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Economics

A COMPARISON OF PRODUCTION COSTS AND INVESTMENT OUTLAY EFECTIVENESS IN THE PRODUCTION OF PROTEIN IN 1969–1972

PORÓWNANIE KOSZTÓW PRODUKCJI I EFEKTYWNOŚCI NAKŁADÓW INWESTYCYJNYCH W PRODUKCJI TOWARÓW BIAŁKOWYCH ZA LATA 1969–1972

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This paper aims at determining the effectiveness of the investment outlay and total production costs connected with obtaining and delivering to the wholesale market protein products derived from:

- breeding farm animals in agriculture and processing them (meat, milk, eggs, broilers),
- sea fisheries and fish processing industry (fishes and fish products).

The calculation of costs and investment outlay has been carried out in reference to 1 kg of edible parts as well as to 1 kg of protein.

INTRODUCTION

In November 1973 a report on the state of agriculture and nutrition of the world's population was presented at the annual meeting by the United Nations' Food and Agriculture Organization (FAO). It is said in that report that the phenomenon of the agricultural production not coping with the ever increasing demand for food must be continued to be reckoned with. The situation is caused by many factors and leads to a quick rise of prices for food products, inclusive of meat and fishes, on the world market.

On the other hand in Poland, as well as in other developed countries a steady tendency is observed of a continuous rise of the consumption of meat, which increased from 45 kg per head in 1960 to 59.3 kg in 1972. The fact should be taken into consideration that meat is actually such plant production which has been processed biologically. Thus, every rise in the production of meat is connected with an increased demand for fodder. It may lead to the appearance of a fodder barier as a decisive factor for the growth af animal production.

As far as substitute food is concerned for meat and meat products in providing proteins for human nutrition, preference is given to fish and fish products especially in the case when the rate of increase in the production of meat by agricultural animal breeding is smaller than the increasing demand for it or when it is needed for the export purposes. That is why any evaluation of the usefulness of developing the country's sea fisheries for gaining substitutes for meat and of organizing industrial fishing for obtaining fish meal from non-edible fish species should be based on an analysis of comparative criteria regarding the level and tendency of production development costs and investment outlay in sea fisheries in relation to those encountered in the production of protein products in agriculture.

The fact, however, should be taken into consideration that the still unclarified situation in maritime law, the continuing broadening of the prohibited coastal fishing zones and other claims from the side of countries lying at the coasts may lead to a considerable limitation of the access to coastal fishing grounds which have been thus far considered as international waters.

In the nearest future those factors may have a greater effect on the development of industrialized sea fisheries than the country's industrial standard enabling it to cope with the far-distant and row-material barriers in ocean going fishing.

In 1970 a report had been worked out aiming at compiling and comparing the costs and investment outlay in the production of fish protein products with those in the production of other protein products*.

A comparison was given in it of the production costs and investment outlay connected with the production, processing and delivering to the market from the wholesale stage of animal products including meat, poultry and dairy products, as well as products derived from them in appropriate processing plants with those connected, with fish products from sea fisheries and products derived from them in fish processing plants in the years from 1966 to 1968. The results of that study were used by the central authorities for the justification of their decisions pertaining to the development of sea fisheries.

These recent years several changes have taken place in the Polish national economy and they may have an influence on the change between the mutual proportions in relation to the particular branches of production presented in the report of 1970. This is the reason why a decision was taken to repeat a study of the same kind for the period of 1969–1972 under the assumption of applying the same method for elaborating the

* Production Costs and Investment Outlay Effectiveness in the Production of Protein Products.

report as a whole as well as for working out its particular parts in order to give the possibility of comparing both those periods – one with another as far as possible.

The above considerations have been taken into account for working out this present report. It consists of statistical studies based on documents from the particular branches of production exclusive of retail trade, thus it includes the protein containing products from home production as comparised by statistical recordings in the four-year period from 1968 to 1972. Similarily as it had been the case with the 1970 report this study also includes determined evidence pertaining to those sectors of economy whose share in the total production of the given branch was found to be fully representative.

The following components have been considered as representative, in accordance with the above described principle: costs of cattle production in the individual farms, with a area over 2 hectars (worked out by **R. Bachańska** M.Sc, from the Agricultural Economics Institute), investment outlay effectiveness in animal production in agriculture as a whole (worked out by Dr. S. **Marek** from the Department of Economics at the Szczecin Technical University), in meat processing and turnover by state-owned and co-operative industry (worked out by Dr. **R. Urban** and **H. Nowacki** M.Sc), in eggs and poultry production – Association of Eggs and Poultry Industry (worked out by **J. Goss**, M,Sc), in cooperative dairy industry (worked out by **Z. Utzig** from the Central Association of Dairy Co-operatives). As far as the production of fish products in concerned in the field of procuring the raw material as well as in its processing and turnover, the state industry was taken as representative (worked out by *T. Żarow* M.Sc. and **U. Szymiec** from the Association of the Fish Industry).

