of fattening cattle breeding. A sign of this is a stagnation of beef production since two years. If this branch of livestock production is to start growing again selected changes in the technology of breeding and the economic conditions must be implemented. It appears that in the near future it is unavoidable that the state farms change from intensive methods of livestock feeding /with a large share of concentrate feeds in the diet/ to rather extensive methods. This will undoubtedly lengthen the fattening period but in turn it will reduce production costs. It is presently the low production profitability which is the principal factor limiting the growth of beef production in the state sector.

4. The growth of young fattening cattle population in state farms is closely regulated by respective parts of economic development plans. The central agricultural administration sets definitely and in detail not only the production goals but the investment outlays and current production activities financial outlays as well. For these reasons in the state farms, contrary to the private ones, the choices of the management regarding growth of the number of young fattening cattle are rather limited, usually to the technical and economic results of given livestock production. This does not mean of course that the economic conditions of livestock breeding or the competition between cattle production and other animals are without influence on the rate of slaughter beef supply growth. These relations and competition are taken under consideration during the decision-making by the central administration. It is at this level that the fundamental decisions are made concerning the rates of growth and development of respective areas of production. To prefer one branch of production means an adverse effect on others. Until recently fattening cattle breeding was

the most preferred branch of animal production in state farms which had an adverse effect first of all on development of dairy cattle breeding. The central administration also manages in a considerable degree the production operations of the state farms, in terms of cattle breeding efficiency. The fact that in given economic and organizational conditions the costs of production of one kilogram of beef vary among respective voivodship state farm unions from 29 to 44 zlotys /1976 data/ is best evidence of the present possibilities of improving beef production in state agriculture. The utilization of these possibilities depends to a large extent on better production methods and work organization in the farms involved.

Changes in Technology of Fattening Cattle Breeding

1. The development of beef production was accompanied by important changes in the technology of cattle breeding. In the period 1960 - 1965 the size of the cow-houses where the cattle was being fattened was fit for 20 to 30 animals. The size of the fattening stock was adapted to the feedstuffs production possibilities of the farms. The buildings were fit for manual servicing of the animals, that is manual supply of feed and removal of manure.

The traditional system of servicing the animals and burdensome character of the chores limited the growth of this production. The mechanization of the production process, especially that of feed supply and manure removal encountered technical barriers when introduced into the old buildings. For this reason most of the livestock facilities had to be modernized. Despite this in a large number of state farms the rearing of young cattle took place in rather primitive conditions, with the servicing only partly mechanized.

The development of modern technologies of young cattle fattening started in Poland after 1970. Since 1972 practically all the new built cowsheds for young cattle permit mechanization of animal

servicing. In 1972 there were about 10 thousand stalls in new type buildings, this figure increasing to 235 thousand stalls by 1977. Thus over 30 % of all stalls for young cattle fattening in state farms was of the new, mechanized type.

Different production conditions require varied technologies of fattening cattle breeding. The most popular in Poland are the technologies elaborated by the BISPROL company.

Their characteristic is a varied number of stalls, suited to the production conditions. The basic type /construction module/ is a facility for 700 stalls which may be combined to form cow-houses numbering from 1,500 to 4,000 stalls. The average size of a production unit, in other words, of an organizational unit breeding only young fattening cattle is about 2,000 stalls.

In most of the modern units the fattening starts with animals weighing from 140 to 150 kilograms, the final weight being 420 to 450 kilograms. The production cycle, lasting 11 months is divided into technological cycles of 49 days each. The animals are usually plased in group pens.

The young cattle technologies employed today in Poland may be divided into two basic groups:

1/ Traditional young cattle rearing, which supplies about 70 % of the total beef production, taking place in old, usually small livestock buildings, with animal servicing little mechanized. The size of the stock is very varied and is adapted to the size of buildings and the size of farm. The breeding of young cattle is one of the many areas of activity of the farm and is not isolated in any way. The animals are fed with roughage feedstuffs /mostly silage and hay/ with concentrate feeds added. Frequently by-products of agricultural industries are utilized in feeding, such as sugar beet pulp, distillery mash etc. In this technology no technological grouping or organization is used. The feeds are supplied manually, feedstuffs are transported

by tractor-drawn traillers. The manure is removed either manually or by tractor loaders. The labor efficiency in this technology is several times lower than that in new modern technologies.

2/ Industrial style rearing of young cattle supplying today about 30 % of all beef, differs from the traditional technologies by the degree of animal servicing mechanization and by the feeding system. In most of the fattening operations the animals are fed silage or hay silage /prepared in silos of varied construction/ with concentrate feeds added. In some units the animals are fed full-diet portions. The basic part of the feed is hay or dried green foods/ constituting about 60 % of the total weight/. In the first type the roughage feeds are delivered by self-unloading traillers or spreaders, in the second by transporters. The number of stock varies from 700 to 4,000, that is by a wide margin. Bigger concentration of animals forces changes in breeding organization, i.e. changes in the system of supplying calves for rearing and feed supply. The big modern units are usually separate operations within the state farm.

2. An evaluation of the effectiveness of technologies of young fattening cattle breeding points to the following statements:

1/ The effectiveness of livestock feeding, as measured by units of feed used per unit of live weight gain, is in the modern technologies higher than that of the traditional. This is an effect of employment of better, modern methods of feeds preservation and preparation, as result of which the losees of nutritional value are reduced.

2/ The labor efficiency, as measured by livestock production in one year per person employed at servicing the animals, is in the modern farms from 7 to 10 times higher than the traditional.

Table 2. Effectiveness of Technologies in Young Cattle Fattening in State Farms

	Traditional farms	Industrial-type operations	
		BISPROL-type /Feeding: silage and concentrates/	IBMER-type /Feeding: full diet portions/
Feeding effectiveness			
Use of concentrate feeds in kilograms per 1 kilogram of live weight gain.	6.27	3.86	3.29
Use of oats units per 1 kilogram of live weight gain.	11.9	9.1	7.2
Use of protein per 1 kilogram of gain in grams.	.	893	770
Labor efficiency			
Livestock production per one man hour, in kilograms.	8.3	20.2	51.0
Final net production per person during one year, in thousand zlotys.	223	2,101	2,907
Capital productivity			
Value of final net production per 1 thousand zlotys of capital engaged, in zlotys.	356	141	137
Value of fixed assets per person employed at servicing the animals, in thousand zlotys.	193	8,703	9,348
Costs of one stall in thousands zlotys.	6	21	17
Use of energy per 1 kilogram of live weight gain, in kilocalories.	1,206	1,582	3,204

Source: J. Seremak-Bulge. Rozwoj przemysłowych metod produkcji zwierzecej w Polsce. Instytut Ekonomiki Rolnej,W-wa 1979. Mat. powielony. /Development of Industrial Type Livestock Production in Poland, by J.Seremak-Bulke, Institute of Agricultural Economics, Warsaw 1979/.

3/ Considerably larger capital investment per unit of production is required in the modern technologies, exceeding that of the traditional technologies 2 to 3 times. A large part of the capital outlays is substitutional in character to the labor otherwise employed. Part of the outlays is used for improvement of the working conditions of the laborers servicing the animals.

4/ The modern technologies consume from 1.3 to 2.8 times more energy than the traditional ones. The extra demand for energy results mainly from a different system of feedstuffs preparation /principally the necessity of drying the feeds /and from a higher level of livestock servicing mechanization;

5/ The weight gains are almost the same level in both technologies, reaching 700 grams of live weight per day.

Technical and Economical Relations in Slaughter Beef Production

1. The production of slaughter beef in state farms is characterized by a very rapid growth of the unit costs of production. Table 3 presents data pertaining to this. In the years 1961/62 - 1977/78 these costs increases yearly an average 6.6 %.

The principal factor causing the growth of the costs discussed were the increasing prices of feedstuffs. The growth of feedstuffs costs represented in the period 1961/62 - 1977/78 over 80 % of the total discussed costs growth. The remaining 20 % of unit costs growth resulted from rising costs of maintenance of livestock buildings and increasing costs of labor. The cost of labor increased although the unit outlays, measured in days per 100 kilograms of live weight gain dropped in the period discussed at a rate of 5.5 % per year.

Table 3. Costs of Production of Young Fattening Cattle in State Farms researched by the Institute of Agricultural Economics in the years 1961/62 - 1977/78.

Time period	Gross costs in zlotys per 1 kilogram of weight gain				Net costs in zlotys per 1 kilogram [a/]	Labor outlays in days per 100 kilograms	Average daily gain of weight of 1 head in kilograms
	total	feeds	wages	general			
1961/62-1963/64	27.8	14.0	3.8	5.4	21.4	5.6	0.544
1964/65-1966/67	28.7	16.3	3.5	5.5	23.8	5.2	0.600
1967/68-1969/70	30.0	17.7	3.1	5.5	25.3	3.9	0.675
1970/71-1972/73	38.9	25.5	3.4	6.2	32.2	3.2	0.692
1973/74-1975/76	52.0	35.7	4.1	7.6	43.5	2.7	0.576
1976/77-1977/78	76.8	55.8	5.2	9.3	65.4	2.4	0.540
Average annual rate of dynamics / in per cent /	6.6	9.0	2.0	3.4	7.2	-5.5	0.0

[a/] Minus manure

The costs of production are influenced on one hand by changes in unit outlays of various production factors and on the other hand by the price changes of these outlays, i.e. in cattle breeding of feedstuffs, labor and other. These changes and their effects shall be examined as they shaped the total costs of production in the period 1961/62 - 1972/73, this period being selected because of the suitable data availability.

As data presented in Table 4 show the total outlays of production factors per 100 kilograms of beef in farms research by the Institute of Agricultural Economics changed very little in the years 1961/62 to 1972/73. However an important change took place in the outlays composition. The progressing mechanization of livestock servicing resulted in relatively most rapid dropping of work outlays per unit of production /at an annual rate of 4.7 %/, then the outlays of live draft animals work fell by an average yearly rate of 2.3 % and the outlays for maintenance of fixed assets decreased by 1.6 %

Table 4. Costs of Production of Young Fattening Cattle in State Farms researched by the Institute of Agricultural Economics in the years 1961/62 and 1972/73 in current and constant prices, in zlotys per 100 kilograms of live weight gain.

Elements of costs and outlays	1961/62 current prices	1961/62 1972/73 prices	1972/73	Rate of change /in %/ unit outlays	unit costs	outlays prices
Total costs	2,496.7	4,127.2	3,992.8	-0.3	4.4	x
in this:						
feeds	1,303.1	2,441.6	2,598.9	0.5	6.5	5.9
labor	363.8	613.7	371.5	-4.7	0.2	4.9
traction	94.8	148.2	115.9	-2.3	1.8	4.1
barn maintenance	125.2	125.2	111.0	-1.6	-1.1	0.5
bedding and medical care	117.8	141.4	146.9	0.4	2.1	1.7
other general	492.0	657.1	648.6	0.1	2.6	2.7

per annum. During the period discussed a slight increase - 0.5 % per year - was observed of the outlays for feedstuffs, resulting principally from growing use of grains in feedstuffs. The remaining outlays increased in a minute degree.

