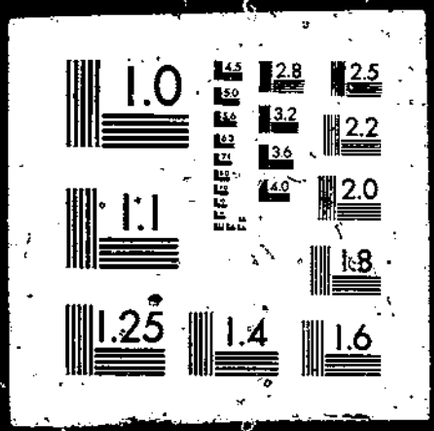
PB84-149962

FAER-99 FEED-LIVESTOCK ECONOMY OF POLAND: PROSPECTS TO 1980, / H. C. COLLINS ECONOMIC RESEARCH SERVICE, WASHINGTON, DC. FOREIGN DEMAND AND COMPETITION DIV. JAN 75 103P

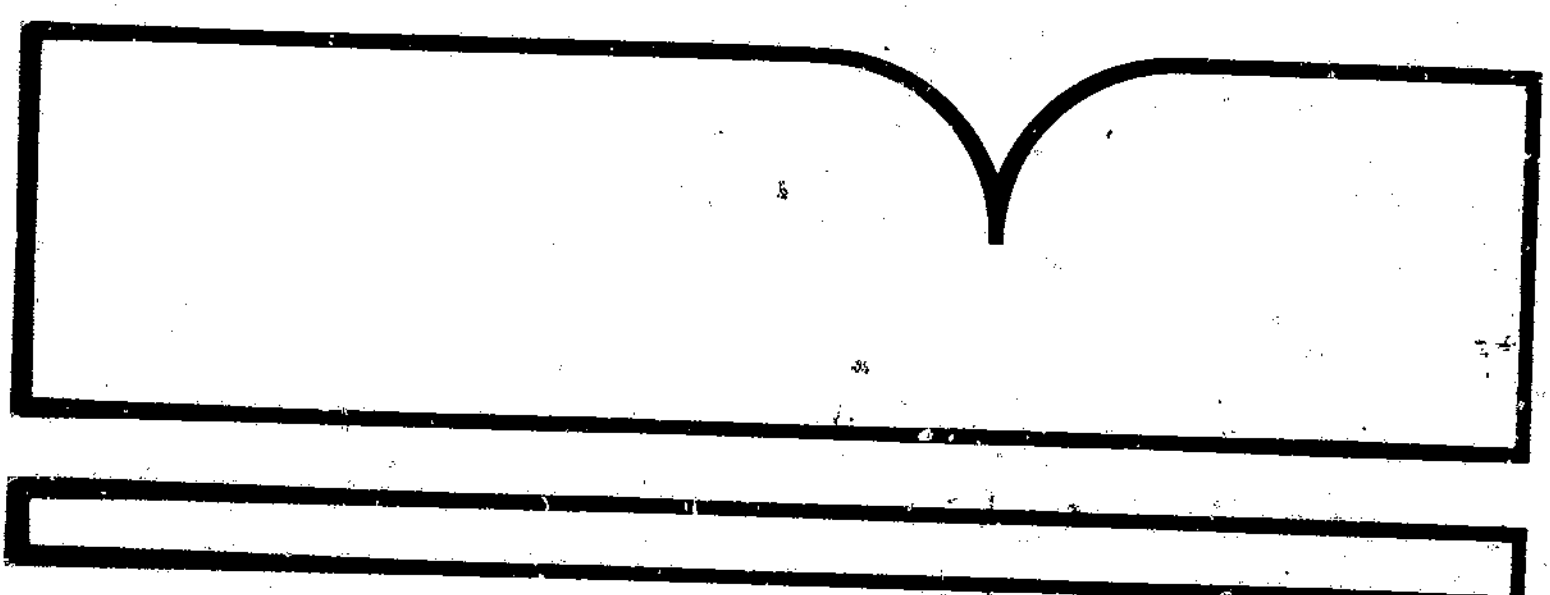


PB84-149962

Feed-Livestock Economy of Poland Prospects to 1980

(U.S.) Economic Research Service, Washington, DC

Jan 75



REPORT DOCUMENTATION PAGE	1. REPORT NO. FAER-99	2.	3. Recipient's Accession No. PB84 149962
4. Title and Subtitle: The Feed-Livestock Economy of Poland: Prospects to 1980			5. Report Date: January 1975
7. Author(s): H. Christine Collins			6.
9. Performing Organization Name and Address: Foreign Demand and Competition Division, Economic Research Service, U.S. Department of Agriculture, Washington, D.C. 20250			8. Performing Organization Rept. No. FAER-99
			10. Project/Task/Work Unit No.
			11. Contract(C) or Grant(G) No. (C) (G)
12. Sponsoring Organization Name and Address: Same as box 9.			13. Type of Report & Period Covered
15. Supplementary Notes			14.

16. Abstract (Limit: 200 words)

Poland's imports of livestock feed are projected to grow during the remainder of the 1970's. Growth in imports of protein meal will be especially large. Poland's 1980 imports of grain and protein meal are projected at 3.3 and 1.4 million tons, respectively. Average annual imports of these commodities during the 1966-79 base period were 2.3 million and 360,000 tons.

17. Document Analysis a. Descriptors

Feed
Imports
Grains
Protein
Economic analysis
Livestock

b. Identifiers/Open-Ended Terms

Poland
Protein meal
Commodities
Feed-livestock economy

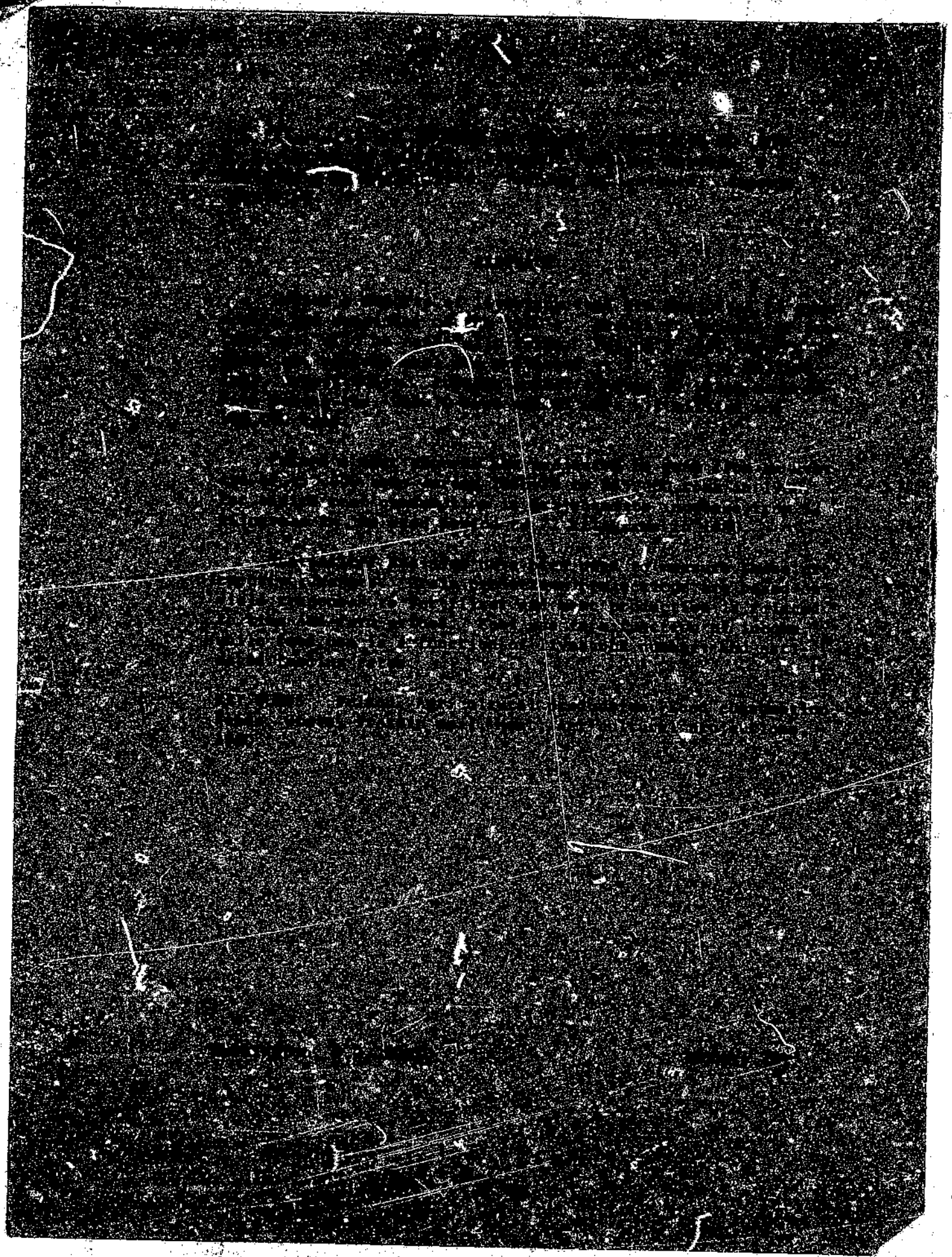
c. COSATI Field/Group: 02-B; 05-C

Prices as of 1/1/83:
Paper:
Fiche: $4.50
Cost codes are: for Paper and A01 for Fiche

18. Availability Statement:
National Technical Information Service
5285 Port Royal Road, Springfield, VA 22161

19. Security Class (This Report): Unclassified — 21. No. of Pages: 103

20. Security Class (This Page): Unclassified — 22. Price:



CONVERSION EQUIVALENTS

One kilogram	equals	2.2046 pounds
One centner or metric quintal	"	220.46 pounds
One metric ton	"	10 centners or 2204.6 pounds
One hectare	"	2.471 acres
One acre	"	0.4 hectare
One kilometer	"	0.6 mile

Metric tons to bushels

One metric ton

	Bushels
Wheat and potatoes	36.743
Rye and corn	39.368
Barley	45.929
Oats	68.894

Official monetary exchange rates

In Polish Zlotys per U.S. Dollar at end of year.

	1970	1971	1972	1973
Basic rate	4.00	3.68	3.68	3.32
Effective rate	24.00	22.08	22.08	19.87

CONTENTS

TABLES

SUMMARY

Continued growth in Poland's imports of livestock feed is expected for the remainder of the 1970's. Growth in imports of protein meal will be especially large. Poland's exports of livestock and meat should also increase significantly.

Poland's 1980 imports of grain and protein meal are projected at 3.3 million and 1.4 million tons, respectively, based on an adjusted model. Average annual imports of these commodities during the 1966-70 base period were 2.3 million and 360,000 tons. Poland's meat exports are projected to grow from an average of 150,000 tons during 1966-70 to 215,000 tons in 1980, and per capita meat consumption is projected to increase from 52 kilograms in the base period to 74 kilograms in 1980.

Demand for livestock products and food grains should increase as Poland's population is projected to increase 1 percent annually and reach 35.8 million in 1980. Per capita national income growth is projected at an annual rate of 5.5 percent--this is the rate officially planned for 1971-75 and corresponds to the actual growth during 1961-65 to 1966-70. Income elasticities, derived by analyzing consumption trends, show that Poland's income elasticity for beef is about the same as that in the EC-9, while the income elasticity for pork is slightly lower. The breakdown of meat consumption by type of meat was estimated from production and trade data.

Poland's meat output is projected to grow 3.6 percent annually between 1966-70 and 1980. The major limitation to livestock growth is the feed supply. Feeding rates of grain and protein meal have been increasing markedly during the 1970's, putting additional strain on the feed supply. The use of grain for feed is projected to increase about 5 percent annually, while the production of grain will grow at a rate of only about 3 percent.

Although pork will continue to dominate meat production and exports, Poland will try to take advantage of any recovery in world beef demand. This demand will be partly met by utilization of Poland's calf reserves, the only such reserve in East Europe suitable for feeding out to heavier weights. If world beef demand recovers, the Polish consumer may go unsatisfied unless Poland elects to import less expensive cuts of beef for the domestic market.

In terms of convertible currency earnings, Poland has had a favorable balance of trade between feed imports and livestock product exports. It is reasonable to expect Polish policymakers to attempt to maintain or improve this balance. The income model used in this study yielded 1980 projections with an unfavorable balance, however, and thus adjustments in that model were required.

The 1980 projections are the same for both the income and adjusted models, except that a slightly lower level of domestic per capita meat consumption assumed in the adjusted model permits a much higher level of meat exports. These adjustments are logical because they allow equal growth in domestic consumption and exports, yet produce a favorable trade balance in terms of convertible currency.

THE FEED-LIVESTOCK ECONOMY OF POLAND:

PROSPECTS TO 1980

by H. Christine Collins
Foreign Demand and Competition Division

OBJECTIVES OF THE STUDY

The principal objective of this report is to examine the relationships between Poland's livestock and livestock feed economies, and to determine the country's ability to meet its food consumption goals and its import requirements of grains and protein feeds through 1980. The study is directed to the following specific areas:

--Factors determining the effective demand for livestock products, the derived demand for grains and other animal feeds, and the size of this demand.

--Factors determining the supply of these products.