All the calculations have been expressed in unified measures, for which natural quantities of conventional edible parts have been assumed (meat, poultry and fish as pure meat with the exclusion of commercial fats, eggs without shells, milk and dairy products as meagre cottage cheese) as well as pure protein without any distinction between its degree of assimilability and without separating the so-called letent fats.

The alternations that had been introduced into the method of calculating cattle breeding costs at the Agriculture Economics Institute make it impossible to make a direct comparison of figures and results given in the reports for the 1966–1968 period with those for the 1969–1972 period because of the fact that cattle production costs and not the purchase costs were taken into consideration as raw material costs in the consecutive stages of processing. That is why the results have been interpreted and commented upon separately for the years 1969–1972 covered by this report and separate interpretation has been given of the internal proportions in both the reports because it is only those proportions, and not absolute figures, that have a comparative character.

The above given comments refer to the study as a whole. Detailed explanations of the assumption made and of the methods of calculations are given in the particular parts of this report.

The results and conclusions presented herein make it possible to form generalization at a high degree of aggregation and give an idea on the scale of mutual proportions pertaining to the economic effectiveness of production in the particular field of protein food production.

The share of protein products sold on market in 1972 in relation to their total mass produced in our country amounted to:

56.4% in the edible parts
56.4% in pure protein.

The remaining quantities are protein products that are sold outside the market, exported, or lost in processing, fish gained by the activity of the Polish Anglers Association as well as small quantities sold directly to the consumers by individual sea and inland fishermen.

The quantity and structure of protein products expressed in the assumed measures of edible parts and pure protein on the nationalized market in 1972 as well as the indices of increase in relation to 1968 are given in Table 1.

Table 1

Volume of market product in tons in 1972

Description	Edible parts			Protein		
	tons	%	Tons increase in relation to 1968 = 100	tons	%	Increase in relation to 1968 = 100
Fish a. fish products	127 500	5.5	120	27 300	6.1	134
Eggs	127 800	5.5	175	31 500	7.0	175
Meat a. meat products	1 346 300	58.0	153	219 100	49.1	151
Dairy products	663 333	28.5	149	155 219	34.8	146
Broilers	58 500	2.5	281	13 300	3.0	296
Total	2 323 433	100	152	446 419	100	152

Table 1 shows that the total quantity of protein products on the market increased considerably in relation to that of 1968. The edible parts increased by 52%, the broilers increased the most (by 181%), then eggs (by 75%), meat (by 53%), and fish least of all (by 20%). The structure of the market mass of protein products as given herein, is not representive for the structure of their consumption which differs from the former by the different share of the particular groups of products which do not pass through the market, especially on farms as well as by the quantity of imported ones.

COSTS OF PRODUCTION

In accordance with the assumed method of costs calculation, which is similar to that applied in 1970 report, the figures given herein are a result of compiling all the costs from the stage of gaining the raw materials, through the costs of purchasing, processing, storing and transport up. to the wholesale turnover inclusively.

The principle of determining the cost of raw material in the item pertaining to the processing and turnover of meat, milk, poultry and eggs is based on the cost of breeding the cattle, and not on its purchase price. A similar principle has been assumed for calculating the costs of raw material in fish processing because of this alteration introduced by the Agricultural Economics Institute pertaining to the above mentioned principle of calculating the production costs of cattle from agricultural breeding in relation to the report of 1969, the 1969–1972 results cannot be compared with those contained in the report of 1970. It is due to the same reasons as well as because of the high degree of aggregation and the methodology assumed, that the results of calculations presented in this study cannot be considered as production calculation costs for the particular commodities, but only as general comparative measures between the particular branches of production.

Similarily as it was the case in the report of 1970, in the system of costs presented now no governmentsubsidies have been taken into account. This is so because of the fact, that they are difficult to be indentified owing to the great diversity of their structure and range*. Further they cannot be compared with any other branches of production.

The subsidies from the state treasury in the fish industry consist in compensating for the difference between the value of production and the value of the costs.

Thus they have no influence upon the magnitude of the costs. On the other hand, the subsidies in agriculture include many highly diversified items, many of which have a direct or indirect effect upon the lowering of the level of costs.