2. The relatively low growth of outlays productivity/0.3 %/ in beef production is a matter of concern, since in this area of agriculture breeding and technology progress bring numerous possibilities of increasing this productivity. The most important development here is growing scale of production and its intensity. The influence of these factors on beef production costs is shown in Tables 5 and 6. Below presented are, synthetically, changes in unit costs of production of beef and the principal indices resulting from a 1 % increase in:

	a/ daily gains	b/ stock number	c/slaughter beef production
total costs	-0.31	-0.01	-0.01
feed costs	-0.34	0.00	-0.01
barn maintenance costs	-0.70	-0.10	-0.05
work outlays	-1.06	0.02	-0.01
feeds outlays	-0.34	-0.01	-0.02

Table 5. The Relation between the Average Daily Weight Gain of One Head Reared and the Slaughter Beef Production Unit Costs in State Farms researched by the Institute of Agricultural Economics in the years 1972/73.

	Groups of farms according to rate of daily weight gain of one head in kilograms:		
	up to 0.650	0.650-0.850	over 0.850
Number of farms in the group	27	24	14
Average daily weight gain of one head in kilograms	0.590	0.718	0.938
Cost of one kilogram of weight gain, total, in zlotys per kilogram	44.23	39.62	37.26
in this:			
direct costs in zlotys per kilogram	37.65	33.37	30.71
total feeds costs in zlotys per kilogram	29.47	25.71	24.12
wages in zlotys per kilogram	4.04	4.00	3.50
maintenance of fixed assets in zlotys per kilogram	1.19	0.96	0.87
Feeds used to achieve 1 kilogram of gain, in oats units	12.9	11.2	10.3
Use of concentrate feeds per 1 kilogram of weight gain, in kilograms	3.7	3.6	3.6
Share of concentrate feeds in total feeds, in per cent	41	44	48
Average number of head in stock	145	152	146
Average size of farm, in hectares	863	707	1,035
Share of meadows and pastures in agricultural land, in per cent	21.7	23.9	27.9

Table 6. The Relation between the Size of Young Fattening Cattle Stock and Slaughter Beef Production Unit Costs in State Farms researched by the Institute of Agricultural Economics in the years 1972/73

	Groups of farms according to size of stock: up to 100 head	100 to 250 head	more than 250 head
Number of farms in the group	29	23	13
Average size of cattle stock in heads	51	160	343
Cost of one kilogram of weight gain, total, in zlotys per kilogram	41.12	39.62	41.09
in this:			
direct costs in zlotys per kilogram	34.21	33.17	34.80
total feeds costs in zlotys per kilogram	26.29	26.17	26.92
wages in zlotys per kilogram	3.81	3.47	4.24
maintenance of fixed assets in zlotys per kilogram	1.36	1.01	0.90
Feeds used to achieve 1 kilogram of gain, in oats units	12.1	11.2	11.7
Use of concentrate feeds per 1 kilogram of weight gain, in kilograms	3.6	3.7	3.5
Share of concentrate feeds in total feeds, in per cent	46	45	42
Average size of farm, in hectares	681	785	1,306
Share of meadows and pastures in agricultural land, in per cent	24.5	22.7	24.3

As the presented figures show increased weight gains of the animals affected radically not only the work outlays, i.e. their reduction, but also the remaining factors of production, that is the fixed assets and labor. This resulted in a considerable reduction of the total costs of 1 kilogram of weight gain.

Suprisingly low were the effects of increasing the size of the cattle stock in the period discussed. This factor according to conventional wisdom permits considerable reduction of the costs involved, principally due to smaller work outlays. In state farms also of smaller importance is the phenomena of labor and means of production indivisibility as compared to private farms, thus the scale growth effects are greater in private farms. But the lack of significant improvement of effectiveness in state farms as result of increasing the cattle stock suggests that in the state sector the so called dis-advantages of scale are beginning to appear, resulting from growing costs of feedstuffs transportation, environment pollution, worse conditions in which the animals are kept etc. One may find then, that these reasons cause the positive effects of scale of production growth, after the introduction of industrial-type technologies of breeding, to be neutralized in the macro-scale by the necessity of additional outlays which were not required in the traditional technologies.

3. The unit costs of production of slaughter beef in state farms vary significantly depending on the technical and organizational conditions of the livestock production. In the 100 state farms researched by the Institute of Agricultural Economics in the year 1972/73, the farms conducting multi-directional production, the ratio of the highest costs to the lowest ones was 1.5 to 1. Similar differences were observed in 20 industrial-type fattening operations researched by the Institute of Agricultural Economics in the year 1977/78.

In both cases the principal source of costs differentiation were the outlays of feedstuffs and in a smaller degree differences in unit prices of these outlays. Detailed analysis shows that the

Table 7. Factors Differentiating Unit Costs of Slaughter Beef Production in State Farms researched by the Institute of Agricultural Economics in the year 1972/73

	Groups of farms according to costs of 1 kilogram of slaughter beef weight gain, in zlotys		
	less than 37.0	37.0 to 42.0	over 42.0
Number of farms in the group	20	20	25
Cost of 1 kilogram of weight gain in zlotys	32.52	39.24	47.33
in this:			
direct costs in zlotys per kilogram	25.78	33.18	40.84
total feeds in zlotys per kilogram	19.89	25.46	32.20
wages in zlotys per kilogram	2.91	3.81	4.63
maintenance of fixed assets in zlotys per kilogram	0.70	1.21	1.10
Average daily weight gain of one head in kilograms	0.801	0.688	0.674
Use of feeds per 1 kilogram of weight gain in oats units	9.3	11.6	13.2
Use of concentrate feeds for 1 kilogram of weight gain in kilograms	2.9	3.3	4.3
Share of concentrate feeds in total feeds, in per cent	47	42	43
Average number of animals in a stock	131	141	167
Average size of farm, in hectares	756	807	940
Share of permanent green crops land, in per cent	26.9	21.3	23.5

differences in feeds outlays were a result of improper feeding which found its reflection in the rates of animals' weight increases and frequently feedstuffs waste. The differences in feedstuffs prices resulted either from different feeding technologies / a varied share of concentrate feedstuffs/ or from different costs of production of cattle feeds in respective farms.

At the same time no definiti influence was found on the costs of production which could be attributed to changes in the scale of production.

To reassume one may state that the greatest possibilities of reducing the beef production costs in the farms which produce it at the highest expense, as well as of stopping the upward trend in beef production costs in the whole state sector are to be found in improved organization of feedstuffs production and better feeding.

4. Despite the rapid growth of slaughter beef purchase prices /in the year 1960 - 1977 these prices grew from 15.0 to 37.0 zlotys per 1 kilogram / the profitability of beef production has dropped systematically. During the last two years the purchase prices covered only about 56 % of the costs of weight gains of livestock. Presently beef is the least profitable area of livestock production in state farms.

Table 8. Profitability Indices for Beef and Milk Production in State Farms researched by the Institute of Agricultural Economics in the years 1961/62 - 1977/78.

Time period	Milk	Slaughter beef		Pork livestock
		weight gain	total weight[a/]	
1961/62-1963/64	84	70	82	80
1964/65-1966/67	87	63	81	81
1967/68-1969/70	72	60	64	80
1970/71-1972/73	80	56	60	96
1973/74-1975/76	77	60	70	91
1976/77-1977/78	74	56	70	89

a/ Together with the weight of the animals purchased for fattening

In these conditions an important role in supporting and stimulating of beef production in the state farms are non-price economic instruments - expecially subsidies.

These established subsidies to the operations of state farms represent today 47 % of the net market production value / that is market production minus the purchases of means of production of agricultural origin /. These subsidies as a rule do not cover the losses suffered by state farms undertaking young cattle fattening. Even far reaching rationalization of production methods and organization cannot, considering the existing relation between the final product price and outlays prices make this area of production profitable in state farms.

ECONOMIC OPTIMIZATION OF AGE AND SLAUGHTERING WEIGHT IN BEEF PRODUCTION

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1. The growth process model

Beef production is based on the utilization of the growth ability of the animal. Having certain limits, the growth ability plays an important role in the economics of production.

The main input in beef production is feed which is converted into beef, the final product, by the biological growth process. Thus, in order to obtain the best economic result, recognition of the relationship between feed input and output is necessary.

Numerous studies in input-output relationships in beef production are carried out in 1950's and 1960's. Anyway, most of them are constructed with the feed input measured in weight or energy units, which is not sufficient to describe the quality of feed for production. Also, the intake capacity of the animal or the time factor has been ommitted in most of the input-output studies. In the following a model will be developed to describe the biological growth process of a beef animal, taking the economic aspects into consideration. Later on, a method for optimization of slaughtering weight and age will be discussed.

The most important factors in the growth process are the weight gain resulting from the growth, and the inputs used for this purpose. Even if the economic aspect is of central importance in the model, the biological growth process places limits and a framework to the building of the model.

The growth and maintenance of an animal reguires sufficient quantities of energy, nitrogen containing materials, minerals and vitamins; in other words, nutrients. Parts of the nutrients are wasted in faeces, urine and conversion losses, while the rest remains for production. When the size and weight of the animal increase as a result of growth, the feed intake also increases. This is essential for satisfying the growing animal's increased need for feed. In addition, other factors affect the need for nutrients such as individual, breed or sexual differences. Some external factors may also influence the need for nutrients.

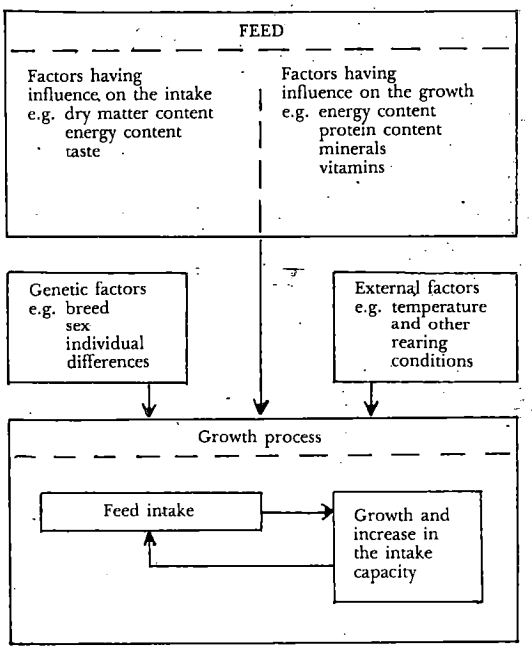

Figure 1. Simplified presentation of the growth process.

The growth process is shown in Figure 1. The lower part of the figure shows the growth process brought about by the proportion of nutrients in the feed which remains for production. As a result or growth, the intake capacity and the need for feed increase, thus increasing the total feed use per weight gain unit.

Taking the problem as a whole, the intake capacity must be considered simultaneously with the nutrients of the feed available for growth. Intake capacity is affected by the size of the animal as well as many other factors. Consequently there are difficulties in finding detailed norms for feed intake. The daily dry matter intake is usually used as an estimate of the feed intake capacity.

Feed intake capacity plays an important role, as a limiting factor, in the nutrients used in production. If the nutritional value of the feed, in relation to that of dry matter, is low, the feed is bulky; or in the opposite case, concentrated. The energy content of feed, usually measured in feed units per kilogram of dry matter, has an influence on the rate of growth. The weight gain is negative with very low energy contents of feed, and the highest possible, when the energy content is sufficiently rich. (The growth rate is naturally limited by the growth ability of the animal).