--Supply-demand balance for the products involved, to determine probable import demand or export availability.

--Development of a model that could be adapted for short-term forecasting.

FACTORS AFFECTING GRAIN, OILSEED AND LIVESTOCK OUTPUT DURING 1956-70

The following sections briefly analyze the key quantifiable factors--such as farm price, fertilizer use, weather, feed availability, and general effects of time--which affect the performance of Poland's feed-livestock economy. These factors are responsible for the historical changes in Poland's production, consumption, and trade of grain, oilseeds, and meat.

Farm Prices and Profitability of the Grain and Livestock Enterprises

In the long run the relative profitability of the grain and livestock enterprises decides their future development. Relative farm prices determine profitability and, in a centrally planned economy like Poland's, reflect the Government's overall agricultural policy. Wheat, rye, and oat prices nearly

doubled between 1955 and 1960, while barley prices increased 250 percent. These increases generally reflect the increases in compulsory delivery prices. (The marketing system and other institutional factors are discussed in appendix A.) Since 1960, price increases for these grains have been more modest, reflecting both the introduction of contract prices and the larger portion of grain marketed through the contract system. From 1960 to 1969, compulsory delivery prices of grain showed little change. The prices for 1 kilogram of the four major grains in 1971 were: wheat, 372 zlotys; rye, 245 zlotys; barley, 361 zlotys; and oats, 244 zlotys.

Between 1955 and 1970, average prices doubled for cattle, calves, and hogs. The upsurge in contract prices for cattle and hogs in 1955 and 1960 and obligatory prices for calves between 1965 and 1970 accounted for much of the price change.

In 1971, average prices for livestock were as follows: Cattle, 12.77 zlotys per kilogram live weight; calves, 13.28 zlotys per kilogram; meat-type hogs, 25.55 zlotys per kilogram; chickens, 26.87 zlotys per kilogram; milk, 3.06 zlotys per liter; and eggs, 1.70 zlotys each.

During the 1960's, neither grain nor livestock production was considered particularly profitable compared with industrial crops--especially since obligatory grain and livestock delivery prices were so low. Farm sales of livestock products did provide cash for private farmers and, until the early 1960's, livestock production generally appears to have been more profitable than grain.

By 1965, however, the farm price ratio between livestock and grain shifted in favor of grain, since grain prices rose faster than livestock, egg, and milk prices. This shift caused difficulties in maintaining livestock production in 1970 and points out the importance of maintaining the delicate balance of profitability between grain and livestock enterprises. Rising grain prices in 1970 exacerbated an already deteriorating livestock--and particularly hog--production situation. But increases in livestock prices in 1971 again made livestock production profitable in relation to grain.

Although farm incomes in Poland were rising until 1969, in terms of real income they had not increased as rapidly as the real wages of socialized sector employees. Moreover, setbacks in 1969 and 1970 caused by shortfalls in grain, potatoes, and livestock worsened the farmer's overall economic status.

Year	Nominal income of rural population	Real income of rural population	Real wage of socialized sector employees
1960	100	100	100
1965	124	116	120
1966	130	120	125
1967	131	120	130
1968	142	131	135
1969	123	1/110	140
1970	125	112	144

1/ Reflects the results of the reduced agricultural production in 1969.
Source: (19). (Underscored numbers in parentheses refer to items in references).

Technical Factors Influencing Agricultural Production

Increased fertilizer use, introduction of higher yielding seed varieties, and increased mechanization of grain production are signs of the improving technology available to Polish farmers.

Expanded fertilizer use is the prime factor in increasing grain yields in Poland, and liming is crucial to maintaining crop yields on Poland's acid soils. Most soils are short of phosphate and potash and all soils require nitrogen. According to statistical surveys and fertilizer tests in Poland, the use of fertilizers causes an average increase in cereal yield of 5-7 kilograms per kilogram of NPK (nitrogen, phosphate, and potash) used.

There was a serious fertilizer shortage until the mid-1960's. Moreover, economic planners did not make effective use of what little was available. They established a priority system based on the most effective use of fertilizers from the point of view of the economy. The total amount of mineral fertilizer was divided annually and allocated to socialized farms and private farms. Transfer between sectors was prohibited. Socialized farms usually received more fertilizer per cultivated hectare than private farms. Use of fertilizer on the private farms was not very noticeable prior to 1965. During the period of serious mineral fertilizer shortage, private farms received fertilizer for cereal crops only after the needs for the technical crops (particularly sugarbeets) had been met (35). Other crops such as forage and pasture were given less priority. Until recently, 40 percent of all farms in Poland used no fertilizer on their pastures and meadows.

In 1971 Poland used 168 kilograms of NPK per hectare of arable land (table 6). It lagged well behind East Germany--Eastern Europe's leading user of mineral fertilizer--and West Germany in application rates. Nevertheless, Poland has made significant strides in increasing fertilizer and lime use. Particularly rapid growth has occurred since 1965, with the principal components--nitrogen, phosphate, and potash--all sharing in the growth. Mineral fertilizer applications increased from 544,000 tons in 1955 to 2.6 million tons in 1970. 1/ Lime

1/ Fertilizer data in this report are in terms of nutrient content unless otherwise specified.

applications increased from 285,000 tons to nearly 1.8 million tons. Expanded domestic production and improved distribution programs were an impetus to increased fertilizer and lime use. Expanded domestic production was the source of nitrogen and phosphate fertilizers, while potash originated entirely from imports from East Germany and the USSR. Increasing domestic lime production provided the country's agricultural requirements until 1965, but in 1971, about one-third of the lime was imported.

Since 1966, use of fertilizer on grain has been officially encouraged (21). As an incentive to increase fertilizer use, farms participating in the grain contracting program became entitled to a 40-percent reduction in the purchase price of fertilizers intended for the contracted grain area. The prerequisite for eligibility of the contracting farm was the sale of a guaranteed minimum quantity of grain--determined by the state according to a scale based on quality of soil--from the contracted grain area. The Government also guaranteed to the participating farms up to 200 kilograms of fertilizer per hectare of land under contract. Moreover, the farms were permitted to purchase the fertilizer on no-interest credit from the supplying cooperatives.

To encourage private farmers to purchase more fertilizer, the Government lowered the retail prices of nitrogenous and phosphate fertilizers by 15 percent during February and March 1971. While these programs were an incentive to increase fertilizer use, their efficacy was diminished by local distribution problems.

Fertilizer application is a relatively profitable means of increasing grain yields in Poland. The price ratio of fertilizer to grain is relatively low in Poland compared with that in West European countries but fertilizer is relatively more expensive in Poland than in the United States. Ratios of average prices per unit of plant nutrients to average wheat prices in Poland and selected Western countries are given below: 2/

Nutrient 1/	Poland 2/	United States 3/	West Germany 3/	France 3/	Italy 3/
Nitrogen	2.1	0.5	2.0	3.3	2.4
Phosphate	1.3	.5	2.7	2.9	1.7
Potash	.6	.2	.9	1.1	1.1

1/ Nitrogen fertilizer, 46 percent N content; superphosphate, 17.5-18.0 percent P_2O_5 content; potash, 38-42 percent K_2O. All adjusted to 100 percent active substance.
2/ 1971 prices.
3/ 1970 prices.

Sources: (10), (19).

2/ In terms of active ingredients.

Herbicides and pesticides are in wide use in Polish agricultural production. Although data on the quantities of herbicides actually applied to grain are not available, Polish farmers in 1971 were supplied with some 44,000 tons of herbicides, fungicides, and pesticides (in terms of active substance), 80 percent of which were insecticides. Although DDT is being phased out, the use of other pesticides is generally increasing. In grain production, emphasis is on expanding the area sown with chemically dressed seeds. In 1970, about 55 percent of the grain area was sown with treated seed.

Poland is also looking toward the introduction of new seed varieties as a primary means of increasing yields. Principal wheat varieties are Grana and Luna, which are high yielding and resistant to lodging. The Soviet winter wheat varieties, Mironovskaya-808 and Bezostaya I, which dominate winter wheat areas in Czechoslovakia and East Germany, rank 10th and 12th among principal winter wheat varieties used in Poland.

Among the rye varieties, Somolickie, Garczyskie, Wloszanowskie, and Dankowskie are widely cultivated. The older varieties are subject to lodging when fertilizers are applied heavily. The newer varieties are short stemmed, a feature which increases resistance to lodging, and are generally more productive. They are also resistant to Fusarium wilt, a fungus disease causing considerable loss.

Since Polish agriculture still depends heavily on horses for draft power, the benefits generally accrued from mechanization did not begin to come to Polish agriculture until after 1970. Even in 1971, sales of such horse-drawn farm machinery as plows, field harrows, grain drills, mowers, and potato diggers far exceeded sales of their mechanized counterparts. Mechanization is still so limited that the reduction of horse numbers and the farm labor force which usually accompanies mechanization has not yet occurred in Poland. Data on labor and draft power per hectare of arable land reflect these trends.

Year	Workers	Horses	Tractors
	Number per 1,000 hectares of arable land		
1955	440	160	1
1960	410	170	4
1965	400	160	8
1970	400	170	14

Tractors are unevenly distributed in Polish agriculture. Of the 248,000 tractors (307,000 in 15-horsepower units) in use at the end of 1971, 40 percent were owned by the agricultural circles (described on page 84) and 27 percent by state farms. Private farmers owned 29 percent of the tractors, compared with only 17 percent in 1966.

The average age of tractors owned by agricultural circles was between 8 and 9 years, while the state farms' tractors were generally newer. Only since November 1970 have private farmers--and then only those farming at least 10

hectares--been allowed to purchase new tractors. Nevertheless, mechanization of Polish agriculture increased rapidly during the 1960's. Tractor sales and end-of-year tractor inventories in 1971 were triple the 1960 level. Tractor inventories averaged 210,000 tractors (in 15-hp units) during 1966-70 compared with 71,000 during 1956-60.

For livestock, artificial insemination has been extensively used to improve the quality of cattle herds genetically. In 1970, some 78 percent of the bred cows in Poland were artificially inseminated (47). During 1960-66, there was also a small but steady stream of imports of registered breeding cattle, ranging from 517 head in 1965 to 1,078 head in 1962. While breeding cattle imports were practically nil in 1967-69, a boost was given to the cattle industry when 36,700 head of cattle classified as breeding cattle (although the low per unit value indicates that they were not top quality breeding cattle) were imported in 1970. Smaller numbers of breeding hogs were imported in the 1960's.

While the feed supply has been erratic enough to cause major swings in the livestock numbers, the general improvement of the feed base has been the most meaningful technological aid to the development of the livestock industry. In terms of oat units, the Polish feed supply increased more than 40 percent between 1956-60 and 1966-70. As shown below, 3/ the distribution of types of feeds varied little. The percentage decline in the use of hay and the slightly more than proportionate increases in grain, oilseed meal, and potatoes accounted for the shifts in the feed supply. Every category of feed increased.

Feed	1956-60		1966-70	
	Oat units	Percent of total	Oat units	Percent of total
Grain	7,807	23	11,840	25
Oilseed and fishmeal	216	1	794	2
Mill feeds	796	2	789	1
Feed pulses	390	1	380	1
Milk	680	2	919	2
Hay	9,241	27	10,892	23
Pasture and forage	7,763	23	11,363	23
Potatoes	5,567	16	8,558	18
Feed beets	508	1	845	1
Sugarbeet tops	1,021	3	1,795	4
Total	33,990	100	48,175	100

Since the mid-1950's, feed grain consumption in Poland increased sharply in the aggregate and in rates of use per animal (table 18). While grain production rose 2.9 million tons (21 percent) during 1956-60 to 1966-70, feed use of grain grew by 3.4 million tons (48 percent) (table 18). During 1961-65, a rapid increase in grain imports supported much of the increased livestock feeding. Later growth came primarily from the acceleration in domestic grain production.

3/ More details given in table 38.

Oilseed and fishmeal availability increased from 203,000 tons in 1956-60 to 719,000 tons in 1966-70. Most of the feed was from domestic production--grain and protein meals were the only feedstuffs for which imports augmented native supplies.

Hay, pasture, and forage are the main alternative sources of energy and protein to grain and oilseed meal. Poland, more than any other East European country, depends on potatoes as livestock feed, particularly in short grain crop years. Potatoes provided 18 percent of the oat units in 1966-70, when about half of the potato crop was used as feed (table 23). Milk provided only 2 percent of the oat units, but was more important as a protein source. An estimated 9 percent of the milk output was used as feed in 1970 (47). While the energy level of the feedstuff supply is adequate, the protein content should be upgraded.

Feed standards published by GUS (Glowny Urzad Statystyczny, or the Polish Office of Statistics discussed in (40) in 1966/67 give an indication of feeding rates among species.

Feed	Horses (per head)	Sheep (per head)	Cows (per 2,000 liters of milk)	Cattle & calves (per 100 kg. live weight)	Hogs (per 100 kg. live weight)	Poultry (per 100 eggs equivalent)
			Quintals			
Concentrates:	9.5	0.4	2	1.1	2.6	0.35
Hay.....:	15	2	11	4	0.2	--
Straw.....:	12	2	12.5	2	--	--
Pastures....:	22	2	45	8	4	--
Feed roots..:	7	4.5	4	2	--	--
Potatoes....:	3	1.5	7	2	9	.3
Silage.....:	--	1	25.5	5	--	--
Whole milk..:	--	2	--	5	--	--
Skim milk...:	--	--	--	1.3	1.6	.1

Source: (40, p. 121).