The Tables 2 and 3 show the costs in the stage of raw material production as well as in the processing and turnover stage expressed in the assumed comparative measures. In the 1969–1972 period, the correlation of production costs in the particular commodity groups was similiar to that of 1970, i.e., the cheapest source of animal protein in the edible parts group are milk products, and then subsequently fish products, meat, meat products and eggs.

In Poland poultry products continue to be the most expensive. As far as the calculation is concerned for pure protein, the sequence is in general the same, the costs of protein in eggs is much lower than in meat and is ranke third.

In the same system the difference between the milk products and the other ones increases also. The differences in the protein arrangement appear due to the different content of protein in the edible parts.

In the analysis of those phenomena consideration should be given to the behaviour of the consumer in relation to the prices of the commodities he buys. The consumer does not buy protein by grammes on the market. He buys such a product which meets his requirement, regardless of the content of protein in it. That is why the flexibility of prices takes place in relation to consumable products, and not to the quantity of protein contained in them, because the consumer is not in the position or even does not intend

* Cf **Z. Grochowski** and **T. Rychlik:** „**The** problem of subsidies in Agriculture". Agricultural Economics Problems No. 2/1973.

Table 2

Cost of production in zloties per 1 kg of edible parts in 1969–1972

Description	Production stage				Processing and turnover stage				Total			
	1969	1970	1971	1972	1969	1970	1971	1972	1969	1970	1971	1972
Fish and fish products	17.5	17.2	21.3	20.2	12.4	13.2	14.9	15.0	29.9	30.4	36.2	35.2
Eggs	36.2	37.6	40.2	39.2	6.7	6.7	6.6	6.6	42.9	44.3	46.8	45.8
Meat and meat products	30.5	31.6	32.5	33.1	8.7	9.2	10.2	10.2	39.2	40.8	42.3	43.3
Dairy products	17.7	17.6	19.6	18.3	8.7	8.7	9.4	9.7	26.4	26.3	29.0	28.0
Broilers	56.5	52.3	56.3	54.5	16.7	16.4	15.3	13.6	73.2	68.7	71.6	68.1

Table 3

Costs of production in zloties per 1 kg of protein in 1969–1972

Description	Production stage				Processing and turnover stage				Total			
	1969	1970	1971	1972	1969	1970	1971	1972	1969	1970	1971	1972
Fish a. fish products	84.6	84.6	100.6	94.6	60.2	64.9	70.1	70.0	144.8	149.5	170.7	164.0
Eggs	147.2	152.8	163.4	159.3	27.3	27.3	26.7	26.9	174.5	180.0	190.1	186.2
Meat and meat products	180.8	189.2	196.7	205.7	51.7	55.1	58.9	62.8	232.5	244.3	255.6	268.5
Dairy products	74.9	74.6	82.4	78.2	36.7	37.0	39.6	41.7	111.6	111.6	122.0	119.9
Broilers	248.9	230.4	247.8	240.3	73.6	72.2	67.4	59.9	322.5	302.6	315.2	300.2

to calculate the content of pure protein. The protein calculation is indispensable for determining the nutrition models for the population with consideration given to the structure of consumption. Therefore in every analysis of prices and customers behaviour consideration is to be given to figures taken from the edible parts arrangement, and not from the grammes of protein. The edible parts arrangement is also used in the FAO statistics in addition to the protein arrangement.

Tables 4 and 5 as well as Fig. 1, show the structure of production costs in edible parts and in pure protein. It should be noted here that the calculations in relation to both those measures show no differences and that in the particular years of the 1969–1972 four year period there were no principle differences in the structural arrangement in any of the commodity groups. On the other hand, a comparison of each of the particular groups with the others shows considerable differences in the share of the processing and turnover stages in the general costs. The greatest share of that stage appears in fishes and fish products. It exceeds 40 per cent.

This phenomenon is characteristic for that group of commodities. It has been found in the West-European countries that the retail price of fishes, especially inland, is twice as high as the price at unloading.