As stated above, the growth process is dependent on the relationship between growth and the nutritional value of the feed, the intake capacity of the animal, its changes, and factors affecting it. Growth and intake capacity are linked together by the quantity and quality of the feed nutrients. The growth rate, defined by the limits of the physiological growth ability of the animal, is affected by the supply of nutrients in the feed consumed. This explains the dynamic nature of the growth process.

Feed input is Figure 1 is divided into two parts. One group is formed by factors having an influence on the growth, and the other by factors having an influence on the feed intake of the animal.

Having

X_i = factors of feed affecting growth
X_j = " " " " feed intake
G = genetic factors
U = external factors
Y = weight gain (growth)
T = time needed to consume a given quantity of feed
u = disturbance term,

the model depicting the growth process can be stated as follows:

1. Weight gain

$$Y = f(X_i, G, U) + u_Y$$

2. Intake capacity

$$T = f(X_j, G, U) + u_T$$

The weight gain function of the model specifies the growth of the animal as a function of nutrients of feed, and genetic and external factors. The intake capacity is expressed as the time needed to consume a given quantity of feed, when genetic and external factors are taken into account.

Variables of the model

Output is measured as liveweight gain, without taking the quality of beef into consideration. Here, difficulties arise in the time series data because, without slaughtering results, it can not account for quality differences or the percentage of beef in the liveweight.

The basic variables in the growth process are the gross energy, measured in feed units (f.u.), and the digestible crude protein (DCP) of the total feed mixture. The protein is measured as protein content of feed unit (DCP/f.u.) and will be handled as a factor depicting the quality of the feed energy.

The main factor regulating the time needed to consume a given quantity of feed is the dry matter content of the composition (DM). The quality of feed affecting the intake of dry matter is measured by the energy content of the dry matter (f.u./kg DM) and the digestible crude protein content of the feed unit (DCP g/f.u.). The crude fibre content of dry matter was also chosen as an indicator of the dry matter intake.

Qualitative factors, such as the taste of the feed, could not be taken into account. In addition, minerals and vitamins were omitted, assuming that the feed in the empirical data was so composed that it satisfied the animal's needs of these ingredients.

Variation in the weight gain and in the feed intake between animals is also caused by sex, breed and individual genetic factors. Some of the quantification problems connected with these variables are avoided when using a model with homogenous groups, or when using dummy variables for these factors. In this sdudy, only bulls will be included and the model will be estimated for some breeds only, partly separately and partly using dummies.

Individual differences of animals within homogenous breed groups are measured by the live weight of the animals at the start of rearing.

Variables of the model are as follows:

Exogenous variables

FU = total energy of the feed composition in feed units (f.u.)
DCP = digestible crude protein, grams/f.u.
EC = energy content of feed, f.u./100 kg dry matter
DM = total dry matter of the feed composition, kg
CF = crude fibre as a percentage of the dry matter
W = live weight of the animal at the start of rearing, kg
D = dummy, representing the breed

2. Estimates of the model

Some beef rearing trials, conducted by the Agricultural Research Centre, Finland, form the data, which was used in the estimation of the model. The data consisted of 71 bull calf time series of Ayrshire race and of 42 time series of Friesian-Ayrshire and Charolais-Ayrshire crossbreeds. The choice of the function form was made by proving different alternatives. Comparisons made showed that the estimates derived from transcendental function were logical and, as a rule, more significant than those derived from other functions. The estimates of the model are given in tables 1 and 2.

Estimates derived from the model offer abundent information concerning the influence of feed quantity and properties on the growth and on the feed intake of the animal. Main points given by the regression coefficient estimates can be summarized as follows:

- maximum live weight is attained at input level of 4 164 f.u. (Ayrshire) and 5 516 f.u. (cross-breeds)
- feed use (f.u./kg gain) is highest in Ayrshire, lower in Friesian-Ayrshire and lowest in Charolais-Ayrshire
- productivity of f.u. is at its highest when the energy content of the feed is 136 g DCP/f.u. (Ayrshire) and 115 g DCP/f.u. (cross-breeds)
- daily intake of dry matter is at its lowest when the protein content of the feed is 126 g DCP/f.u. (Ayrshire) and 86 g DCP/f.u. (cross-breeds)
- increases in the crude fibre content or in the energy content of the feed decrease the daily dry matter intake.

Table 1. Regression coefficient estimates, their standard deviations and t-values of the weight gain functions. Endogenous variable log Y (live weight gain).

Variable	Regression coefficient	Standard deviation	t-value	
Ayrshire				
log FU	0.8646	0.0158	54.7	
FU	− 0.0001	0.0000	− 6.4	
log DCP	6.4761	0.5878	11.0	
DCP	− 0.0207	0.0017	−12.5	
log W	1.4879	0.8357	1.8	
W	− 0.0130	0.0077	− 1.7	
intercept	−12.9682	1.4179	− 9.1	
				$R^2 = 0.958$
Friesian-Ayrshire and Charolais-Ayrshire cross-breeds				
log FU	0.9368	0.0201	46.6	
FU	− 0.0001	0.0000	− 4.5	
log DCP	3.2938	0.2499	13.2	
DCP	− 0.0124	0.0007	−17.5	
log W	0.7214	0.4591	1.6	
W	− 0.0068	0.0039	− 1.7	
D_{fr}	− 0.0211	0.0069	− 3.1	
intercept	− 6.5071	0.7285	− 8.9	
				$R^2 = 0.983$

Table 2. Regression coefficient estimates, their standard deviations and t-values of the intake capacity functions. Endogenous variable log T (number of days).

Variable	Regression coefficient	Standard deviation	t-value	
Ayrshire				
log DM	0.6063	0.0059	102.6	
log EC	−0.6192	0.3705	− 1.7	
EC	0.0039	0.0014	2.7	
log DCP	2.4383	0.3773	6.5	
DCP	−0.0084	0.0011	− 7.9	
log CF	−0.1194	0.0599	− 2.0	
CF	0.0100	0.0023	4.4	
log W	2.3988	0.4766	5.0	
W	−0.0236	0.0044	− 5.4	
intercept	−5.4787	1.1764	− 4.7	
				$R^2 = 0.983$
Friesian-Ayrshire and Charolais-Ayrshire cross-breeds				
log DM	0.6177	0.0074	83.6	
log EC	0.9056	3.2457	0.3	
EC	0.0049	0.0132	0.4	
log DCP	1.0674	0.2286	4.7	
DCP	−0.0054	0.0007	− 8.1	
log CF	0.1174	0.0657	1.8	
CF	0.0150	0.0047	3.2	
log W	0.9525	0.2940	3.2	
W	−0.0089	0.0025	− 3.5	
D_{fr}	−0.0142	0.0045	− 3.2	
intercept	−4.7873	5.1757	− 0.9	
				$R^2 = 0.989$

3. Economic optimization of production

From the different concepts of the business result, gross and net profits were chosen as the indicators of the economic result of production. Gross profit is reached when variable costs are deducted from the gross return. If all the production costs are deducted net profit is the result.

Taking the time factor of dynamics of production into consideration maximal profit per time unit (day) of rearing was chosen as the optimization criterion. Supposing that daily costs of labour, capital and other supplies (except feed) are fixed, and with:

NP = net profit
GP = gross profit
Y = live weight gain
T = time used in production
X = feed input (f.u.)
p_{calf} = price of calf
p_{oc} = other costs
py = price of beef
px = price of feed

the profits can be written as follows:

$$NP = \frac{pyY}{T} - \left(\frac{pxX + p_{calf}}{T} + p_{oc}\right)$$

$$GP = \frac{pyY}{T} - \left(\frac{pxX + p_{calf}}{T}\right).$$

When deriving the functions for X and setting it = 0, the value of X, or the number of feed units which yields the maximum daily average profit can be discovered. In the short run, cost items included in p_{oc} are supposed to be fixed. Thus, the derivate of both net and gross profit is as follows:

$$\frac{dT}{dX}(pxX + p_{calf} - pyY) - T\left(px - py\frac{dY}{dX}\right).$$

Substituting Y and T for resp. functions of the model and setting the derivate = 0, maximum daily profit is obtained from the following function

$$\left(\frac{e \cdot z}{X}\right)\left[pxX + p_{calf} - py(10^{a}X^{b}10^{cX})\right] - px$$

$$+ py\left(\frac{b}{X} + \ln 10\, c\right)(10^{a}X^{b}10^{cX}) = 0.$$

In the equation

a = constant term in the weight gain function resulting from the given input (energy net included)

b and c = logarithmic and linear regression coefficients of energy (FU) in the weight gain function

e = logarithmic regression coefficient of dry matter (DM) in the intake capacity function

z = energy content of the given feed input

Using the value of X calculated from the function above, the model estimates and the feed ingreadients, estimates for the live weight gain and the length of the rearing period can be calculated. With the daily costs of labour, capital and supplies, other than feed, fixed, the optimum is determined only by the prices of beef, feed and the calf.

4. Application of the model

The model incorporates the principal activities needed for profit maximization in beef rearing. Ordinarily only facts on feeds available for production, animals and price levels of beef, feeds and other inputs are needed to find out the optimal lenght of rearing period and weight gain.

In the following the model is used for maximizing the profit in rearing of bull calfs of Ayrshire race and of Friesian-Ayrshire cross breed. The basic assumptions are as follows:

beef price, py = actual, 15.15 Fmk/kg carcass weight (16.45 Fmk/kg for animals over 160 kg)

feed price, px = 0.85 Fmk/f.u.

calf price, p_{calf} = 500 Fmk (Ay), 600 mk (FrAy)

other costs, p_{oc} = 2 Fmk/day

The feed consists of silage, hay and some concentrates including 143 g DCP/f.u.