The estimated distribution of feed grain is given in feed consuming animal units in this study. 4/ Feedstuffs fed per representative animal unit per year

4/ The feed consuming animal unit is a means of aggregating inventories of various types of livestock in relation to feed supplies. Midyear livestock numbers are weighted by feeding rates based on data given by GUS in their estimates of feed requirements and supplies during 1961-65 (20). These rates in thousands of oat units are as follows: Cattle, 2.276; swine, 0.745; sheep, 0.317; poultry, 0.054; horses, 2.531. The resulting animal units per head of different species in relation to one cow are cow=1.00; horse=1.112; hog=0.327; sheep=0.139; poultry=0.024.

increased 20 percent during 1966-70 in comparison with 1956-60, representing both an improvement in rations and a shift in the composition of the livestock inventory.

A necessary adjunct to the feed base is a viable mixed feed industry. The use of modern feeding programs for broilers and laying hens, revitalization of the hog industry, and growth of feedlot operations gave impetus to the mixed feed industry. Poland produced 4.3 million tons of mixed feed in 1970, whereas a decade earlier it produced practically none. About one-third of the mixed feed is sold to state farm units, although they have only one-tenth of the cows, one-fourth of the other cattle, and 6 percent of the hogs.

Natural Factors Influencing Agricultural Production

Soils and Climate

Although Poland is situated predominantly on large plains, the climate and soil only moderately favor agriculture. Poland, located between the continental climate of Eastern Europe and the oceanic climate of Western Europe, has a transitional climate. Temperatures are cool, and the growing season is relatively short. Precipitation ranges from 20 to 24 inches in the plain. Rainfall is heaviest from May through August but soil moisture peaks in February and March as a result of heavy snow melt. Heavy winter snowfall protects autumn-sown crops from the full severity of the cold, preventing winterkill, and in the spring, the melt provides soil moisture. The heavy summer rainfall benefits grain development to maturity, but in some years impedes harvesting. Poland, however, is subject to frequent droughts.

The weather effects are well illustrated in a regression analysis which correlates grain yields with such monthly weather variables as soil moisture or rainfall (see table 32). In Poland, the combination of October, April, and June soil moisture best explains the fluctuation of winter wheat and barley yields. April weather variables, whether specified as soil moisture or precipitation, correlate closely with small grain yields. The statistical relationship is inverse: the higher the precipitation or soil moisture, the lower the yields. It appears that high levels of April precipitation are associated with cool, delayed springs which impair development, while low levels of precipitation reflect early springs and early crop growth. The point at which grain crops are adversely affected by abnormally low April soil moisture and/or precipitation, however, is not known.

Grain is cultivated throughout Poland, but the mix among grains is heavily influenced by soil pattern. Light and sandy soils, which are inherently acid, make up nearly two-thirds of Poland's land area. Only 1.7 percent of the soils are chernozems. The predominant light and sandy soils favor rye production, while wheat is limited to the heavier soils.

HISTORICAL PRODUCTION TRENDS IN GRAINS, OILSEEDS, AND LIVESTOCK

While official Polish statistics point to a 46-percent increase in gross agricultural production between 1956 and 1971, the period was more of a "grain" era than a "livestock" era.

Concessional sales of grain to Poland under the U.S. P.L. 480 program were terminated in 1965. As Poland was forced to expend hard currency for grain imports, the Gomulka regime's policy of self-sufficiency became attractive to political leaders, even if it meant some short-term sacrifices in livestock production. While simultaneous expansion of grain and meat production would have been desirable, grain output clearly took precedence over livestock in this period of limited resources. Poland is currently the world's tenth largest grain producer, and is second only to the USSR in rye output.

Grain output averaged 17 million tons during 1966-70--an increase of 21 percent from a decade earlier (table 7). Growth accelerated during the latter half of the 1960's, with output gains resulting from higher average yields. A downward trend in grain area prevailed during 1961-65 but was halted during 1966-70. Because it is suited to Poland's sandy soils, rye remained the predominant grain, but its area dropped sharply. Wheat area expanded rapidly at the expense of rye and oats. Wheat production is concentrated in southern and western Poland and rye production is largely in the central and eastern parts of the country, where it is more naturally suited to the sandy soil conditions than wheat.

During 1961-70, wheat and barley yields advanced more than yields of any other grain. The average wheat yield of 23.2 quintals per hectare during 1966-70 was up 44 percent from a decade earlier and the average barley yield of 23.0 quintals per hectare was up 42 percent. Because of poor soils, low mineral fertilizer inputs, and adverse weather, yields in Poland are well below those of East Germany and Czechoslovakia.

Nearly two-thirds of the grain area is fall-sown. Rye and wheat--86 percent of which is fall-sown--make up the bulk of the winter grain. Oats, corn, millet, and buckwheat are all spring-sown, as is more than 95 percent of the barley. Cultivation of fall-sown wheat has trended upward while spring wheat area has declined. The opposite trend occurred in barley production.

Poland is Eastern Europe's largest producer of rapeseed, the country's primary domestic oilseed. Rapeseed production during 1966-70 averaged 516,000 tons (equivalent to 295,000 tons of meal), a fourfold increase from the 1956-60 average production of 108,000 tons (62,000 tons oilmeal equivalent). Rapeseed meal has the limitation of containing glucosides which under specific conditions are irritating to livestock digestive systems and are best fed in limited quantities. Current research on rapeseed production is aimed at increasing yields and reducing the glucoside content.

Linseed, the country's second largest domestically produced oilseed, averaged 66,000 tons during 1966-70 (about 43,000 tons of oilmeal), up from the 52,000 tons (33,000 tons of oilmeal) produced in 1956-60.

Poland, with Eastern Europe's largest fishing fleet, produced 27,000 tons of fishmeal in 1966-70, up from practically nil in 1956-60. Domestically produced oilseeds and fishmeal comprised about half of the meal supply in 1956-60 and 1966-70 (table 21).

Poland is by far the largest meat and milk producer in Eastern Europe. Poland produced an annual average of 14.6 million tons of milk in 1966-70 (table 10) and was sixth in world production after the USSR, the United States, France, West Germany, and India. With meat output at 3 million tons, Poland ranked tenth, after the large Western countries, Argentina, China, and the USSR. In bacon production alone, Poland was second only to Denmark.

Average growth in the livestock sector was steady during the 1960's, with meat production increasing 34 percent from the 1956-60 average. During 1966-70, pork accounted for 56 percent of Poland's meat production. Beef and veal, with the second largest share, comprised only one-third. Through the 1960's beef production gained on pork as improved export markets and encouraging procurement policies brought about a 76-percent increase in beef production between 1956-60 and 1966-70. Average annual output of poultry meat doubled from the 1956-60 level, but still comprised only 6 percent of the meat produced in 1966-70. During 1956-60 to 1966-70, milk production rose 25 percent. Egg output reached 6.5 billion eggs in 1966-70, 36 percent higher than a decade earlier (table 12).

Increased livestock inventories, coupled with some improvement in productivity, brought about these gains. During 1966-70, beginning year cattle inventories averaged 10.1 million head, 29 percent higher than during 1956-60 (table 13). Meat production is currently of paramount importance, but until recently, more emphasis was placed on dairying. Dairy cows dropped from 70 percent of the cattle population during 1956-60 to 58 percent during 1966-70. Nevertheless, Poland has 31 percent of Eastern Europe's cattle but produces only 26 percent of the region's beef and veal. Dual purpose animals like the Black and White Lowland (comprising 85 percent of the cattle population) and Polish Red and Danish Red (together making up 10 percent) are the dominant breeds. About 80 percent of the native Polish Red cattle are on peasant holdings. Well into the 1960's cattle herds were still being rebuilt to the pre-World War II levels.

While hog numbers increased by 17 percent to 14.6 million head in 1966-70, they have been extremely susceptible to cycles, hitting lows in 1959, 1963, 1968, and mid-1970. About 70 percent of the hogs are Large Polish White (Wielka Biala Polska), followed by White Longear (Biala Zwisloucha). Cattle, hog, and poultry inventories grew rapidly during 1961-65 but increased at a slower rate in 1966-70. Sheep, goat, and horse numbers declined sharply during 1961-65; sheep and horses made a comeback during the subsequent 5-year period.

Shifts in the production cycle and better feeding contributed to added productivity per animal. Milk per producing cow increased 20 percent to a 1966-70 average of 2,381 kilograms. Eggs per producing laying hen reached 98 units, an 8-percent increase. Beef output per adult cow increased to 0.165 ton from 0.101 ton in 1956-60, but the ratio of pork output per adult sow remained at 1.48 tons. While livestock productivity is growing in most cases, it is low by West European standards, and often erratic. There is still a great deal of seasonality in the dairies' receipts of milk. For example, the ratio of the milk received in the November 1-April 30 period to that received in the summer period was as divergent as 1:2.55 in Rzeszow and 1:2.35 in Bialystok. In the state purchasing facilities for meat, livestock supplies sometimes amount to only 50 percent of slaughter facilities and other times far exceed them.

Production cycles for cattle and hogs have changed. In the cattle industry, the number of slaughter cattle (excluding calves) averaging 340-350 kilograms live weight nearly doubled between 1956-60 and 1966-70. But the number of slaughter calves declined by 22 percent. While the average weight of slaughter cattle remained nearly steady, the average weight of slaughter calves increased from 46 to 62 kilograms, marking some change from the slaughter of veal calves to baby beef animals. Yet, some 2.5 million calves of 2-3 weeks old were slaughtered each year during 1966-70 (19). Poland, during 1966-70, had a considerable unused calf reserve (measured by the additional beef supply available had these veal animals been fed out to full maturity). By 1972, another 1.8 million calves were slaughtered. About 1 million of these would have been suitable for fattening to maturity, thus yielding an additional 400,000 tons of beef live weight.

For hogs, increased farrowing rates permitted a faster growth in slaughter hogs than in beginning year inventories. Slaughter hogs in 1956-60 were 100 percent of end-of-year numbers and in 1966-70, they were 101 percent. The ratio of hogs under 6 months of age to sows increased from 7.36 in 1956-60 to 8.90 in 1966-70. The hog production cycle was shortened, with average weight at slaughter declining from 120 kilograms live weight in 1956-60 to 114 kilograms in 1966-70. The Poles are making a concerted effort to shift hog production from the meat-fat type to the leaner bacon type.

CONSUMPTION PATTERNS OF LIVESTOCK AND GRAIN PRODUCTS

As Polish farmers increased their output, there is no question that they contributed to the domestic and international supply of foodstuffs. There were years, however, when the dichotomy between domestic requirements and lucrative foreign trade possibilities strained the agricultural economy.

On the domestic side, the Poles, with an average daily intake of 3,100 calories, have adequate diets and are shifting to high protein from high carbohydrate food.

Meat consumption grew from 43 kilograms during 1956-60 to 52 kilograms during 1966-70. Poland is at about the same level of income and meat consumption as Hungary and compares favorably with such West European countries as Italy. Annual per capita consumption of potatoes fell from 230 to 203 kilograms during the same period. Similarly, cereal intake declined from 212 to 191 kilograms (table 48). Population size and growth, per capita disposable income, prices, individual preferences, and Government policies all influenced the level and composition of food consumption. Poland's population expanded at an annual rate of 1.04 percent between 1956-60 and 1966-70, reaching 32.7 million persons in June 1971.

Income

Income growth is the overriding contributor to the changing food consumption patterns. 5/ National income, a surrogate measure of disposable income or purchasing power, increased over 6 percent per annum during 1956-60 to 1966-70 (table 14). In 1971, national income (in 1965 prices) reached 770 billion zlotys, or 23,510 zlotys per person.

With limited consumer durables available, free education and medical care, and subsidized housing and public transportation, about 45 percent of the Polish population's expenditures are for food. In 1969, 3,375 zlotys, or half of the per capita food expenditures, went for meat and dairy products (16).

In this study, income elasticities for food products have been calculated to fall in the moderate range, as shown below:

Product	Income elasticity 1/
Meat without fat	+.56
Milk products excluding butter	+.33
Potatoes	-.32
Cereals	-.21

1/ Based on the equations in table 47.

Prices

Polish citizens reacted strongly to food price rises in December 1970 (especially since they were coupled with shortages).

That Polish consumers are price conscious can also be borne out when meat or pork consumption is related to income and price in a statistical model (table 47). The upward adjustment of prices in December 1970 was an attempt by the Government to soak up purchasing power and submit the limited meat supplies to price rationing. Under the Polish system of fixed state prices, the increases were not the result of higher consumer bidding. After the sizable price increases in December 1970, meat prices were almost double the 1955 prices (in current zlotys). In contrast, bread prices (in current zlotys) remained stable during the 16-year period, with praski wheat-rye bread, for example, costing 4 zlotys per kilogram. While the December 1970 price increases were rescinded, meat, eggs, and butter are still luxury items. During 1971 pork shoulder roast, one of the less expensive cuts, was 42 zlotys per kilogram and was equivalent to a salary and wage earner's 3.3 hours of work. A kilogram of boned ham required 7.1 hours of work. But a kilogram of wheat-rye bread required 20 minutes of work and a liter of milk, 12 minutes (table 24).