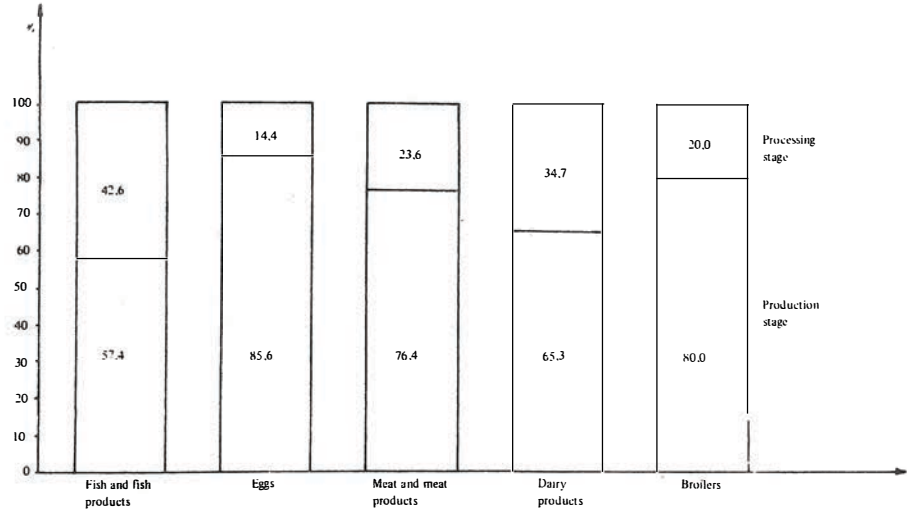

Fig. 1. Production costs structure of 1 kg of edible parts in 1972

Owing to the underdeveloped infrastructure of the hinterland and transport in the developing countries, the above mentioned differences between the price at unloading in the harbours and at the costs is still much more higher than the price inland. The share of processing and turnover costs in the general costs exceed 30 per cent in the milk industry, 20 per cent in meat and broilers, and 15% in the production of eggs.

Table 6 shows the average general cost for all the comparable commodity groups. Further their relation is given to the costs of fishes and fish products, which have been

Table 4

Percentage production costs structure of 1 kg of edible parts in 1969–1972

Description	Production stage				Processing a. turnover stage			
	1969	1970	1971	1972	1969	1970	1971	1972
Fish and fish products	58.5	56.6	58.8	57.4	41.5	43.4	41.2	42.6
Eggs	84.4	84.9	85.9	85.6	15.6	15.1	14.1	14.4
Meat and meat products	77.8	77.4	76.8	76.4	22.2	22.6	23.2	23.6
Dairy products	67.0	66.9	67.6	65.3	33.0	33.1	32.4	34.7
Broilers	77.2	76.1	78.6	80.0	22.8	23.9	21.4	20.0

Table 5

Percentage production costs structure of 1 kg of protein in 1969–1972

	Production stage				Processing and turnover stage			
	1969	1970	1971	1972	1969	1970	1971	1972
Fish a. fish products	58.4	56.6	58.9	57.3	41.6	43.4	41.1	42.7
Eggs	84.3	84.9	86.0	85.5	15.7	15.1	14.0	14.5
Meat a. meat products	77.8	77.4	77.0	76.6	22.2	22.6	23.0	23.4
Dairy products	67.1	66.8	67.5	65.2	32.9	33.2	32.5	34.8
Broilers	77.2	76.1	78.6	80.0	22.8	23.9	21.4	20.0

Table 6

Average production cost of 1 kg of protein products in zloties in 1969–1972 and comparative indices

Description	Average production cost of 1 kg in zloties in 1969–1972		Average costs indices in relation to fish = 100	
	Edible parts	Protein	Edible parts	Protein
Fish and fish products	32.9	157.3	100	100
Eggs	44.9	182.7	136	116
Meat and meat products	41.4	250.2	126	159
Dairy products	27.4	116.3	83	74
Broilers	70.4	310.1	214	197

Table 7

Production costs dynamics of 1 kg of edible parts in 1969–1972

Description	Production stage				Processing stage				Total			
	1969	1970	1971	1972	1969	1970	1971	1972	1969	1970	1971	1972
Fish and fish products	100	98.3	121.7	115.4	100	106.4	120.2	121.0	100	101.7	121.1	117.1
Eggs	100	103.9	111.0	108.3	100	100.0	98.5	98.5	100	103.3	109.1	106.8
Meat and meat products	100	103.6	106.5	108.5	100	105.7	112.6	117.2	100	104.1	107.9	110.4
Dairy products	100	99.4	110.7	103.4	100	100.0	108.0	111.5	100	99.6	109.8	106.1
Broilers	100	92.6	99.6	96.5	100	98.2	91.6	81.4	100	93.8	97.8	93.0