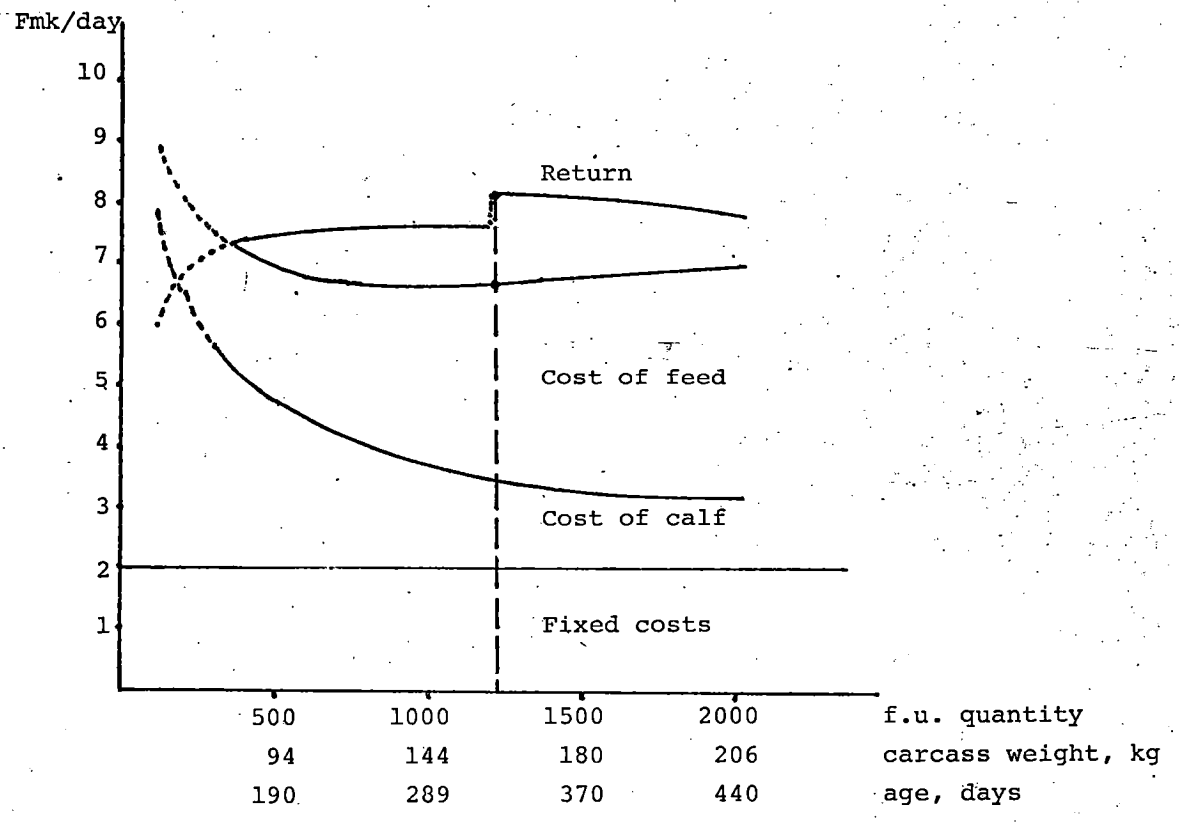

Fig. 2. Return, costs and slaughtering optimum as assessed by maximal daily profit (Ayrshire bull).

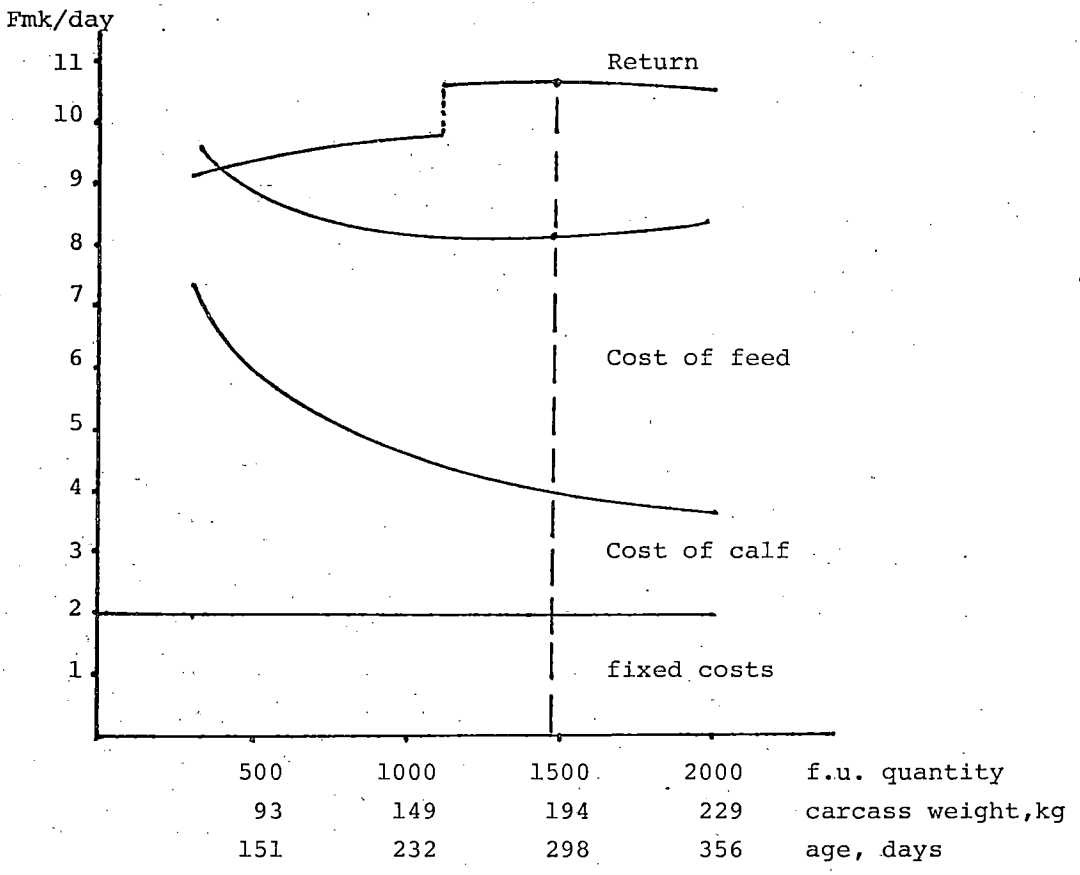

Fig. 3. Return, costs and slaughtering optimum as assessed by maximal daily profit (FrAy bull).

Daily averages for gross return and costs as well as optimal age and slaughtering weight are presented in figures 1 and 2. For Ay-race the optimum is found at the level of 160 kg or 11 months and for FrAy cross-breed at the level of 190 kg or 10 months.

Source: SIREN, J. 1978. An Econometric Model of Beef Production for Optimization Purposes. J. Sci. Agr. Soc. Finl. 50:399-444.

COMPARISON OF THE PROFITABILITY OF BEEF AND MILK PRODUCTION

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1. Lines of production

Until very recently beef was in Finland traditionally produced alongside milk. Even today about 80 % of our beef still comes from farms that also produce milk. More and more production units based on beef alone have, however, been established since it is easy nowadays for producers to buy calves through slaughterhouses and pure breed beef cattle are also starting to increase in Finland. There are not, however, enough bookkeeping farms specializing entirely in beef production to make it possible to calculate their financial result separately or to compare their results with those of farms producing other products. The examination must thus be restricted to the results of farms specializing in beef production to a relatively high degree. Almost all the beef farms presented here also produce milk or other agricultural products to some extent.

In the course of profitability research the results of e.g. farms specializing in milk production have been observed for some years now. Milk farms are defined as those on which the return on milk and beef cattle is more than 60 %. These have been dealt with in two groups, milk farms proper constituting those on which the income from beef has been more than 80 % of the total agricultural return. Beef farms here comprise farms on which the income from beef has been more than 50 % of the total income. The average specialization varied between 65 % and 85 %. On these farms the production of beef clearly dominates.

The arrangement and financial result of production are influenced decisively by the size of the farm. It is not possible here to make a thorough examination of the effect of the size of a farm on its result. Because of the small number of farms the results could be examined as mean values for only two size classes. One group contains farms of less than 20 hectares arable land and the other farms of more than 20 hectares. Estimation of the size of a farm was made according to the heads of cattle raised, but in this case there are precise details on the numbers of animals at the turn of the year only.

The profitability of beef production does not appear to depend greatly on the geographical location of a farm. However, the fodder crop yield varies from one region to another and this indirectly affects the financial result. Similarly, the length of the grazing season and the grazing facilities in general influence costs. In view of the small number of farms, the examination by region is here inconclusive. The farms in the regions of sourhern Finland, central Finland and South Ostrobothnia used in this profitability study were examined as one group. Production conditions in northern Finland differ from those in the rest of the country to such an extent that farms in northern Finland should be examined separately. Furthermore a higher producer price is paid for beef in northern and eastern Finland. Thus beef production in the northern regions would also be an interesting object for examination.

2. Gross return

A cattle farm specializing in beef production usually brings in a smaller gross return than e.g. a milk farm. On small beef farms with an average of about 12 hectares and about 7-11 head of cattle (at the turn of the year) the gross return in 1975-1977 was on average 47,000 - 64,000 marks. During the same period the gross return on milk farms (10-12 hectares in southern Finland and less than 20 hectares in central Finland) was correspondingly

about 60,000 - 85,000 marks. On slightly larger farms (average size 37 hectares) the gross return on beef and milk production was almost the same, as the table below shows. True, there were considerable differences between farm groups. In very small farms in particular, the shift to beef production seems to mean a transfer to more extensive production. Comparison of the herds of cattle on the farm groups in question shows nevertheless that they are about the same size. The average per hectare yield in feed units also seems to be approximately the same on beef and milk farms.

	Gross return from agriculture, marks/farm		
	1975	1976	1977
Small farms:			
Beef farms (av. size 12 ha)	48 048	47 163	64 005
Milk farms -			
under 10 ha south Finland	33 611	41 611	41 626
10-20 ha south Finland	66 911	83 935	87 140
under 20 ha central Finland	61 043	72 274	84 221
Medium-sized farms:			
Beef farms (av. size 37 ha)	163 868	127 196	182 852
Milk farms -			
20-30 ha south Finland	105 294	134 286	141 459
over 30 ha south Finland	168 571	205 436	225 246
over 20 ha central Finland	113 584	136 554	165 682

3. Costs

Certain agricultural expenditure items also decrease when a farm shifts to beef production. This is particularly evident in the use of labour. The table shows the total costs of farms' average in different farm groups for 1975-1977.

	Total costs marks/farm 1975	1976	1977
Small farms:			
Beef farms (av. size 12 ha)	48 732	60 725	77 433
Milk farms -			
under 10 ha south Finland	46 433	58 860	62 053
10-20 ha south Finland	74 059	92 139	101 619
under 20 ha central Finland	71 246	86 314	108 464
Medium-size farms:			
Beef farms (av. size 37 ha)	149 411	128 482	177 183
Milk farms -			
20-30 ha south Finland	107 230	132 088	140 031
over 30 ha south Finland	151 930	183 050	213 257
over 20 ha central Finland	109 985	134 091	160 603

The costs make allowance for total labour costs, including the work done by the farmer's family priced according to the wages paid to agricultural workers. The costs also include expenditure on purchased goods, depreciations on machinery, equipment and buildings, maintenance costs, and also miscellaneous agricultural costs and other such smaller items. Interest on capital is not included in the costs. Nor are interest on loans and taxes, mainly because of practical difficulties with calculation. The total costs on small beef farms were around 50,000 - 77,000 marks per farm and on medium-sized farms 130,000 - 177,000 marks. The costs on small farms specializing in milk production were about 70,000 - 110,000 marks. The costs per farm on medium-sized farms in southern Finland were 100,000 - 200,000 marks and in central Finland 110,000 - 160,000 marks. The price of various production inputs rose considerably over the three years under examination, which makes the comparison more difficult. The figures nevertheless indicate the level and trend in expenditure in these years.

4. Use of labour

The use of labour in agriculture has been observed by means of routine farm work. This includes the labour required for agricultural production proper. It does not include e.g. the work put in on land improvement and newbuilding. Needless to say all the work put into forestry or the individual household is excluded in this agricultural labour input. Small beef farms required about 2,000 to 2,800 hours of labour a year, milk farms of the same size about 4,000 to 4,300 hours a year. The medium-sized farms specializing in beef production worked 4,000 - 4,600 hours a year, milk farms of the corresponding size 5,000 - 6,000 hours. The labour requirement varies greatly from farm to farm. One of the reasons for this is the amount and type of fodder producer on the farm. The labour requirement is further influenced by mechanization and the level of rational equipment in buildings.