5/ The statistical correlation of income with per capita consumption of livestock products, grain, and potatoes is extremely high. During 1960-70 the variation in food consumption explained by national income growth (R^2) is as follows: Meat, 0.937; milk products, 0.918; butter, 0.904; eggs, 0.961; potatoes, 0.991; and cereals, 0.953.

Nevertheless, the Polish Government does subsidize food costs. By 1971, retail price subsidies, predominantly for staple foods, comprised 6 percent of the Polish national budget.

MEAT, GRAIN, AND PROTEIN MEAL UTILIZATION

The supply of meat increased from 1.2 million tons in 1956-60 to 1.7 million tons in 1966-70, an increase of 34 percent. On a per capita basis, this represented a growth from 43 to 52 kilograms (tables 15-17). Most of the supply increases occurred with beef, which rose 60 percent, and poultry, which more than doubled. Lamb consumption fell by 20 percent. In 1966-70, as in 1956-60, pork was the leading meat consumed. It comprised about 60 percent of the meat supply, beef about one-fourth, and poultry about 5 percent.

Total Polish utilization of grain during 1966-70 6/ averaged 19.5 million tons, with wheat accounting for 29 percent of the disappearance and coarse grains, led by rye, 70 percent. Grain use during 1966-70 increased 22 percent from the 1956-60 levels (tables 18-20), in response to the increasing requirements of an expanding livestock industry. Grain use grew steadily during the 1960's. During 1961-65, Poland primarily increased imports but during 1966-70, increased availabilities originated from growing domestic production. Nevertheless, average annual use during 1966-70 exceeded production by 2.3 million tons.

About one-third of the domestic grain supply was used as food during 1966-70, an average of 6.1 million tons annually. Food use increased slightly during the early 1960's but began to decline during the latter half of the decade, principally as a result of the fall in rye flour production. During 1966-70, wheat accounted for 56 percent of the grain consumed as food, and rye, 39 percent. Poland is second only to the USSR as a rye flour consumer. The 1966-70 average per capita consumption of 191 kilograms was well above the U.S., West European, East German, and Czechoslovak levels.

Livestock feed is by far the major grain use, accounting for 55 percent of total use during 1966-70. Feed use has climbed steadily since 1956-60, when it amounted to 45 percent of the domestic supply. Average annual feed use of 10.5 million tons during 1966-70 was 48 percent above the 1956-60 level (table 18). Rye is the leading livestock feed, accounting for about 38 percent of the grain fed to livestock during 1966-70, followed by oats (24 percent) and wheat (16 percent). The average annual feed use of wheat increased nearly threefold since 1956-60, when wheat constituted only 9 percent of the domestic feed grain supply.

Poland more than tripled its oilseed and fishmeal use between 1956-60 and 1966-70, from 203,000 to 719,000 tons (meal equivalent) (table 21).

6/ In the references to utilization, the data refer to utilization years which, for example, are based on production in 1966 but include trade and feed use during the split year 1966/67.

FOREIGN TRADE--TRENDS AND TRADING PARTNERS

In Eastern Europe, Poland is a ranking grain and protein meal importer and livestock product exporter. During 1966-70, net meat and livestock exports averaged about $161 million annually, and net grain and protein meal imports together were about $164 million. Since the value of total Polish imports exceeded total imports by about $77 million during this period, meat exports were important in lowering Poland's trade deficit. But grain and protein meal imports were necessary for developing the livestock industry.

Grain Trade

Poland ranks with Czechoslovakia and East Germany as a major East European grain importer. Net grain imports accounted for about one-eighth of the domestic supply during 1956-70. Grain imports during 1966-70 7/ averaged more than 2.4 million tons, of which 60 percent was wheat, 38 percent feed grains, and 2 percent rice (table 25). Deviations from the trend in imports were associated with unusual crop conditions. While average annual grain imports during the period were up 37 percent from a decade earlier, they declined 5 percent from the 1961-65 average. Only barley imports, which nearly doubled, showed any growth since the early 1960's. About half of Poland's $141 million net grain imports during 1966-70 originated in hard currency countries.

Except for the shortfall years of the early 1960's, the USSR was the major grain supplier to Poland. During 1966-70, the USSR supplied half of the grain imports--74 percent of the wheat and 15 percent of the feed grains.

During 1955-70, the United States had a sizable part of the Polish grain market. During the late 1950's, the United States supplied 44 percent of Poland's grain imports, most of which were concessional sales of wheat under P.L. 480, a program which continued until 1965. Since then the U.S. share of the Polish grain market declined to about 13 percent during 1966-70. The fall occurred in U.S. wheat exports, which went from 546,000 tons in 1956-60 to 43,000 tons in 1966-70. After a shortfall in the early 1960's, U.S. feed grain exports to Poland regained their 1956-60 level. During 1966-70, U.S. feed grain exports to Poland averaged 263,000 tons. Poland purchased sizable amounts of grain from Canada, France, and West Germany and from Mexico and Argentina during the early 1960's. Other LDC exports to Poland were limited to rice.

Polish grain-trading patterns have been guided by the country's position in the Soviet sphere of influence. Membership in CEMA (Council for Economic Mutual Assistance, or COMECON), coupled with longstanding bilateral trade agreements with the USSR, strengthen Poland's trading ties with the Soviets and Eastern Europe. Such trading relations have been advantageous to Poland since they do not require the expenditure of hard currency and give Poland a market for products which it would not sell to the West.

For U.S. trade, Poland has a more favorable status than most other East European countries. Poland has received MFN treatment from the United States

7/ All grain statistics refer to marketing years beginning July 1.

since 1958 (after the status had been withdrawn in 1951) and is eligible for CCC (Commodity Credit Corporation) credits for commercial grain purchases. Since 1967, Poland has been a full member of GATT (General Agreement on Tariffs and Trade) and is thus eligible for Kennedy Round tariff reductions with the United States and Western Europe. Moreover, the passage of Export Administration Act of 1969 by the U.S. Congress explicitly endorsed expanded trade with Eastern Europe, and therefore with Poland.

Polish grain exports amounted to about $5 million annually during 1966-70. Volume reached 126,000 tons during the period, more than double the decade earlier. Malting barley, a specialized product for export to the West, comprised half of the exports.

Protein Meal Trade

Imported oilseed, oilseed cake and meal, and fishmeal have been inexpensive sources of protein, a deficient ingredient of Polish livestock rations. In terms of protein content 8/ the price ratio between oilmeal and grain widely favored oilmeal and hastened the growth in protein meal use, as indicated by the unit values given below:

	1965	1971
	Zlotys/ton CIF	
Wheat	2,347	2,960
Barley	2,549	1,940
Corn	2,081	2,350
U.S. oilseed meal	3,600	(
Indian oilseed meal	3,134	(3,380
Peruvian fishmeal	5,170	7,030

During 1966-70, Poland nearly balanced exports of rapeseed with imports of soybeans. Oilmeal and fishmeal imports were 360,000 tons, nearly eightfold more than in 1956-60. During 1966-70, U.S. soybeans accounted for virtually all of the 56,000 tons of Poland's oilseed imports. Together with soybean meal, the U.S. share of oilseed meal imports (in protein meal equivalents) was 28 percent. India, with peanut meal, had 63 percent. Poland's fishmeal purchases of 102,000 tons were mostly from Peru (table 26).

The United States faced sharp price competition in oilmeal trade because of Poland's hard currency limitations. Indian oilmeal (largely from peanuts) averaged 3,210 zlotys per ton and U.S. soybean meal, 3,600 zlotys per ton in 1968. Protein meal imports (including the protein meal equivalent of imported soybeans) averaged about $27 million in 1966-70. About $4 million of rapeseed (in protein meal equivalent) was exported. Nearly 35 percent of Poland's net protein meal imports were from hard currency countries.

8/ Assuming that oilseed meal has a protein content of 40 percent, fishmeal 48 percent, and grain 7 to 11 percent. The protein from protein meal is more complete than that obtained from grain.

Livestock Product Trade

Livestock product exports are a major source of foreign exchange for Poland, with net exports valued at an annual average of $161 million during 1966-70. Therefore, even in crisis years it is difficult for the Polish Government to sacrifice exports for domestic consumer demands. Net exports of meat, dairy and egg products, and live animals have followed the same trend, peaking during 1961-65 and declining slightly during 1966-70 (tables 27 and 31). Net exports of meat (in carcass weight equivalent) averaged 114,000 tons during 1966-70. During those years, fresh frozen beef, poultry, canned hams and shoulders, and bacon comprised 80 percent of meat exports. During 1966-70, dairy product exports included 12,500 tons of butter, 600 tons of prepared eggs, and 3,200 tons of frozen eggs. Exports of live animals for slaughter amounted to 54,000 tons live weight (or about 34,000 tons carcass weight). In addition, exports of riding horses averaged 6,900 annually.

The importance of livestock products as foreign exchange is illustrated by (1) the destination of the livestock products, (2) the share of these products entering foreign trade, and (3) the export prices of these products. As illustrated in table 27, nearly all of the exported livestock products are destined for the West, particularly the United States, Italy, the United Kingdom, and West Germany. Three-fourths of the Polish ham exports are sold in the United States (this trade dates from the early 1930's); virtually all of the bacon and butter reaches the United Kingdom; West Germany takes two-thirds of Poland's poultry and 42 percent of its canned meat; and Italy imports largely beef, cattle for slaughter, and feeder cattle. Only eggs are exported heavily to CEMA countries.

Poland's membership in GATT and MFN treatment from the United States enhance livestock trade possibilities in the West. Poland is also permitted to sell hams and shoulders from veterinary inspected plants to the United States. The U.K. Bacon Market Sharing Agreement gave Poland access to the British ham and bacon market.

Ham and bacon, the principal export meats, are still largely export products; three-fourths of the ham and 89 percent of the bacon output entered international trade in 1970.

The price ratio between pork product exports and grain imports favors the pork export-grain import situation. Even if hogs were fed imported feeds exclusively, the Poles would receive $2 on the pork for every dollar spent on grain (41).

Unit prices of the leading export meat products have advanced since 1965, led by fresh frozen beef and veal, as shown on the following page.

Poland imports low-priced cuts of meat and exports expensive cuts, especially in years of short supply. Poland depends on the centrally planned economies for meat imports. During 1966-70, China provided more than half of Poland's pork purchases. Only fresh frozen beef, poultry, dried milk, and lard were imported more heavily from the West and LDC's--and then (except for lard) only in small quantities.

	Zlotys per kilogram	
	1965	1971
Fresh frozen veal	3,760	4,792
Fresh frozen beef	3,240	4,090
Fresh frozen pork	2,233	1/2,472
Poultry	2,680	3,050
Canned hams	6,095	6,620
Other canned meat	4,123	5,148
Bacon	2,397	2,730

1/ 1969 price.

POLAND'S AGRICULTURAL POLICIES SINCE 1970 AND OFFICIAL PLANS TO 1975

In December 1970, the Gomulka regime enacted drastic retail price increases for a wide range of food products (1) to prepare for a general economic reform program slated for early 1971 and (2) to curtail rapidly growing consumer purchases of meat. These price increases cut purchasing power since wages were not increasing so fast. Polish citizens resented the high meat prices, since trading companies continued to export meat while the domestic supply of meat remained the same. The ill feeling led to strikes in several Baltic coast cities and the eventual ouster of Gomulka.

The grave situation faced by the new Party Secretary Gierek in 1971 led to a consumer price rollback and a pledge to keep consumer prices from rising as well as a reassessment of the agricultural situation and a program which stressed the development of the livestock industry.

To facilitate immediate growth in livestock, and particularly pork production, the Gierek regime increased benefits to livestock producers in March 1971. They are as follows:

(1) Increased procurement prices, the second price increase in 4 months. Average procurement prices for hogs were increased to 27.20 zlotys per kilogram, a 35-percent increase over the 1970 average price (or 45 percent more than the 1969 average). Similarly, cattle and milk prices were increased. The regional two-tier pricing system for cattle and milk was also abandoned for a uniform national pricing system, making quality the only official basis for a procurement price differential.

(2) Provision for the sale of increased amounts of mixed feed to farmers contracting hogs and cattle to the state procurement agencies. The March 1971 resolution also provided for the sale of a minimum of 140-160 kilograms of mixed feed for each contracted hog delivered to the procurement agency, at a reduced price from that set the previous December by the Gomulka regime. This provision was especially aimed at restoring hog production on small farms.

(3) The allocation of more building materials to farms for livestock barns.

(4) The establishment of a minimum price for piglets to lessen fluctuation in hog numbers, particularly in years with poor potato crops.

(5) The complete abandonment of the compulsory delivery system with its relatively low procurement prices on January 1, 1972.

In the longer run large socialized livestock farms are being organized. Twenty-six modern hog barns with output capacities ranging from 20,000 to 35,000 animals per year have been purchased abroad for installation by the end of 1975 (63).

Several large-scale cattle feeding operations will be initiated in 1973 and 1974. According to state farm plans the number of cows will increase by 7 percent, beef production by 35 percent, and pork production by 110 percent (50). Commercial broiler and layer poultry enterprises are also scheduled. Moreover, the agricultural land area in state farms is slated to increase by one-half million hectares between 1973 and 1975 (46). Private livestock farms, which dominate Polish agriculture, are also to receive assistance. For example, the Government is encouraging some private farms to specialize in beef feeding.