Table 8

Production costs dynamics of 1 kg of protein in 1969–1972

Description	Production stage				Processing a. turnover stage				Total			
	1969	1970	1971	1972	1969	1970	1971	1972	1969	1970	1971	1972
Fish a. fish products	100.0	100.0	118.9	111.1	100	107.8	116.4	116.3	100	103.2	117.9	113.2
Eggs	100.0	103.8	111.0	108.2	100	99.6	97.8	98.5	100	103.1	108.9	106.7
Meat a. meat products	100.0	104.6	108.8	113.8	100	106.6	113.9	121.5	100	105.1	109.9	115.5
Dairy products	100.0	99.6	110.0	104.4	100	100.8	107.9	113.6	100	100.0	109.3	107.4
Broilers	100.0	92.6	99.5	96.5	100	98.1	91.6	81.4	100	93.8	97.7	93.1

Table 9

Dynamics of average production costs increase in 1969–1972

Description	1 kg of edible parts			1 kg of protein		
	Prod. stage	Processing a. turnover stage	Total	Prod. stage	Processing a. turnover stage	Total
Fish a. fish products	111.8	115.9	113.5	110.0	113.5	111.4
Eggs	107.7	99.0	106.4	107.7	98.6	106.2
Meat a. meat products	106.2	111.8	107.4	109.1	114.0	110.2
Dairy products	104.5	106.5	105.2	104.6	107.4	105.6
Broilers	96.2	90.4	94.9	96.2	90.4	94.9

Table 10

Dynamics of total costs increase in 1966–1968

Description	Edible parts				Protein			
	1966	1967	1968	mean in 1966–1968	1966	1967	1968	mean in 1966–1968
Fish a. fish products	100	122.0	118.3	120.1	100	121.5	118.2	119.9
Eggs	100	104.6	111.2	107.9	100	104.5	111.1	107.8
Meat a. meat products	100	106.3	108.5	107.4	100	105.5	106.7	106.1
Dairy products	100	111.4	105.0	108.2	100	108.4	106.4	107.4
Broilers	100	98.6	97.0	97.8	100	98.6	97.0	97.8

Table 11

Costs level indices in relation to fish = 100

Description	Edible parts				Protein			
	1969	1970	1971	1972	1969	1970	1971	1972
Fish a. fish products	100	100	100	100	100	100	100	100
Eggs	143	145	129	130	121	120	111	113
Meat a. meat products	131	134	117	123	161	163	150	163
Dairy products	88	86	80	80	77	74	71	73
Broilers	245	225	198	193	223	202	184	183

assumed to be equal 100. In this way it is possible to give an idea on the proportions of the differences of costs in the particular fields of production.

Further analytical comparisons refer to the dynamics of costs in both the periods reported, i.e., 1966 to 1968 and 1969 to 1972. A cost-increasing tendency is found in all the fields. It is only in the industrial production of broilers that the costs continue to become lower and lower.

The attached tables 7 and 8 show the production costs dynamics of all the protein products with a subdivision into the raw material obtaining stage as well as the processing and turnover stage.

Mean values for the 1969–1972 four-years period are given in Table 9.

For the sake of comparison relevant calculated data from the 1966–1968 report are given in the table 10. It follows from the above summarised data that the cost increase in the fish and meat group took place mainly in the processing and turnover stage, and that its rate of increase in the meat edible parts is twice as high in the processing than in production.

The increase of production costs in the fish processing and turnover is justified by the increasing reduction from year to year of the raw material in the commodity quantity, and the bigger and bigger amount of frozen fish.

The costs in the remaining group increased regularly in both the stages. The broiler production costs became lower and lower also regularly.

The highest average dynamics of the increase of general costs was found in fish, exceeding 13% in the edible parts and 11% in protein.

The lowest average dynamics takes place in meat (7.4% and 10.2%), in eggs (6.4 and 6.2%) and in milk (4.5% and 5.6%).

Table 10 shows the average costs increase dynamics in the 1966–1968 period for comparison.

The high rate of the general costs increase in that period is based on the exceptionally high increase of costs towards the end of 1966 as pointed out in the previous report. In order to supplement the conclusions to be drawn a comparison of the cost level indices in relation to fishes in the 1966 to 1972 period has been given in Table 11.

It is fishes and fish products that are the main substitute for meat. That is why the interpretation of all the presented figures is to be related, first of all, to those commodity groups. As already mentioned before, an analysis of the price arrangement and of their influence upon the demand is to be carried out not in relation to the protein content but to the cost of 1 kg of edible products bought by the consumer. Such kind of interpretation can be carried out by compiling the cost tendency indices on the background of the average dynamics of increasing production costs. It is obvious that because of methodical considerations it is impossible to carry out any extrapolation for the years to come, due to the short period of time under analysis.