	Routine farm work, hours per farm		
	1975	1976	1977
Small farms:			
Beef farms	2 052	2 628	2 849
Milk farms -			
under 10 ha south Finland	3 333	3 345	3 346
10-20 ha south Finland	4 218	4 348	4 307
under 20 ha south Finland	3 924	3 996	3 999
Medium-sized farms:			
Beef farms	4 619	4 077	4 087
Milk farms -			
20-30 ha south Finland	4 864	5 299	5 133
over 30 ha south Finland	5 753	5 851	5 995
over 20 ha central Finland	5 040	5 140	5 313

One of the reasons for shifting to beef production is no doubt precisely the attempt to reduce the labour requirement. The results show that the shift to beef production reduce the labour requirement. It should, however, be noted that beef production ties the farmer in the same way as milk production. The cattle have to be fed and tended daily, though this work is not tied to a set time of day, as milking is.

5. Financial result

a. Results calculated per farm

The financial result of beef production can be assessed in many ways. Profitability is here examined according to the result for farming over the whole farm and on the basis of the earned income of the whole farming family. The results are chiefly compared with those for farms specializing in milk production. As the labour requirement falls with specialization in beef production, the results for beef farms are later compared with the result obtained from crop farms as well.

In the years in question net return[1] on very small beef farms was 14,000 - 20,000 marks per farm. This is of the same magnitude as the net return on milk farms of less than 10 hectares over the same period. Comparing small beef and milk farms of the same size, the net return is clearly higher on the milk farms. The same applies to slightly larger, i.e. medium-sized farms. In these years the net return on beef production was 33,000 - 46,000 marks per farm. Almost without exception the net return on larger farms was 40,000 - 65,000 marks per farm.

	Net return, marks per farm		
	1975	1976	1977
Small farms:			
Beef farms	14 220	14 758	19 914
Milk farms -			
under 10 ha south Finland	14 415	18 226	18 075
10-20 ha south Finland	25 723	34 426	33 249
under 20 ha south Finland	21 054	25 014	28 842
Medium-sized farms:			
Beef farms	45 548	33 424	42 879
Milk farms			
20-30 ha south Finland	34 243	50 305	53 576
over 30 ha south Finland	55 560	62 385	66 645
over 20 ha central Finland	39 763	50 595	57 446

[1] The net return is the return on capital invested in agriculture and the farming family's remuneration for work done on the farm.

The financial result per farm was also examined by means of the profitability coefficient[1]. This coefficient expresses the economic result on producing various products, allowing for the labour required by production and the capital invested in production. It was stated above that even allowing for fodder produced on the farm, beef production clearly requires less labour than milk production under corresponding conditions.

	Profitability coefficient,		
	1975	1976	1977
Small farms:			
Beef farms	0.67	0.42	0.48
Milk farms -			
under 10 ha south Finland	0.47	0.47	0.41
10-20 ha south Finland	0.63	0.66	0.56
under 20 ha central Finland	0.56	0.53	0.54
Medium-sized farms:			
Beef farms	0.87	0.58	0.68
Milk farms -			
20-30 ha south Finland	0.69	0.78	0.76
over 30 ha south Finland	0.81	0.96	0.78
over 20 ha central Finland	0.83	0.80	0.80

The need for capital is also to some extent smaller in beef production than in milk production. Despite this the relative profitability of beef production has in many years been lower than that of milk production. Although little can be concluded about the trend in profitability on the basis of results for three years, the profitability of beef production would seem to have decreased slightly compared with milk. The profitability of farms spezializing in milk production stood at approximately the same level throughout the period and the results for beef farms fell. True, the results are based on the results for relatively small farm groups.

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[1] The profitability coefficient shows the ratio between the amount of farming family income per working hour compared with the wages of farm workers and also the amount of interest obtained on capital at the current rate of interest.

b. Earned income of the farming family

The net return per farm presented above is further divided into earned income and capital income in proportion to the labour input of the farming family and the use of capital. The labour input of the farming family is calculated by pricing the number of hours worked according to the hourly rate paid to agricultural workers. The use of capital is assessed on the basis of the interest charged at a rate of 5 %. The earned income is calculated per farming family or farm and also per hour worked in agriculture. It should, however, be noted that in calculating the net farm income farming tax was not included as expenditure. Thus the farming tax has to be deducted from the earned and capital income. The results confirm the general belief that beef production is rarely an economical alternative on very small farms. The gross return decreases on a farm shifting from milk to beef production. At the same time the labour requirement drops decisively and is also evident in the reduced earned income of the family. On the

	Earned income of farming family, marks per family		
	1975	1976	1977
Small farms:			
Beef farms	9 986	11 895	15 812
Milk farms -			
under 10 ha south Finland	12 801	15 733	15 786
10-20 ha south Finland	20 709	28 136	26 728
under 20 ha central Finland	17 504	20 699	23 934
Medium-sized farms:			
Beef farms	27 050	20 132	25 303
Milk farms -			
20-30 ha south Finland	24 964	37 524	39 633
over 30 ha south Finland	35 916	45 119	42 632
over 20 ha central Finland	30 015	38 506	41 893

small farms mentioned here the earned income of farming families specializing in beef production was 10,000 - 15,000 marks. The earned income of milk farms of the same size was correspondingly 15,000 - 30,000 marks. Beef production would seem motivated on

very small farms it members of the farming family can obtain part time work outside the farm. There may also be many other reasons for choosing beef as the main product.

On slightly larger farms the ratio for earned income on beef and milk is along the same lines as the above. However, on even slightly bigger farms the earned income on beef is already sufficient to support the family. In this case it varied from 20,000 - 27,000 marks as the average for different years. The family's earned income on milk production was, however, usually clearly higher than on beef farms (see also Figure 2).

c. Earned income per hour

The earned income of farming families was also calculated per hour worked. On very small and medium-sized farms the earned income per hour worked was practically the same as in milk production. On small farms this earned income was about 4-6 marks

	Earned income of farming family, marks per family		
	1975	1976	1977
Small farms:			
Beef farms	5.90	4.55	5.74
Milk farms -			
under 10 ha south Finland	3.88	4.78	4.74
10-20 ha south Finland	5.22	6.87	6.54
under 20 ha central Finland	4.69	5.51	6.39
Medium-sized farms:			
Beef farms	7.83	6.60	8.87
Milk farms -			
20-30 ha south Finland	5.79	8.09	8.85
over 30 ha south Finland	7.71	10.21	9.40
over 20 ha central Finland	6.95	8.36	9.44
	Average wage of agricultural workers, marks per hour		
Men	8.60	10.80	12.20
Women	7.30	8.90	9.90

an hour. On slightly larger farms it was about 6-10 marks an hour. The average recommended hourly wage for agricultural workers in the years in question was 10.50 marks for men.

d. Capital income and indebtedness

It has already been stated that the net return calculated per farm is divided into the earned and capital income of the farming family. The capital income per farm in 1975-1977 varied from group to group as follows.

	Capital income, marks per farm and % of farming capital					
	1975		1976		1977	
	marks/ farm	%	marks/ farm	%	marks/ farm	%
Small farms:						
Beef farms	4 234	3.4	2 863	2.1	3 702	2.4
Milk farms -						
under 10 ha south Finland	1 614	2.4	2 493	2.4	2 289	2.1
10-20 ha south Finland	5 214	3.2	6 290	3.3	6 521	2.8
under 20 ha central Finland	3 550	2.8	4 315	2.7	4 908	2.7
Medium-sized farms:						
Beef farms	18 498	4.4	13 292	2.9	17 576	3.4
Milk farms -						
20-30 ha south Finland	9 279	3.5	12 781	3.9	13 943	3.8
over 30 ha south Finland	20 144	4.6	24 266	4.8	24 013	3.9
over 20 ha central Finland	9 748	4.2	12 089	4.0	15 553	4.0

On small farms the capital income stated here varied in the groups described between 1,000 and 6,500 marks per farm. In proportion to farming capital it varied c. 2.1 - 3.4 %. On larger farms it was correspondingly c. 10,000 - 25,000 marks per farm, i.e. 3.5 - 4.5 % of the bookkeeping value of farm capital.

On bookkeeping farms it is not possible to calculate farming tax as distinct from other tax, so tax must also paid on the net farm return. The same applies to interest on loans. The indebtedness of farms varied as follows.

	Debts as % of farm capital		
	1975	1976	1977
Small farms:			
Beef farms	20.8	23.1	24.6
Milk farms -			
under 10 ha souht Finland	13.1	10.3	6.3
10-20 ha south Finland	12.5	13.5	14.9
under 20 ha central Finland	13.5	15.2	16.6
Medium-sized farms:			
Beef farms	33.4	29.7	26.9
Milk farms -			
20-30 ha south Finland	19.7	18.1	18.5
over 30 ha south Finland	25.0	24.4	23.2
over 20 ha central Finland	19.0	20.9	21.9

The indebtedness of the small farms specializing in beef production was 20-25 % of the farmer's total capital. The corresponding figure for milk farms was 10-17 %, i.e. clearly lower. On larger farms producing beef debts represented 27-33 % of capital. The indebtedness was also lower on the larger farms producing milk.

Many farms have specialized in beef production only in very recent years. In some cases the farm had to repair or build farm buildings and buy new equipment. These measures raised the indebtedness. In many cases most of the unearned income goes on paying the interest on loans. This further weakens the financial result of beef production.

e. Comparison of beef and crop farms

By way of example the following compares the financial result of beef farms and crop farms. The crop farms are in Southern Finland and the average size is 26 hectares. The beef farms are in the south and central parts of the country and have an average size of 37 hectares. During the period in question they had a good 20 head of cattle. The results are for 1976.

	Beef farms average size 37 ha	Crop farms average size 26 ha
Net return, marks per farm	33 424	26 992
Profitability coefficient	0.58	0.88
Earned income, marks/farm	20 132	16 062
marks per hour	6.62	9.73
Farming labour, hours per farm	4 077	1 727
Indebtedness, %	29.6	11.2

Comparison of the results shows that because of fodder production the amount of labour required for beef production is relatively large. The net return was greater in beef production than crop growing. The earned income per farm or family was also greater in beef production. The earned income calculated per hour worked was, on the other hand, higher in crop growing. The results are, however, for one year only, and the farms are also of different sizes.

6. The situation since 1977

The most recent data on bookkeeping farms are for 1977. Since then the trend has been observed by means of farm models. In the farm models it is assumed that the farm specializes entirely in beef production. As regards the yield and the use of production equipment these farm models are somewhat more efficient than bookkeeping farms. It is assumed that most of the fodder is produced on the farm itself and the sizes used are farms producing 20, 60 and 120 head of cattle a year.

Comparison of the costs of producing beef with the target price for beef shows that on a farm producing only 20 head a year the production costs clearly exceed the target price. (Figure 3). On a farm producing more than 100 head a year the target price covers the production costs. At the end of 1978 the production costs

and target price of a farm with 60 head of cattle are close to one another. The target price quoted here does not allow for the price supplement paid on young cattle.

It can be concluded that the profitability of beef production since 1977 has continued along the same lines as in 1975-77.