The pork production program is receiving more attention than the beef program. In all sectors, the Government is encouraging the production of leaner hogs fed on high protein feed mixes. This type of animal husbandry would permit faster growth of animals in shorter feeding periods. Feeding to lighter weights would allow a smaller feed consumption per animal and more rapid turnover in the limited stall space.

Plans for 1971-75 call for overall gross agricultural production to increase 18-21 percent. The growth in livestock production of 22-23 percent will exceed growth in crop production (table 4). Cattle numbers are slated to reach 12-13.3 million and hog numbers, 16.8-17.2 million (24).

Improvement in the feed base is the backbone of the program, with increased grain production being the principal means of supplying the additional feedstuffs. Polish officials plan production of wheat, barley, oats, and rye to total 19.4-20.3 million tons by 1975, compared with the 17-million-ton average of 1966-70 (24, 43). Average yields for the four major grains are to reach 24-25 quintals per hectare in 1975. While the bulk of the increased grain production is slated to come from increased yields, the overall area under grain crops is to increase by 80,000 hectares by the target year. Wheat area is to increase by 300,000 hectares and barley area by 200,000-250,000 hectares (30, 43), at the expense of oats and rye. In some regions industrial crop areas are also to be cut back in favor of grain (30).

To implement production goals, fertilizer applications are to reach 190-200 kilograms of NPK per hectare of agricultural land, 9/ including 66 kilograms of nitrate, 55 kilograms of phosphate, and 73 kilograms of potash in the target year (64).

9/ Agricultural land, the land measurement used in the official Polish plan, includes arable land, permanent meadow, and permanent pasture. Arable land, which is referred to in tables 8 and 36, is cultivated land plus orchards, gardens, and vineyards.

Improved varieties, particularly those responding well to increased fertilizer use, will be cultivated. The share of the winter wheat area planted in these improved varieties is slated to increase from 35 to 65 percent. In the spring wheat area, their share is to reach 50 percent.

Green feed crops are also earmarked for development. The supply of mixed feed is to reach 5 million tons by 1975. Poland will build two 100,000-ton mixed feed plants. Almost 1 billion zlotys of investment funds are to be allocated for the modernization and expansion of the industry.

Even with rapid increases in feed crop output the Polish Government foresees the necessity of increasing protein feed and grain supplies through large imports (44). This policy is a marked departure from the Gomulka regime's basic policy of striving toward self-sufficiency, even at the cost of livestock production.

On the meat side, if the thrust in livestock production occurs as planned, Polish agricultural planners hope to provide a per capita domestic supply of 61-63 kilograms of meat while maintaining meat exports. Polish agricultural experts project 1975 livestock product exports to be 38 percent higher than in 1970 (63), with exports of hams and canned meat increasing at approximately the same rate. The Poles are looking toward Western Europe, and particularly Italy, as a profitable and expanding market for the export of beef cattle, beef, and veal. Pork product exports may require some realignment however. The United Kingdom's entry into the EC will preclude the traditional bacon exports under the United Kingdom Bacon Agreement, but the U.S. canned ham market is considered to have good prospects.

PROJECTED AGRICULTURAL PRODUCTION, CONSUMPTION, AND TRADE TO 1980

Since 1970, Poland has made remarkable progress in raising its livestock and grain output, reaching its 1975 planned goals by 1972. By June 1973, hog numbers had increased to 19.5 million head, from 13.4 million head in June 1970. At the midpoint of the 1971-75 Five-Year Plan, Poland is clearly in the midst of a "livestock era," following the "grain era" of the late 1960's. Even though feed supplies are increasing rapidly during the 1970's, they will be strained and Poland will continue to import grain and oilseed meal. The grain imports will make possible added livestock output. But even with expanded livestock production, Poland faces the problem of allocating meat between growing consumer use and export demand.

The following projections emerge when the effects of changing income, prices, and technology are quantified.

Meat

Poland, a traditional livestock product exporter, will be aiming at maintaining its high level of exports depending on a sharp rise in hog numbers and a steady growth in cattle and poultry numbers. Based on regression analysis, meat output is projected to reach nearly 2.9 million tons in 1980 (tables 1 and 2). Poultry, pork, and beef will all contribute to this growth.

Since 1970, the Polish Government has instituted policy changes to benefit the livestock sector. The hog industry, which stagnated in the 1960's, has been jolted by a nearly 50-percent increase in farm prices since 1970. Small price increases for hogs will probably be enacted to foster further growth. The abolition of the compulsory delivery system--where specified quantities of agricultural products were delivered to state procurement agencies at a low price 10/--and increases in contract and non-contract delivery prices are all adding to farmers' compensation for livestock. On the input side, a growing proportion of grain production is being left on the farms for feed use.

The Government's shift from an autarchic policy on grain to a more liberal import policy is also a boon to the livestock industry. The supply of domestically produced feedstuffs is growing steadily, but unless feeding methods become markedly more efficient, Poland must support the growth in the livestock sector with larger imports of grain and protein meals. For Poland's livestock sector to expand in this way, it is assumed that international feed grain and protein meal prices will be low enough to make livestock production profitable, or that international livestock product prices will increase faster than feed prices.

Poland is also trying to upgrade its livestock industry through better breeding and housing. Poland, however, is only beginning to achieve some improvement in efficiency resulting from these aids. Production cycles are changing. In swine production, fat-type animals are being replaced by meat types. Hogs are being fed to lower weights, and the slaughtering rate, in comparison to beginning year numbers, is declining slightly. The quantity of meat available from the existing inventories is increasing. But efficiency, measured in terms of increased meat output of progeny per breeding sow, has not yet occurred. The Government is attempting to accelerate the transition to increased beef production. Marked increases in the average slaughter weight show the changeover from the slaughter of veal calves to heavier cattle. Much of the upsurge in livestock output is occurring on Poland's 3.4 million small farms, but some confined feeding operations are gradually being instituted on state farms.

On the consumption side, Poland's rapidly increasing national income--projected at 6.5 percent per annum--is being translated into improved diets, particularly added per capita meat consumption. Per capita consumption of meat is estimated to reach 75 kilograms in 1980. With a projected population growth of 1.0 percent per annum, total use is estimated at 2.7 million tons in 1980 (table 3). Pork consumption will account for slightly more than half of meat consumption and will be more than met by output. Projected growth in beef consumption could outstrip output by 1980 but such a consumption level will probably not be reached due to Polish Government export allocations.

From the preceding estimates of livestock output and consumption, slowed production increases and burgeoning domestic requirements would leave nearly

---

10/ Near the end of the era of the compulsory delivery system, farmers delivered a given value of agricultural commodities, with some substitution among products.

195,000 tons of livestock and livestock products for export--nearly all pork. 11/ This situation may be altered by Government efforts to limit consumption. Poland must gear itself carefully for the very important export market. Western Europe, one of Poland's principal customers, is a growing net exporter of pork, but has expectations for rapidly growing beef needs. The slowing of large West European pork product markets may preclude further expansion of Poland's hog industry, although the U.S. canned pork product market is viewed by the Poles as an expanding market. On the basis of long-term foreign demand, Poland's beef industry has the best chance for expansion. Poland could export expensive cuts of meat or live beef animals, while importing lower priced meats. A favorable international price structure for livestock products is assumed.

The following factors could change the livestock projection:

(a) To meet the export demand for cattle, policymakers could raise cattle prices sharply to boost beef production, and the Government could suppress domestic demand by not making beef available in Polish stores.

(b) Poland could incur livestock diseases, halting growth in production. Foot-and-mouth disease was reported in several East European countries in 1972.

(c) Poland could have a shortfall in grain and potatoes in the same year. Shortfalls in these two important feed crops have led to cutbacks in hog numbers in the past.

(d) Growth in national income could differ from the 6.5 percent per annum projected through 1980, affecting consumption.

(e) Since the Polish Government through its procurement system has strong control over the distribution of meat, it may leave fresh pork for the domestic market while channeling beef to export markets. Thus in the domestic market, concern would only be for ensuring an adequate supply of meat per se.

(f) The Polish Government could abandon or moderate its current policy of subsidizing foods, which has become increasingly expensive. In 1971, the subsidy amounted to nearly 6 percent of the Polish national budget. Related to this possible change are meat price increases. The Polish Government is committed to a program of holding retail prices through 1974.

Grain

Rapid expansion in the livestock sector will result in increased use of concentrates. Poland's grain imports are expected to remain large and protein meal imports will grow rapidly. Grain imports could reach 3.3 million tons if grain output continues to grow well, livestock continues to increase, and protein meals are used more widely.

Poland is continuing its drive to spur grain production for feeding its burgeoning livestock inventories. The country will produce a projected 25 million tons of grain by 1980. Grain production will grow as a result of increased

11/ Livestock and livestock products given in carcass weight equivalent throughout this study.

fertilizer use and introduction of high-yielding varieties. Some grain production increases will come from the shift from low-yielding oats and rye to the higher yielding wheat and barley. While yields will be trending upward, grain area will at best approximate the level of the late 1960's. By 1980, feed use is expected to rise to nearly 20 million tons and food use to decline to 5.6 million tons.

The following factors could change the grain projection:

(a) Short or exceedingly large feed and grain crops due to weather conditions. During the 15-year period 1956-70, 3 years had crops exceeding the trend production by 5 percent or more and 4 years had crop shortfalls of 5-10 percent. In 1964, grain production was 10 percent less than trend.

(b) Failure of the crop to respond as anticipated to fertilizer, causing yields to be lower than projected. This may be especially important if fertilizer supplies are short.

(c) A shift in relative prices of grain and protein meal could make grain less expensive than meal in terms of protein content, thus slowing down the changeover from grain to protein meal.

In 1971, the latest year for which Polish trade data are available, protein meals were relatively less expensive than grain in terms of the protein they provide. Ratios of protein content and 1971 import prices between selected meals and grains were as follows:

Product	Protein ratio	Price ratios
Soybean meal/barley	5.0:1	1.74:1
Soybean meal/corn	5.4:1	1.44:1
Fishmeal/barley	6.0:1	3.62:1
Fishmeal/corn	6.5:1	2.99:1

In 1973, because of international shortages of fishmeal and soybean meal, the gap between the protein ratios and price ratios narrowed. (One must keep in mind, however, that the quality of protein--in terms of essential amino acids--differs between grain and protein meal and that Poland's feed supply is protein deficient.)

(d) A faster than anticipated growth in green feed and other forage crops could reduce grain requirements. Any substantial increase in cattle numbers would require considerable improvement in the green feed supply, but Poland has had difficulties in boosting production of this much-needed feedstuff in the past.

(e) Unforeseen shifts in feeding rates or unforeseen growth in livestock inventories would alter grain use. Livestock feed is the largest use of grain.

(f) A slower than anticipated fall in horse numbers could keep up the country's grain needs. Horses, the most prevalent draft power on private farms, consumed about 15 percent of Poland's feed and a much larger portion of Poland's feed grain during 1966-70.

(g) A faster than anticipated changeover from slaughter of veal animals to full-grown beef could require more grain.

(h) The transition from extensive type livestock operations to feed-lot type operations which feed higher carbohydrate and protein rations may occur more rapidly than is assumed in this study.

Protein Meal

The increased need for protein in livestock rations is an incentive for added rapeseed, linseed, and fishmeal output, but Poland must depend on imports to supplement production (table 1). By 1980 about 700,000 tons of protein meal could be produced. About 85 percent of the protein meal output will have to originate from rapeseed. Substantial increases in rapeseed yields and area will be necessary for rapeseed output gains of this magnitude, and production of this crop fluctuates widely.

With increasing livestock output and increasing protein needs, Poland could use as much as 2.1 million tons of protein meal by 1980. In the proportionate use of oilseed meal to grain, the share of oilseed meal is assumed to continue its upward trend. Imports could reach 1.4 million tons by 1980. The protein meal projection could change if:

(a) The growth in livestock does not occur as projected, or
(b) The cost of protein meal is so high that Poland expands its rapeseed and linseed areas for higher output.

When the separate trade projections for grain, protein meal, and meat and livestock of table 4 are brought together and valued in 1966-70 average import and export prices, they suggest that Poland is heading toward a deficit grain/livestock payments balance. In terms of earnings Poland has had a balanced trade between feed imports and meat and livestock exports (see discussion on pp. 14-16).

In terms of net hard currency earnings, the balance has been very favorable. It is reasonable to expect Polish policymakers to attempt to maintain or improve this balance. The income model used in this study yields 1980 projections with an unfavorable trade balance (when considered in terms of all currency).