Attention can be drawn, however, to the distinct tendency towards a diminishing differences in the cost indices between fishes and meat (1969 = 131, 1972 = 123) as well as to a quicker tendency towards an increase of production costs in the fish industry than in the meat industry.

It is impossible, however, to draw any determined conclusions for the future. It is namely impossible to predict when and how will quantitative factors of the barrier of increase will begin to act, e.g., in meat – the fodder barrier, and in fisheries – the distance and accessibility barriers. Under the assumption of an unchanging arrangement of the costs increasing factors in future it may be found that the differences in the production costs of meat and fishes, although being still high now, will continue to become lower as shown in Fig. 2.

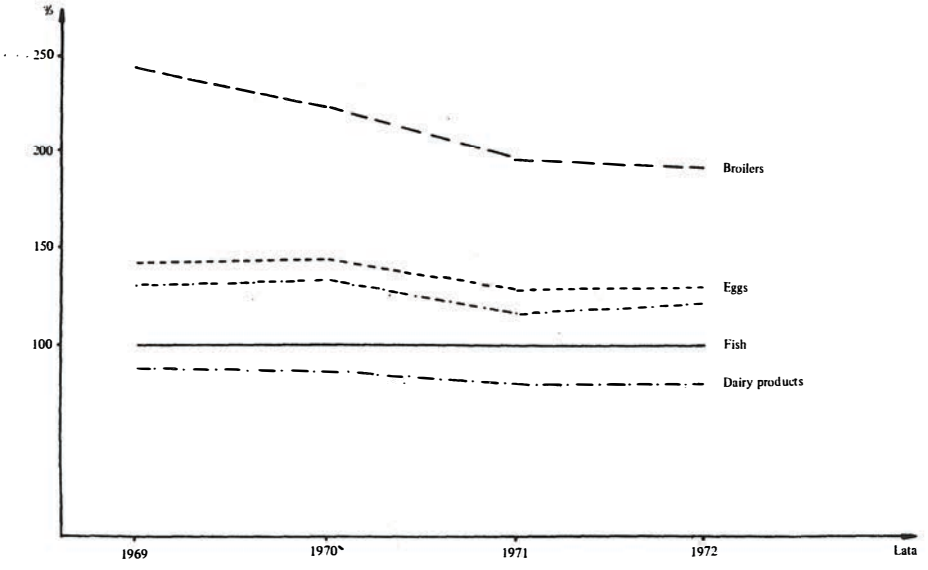

Fig. 2. Edible parts costs level indices in relation to fish = 100%

The above given comments refer to the production costs increase dynamics in the fish industry in comparison with other protein-containing products as well as to the possibility of the appearance of new factors in future having an influence on their mutual arrangement.

Further, those comments indicate that there is a necessity of repeating the comparative calculations periodically and to continue to observe the costs growing tendency in all the comparable fields.

CAPITAL INTENSITY AND THE GROWTH OF PRODUCTION

In the evaluation of the investment effectiveness based on the capital intensity for the growth of production a considerable difficulty is encountered in subdividing the investment outlay in agriculture into plant and animal production. Such a subdivision does not appear in the statistical reports.

In our case that kind of subdivision has been based on similar methodological assumptions as in the 1970 report.

As far as the investment outlay is concerned for animal production, direct expenditures have been taken, i.e., such items in the general investment costs that are directly connected with the animal production sections as well as indirect costs which appear in the plant production but are connected with the animal production because of providing fodder for growing animals.

In order to express the aggregated plant and animal production by the same measure a unit of grain has been taken as the measure. Such procedure made it possible to determine the percentage share of the plant production used as fodder for breeding animals. Such method of calculation made evaluation possible of the investment costs which were to be referred to the animal production from the plant production. At the same time an assumption has been made that every grain unit is equally charged by the investment expenditures.

The investments costs in the purchase, processing and turnover stages up to wholesale inclusively have been reported separately for the particular food industries. The time periods at which the productional effects appear as the result of the costs have been assumed to amount to 2 years in agriculture, and one year in the other fields of production.

The capital intensity of the growth of production has been expressed by the value of the investment costs per unit of production rise, calculated in comparable units, i.e., in edible parts and in pure protein similarly as it had been the case in the calculation of the production costs.

However, the fact should be taken into consideration that a generalization has been made regarding the influence of investments upon the growth of production because every increase in production, and especially in agriculture, is dependent also upon several other factors and is not only the result of the investment outlay.

The magnitude of the investment expenditures has been expressed in current prices. Similarly as it was the case with the production costs calculation, the results of calculations given in this report cannot be considered, also in the capital intensity range, as calculated values in absolute figures, but only as comparative measures between the particular branches of production.