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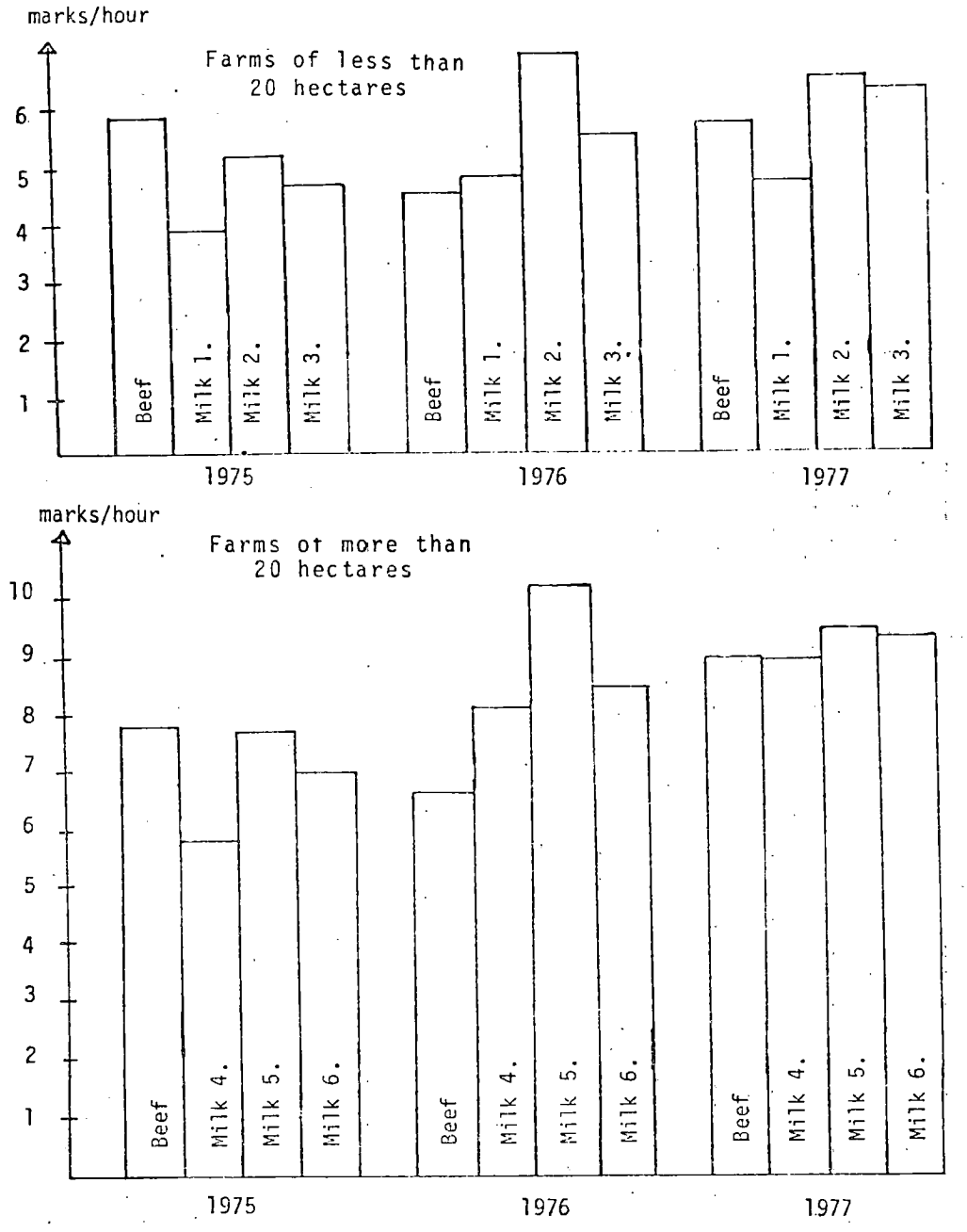
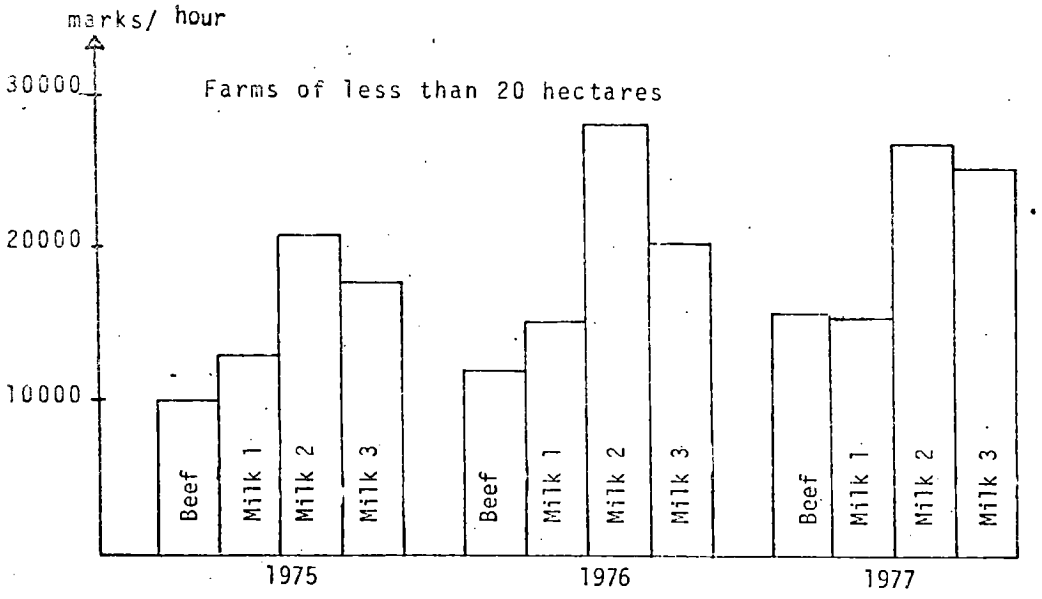
Figure 1. Income of farm family on farms specializing in beef and milk production in 1975-77 Marks /farm (family



Farms with over 20 hectares

Milk 1. South Finland under 10 ha.
Milk 2. South Finland 10-20 ha.
Milk 3. Central Finland under 20 ha.
Milk 4. South Finland 20-30 ha.
Milk 5. South Finland over 30 ha.
Milk 6. Central Finland over 20 ha.

Figure 2. Income of farm family on farms specializing in beef and milk production in south and central Finland in 1975-1977.



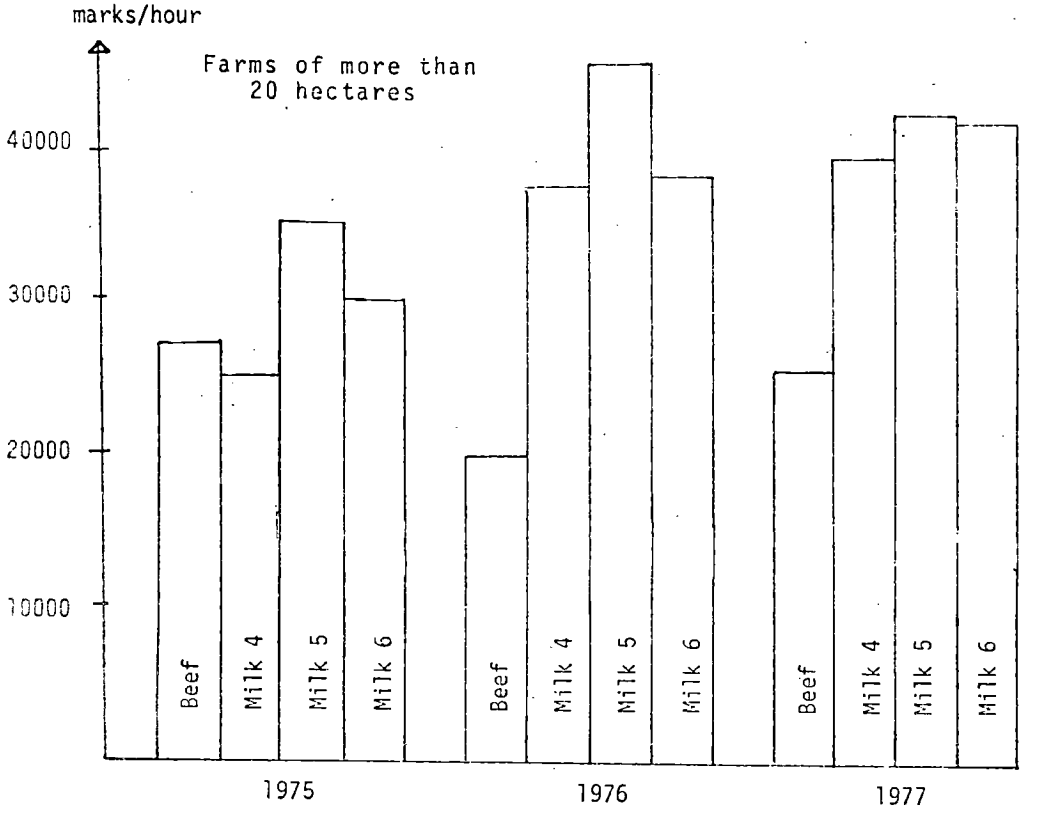
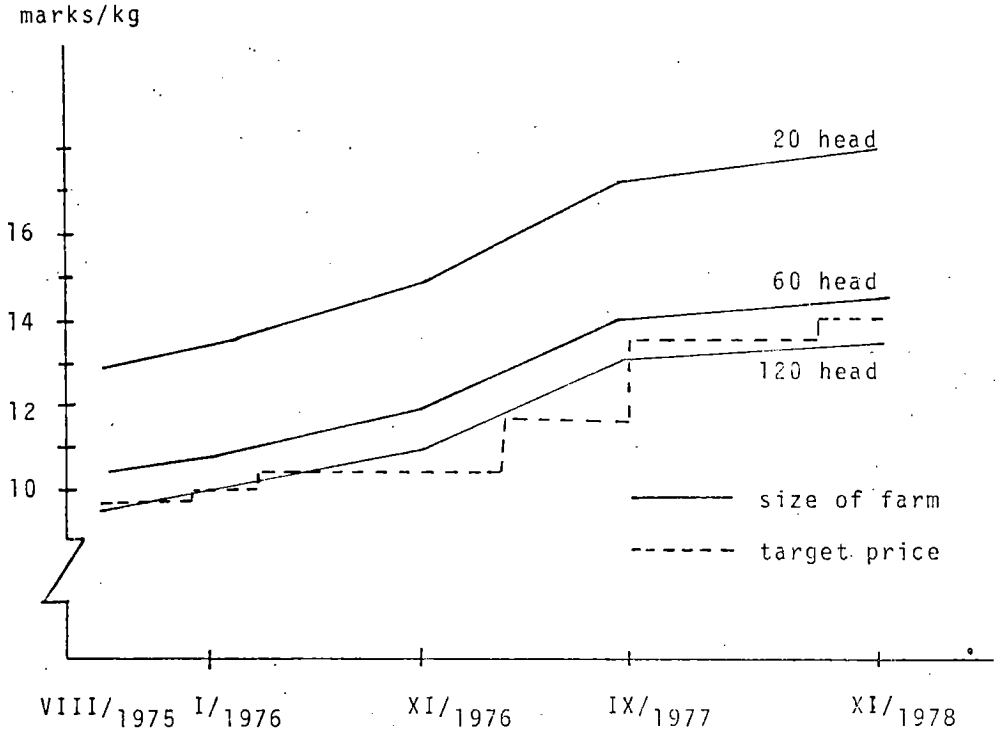


Fig. 3. Production costs of beef according to farm models and target price for beef.