Several alternative projections were tested to indicate what realistic options Polish policymakers have to prevent the value of grain and protein meal imports from exceeding the value of meat and livestock exports (in terms of all transactions or hard currency transactions only). The alternatives, which are generally concerned with limiting meat consumption, 12/ are in the context of

12/ Another possibility is suggested in (61). The Poles could try to "spend" their way out of the situation by importing more feed to raise more livestock for export. By importing about 4 million tons of grain (the 1980 projection from (61), for example, net meat exports would exceed net grain and protein meal imports in hard currency earnings only. If meat production (including the added output) were allocated so that livestock exports and domestic consumption grew at the same rate, net livestock exports would be about $220 million and net grain and protein meal imports, $340 million. In terms of hard currency earnings, net livestock exports would exceed net feedstuff imports by $70 million (in 1966-70 average prices).

this study model and 1966-70 average import-export prices. The alternatives are: (1) Limit meat consumption so that meat exports at least equal grain and protein meal imports, keeping livestock numbers at the levels projected in this study. (2) Limit meat consumption so that meat exports in terms of hard currency at least equal grain and protein meal imports in terms of hard currency. If the proportion of total sales and purchases continues as it did during 1966-70, virtually all of Poland's meat and livestock products would be exported to the West; about half of Poland's grain and 35 percent of its protein meal would be imported from the West. (3) Ensure that livestock exports and domestic consumption grow at about the same rate (especially for beef, for which world demand is strong) to at least balance hard currency expenditures and outlays. (4) Limit consumption so that livestock exports and per capita domestic consumption grow at the same rate.

These alternatives would result in approximately the following situations in 1980:

Original projection or alternative solution	Value of meat exports	Value of grain imports	Value of protein meal imports	Per capita consumption of meat
	---million dollars---			Kilograms
Original projection	215	202	91	74.8
	1/215	1/101	1/32	74.8
1. Limit consumption so that meat exports grain and protein meal imports	293	202	91	72.9
2. Limit consumption so that meat exports in terms of hard currency grain and protein meal imports in terms of hard currency	Original projection sufficient to cover this situation			
3. Limit consumption so that livestock exports and domestic consumption grow at same rate	1/263	1/101	1/32	73.6
	263	202	91	73.6
4. Limit consumption so that livestock exports and per capita domestic consumption grow at same rate	1/236	1/101	1/32	74.3

1/ Hard currency only.

The most logical adjustments are those associated with the last alternative shown above. Under this alternative, 1980 feed imports remain the same as for the income model, but a slightly lower level of domestic per capita meat consumption permits a much higher level of meat exports. These adjustments are logical because they allow equal growth in domestic consumption and exports yet produce a favorable trade balance.

Table 1.--Meat, grain, and protein meal production, Poland, average 1956-60, 1961-65, and 1966-70, and projections to 1980

Year and item	Grain			Meat 1/						Protein meals			
	Wheat	Feed-grain	Total	Beef	Pork	Lamb	Poultry	Other 2/	Total	Rapeseed meal	Fish-meal	Other	Total
	1,000 tons												
Production:													
1956-60 average. . .	2,300	11,700	14,000	280	870	30	50	120	1,350	60	3/	40	100
1961-65 average. . .	3,000	12,000	15,000	400	930	30	70	140	1,590	180	10	50	240
1966-70 average. . .	4,250	12,750	17,000	500	1,020	30	110	160	1,820	290	30	40	360
1980.	9,200	16,000	25,200	800	1,575	20	250	230	2,875	600	60	50	710
	Percent												
Average annual growth:													
1956-60 - 1961-65. .	5.2	0.5	1.3	7.6	1.7	--	7.1	3.2	3.3	24.3	40.7	--	19.4
1961-65 - 1966-70. .	7.0	1.2	2.4	5.6	1.6	--	7.5	2.6	2.6	9.7	19.6	--	9.0
1966-70 - 1980 . . .	6.	1..	3.1	3.7	3..	-3.0	6.5	2.6	3.6	3.8	5.5	1.7	5.3

-- means zero.

1/ Carcass weight equivalent, including live animal trade.
2/ Includes offals but excludes fat. Also includes meat from horses, rabbits, and game.
3/ Negligible.

Sources: (1), Tables 17-24.

Table 2--Livestock situation, Poland, 1970 and projections to 1980

Item	January 1 inventories	Ratio of animals for slaughter to inventory	Animals for slaughter	Average live weight of slaughter animals	Live weight output	Dressing percentage	Carcass weight output
	Thousands	Percent	Thousands	Kilograms	1,000 metric tons	Percent	1,000 metric tons
1970:							
Hogs	14,755	99	14,613	113	1,654	61	1,009
Cattle and calves	10,285	49	4,970	219	1,089	49	533
Sheep	2,631	42	1,097	43	47	47	22
Poultry	--	--	--	--	198	60	119
Other	--	--	--	--	1/104	--	2/180
Total meat	--	--	--	--	1/3,092	--	1,863
Milk	3/6,081	--	--	4/2,458	4/14,948	--	--
Eggs	3/69,410	--	--	5/100	6/6,941	--	--
1980:							
Hogs	23,320	100	23,320	109	2,540	62	1,575
Cattle	12,700	43	5,410	288	1,560	51	800
Sheep	2,500	33	800	44	40	46	20
Poultry	119,200	--	--	--	400	64	250
Other	--	--	--	--	1/120	--	2/230
Total meat	--	--	--	--	4,660	--	2,875
Milk	3/6,660	--	--	4/2,710	18,100	--	--
Eggs	3/85,300	--	--	5/104	6/8,900	--	--

Note: Numbers in these tables have been rounded, so may not add.

1/ Includes horses, rabbits, and game.
2/ Includes horses, rabbits, game and offals.
3/ Average number of producing animals.
4/ Kilograms of milk produced per cow.
5/ Number of eggs produced per hen.
6/ Millions of eggs.

Sources: Tables 10, 11, 46 and 47.

Table 3.--Production, consumption, and trade of grain, protein meal, and meat, Poland, average 1956-60. 1961-65, and 1966-70, and projections to 1980

Item	Grain	Protein meal	Meat 2/	Average annual rate of increase from previous 5 year period 1/		
				Grain	Protein meal	Meat
	1,000 metric tons			Percent		
1956-60 average:						
Production	14,000	100	1/1,350	N.A.	N.A.	N.A.
Consumption	15,800	190	1,250	N.A.	N.A.	N.A.
Trade 3/	-1,800	-90	-100	N.A.	N.A.	N.A.
1961-65 average:						
Production	15,000	240	1,590	1.3	19.4	3.3
Consumption	17,500	400	1,410	2.1	16.3	2.4
Trade 3/	-2,500	-160	180	7.5	12.7	11.5
1966-70 average:						
Production	17,000	360	1,820	2.4	9.0	2.6
Consumption	19,300	710	1,670	1.9	12.2	3.3
Trade 3/	-2,300	-350	150	-1.3	16.4	-3.3
1980:						
Production	25,200	710	2,875	3.1	5.3	3.6
Consumption	28,500	2,130	2,660	3.0	8.8	3.4
Trade 3/	-3,300	-1,420	215	2.8	11.4	4.0

1/ For 1980, the average annual increase is measured from the 1966-70 averages.
2/ Carcass weight equivalent, including live animal trade.
3/ Minus denotes imports.

N.A. = Not available.

Sources: Tables 2,17,20,23,34,35,43-44,47-49.

Table 4.--Basic indicators of fulfillment of 1966-70 agricultural plans, Poland, and goals for 1971-75 and 1975

Item	Unit	1966-70 actual	1970 actual	1971-75 plan	1975 plan
Agricultural output:					
Increase in gross agricultural product	Percent	1/16	2/10		3/18-21
From crops	do.	1/18	2/10		3/17-20
From livestock	do.	1/12	2/8		3/22-23
Crop production:					
4 major grains	1,000 m. tons	17,000	16,200		4/19,400-20,300
Crop procurements:					
Grain	do.	4,290	4,310		4/6,200
Oilseeds	do.	471	518		4/715
Sugarbeets	do.	13,600	12,742		4/15,300
Potatoes	do.	5,109	5,407		4/6,300
Livestock numbers:					
Cattle	1,000 head	10,084-10,798	10,285-10,844		4/12,000-13,300
Cows	do.	5,910-6,136	6,045-6,082		4/6,300
Hogs	do.	14,039-14,577	13,446-14,755		4/16,800-17,200
Horses	do.	2,574-2,625	2,618-2,585		4/2,300
Livestock procurements:					
Total livestock	1,000 m. tons				
Hogs (live weight)	do.	1,089	1,059		4/2,964
Beef (live weight)	do.	840	905		4/1,600
Poultry	do.	66	81		4/1,010
Milk	Mil. liters	4,977	5,309		4/200
Eggs	Millions	2,284	2,509		4/7,100-7,300
Agricultural inputs:					4/2,850
Agricultural investment	Bil. zlotys	5/160.9			
Socialized investment	do.	5/108.1		4/182	
Private investment	do.	5/52.8			
As share of total investment	Percent	15		15	
Fertilizer applications:					
Nitrogen	1,000 m. tons	2,107	2,571		4/3,750
Phosphate	do.	685	822		4/1,200
Potash	do.	523	635		4/1,000
Supply of livestock feed	do.	900	1,114		4/1,550
Per capita consumption:			4,300		4/5,000
Meat	Kilograms	52	53		5/61-63
Eggs	Units	176	184		5/181-193
Milk and milk products	Liters	387	397		5/420

1/ Compared with 1961-65 average.
2/ Compared with 1965.
3/ Compared with 1970.
4/ Source: (35).
5/ 1971 prices.

Source: Unless otherwise noted (9).

Table 5.--State procurements of grain and livestock products and their share of total production, Poland, average 1956-60, 1961-65, and 1966-70

Year	Grain	Livestock 1/	Total cattle and calves	Cattle 2/	Calves	Hogs	Poultry	Milk 3/	Eggs
				1,000 tons					Million
				Total procurement					
1956-60	2,313	1,387	437	347	90	894	23	3,395	1,971
1961-65	2,404	1,680	656	589	67	988	34	3,937	2,649
1966-70	3,947	2,044	841	779	62	1,089	64	5,153	2,283
				Products left on farms or entering nongovernment trade					
1956-60	11,188	n.a.	139	86	53	558	65	8,199	2,800
1961-65	12,111	n.a.	153	79	74	567	90	8,712	3,401
1966-70	12,359	n.a.	174	87	87	596	115	9,433	4,260
				Procurements' share of total production					
1956-60	17	62	76	80	63	62	26	29	41
1961-65	17	64	81	88	47	64	27	31	44
1966-70	24	68	83	90	42	65	36	35	35

n.a. means not available.

1/ Beef, veal, pork, mutton, horsemeat and poultry in live weight.

2/ Excluding calves.

3/ Converted from liters at the ratio of 1 liter of milk = 1.031 kilograms.

Table 6--Mineral fertilizer and lime use, Poland, 1955/56-1970/71 and projections to 1980/81

Year 1/	Mineral fertilizer				Lime
	Nitrogen	Phosphate	Potash	Total	
	Kilograms per hectare of arable land 2/				
1955/56	10.0	9.3	16.9	36.2	20.5
1956/57	12.1	9.6	16.9	38.6	19.5
1957/58	12.2	9.2	14.2	35.6	17.2
1958/59	14.0	10.0	16.1	30.1	15.9
1959/60	15.5	11.1	15.3	41.9	15.5
1960/61	16.9	12.9	19.2	49.0	18.7
1961/62	18.6	14.6	22.3	55.5	26.6
1962/63	19.8	15.6	22.1	57.5	34.0
1963/64	22.1	17.1	22.6	61.8	42.7
1964/65	25.1	21.0	25.7	71.8	61.4
1965/66	28.1	23.0	33.5	84.6	72.9
1966/67	33.4	26.5	43.6	102.9	86.9
1967/68	39.4	29.4	50.4	119.1	102.0
1968/69	45.7	34.3	59.6	139.7	112.5
1969/70	53.2	39.2	65.3	157.8	115.9
1970/71	53.8	41.6	72.9	168.3	130.0
1980/81	110	95	122	327	240

1/ Year beginning July 1.
2/ Arable land is cultivated land plus orchards and gardens.

Source: (19). Methodology for projections is given in appendix B.

Table 7--Grain production, Poland, 1956-70 and projections to 1980

Year	Wheat	Coarse grains						Total grains
		Barley	Corn	Oats	Rye	Other 1/	Total	
	1,000 metric tons							
1956	2,121	1,131	90	2,259	6,558	477	10,515	12,636
1957	2,319	1,227	38	2,541	7,437	518	11,761	14,080
1958	2,321	1,210	34	2,670	7,329	517	11,760	14,081
1959	2,484	1,043	19	2,483	8,123	427	12,085	14,569
1960	2,303	1,310	47	2,774	7,878	497	12,506	14,809
Average	2,310	1,184	46	2,545	7,463	488	11,725	14,035
1961	2,792	1,339	33	2,940	8,356	545	13,213	16,005
1962	2,700	1,315	19	2,740	6,685	466	11,225	13,925
1963	3,067	1,479	14	2,830	7,124	546	11,993	15,060
1964	3,042	1,261	18	2,218	6,964	486	10,947	13,989
1965	3,338	1,445	14	2,476	8,202	545	12,682	16,020
Average	2,988	1,368	20	2,641	7,466	518	12,013	15,001
1966	3,557	1,398	13	2,594	7,661	569	12,235	15,792
1967	3,857	1,394	14	2,768	7,645	588	12,409	16,266
1968	4,567	1,478	13	2,831	8,438	619	13,379	17,946
1969	4,710	1,948	11	3,063	8,166	676	13,864	18,574
1970	4,608	2,149	12	3,209	5,433	851	11,654	16,262
Average	4,260	1,673	13	2,893	7,469	661	12,709	16,969
1980	9,223	4,364	15	3,641	6,964	976	15,960	25,183

1/ Mixed grains, millet and buckwheat.