Accepting such a assumption it is necessary to agree that the average dynamics of supply prices at a high degree of aggregation is the same in the same period of time for all

Table 12

Capital intensity of production in zloties per 1 kg of protein and edible parts in the animal production stage in agriculture

Periods	Edible parts	Protein
1958–1962	77.7	318.9
1963–1967	170.6	781.0
1968–1972	196.0	1471.0
1958–1972	151.3	789.0

Table 13

Protein and edible parts production increase capital intensity in zloties per 1 kg of production in the fish industry

Period	Edible parts			Protein		
	prod. stage	processing a. turnover stage	total	prod. stage	processing a. turnover stage	total
1957–1961	79.7	32.8	112.5	385.5	158.4	543.9
1962–1966	106.2	22.6	128.8	554.2	118.2	672.4
1967–1972	63.9	23.3	87.2	304.2	111.0	415.2
1957–1972	77.0	24.5	101.5	375.9	119.8	495.7

the branches of production. This fulfills the condition of comparability betwen the branches.

Any differentiation of investment expenditures in agriculture into the particular lines of animal production is inperceptible for statistics.

Table 12 shows capital intensity indices for the whole animal production in an arrangement of comparable measures referred to edible parts and pure protein in the 15 years period from 1958 to 1972 subdivided into three five-years periods.

An analysis of the indices presented here shows a great dynamical increase of production growth capital intensity in all the five-years sub-periods in the edible parts as well as in protein.

Table 13 shows the capital intensity for the production growth of fish products in the same measures and with subdivision into such production stage as search for raw material in fishing as well as into a processing and turnover stage in the years from 1957–1972 as a whole and also with a subdivision into sub-periods. The activities connected with preserving the raw material on ships have not been expressed separately in the fishing stage as processing.

Table 14 shows the average capital intensity in zloties per unit of animal production growth in agriculture (meat, poultry, eggs, dairy products) in comparison with the production of fishes in sea fisheries in the 15 year period from 1957/1958 to 1972.

Similarly as it was the case in the 1970 report which comprised the capital intensity calculation in the ten-year period from 1958 to 1968, the average production growth capital intensity in the 15-year period from 1957 to 1972 in sea fisheries is lower than in animal production in agriculture. The results of capital intensity for the growth of production in processing and turnover of the food industries connected with processing protein products in the period from 1968–1972 have been compiled in Table 15 in both the comparable measures.

Table 14

Capital intensity for the growth of production of protein and animal edible parts in agriculture and fishes from sea fisheries in the period from 1958 to 1972

Description	Edible parts in zloties/kg	Protein in zloties/kg
Animal production in agriculture (meat, poultry, eggs dairy products)	151.3	789.3
Sea fishing*	77.0	375.9

* 1957–1972

It is possible to compare the figures given in Table 15 with the production and turnover for the period of 1967–1972 as given in Table 13 (for edible parts – 23.2, for protein – 111.0). The whole arrangement of indices in the processing and production

stage of all the protein commodities production branches does not show any principal deviations from the results arrived at in the 1970 report.

Table 15

Capital intensity for the production growth of protein and edible parts in the processing and turnover stage

Description	Edible parts	Protein
Dairy products	24.0	106.2
Meat and meat products	16.8	106.4
Poultry	23.4	48.0
Eggs	11.2	58.2

CONCLUSIONS

The mutual relation of costs between the particular fields of production as presented in this paper indicates that the least expensive source of protein in edible parts are above all diary products, and then fish, meat and eggs. This is in conformance with the general opinion expressed thus far in Polish as well as in foreign research reports: **Gerhardson** G.H. A Note of Costs in Fisheries. The Economics of Fisheries Roma 1957. FAO; **Taylor** H.F. Survey of Marine Fisheries of North Carolina-University. N. Carolina Press – 1951.

In Polish circumstances it is poultry products that are most expensive now.

That correlation undergoes changes in the calculation regarding protein. The differences between the dairy products and the others increase, which is explained by the highest share of protein in the edible parts such as cottage cheese, milk and its products in comparison with that in other products in which the protein content is diminished by other compenents, above all, by non-exctracted concealed fats.

Attention is drawn to the fact that a cost increasing tendency was found to take place in all the production branches in the years 1969–1972. Only the production costs of broilers showed a falling tendency which is expected to continue in the coming years, too.