DEVELOPMENT OF BEEF CATTLE PRODUCTION IN INDIVIDUAL PEASANT FARMS IN POLAND

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1. Development trends of slaughter cattle production in Poland

Fattening of young slaughter cattle has no long-standing tradition in Poland although, contrary to a number of West European countries, shortage of animal material for fattening of high genetic quality is not a factor limiting possibilities of beef production growth. This is the result of both a definite consumption model, with obvious preference for pork, and of natural conditions of Polish agriculture, which cannot be considered to be particularly favourable for development of ruminants' breeding.

Production of young slaughter cattle in Poland started to develop in an organized way only after 1960. Up till then main fattening material was provided by mature cattle of poor fattening capacity and low slaughter productivity. Modernized selection methods introduced in 1961 allowed an evident change of quality of cattle purchased for slaughter. In the years 1960-76 the quantity of cattle for slaughter increased from 1.3 million to 3 million heads, and that of slaughtered calves decreased from 3.1 million to 1.2 million heads. The supply structure of slaughter cattle also changed essentially. The share of young slaughter cattle grew in relation to cattle purchased altogether from 48 per cent to 77 per cent, with simultaneous weight growth of 1 head of purchased cattle. In 1976 the average weight of 1 head purchased amounted to 420 kg, the growth occurring primarily in the category of young slaughter bulls.

Population of cattle in the entire Polish agriculture increased, in comparison with 1970, by 21 per cent and in 1978 amounted to 13.1 million heads, 6.1 million cows included, the population of which remains unchanged since 1970. In individual farms the cattle population amounts to 9.6 million heads, 5.2 million cows included. Thus, cattle being owned by individual peasant farms constitutes 73 per cent of the total cattle population in Poland, and cows make 86 per cent.

In the years 1970-78 production of beef cattle increased by 36 per cent, and in 1978 amounted to 1 311 thous.tons. As it appears from comparison of growth indices of beef cattle population and production, the rate of production growth considerably exceeded the rate of population growth, which results, undoubtedly, from intensification of cattle breeding.

In total meat production the share of beef shows a constant upward trend with simultaneous considerable growth of pork production and a dynamic growth or poultry production. At present, the share of beef is 23.4 per cent, and that of veal 1.6 per cent. In 1978 in Poland the structure of meat production/post-slaughter weight with fats and without pluck/was the following, in per cent:

beef	24.3 per cent
veal	1.6 per cent
pork	59.6 per cent
poultry	12.0 per cent
others/mutton, horse meat, rabbit meat, venison/	3.4 per cent

It should be emphasized that the major part of produced beef cattle/58.6 per cent/and calves/88 per cent/ comes from individual peasant farms.

In the years 1960-78 beef production increased almost threefold/ from 236 to 691 thous.tons/, whereas consumption of beef and veal per 1 inhabitant increased 2.5-fold - from 6.8 kg to 17.3 kg.

Poland holds one of the top locations in Europe as regards cattle population but the possibilities of beef production are not used to the full. We have tremendous biological possibilities in the amount of 5.2 to 5.5 million heads of calves yearly, which we do not make use of. In spite of a systematic reduction of slaughter of calves in very low body weight, in 1978 still about 1 million of calves, which was about one fifth of all the population, were designated for slaughter in the first month after birth. Polish production conditions determine the need for considerable acceleration of the rate of growth of slaughter cattle breeding, and for full use of animal material for further fattening. In this connection, in 1978 there was prepared a development programme of cattle breeding, which assumes the following:

- increase of cattle population from 13.1 million heads in 1978 to 17 million heads in 1990,
- increase of beef cattle production respectively from 1.3 million to 2.0 million tons.

It is anticipated that the average yearly rate of growth of cattle production up to 1980 will amount in the entire agriculture to 6.4 per cent, and in the years 1981-85 it will drop somewhat and will amount to 4.5 per cent. The expected production level of beef cattle will be achieved in effect of production intensification and of the increasing of quantity of cattle designated for slaughter. It is also anticipated that the rate of growth of beef production will be considerably higher in socialized farms than in peasant ones. In peasant farming, as an effect of a growing process of transferring of farms by old farmers to the state against a pension, as well as because of decrease of cattle population in farms of dual-occupation holders, a decrease of cow population and a somewhat lower rate of growth of beef production were assumed. On the other hand, a population growth per 100 ha of arable land and cattle breeding intensification will occur mainly in large-scale production individual farms and in specialized farms. Implementation of the aims determined in

the development programme of cattle breeding will be possible in effect of using all calves fit for fattenning or herd reproduction. There is assumed a wider crossing of dairy cows with bulls of meat breeds in order to improve meat quality, as well as improvement of technology and organization of fodder economy, mainly on grasslands, and higher efficiency of insemination, zootechnical and veterinarian care.

The essential factor which limits beef production volume in Poland is, primarily, the scanty fodder base, while the indirect factor is unfavourable structure of cattle herd in socialized and individual farms. This structure is the following:

Cattle structure in Poland as of 1978

Specification	Total in the country	Socialized farms	Individual farms
Calves up to 6 months	19.9	23.2	18.8
Heifers and bull-calves from 6 months to 1 year	13.9	15.6	13.3
Heifers and bull-calves of 1 year and over	10.8	16.2	8.9
Bulls, baby beefs, steers, fatlings	9.0	21.8	4.5
Cows	46.4	23.2	54.5
Total	100	100	100

Differences in herd structure determine that the basic quantity of calves comes from individual farms, in which there are no possibilities of using them rationally in the closed cycle. Moreover, the highest supply of calves in individual farms occurs in central and south-eastern part of Poland, in which simultaneously occur the highest in Poland comminution of farms, and the share of grasslands in arable land much lower than the average in the country. On the other hand, in northern and western regions, which have the optimum conditions for cattle breeding, there occurs the highest concentration of socialized farms that experience

permanent shortage of breeding material for fattening and of heifers for dairy farms. This specific paradox consisting in having, at the same time, apparent excess of calves in individual farms, and shortage of calves in socialized farms, created the need for adequate transfer of some quantity of calves from peasant farms to socialized ones for further calf fattening. However, since transfer of young calves at long distances proved irrational, decision was made to expand calf breeding in individual farms to higher weight/young bulls to 150-200, and heifers to 150-170 kg/ with providing profitable economic conditions. Socialized farms take over the next phase of fattening up to heavy weights. At the initial stage of the realized programme, it is planned to designate in 1979 and 1980 additionally for further fattening about 400 thous. calves, 200 thous. of which will be fattened in individual farms. Considering the fact that calves purchased for further fattening are very young and thus difficult for breeding and not resistant to long-distance transport, it was decided that the radius of calf delivery should not exceed 30 km. Therefore the agreements for cattle breeding are concluded primarily with farms located in regions of high calf supply.

General lines of calf trade for further breeding are the following:

- the organizer of calf trade are regional enterprises of raised animal trade, which conclude contracts with individual and socialized farms. Such farms are considered as calf "nurseries" and provide an indirect link between purchased of calves from individual farms and their sale for further fattening;
- farms undertaking additional calf breeding are provided with fodder, mainly milk-substituting preparations and concentrated feeds;
- after completion of breeding the animal trade enterprises buy calves from the "nursery" and transfer them to socialized farms for further fattening.

2. Systems of slaughter cattle fattening

The main barrier determining the level, rate and direction of the animal production development in Poland is the insufficient fodder base. It is the effect of both unfavourable area structure of peasant farms and of sowing structure which is not always subjected to animal production structure. Therefore determined production conditions require choice of a cattle fattening system that will be subjected both to stock and structure of fodders available in the farm. The general line should be the basing of beef production on cheap bulky feeds.

The demand of fattened cattle for single kinds of fodders can be different according to the fattening system, which determines the necessary quantity of concentrated feeds. In Poland there are used for feeding of a fattened stock mainly bulky feeds such as green forage, hay, silage, mangel, industrial offal fodders, and partly concentrated feeds. In beef production in individual farms three main directions of fattening can be singled out: intensive, semi-intensive and extensive.

Intensive fattening lasting about 14 months, in which calves achieve from 400 to 450 kg body weight, using about 6 to 7 oat units for 1 kg weight growth.

Intensive fattening is based, to a high degree, on concentrated feeds, the share of which in feeding unit amounts from 50 to 75 per cent; the remaining part are dry and sacculent forages.

Semi-intensive fattening lasting up to about 20 months, up to 450 to 500 kg body weight, using about 7 to 8.5 oat units per 1 kg weight growth, with the share of concentrated feeds in the feeding unit of about 25 to 30 per cent.

Extensive fattening lasting about 24 months, up to 400 kg body weight, which is run on scanty winter feed and two season pasturage. The use of fodder in this fattening system amounts from 10 to 12 oat units per 1 kg of weight growth with the share of concentrated feeds up to 10 per cent.

The most common technology in individual farms are the semi-intensive and extensive fattening of slaughter cattle. The choice of the fattening system depends on the farm area, availability of grassland, and on equipment of the farm with technical labour facilities.

In individual peasant farms specialized in beef cattle production the semi-intensive fattening system prevails, only in big-scale production, exceeding 300 q beef cattle for 1 farm, the major part of farms fatten cattle by semi-industrial method using in the feeding unit about 50 per cent of concentrated feeds and protein components.

The structure of fodders fed to the cattle in oat units in specialized farms according to the production scale is the following:

Production of beef cattle per 1 farm in q [1]	Average production of beef cattle in group ca net q	Fodders fed total = 100					
		concentrated	root crops	green forage	hay	silage	others
up to 100	75.5	23.5	9.0	25.0	15.3	22.2	5.0
100-200	148.8	29.3	5.4	18.7	12.2	26.2	5.2
over 200	314.7	45.0	6.7	8.7	11.3	22.4	5.9

Extensive fattening in specialized farms is noted where meadows and pastures exceed 50 per cent of arable land, or at fattening of mature cattle to the proper limit.

Extensive fattening system in a two-year cycle with using of grassland is not very grain-consuming but in view of a fairly high use of bulky feeds per unit of production growth is in most cases more "land-consuming" than semi-intensive fattening is. It seems that in Poland the semi-intensive fattening is at present, and will be in the future, most widely used. Price changes of cereals and beef, which occurred on world market in recent years, suggest preferences of this very system of fattening in beef production in Poland.

[1] q = 100 kg

3. Possibilities of development for individual farms specialized in slaughter cattle production versus the fodder balance

The specialization development of individual farms in Poland oriented on beef cattle production must be considered in the context of grain and concentrated feed balance as well as maximization of animal product per area unit. That is so because the volume of this production depends essentially on the amount of grains and concentrated feeds which can be designated for feeding in the country scale.

At present the major part of individual farms specialized in livestock production shows an unfavourable grain balance. The debit grain balance/i.e. the difference between the quantity of sold grains and that of purchased concentrated feeds/in peasant farms specialized in the production of pigs and beef cattle, investigated by the Institute of Agricultural Economics, is the following at different scale of yearly livestock growth/in q per 1 ha of arable land/:

	to 100 q	100-200 q	over 200 q
pigs - closed cycle	- 7.6	- 16.8	- 36.1
open cycle	-13.5	- 31.2	- 78.2
slaughter cattle - fattened	- 3.0	- 8.8	- 29.0

As it appears from the quoted data, the growing scale of livestock production, both pig and beef production per one farm, is accompanied by an ever groving deficit of grain production which results from scale of production not adjusted to the farm area and to its own fodder reserves, which consequently brings about an increase of concentrated feed purchased. This is shown in data of Table 1.