Source: (19). Methodology for projections is given in appendix B.

Table 8--Grain area, Poland, 1956-70 and projections to 1980

Year	Wheat	Coarse grains						Total grains
		Barley	Corn	Oats	Rye	Other 1/	Total	
	1,000 hectares							
1956	1,465	777	44	1,595	4,964	419	7,799	9,263
1957	1,441	777	15	1,738	5,066	441	8,037	9,478
1958	1,474	742	13	1,709	5,213	406	8,083	9,557
1959	1,435	644	9	1,686	5,202	360	7,901	9,336
1960	1,361	717	18	1,641	5,122	365	7,863	9,224
Average	1,435	731	24	1,674	5,113	399	7,940	9,375
1961	1,401	679	12	1,602	4,880	373	7,547	8,948
1962	1,393	664	9	1,584	4,700	337	7,293	8,686
1963	1,542	749	7	1,682	4,383	373	7,193	8,734
1964	1,625	741	7	1,561	4,404	343	7,056	8,682
1965	1,617	688	7	1,314	4,447	342	6,799	8,416
Average	1,516	704	8	1,549	4,563	353	7,178	8,694
1966	1,657	678	6	1,381	4,309	353	6,727	8,384
1967	1,723	645	6	1,403	4,274	360	6,688	8,411
1968	1,844	628	5	1,364	4,263	353	6,613	8,457
1969	1,965	759	5	1,367	4,174	401	6,706	8,671
1970	1,985	924	5	1,530	3,413	488	6,360	8,345
Average	1,833	727	5	1,409	4,092	390	6,622	8,455
1975	2,280	1,023	5	1,269	3,470	409	6,176	8,456
1980	2,609	1,224	5	1,156	3,015	430	5,830	8,439

1/ Mixed grains, millet, and buckwheat.

Source: (19). Methodology for projections is given in appendix B.

Table 9--Grain yields, Poland, 1956-70 and projections to 1980

Year	Wheat	Coarse grains						Total grains
		Barley	Corn	Oats	Rye	Other 1/	Total	
	Quintals per hectare							
1956	14.5	14.6	20.5	14.2	13.2	11.4	13.4	13.6
1957	16.1	15.8	25.1	14.6	14.7	11.7	14.6	14.8
1958	15.7	16.3	26.7	15.6	14.1	12.7	14.5	14.7
1959	17.3	16.2	21.4	14.7	15.6	11.9	15.3	15.6
1960	16.9	18.3	26.9	16.9	15.4	13.6	15.9	16.0
Average	16.1	16.2	19.2	15.2	14.6	12.2	14.8	15.0
1961	19.9	19.7	27.6	18.4	17.1	14.6	17.5	17.9
1962	19.4	19.8	21.6	17.3	14.2	13.8	15.4	16.0
1963	19.9	19.8	22.1	16.8	16.3	14.6	16.7	17.2
1964	18.7	17.0	23.4	14.2	15.8	14.2	15.5	16.1
1965	20.6	21.0	20.4	18.8	18.4	15.8	18.6	19.0
Average	19.7	19.4	25.0	17.0	16.4	14.7	16.7	17.2
1966	21.5	20.6	23.6	18.8	17.8	16.1	18.2	18.8
1967	22.4	21.6	24.1	19.7	17.9	16.3	18.6	19.3
1968	24.8	23.6	24.8	20.7	19.8	17.4	20.2	21.2
1969	24.0	25.7	24.7	22.4	19.6	16.8	20.7	21.4
1970	23.2	23.3	24.0	21.0	15.9	17.4	18.3	19.5
Average	23.2	23.0	26.0	20.5	18.2	18.7	19.2	20.1
1980	35.4	35.6	30.0	31.5	23.1	22.7	27.4	29.8

1/ Mixed grains, millet, and buckwheat.

Source: (19). Methodology for projections is given in appendix B.

Table 10--Production of livestock products, Poland, 1956-70 and projections to 1980 1/

Year	Beef and veal			Pork	Lamb	Poultry
	Beef	Veal	Total			
			1,000 metric tons			
1956	397.9	108.2	506.1	1,333.2	53.9	77.3
1957	367.7	126.3	494.0	1,496.6	58.0	88.0
1958	433.1	161.2	594.3	1,558.8	56.3	84.9
1959	484.4	158.9	643.3	1,418.6	61.5	90.3
1960	481.6	158.4	640.0	1,452.2	54.8	99.1
Average	432.9	142.6	575.5	1,451.8	56.9	87.9
1961	523.9	147.3	671.2	1,662.1	52.7	112.8
1962	628.3	145.8	774.1	1,641.0	50.3	119.3
1963	719.4	136.2	855.6	1,402.4	44.3	116.0
1964	776.2	134.9	911.1	1,407.9	39.5	129.9
1965	692.3	142.5	834.8	1,659.2	39.2	140.4
Average	668.0	141.3	809.4	1,554.5	45.2	123.7
1966	705.3	139.4	844.7	1,708.9	40.1	159.3
1967	822.7	145.3	968.0	1,686.6	43.5	166.0
1968	902.4	147.1	1,049.5	1,650.6	47.3	178.4
1969	960.1	159.6	1,120.0	1,691.6	48.5	191.4
1970	937.7	151.2	1,088.9	1,653.7	46.9	198.0
Average	865.6	148.5	1,014.2	1,678.3	45.3	178.6
1980			1,557	2,542	36	396

Continued

Table 10-- Production of livestock products, Poland, 1956-70 and projections to 1980 1/--Continued

Year	Horse	Other 2/	Total meat 3/	Other livestock products		
				Eggs	Milk	Wool
	--1,000 metric tons--			million units	--1,000 metric tons--	
1956	11.5	40.0	2,022.0	4,253	10,228	9,762
1957	4.8	40.0	2,181.4	4,332	11,054	9,291
1958	6.8	40.0	2,341.1	4,553	11,871	8,989
1959	32.3	40.0	2,286.0	5,127	12,315	9,162
1960	48.0	40.0	2,334.1	5,589	12,500	9,042
Average	20.7	40.0	2,232.8	4,771	11,594	9,249
1961	45.8	40.0	2,584.6	6,141	12,771	8,778
1962	39.4	40.0	2,664.1	6,092	12,873	8,163
1963	31.5	40.0	2,489.8	5,751	12,653	7,273
1964	33.8	40.0	2,362.2	6,000	12,604	7,368
1965	25.7	40.0	2,739.3	6,264	13,344	7,500
Average	35.2	40.0	2,608.0	6,050	12,849	7,816
1966	31.0	40.0	2,824.0	6,253	14,235	8,016
1967	25.9	40.0	2,930.0	6,348	14,494	8,594
1968	35.7	40.0	3,001.5	6,315	14,642	8,849
1969	41.9	40.0	3,133.4	6,700	14,758	8,885
1970	64.2	40.0	3,091.7	6,941	14,948	8,939
Average	39.7	40.0	2,996.1	6,511	14,615	8,657
1980	116		4,647	8,888	18,080	NA

NA means not available.

1/ Meat is given in live weight.

2/ Includes game and rabbits.

3/ Includes live animal exports.

Source: (19). Methodology for projections is given in appendix B.

Table 11--Meat production, Poland, 1956-70 1/

Year	Beef and veal	Pork	Lamb	Poultry	Horse	Other 2/	Offals	Total
	1,000 metric tons (carcass weight) 3/							
1956	247.9	788.7	24.2	46.4	5.5	18.5	78.0	1,209.2
1957	242.0	891.7	26.1	52.8	2.5	16.5	81.7	1,313.3
1958	290.6	903.1	25.3	50.9	2.9	16.7	91.8	1,381.3
1959	312.5	824.7	27.7	54.2	13.2	17.6	92.7	1,342.6
1960	303.5	848.8	24.7	59.5	18.0	17.0	92.9	1,364.4
Average	279.3	851.4	25.6	52.7	8.4	17.3	87.4	1,322.1
1961	330.0	963.4	24.2	67.7	15.2	17.1	98.4	1,516.0
1962	378.1	965.3	23.1	71.6	11.6	14.7	105.7	1,570.1
1963	418.9	848.7	20.4	69.6	9.1	14.5	107.9	1,489.1
1964	442.1	851.8	18.2	77.9	10.4	16.7	117.0	1,534.1
1965	397.6	1,004.9	18.0	84.2	7.5	14.4	113.5	1,640.1
Average	393.3	926.8	20.8	74.2	10.8	15.5	108.5	1,549.9
1966	397.8	1,040.9	18.4	95.6	9.7	19.1	119.9	1,701.4
1967	459.4	1,027.4	20.0	99.6	10.5	16.4	131.9	1,765.2
1968	487.4	1,006.6	21.8	107.0	12.7	19.7	131.9	1,787.1
1969	516.4	1,040.0	22.3	114.6	14.8	12.7	137.1	1,857.9
1970	492.0	1,015.3	21.6	118.8	25.2	19.8	134.6	1,827.3
Average	470.6	1,025.9	20.8	107.1	14.5	17.5	131.1	1,787.5

1/ Excludes live animal exports.
2/ Includes game and rabbits.
3/ Conversion factors used to convert from live weight to carcass weight:

	Beef	Pork	Lamb	Poultry	Horses
1956-60	49	60	45	60	56
1961-65	50	61	46	63	56
1966-70	49	61	46	64	56

Sources: Table 10 and (11, 19).

Table 12--Production of milk and eggs, Poland, 1956-70

Year	Milk 1/		Number of producing milk cows	Eggs		Number of producing laying hens
	Total	Yield per cow		Total	Rate of lay per hen	
	1,000 metric tons	Kilograms	Thousands	Millions	Number	Thousands
1956	10,228	1,837	5,568	4,253	88	48,329
1957	11,054	1,917	5,766	4,332	88	49,227
1958	11,871	2,001	5,933	4,553	90	50,589
1959	12,315	2,043	6,028	5,127	94	54,543
1960	12,500	2,124	5,885	5,589	94	59,457
Average	11,594	1,984	5,836	4,771	91	52,429
1961	12,771	2,159	5,915	6,141	94	65,330
1962	12,873	2,137	6,024	6,092	94	64,808
1963	12,653	2,085	6,069	5,751	92	62,511
1964	12,604	2,096	6,013	6,000	92	65,217
1965	13,344	2,254	5,920	6,264	94	66,638
Average	12,849	2,146	5,988	6,050	93	64,901
1966	14,235	2,367	6,014	6,253	96	65,135
1967	14,494	2,360	6,142	6,348	98	64,776
1968	14,642	2,364	6,194	6,315	98	64,439
1969	14,758	2,361	6,251	6,700	99	67,677
1970	14,499	2,384	6,082	6,941	100	69,400
Average	14,525	2,367	6,137	6,511	98	66,285

1/ Converted from official data in liters (1 liter = 1.031 kilograms).

Sources: (10, 19).

Table 13--Livestock inventories, Poland, 1956-70 and projections to 1980 1/

Year	Cattle			Hogs		
	Total	Cows	Other	Total	Sows & gilts	Other
			1,000 head			
1956	7,516	5,291	2,225	11,324	1,600	9,645
1957	7,935	5,432	2,503	12,023	1,760	10,381
1958	7,852	5,594	2,258	12,818	1,650	11,085
1959	7,800	5,753	2,047	12,437	1,460	10,796
1960	7,935	5,844	2,091	11,657	1,550	10,144
Average	7,808	5,583	2,225	12,411	1,604	10,410
1961	8,260	5,708	2,552	13,119	1,510	11,557
1962	8,710	5,738	2,972	13,971	1,520	12,496
1963	9,392	5,923	3,469	13,698	1,382	12,164
1964	9,320	5,877	3,443	12,328	1,401	10,974
1965	9,348	5,810	3,538	14,197	1,571	12,554
Average	9,006	5,811	3,195	13,463	1,477	11,949
1966	9,480	5,775	3,705	14,367	1,756	12,686
1967	10,002	5,872	4,130	14,704	1,610	13,000
1968	10,123	5,801	4,322	14,384	1,472	12,762
1969	10,530	6,057	4,473	14,677	1,552	13,096
1970	10,285	6,045	4,240	14,755	1,495	13,143
Average	10,084	5,910	4,174	14,577	1,577	12,937
1980	12,744	6,312	6,220	23,320	NA	NA

Continued

Table 13--Livestock inventories, Poland, 1956-70 and projections to 1980 1/--Continued

Year	Sheep	Goats	Horses	Poultry		
				Total	Hens	Other
			1,000 head			
1956	3,479	395	2,509	53,700	40,400	13,300
1957	3,463	355	2,496	58,130	40,400	17,730
1958	3,313	315	2,570	61,560	41,300	21,260
1959	3,183	278	2,678	64,990	42,300	22,690
1960	3,098	279	2,782	68,420	45,500	22,920
Average	3,307	324	2,607	61,360	41,980	19,380
1961	3,002	273	2,749	71,858	49,600	22,258
1962	2,865	266	2,675	77,825	54,400	23,425
1963	2,591	251	2,609	75,770	53,800	21,970
1964	2,377	239	2,555	79,270	53,800	25,470
1965	2,438	222	2,522	81,434	57,100	24,334
Average	2,655	250	2,622	77,231	53,740	23,491
1966	2,572	205	2,495	80,288	55,700	24,588
1967	2,757	194	2,518	81,026	61,500	19,526
1968	2,770	181	2,590	80,117	60,400	19,717
1969	2,787	163	2,649	84,269	59,600	24,669
1970	2,631	170	2,618	85,498	62,400	23,098
Average	2,703	183	2,574	82,240	59,920	22,320
1980	2,512	83	1,959	119,200	81,280	39,920

NA means not available.
1/ Beginning year inventories.