The presented results which had been attained within the limits of acceptable generalization and a high degree of aggregation, permit to form an opinion on the mutual proportion of the economical effectiveness of production in the particular fields of providing protein products for food. The data obtained certify a reasonable development of sea fisheries which may become a principal factor in the economical policy fot determining the most suitable structure of human nutrition.

REFERENCES

List of Segmental References used for Working-out a Synthetic Report entitled „Production Costs and Investment Outlay Effectiveness in the Production of Protein Products in 1969–1972".

Rosalia **Bachańska** , M.Sc.: Production Costs of Animal Products in Individual Farms in 1969–1972. (Typescript).

Jerzy Goss, M.Sc.: Exploitation and Investment Costs in Poultry Industry in 1969–1972. (Typescript).
Julian Jacek, M.Sc.: Method of Referring Investment Costs in Agriculture to Costs Connected with Animal and Plant Production. (Typescript).
Stanisław Marek, Dr.: Capital Intensity of Animal Production in 1969–1972. (Typescript).
Roman Urban, Dr., Henryk Nowacki, M.Sc.: Exploitation Costs and Investment Outlay in Meat Turnover and Processing. (Typescript).
Zbigniew Utzig: Exploitation and Investment Costs in Co-operative Milk Industry in 1969–1972. (Typescript).
Tadeusz Żarow, M.Sc.: Investment Outlay and Intensity in Fish Industry in 1969–1972. (Typescript).
Tadeusz Żarow, M.Sc., Urszula Szymiec: Raw Material Gaining, Fish Processing and Distribution Costs in State-Owned Fish Farms in 1969–1972. (Typescript).
The above described references are to be found in the Fish Industry Economics and Organization Institution, Szczecin, ul. K. Królewicza 4 (Poland).

PORÓWNANIE KOSZTÓW PRODUKCJI I EFEKTYWNOŚCI NAKŁADÓW INWESTYCYJNYCH W PRODUKCJI TOWARÓW BIAŁKOWYCH ZA LATA 1969–1972

Streszczenie

Opracowanie obejmuje porównanie kosztów produkcji i efektywności inwestycji związanych z produkcją, przetwarzaniem i dostarczaniem na rynek do szczebla hurtu produktów zwierzęcych w zakresie produkcji mięsnej, drobiarskiej, jajczarskiej i mleczarskiej i przetwarzanych przez odpowiednie przemysły, oraz produktów rybnych pochodzących z połowów morskich ryb i przetwarzanych przez przemysł przetwórstwa rybnego, za okres 1969–1972, a niektóre obliczenia przeprowadzono w odniesieniu do lat 1966–1968. Wszystkie przeliczenia wyrażono w ujednoliconych miernikach, za które przyjęto wielkości naturalne umownych części jadalnych (w mięsie, drobiu i rybach jako czyste mięso z wyłączeniem tłuszczy handlowych, jaja bez skorupki, mleko i przetwory mleczarskie jako chude sery twarogowe) oraz ilości czystego białka, nie różnicując przy tym jego stopnia przyswajalności i bez wyodrębnienia tzw. tłuszczy utajonych. Wyniki studium dają pogląd o skali wzajemnych proporcji efektywności ekonomicznej produkcji w poszczególnych dziedzinach wytwórczości produktów białkowych przeznaczonych do spożycia.

СРАВНЕНИЕ ИЗДЕРЖЕК ПРОИЗВОДСТВА И ЭФФЕКТИВНОСТИ КАПИТАЛОВЛОЖЕНИЙ ПРОИЗВОДСТВА БЕЛКОВЫХ ТОВАРОВ ЗА 1969-1972 Г.Г.

Р е з ю м е

В работе изображено сравнение издержек продукции и эффективности капиталовложений связанных с производством, переработкой и доставкой на рынок (по уровень оптовой торговли) сырья животного происхождения в области мясного, птицеводческого, яичного и молочного производств, а также продуктов переработанных соответствующими промышленностями; рыбного сырья из морских ловов и продуктов переработанных рыбной промышленностью за пе-

риод 1969-1972 г.г. Некоторые вычисления были проведены за период 1966--1968 г.г. Для всех просчётов были приняты унифицированные единицы измерений, являлись которыми естественные величины условных, съедобных частей (мясо, мясо домашних птиц и рыбы как чистое мясо с исключением торговых жиров: яйцы без скорлупы; молоко и молочные изделия как творог со снятого молока), а также количество чистого белка с исключением дифференцирования степени его усвояемости и выделения т.н. „скрытых жиров". Результаты исследований дают мнение о масштабе взаимных пропорций экономической эффективности производства по отдельным отраслям производства белковых продуктов предназначенных для потребления.

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