Table 1. Use of fodders in q and fodder area per 100 kg of livestock growth in farms specialized in production of pigs and beef cattle

	Yearly livestock production in q					
	pigs			beef cattle		
	to 100	100-200	over 200	to 100	100-200	over 200
Farm area in ha arable land	11.5	13.6	17.1	13.3	17.6	19.1
Net livestock production in q						
per 1 farm	75.0	134.0	277.6	75.5	167.2	314.7
per 1 ha of arable land	6.5	9.9	16.2	5.8	9.5	16.5
Use of fodders per 100 kg of livestock growth in						
Use of concentrated feeds total q	2.4	2.7	3.1	1.7	1.8	2.4
including own fodders	1.5	1.3	1.0	1.3	1.1	0.9
purchased fodders	0.9	1.4	2.1	0.4	0.7	1.5
potatoes	4.2	2.9	1.7	1.3	0.7	0.5
mangel	1.1	1.1	1.2	1.7	1.0	1.3
green forage	-	-	-	9.6	5.2	2.4
silage	-	-	-	10.2	9.0	6.3
hay	-	-	-	2.2	1.7	1.1
Fodder area in ha per 1 ton of livestock growth						
Total basic area	1.20	1.18	1.28	1.52	1.29	1.21
including fodder area:						
purchased fodders	0.43	0.60	0.84	0.21	0.36	0.65
own fodders	0.77	0.58	0.44	1.31	0.93	0.56
Share of purchased fodder area in %	36	51	66	14	28	54

With the growing production scale the use of concentrated feeds per growth unit of livestock production increases, whereas the use of farm fodders, among others root crops in pig production and succulent and dry bulky feeds in beef cattle production decreases, at the same time. This is caused by labour intensity in

preparing feeds for a too great number of animals. For the same reason industrial farms as well use mainly, sometimes only, concentrated feeds.

Considering the unfavourable balance of payments of the country, the assumption is to reduce considerably imports of grains and fodders, which will, of course, determine the choice of technology for animal production. The choice of this technology must be subjected to maximum use of farm fodders. Therefore, in individual farms specialized in beef cattle production the adopted principle now is a moderate concertration of animals adjusted to own grain reserves.

Difficulties which have occurred in recent years in the purchase of concentrated feeds have undermined the economics of farms running fattening of cattle and that of young cattle mainly on the ground of purchased fodders. They confirmed that meat production in peasant farms must be, in principle, adjusted to own fodder reserves of the farm. Though the fattening of young slaughter cattle is a less grain-consuming production line than that of pigs, as it appears from data presented so far, intensive technologies of cattle fattening have no changes for success in our conditions. The fattening of young cattle should be carried out on the basis of semi-intensive, semi-extensive technology and, under specific circumstances, with high share of meadows and pastures on the farm, on the basis of extensive method. This, undoubtedly, expands the duration of fattening but, at the same time, it alleviates the unfavourable grain balance and lowers the cost of the used fodder.

As regards the possibility of increasing animal production, the shaping of its structure is of essential significance, which allows maximization of the final animal product per area unit designated for fodder production. Though the structure is, to a high degree, determined by the demand, if we leave out objective factors that determine the choice of specialization line, there exists an alternative choice between beef and pork production,

which results from competitiveness between cattle and pigs for fodder area in arable land. As it turns out, in order to achieve the same productiveness of arable land measured by meat production in fattening young slaughter cattle and pigs, it is necessary to obtain per area unit 1.5 time higher root fodder crops /in grain units/ used for cattle feeding than the crops of grains which are the basic fodder in feeding the herd. Otherwise, we obtain from 1 ha of arable land area much less beef than pork.

As it appears from investigations of the Institute of Agricultural Economics in farms specialized in animal production, on the average, for producing 1 ton of pork 1.51 ha of fodder area was needed, and for 1 ton of beef - 1.99 ha, including 1.55 ha on arable land and 0.44 ha on grassland. Though production of beef is, formally, less grain-consuming than that of pork, it uses fodders from arable land area, which could be designated for cereals cultivation. Thus, in effect, we obtain from the same area a lower production of beef than of pork.

4. Production costs and economic effectiveness of specialized farms

Production costs of beef cattle in farms specialized in this production line/about 25 zlotys per 1 kg/ are by about 30 per cent lower in comparison with costs in an average, multi-branch peasant farm/about 35 zlotys per 1 kg/. It comes both from big production scale and a more reasonable type of farming. In all, we have in Poland about 4 thousand peasant farms specialized in young slaughter cattle production, which makes only 1 per cent of farms of over 10 ha area/of which there are 425 thousand in the country/.

Costs and profitableness of livestock production in specialized farms are differentiated, and they are the highest in farms of the smallest area, which produce up to 100 q of livestock. These latter farms apply a more labour-consuming production technology/

labour outlays there are fourfold higher than in farms of the highest production scale/. Bigger farms, on the other hand, turn the scale economy to their profit. In farms of the highest production scale of beef cattle, in spite of very low outlays and direct labour costs, a certain growth of production costs occurs, mainly because of growing use of concentrated feeds per growth unit of livestock /Table 2/.

Table 2. Influence of production scale on unit costs of beef cattle production in specialized individual farms - covered by studies of the Institute of Agricultural Economics

/data for 1977/

Specification	Farm groups according to net production of beef cattle in q			
	up to 100	100-200	over 200	general -
Average arable land area ha	13.3	17.6	19.1	15.0
Net livestock production per 1 farm q	77.5	148.8	314.7	116.9
Net livestock production per 1 ha arable land kg	581	846	1647	779
Net cost of 1 q livestock net zloty/q	3018	1966	2048	2490
Including: fodders	2496	1914	2332	2310
other expenses	662	520	440	566
labout cost	705	379	177	472
labour outlays /days/	3.38	1.82	0.85	2.27
Index of profitableness in %	113	144	155	131

Taking into account the tight fodder balance in the country and considerable labour reserves in individual farms, we must say that beef production in the latter type of farms based on expensive concentrated feeds is not justified at the present development stage of agriculture.

In peasant farms existing in Poland now, which are oriented on specialization in animal production, beef cattle production included, we note a clear trend to increasing of production scale, both in result of the increase of farm area and of production intensification per area unit. The effect is an evident improvement of economic results in form of lower production costs, increased labout productivity and profitableness of the farm. Productive and economic results of farms specialized in beef cattle production are shown by comparison with results achieved in total individual farming in the country /Table 3/.

Table 3. Production-economic results of farms specialized in beef cattle production in comparison with results of an average individual farm in the country.

/data for 1977/

Specification	Average individual farms	Farms specialized in beef cattle production			
		to 100 q	100-200 q	over 200 q	general
	Per 1 farm				
Farm area ha arable land	6.5	13.3	17.6	19.1	15.0
Number of employees in farm	1.9	2.9	3.0	2.9	3.0
Number of employees per 100 ha arable land	29.0	21.8	17.1	15.1	20.0
Gross final production in thous. zlotys	136	577	983	1884	798
Gross beef cattle production/tons/	0.5	8.4	17.6	41.7	13.7
Net beef cattle production/tons/growth/	0.5	6.1	13.2	30.4	10.1

Table 3 continued on p. 148

Table 3 continued from p.

Specification	Average individual farms	Farms specialized in beef cattle production			
		to 100 q	100-200 q	over 200 q	general
	Per 1 ha arable land in thous. zlotys /current prices/				
Labour outlays/days/	67.5	67.0	53.3	46.3	60.2
Gross final production	21.0	43.3	55.9	98.6	53.2
Production outlays of agric. origin	2.8	13.9	21.5	50.0	20.1
Net final production	18.2	29.5	34.4	48.6	33.1
Cash expenses	5.9	19.8	28.2	58.1	26.4
including:					
purchased of animals	0.8	6.9	11.0	21.8	9.3
fodders	1.7	6.7	10.2	27.8	10.0
Depreciation	1.0	3.4	3.9	4.5	3.7
Cash outlays	6.9	23.2	32.1	62.6	30.1
Net production	15.1	23.5	27.7	40.5	26.7
Charges	1.1	1.6	1.6	1.5	1.6
Agric. profit	14.0	21.9	26.1	39.0	25.1
	Per 100 zlotys of final gross production				
Cash expenses	28.1	45.7	50.4	58.9	49.7
Depreciation	4.6	7.9	7.0	4.5	6.9
Cash outlays	32.7	53.6	57.4	63.4	56.6
Labour outlays/days per 1.000 zlotys of production/	3.21	1.55	0.95	0.47	1.13
Labour costs	66.9	32.2	19.9	9.8	23.6
Production costs	99.6	85.8	77.3	73.2	80.2
	Per 1 employee in thous. zlotys				
Agric. profit	48.3	100.9	152.9	256.7	125.9

These farms are marked for bigger area, which is obvious in this specialization, and also by higher employment. However, this employment is considerably lower per production unit.

On the average, in farms specialized in beef cattle production the production value from 1 ha is 2.5-fold higher in comparison with the entire peasant farming. Specialized farms, however, buy considerably more production means of agricultural origin/fodders, breeding animals, seeds/. If we deduct the value of these products and measure land productivity by the value of net final production, we find that in specialized farms it is by 80 per cent per ha higher than the average production in the whole individual farming. This is the effect, primarily, of 4-fold higher material outlays per area unit. But higher rationality of farming in comparison with the whole of individual farms is of considerable significance as well. A proof of this rationality is the level of unit costs, which ranges from 73 zlotys with the highest production scale to 85.8 zlotys with the lowest scale in terms of 100 zlotys worth of gross final production in specialized farms, whereas in the entire individual farming it amounts to 99.6 zlotys.

The most synthetic measure of economic effectiveness in peasant farms is the agricultural profit per one employee. In the first group of specialized farms of the lowest livestock production it is twofold higher than the average profit in the whole peasant farming, in the second group threefold higher, and in the third group of the highest production scale it is fivefold higher. One of the factors of this differentiation is, of course, lower employment per area unit. However, this profit grows not only per one employee but also per 1 ha of arable land, and so, in the first group of farms of the lowest scale it is by 56 per cent higher, in the second group by 86 per cent, and in the third group by about 180 per cent higher than the average profit in the whole peasant farming. High profits of farms specialized in beef

cattle production per 1 employee, as well as per 1 ha of arable land, are chiefly the effect of production scale and farming intensity, thus, of a bigger, technically better equipped, more capital-intensive and less labour-consuming agricultural workshop in comparison with other individual farms in the country. However, considering the grain balance of the country, the development of farms specialized in beef cattle production of a scale highly exceeding the farm's fodder reserves, as it happens, particularly, in the third group of farms under study, has no social reason for existence in our conditions. Therefore, it is anticipated that the maximum production scale of beef cattle in individual peasant farms specialized in this production line should not exceed 150-200 q yearly livestock growth. With a higher scale there occurs a trend to excessively grain-consuming production technology.

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