Source: (19). Methodology for projections is given in appendix B.

Table 14--National income and population, Poland, 1956-70 and projections to 1980

Year	National income	Midyear population	Per capita national income
	Billion Zlotys 1/	Thousands	1,000 Zlotys
1956	315.0	27,815	11.3
1957	340.4	28,310	12.0
1958	359.4	28,770	12.5
1959	376.8	29,240	12.9
1960	395.0	29,561	13.4
Average	357.3	28,739	12.4
1961	427.2	29,945	14.3
1962	435.6	30,267	14.4
1963	466.7	30,595	15.3
1964	497.9	31,016	16.1
1965	532.3	31,316	17.0
Average	471.9	30,627	15.4
1966	569.9	31,497	18.1
1967	602.6	31,718	19.0
1968	656.9	32,041	20.5
1969	676.0	32,265	21.0
1970	711.4	32,489	21.9
Average	643.3	32,002	20.1
1975	974.6	34,000	28.7
1980	1,335.2	35,800	37.3

1/ In 1965 prices.

Sources: (19, 32, 61).

Table 1--Production, trade, and consumption of meat, Poland, 1956-70

Year	Production	Imports	Exports	Total consumption	Per capita consumption
	1,000 metric tons				Kilograms
1956	1,209.2	--	82.5	1,126.7	40.5
1957	1,313.3	7.2	88.0	1,232.5	43.5
1958	1,381.3	15.7	90.9	1,306.1	45.4
1959	1,342.6	46.4	100.4	1,288.6	44.1
1960	1,364.4	18.1	110.1	1,272.4	43.0
Average	1,322.1	17.5	94.4	1,245.2	43.3
1961	1,516.0	9.8	170.3	1,355.5	45.3
1962	1,570.1	5.0	171.3	1,403.8	46.4
1963	1,489.1	47.6	145.3	1,391.4	45.5
1964	1,534.1	37.7	146.1	1,425.7	46.0
1965	1,640.1	39.4	197.3	1,482.2	47.3
Average	1,549.9	27.9	166.1	1,411.7	46.1
1966	1,701.4	52.8	158.0	1,596.2	50.7
1967	1,765.2	43.2	173.9	1,634.5	51.5
1968	1,787.1	79.0	176.2	1,689.9	52.7
1969	1,857.9	36.2	176.4	1,717.7	53.2
1970	1,827.3	43.9	156.6	1,714.6	52.8
Average	1,787.5	41.0	168.2	1,670.6	52.2

Sources: Tables 11 and 28-30; (61).

Table 16.--Production, trade, and consumption of beef and veal, Poland, 1956-70 1/

Year	Production	Imports	Exports	Total consumption	Per capita consumption
	1,000 metric tons				Kilograms
1956	247.9	--	--	247.9	8.9
1957	242.0	--	--	242.0	8.6
1958	290.6	2.5	--	293.1	10.2
1959	312.5	16.1	0.2	328.4	11.2
1960	303.5	3.0	1.9	304.6	10.3
Average	279.3	4.3	.4	283.2	10.0
1961	330.0	3.6	22.5	311.1	10.4
1962	378.1	1.8	31.7	348.2	11.5
1963	418.9	16.4	19.7	415.6	13.6
1964	442.1	11.9	16.8	437.2	14.1
1965	397.6	1.3	21.6	377.3	12.2
Average	393.3	7.0	22.4	377.9	12.3
1966	397.8	22.2	14.7	405.3	12.9
1967	459.4	7.8	23.2	444.0	14.0
1968	487.4	2.5	28.7	461.2	14.4
1969	516.4	2.1	37.8	480.7	14.9
1970	492.0	2.0	17.3	476.7	14.7
Average	470.6	7.3	24.3	453.6	14.2

-- means zero.

1/ Excludes fats and offals.

Sources: Tables 11 and 28-30; (61).

Table 17--Production, trade, and consumption of pork, Poland, 1956-70 1/

Year	Production	Imports	Exports	Total consumption	Per capita consumption
	1,000 metric tons				Kilograms
1956	788.7	--	73.2	715.5	25.7
1957	891.7	7.2	76.4	822.5	29.1
1958	903.1	13.1	78.0	838.2	29.1
1959	824.7	27.2	82.7	769.2	26.3
1960	848.8	13.4	86.1	776.1	26.2
Average	851.4	12.2	79.2	784.4	27.3
1961	963.4	5.3	118.8	849.9	28.4
1962	965.3	2.2	117.4	850.1	28.1
1963	848.7	30.6	103.6	775.7	25.4
1964	851.8	25.6	99.2	778.2	25.1
1965	1,004.9	35.9	140.9	899.9	28.7
Average	926.8	19.9	116.0	830.7	27.1
1966	1,040.9	29.1	106.6	963.4	30.6
1967	1,027.4	33.7	113.5	947.6	29.9
1968	1,006.6	75.0	108.2	973.4	30.4
1969	1,040.0	32.9	100.4	972.5	30.1
1970	1,015.3	38.2	96.8	956.7	29.4
Average	1,025.9	41.8	105.0	962.7	30.0

-- means zero.

1/ Excludes fats and offals.

Sources: Tables 11 and 28-30; (61).

Table 18--Production, trade, and domestic use of grain, Iceland, 1956/57-1970/71, and projections to 1980/81

Year 1/	Production 2/	Imports 3/	Exports 3/	Domestic use					
				Total	Seed	Nonfood manufacture	Food	Waste	Feed
				1,000 metric tons					
1956/57. . .	12,636	1,231	34	13,833	1,697	168	6,040	632	5,296
1957/58. . .	14,080	1,163	9	15,234	1,740	196	6,254	704	6,340
1958/59. . .	14,081	1,862	53	15,890	1,755	208	5,869	705	7,353
1959/60. . .	14,569	2,462	55	16,976	1,718	223	6,110	728	8,197
1960/61. . .	14,809	2,230	104	17,035	1,698	231	6,209	741	8,156
Average. .	14,035	1,810	51	15,793	1,722	205	6,096	702	7,068
1961/62. . .	16,005	2,246	63	18,188	1,650	259	6,327	801	9,151
1962/63. . .	13,925	2,909	48	16,786	1,603	256	6,412	696	7,818
1963/64. . .	15,060	2,535	46	17,549	1,612	280	6,310	752	8,595
1964/65. . .	13,989	2,959	51	16,897	1,604	301	6,257	699	8,036
1965/66. . .	16,020	2,364	108	18,276	1,561	307	6,334	801	9,273
Average. .	14,999	2,603	63	17,539	1,601	281	6,328	750	8,574
1966/67. . .	15,792	2,300	106	17,986	1,552	290	6,191	790	9,163
1967/68. . .	16,266	2,356	33	18,589	1,560	312	6,187	813	9,717
1968/69. . .	17,946	1,919	146	19,719	1,571	315	6,104	898	10,831
1969/70. . .	18,574	2,702	160	21,116	1,603	314	6,105	929	12,165
1970/71. . .	16,262	3,084	184	19,162	1,548	330	6,052	816	10,417
Average. .	16,968	2,472	126	19,314	1,567	312	6,128	849	10,456
1980/81. . .	25,183	3,304		28,478	1,595	409	5,554	1,241	19,688

1/ Year beginning July 1.
2/ Production in first of marketing years; e.g., production in 1956/57 is that of 1956.
3/ Includes grain equivalent of flour.

Sources: (11,17,19). Methodology for projections is given in appendix B.

Table 19.--Production, trade, and domestic use of wheat, Poland, 1956/57-1970/71 and projections to 1980/81

Year 1/	Production 2/	Imports 3/	Exports 3/	Domestic use					
				Total	Seed	Nonfood manufacture	Food	Waste	Feed
	1,000 metric tons								
1956/57	2,121	1,046	--	3,167	278	--	2,335	106	450
1957/58	2,319	997	--	3,316	274	--	2,543	116	383
1958/59	2,321	1,345	--	3,666	280	---	2,496	116	774
1959/60	2,484	1,746	--	4,230	273	--	2,690	124	1,143
1960/61	2,303	1,516	--	3,819	259	--	2,857	115	588
Average	2,310	1,330	--	3,640	273	--	2,584	115	668
1961/62	2,792	1,573	--	4,365	266	--	3,058	140	901
1962/63	2,700	1,587	--	4,287	265	--	3,241	135	646
1963/64	3,067	1,966	--	5,033	293	--	3,291	153	1,296
1964/65	3,042	1,411	27	4,426	309	--	3,416	152	549
1965/66	3,338	1,690	--	5,028	307	--	3,416	167	1,138
Average	2,988	1,645	5	4,628	290	--	3,284	150	906
1966/67	3,557	1,755	--	5,312	315	--	3,416	178	1,403
1967/68	3,857	1,332	5	5,184	327	--	3,416	193	1,248
1968/69	4,567	1,133	24	5,676	350	--	3,416	228	1,682
1969/70	4,710	1,209	26	5,893	373	--	3,416	236	1,868
1970/71	4,586	1,972	19	6,539	376	--	3,416	229	2,518
Average	4,255	1,479	15	5,719	348	--	3,416	213	1,742
1980/81	9,223	NA	NA	NA	507	--	4,328	447	NA

-- means zero. NA means not available.

1/ Year beginning July 1.

2/ Production in first of marketing years; e.g., production in 1956/57 is that of 1956.

3/ Includes grain equivalent of flour.

Sources: (17, 19). Methodology for projections is given in appendix B.

Table 20-- Production, trade, and domestic use of coarse grains, Poland, 1956/57-1970/71 and projections to 1980/81 1/

Year 2/	Production 3/	Imports 4/	Exports 4/	Domestic use					
				Total	Seed	Nonfood manufacture	Food	Waste	Feed
				1,000 metric tons					
1956/57	10,515	153	34	10,634	1,419	168	3,675	526	4,846
1957/58	11,761	138	9	11,890	1,466	196	3,683	588	5,957
1958/59	11,760	489	53	12,196	1,475	208	3,345	589	6,579
1959/60	12,085	614	55	12,644	1,445	223	3,318	604	7,054
1960/61	12,506	714	104	13,116	1,439	231	3,252	626	7,568
Average	11,725	422	51	12,096	1,449	205	3,454	585	6,403
1961/62	13,213	613	63	13,763	1,384	259	3,209	661	8,250
1962/63	11,225	1,273	48	12,450	1,338	256	3,123	561	7,172
1963/64	11,995	470	46	12,417	1,319	280	2,920	599	7,299
1964/65	10,947	1,493	24	12,416	1,295	301	2,786	547	7,487
1965/66	12,682	607	108	13,181	1,254	307	2,851	634	8,135
Average	12,012	891	58	12,845	1,321	280	2,978	603	7,669
1966/67	12,235	478	106	12,607	1,237	290	2,708	612	7,760
1967/68	12,409	959	28	13,340	1,233	312	2,706	620	8,469
1968/69	13,379	680	122	13,946	1,221	315	2,629	670	9,111
1969/70	13,864	1,482	134	15,212	1,230	314	2,627	693	10,348
1970/71	11,654	1,047	165	12,536	1,172	330	2,575	587	7,872
Average	12,709	931	111	13,528	1,219	312	2,649	637	8,712
1980/81	15,960			NA	1,068	409	1,202	794	NA

NA means not available.

1/ Rye, barley, oats, corn, mixed grains, millet, and buckwheat.

2/ Year beginning July 1.

3/ Production in first of marketing years; e.g., production in 1956/57 is that of 1956.

4/ Includes grain equivalent of flour.

Sources: (11,17,19). Methodology for projections is given in appendix B.

Table 21--Production, trade, and domestic use of oilseeds and protein meal, Poland, 1956-70 and projections to 1980 1/

Year	Production of seed and meal 2/	Seed imports 2/	Meal imports	Seed exports 2/	Meal exports	Domestic use
			1,000 metric tons			
1956	88	42	3	--	--	133
1957	96	118	2	--	--	216
1958	74	51	2	--	--	127
1959	102	60	51	--	--	213
1960	123	63	145	--	--	331
Average	97	67	39	--	--	203
1961	189	45	66	1	--	299
1962	254	19	94	13	--	354
1963	178	37	128	3	--	340
1964	201	33	221	--	--	455
1965	356	83	221	35	--	625
Average	236	43	146	10	--	415
1966	325	43	251	50	2	567
1967	442	44	301	61	3	723
1968	475	31	407	100	3	810
1969	181	100	401	49	6	627
1970	394	60	439	25	--	868
Average	363	56	360	57	3	719
1975	542		878			1,420
1980	707		1,423			2,130

-- means zero.

1/ Rapeseed, peanut, sunflowerseed, soybean, cotton, and linseed.

2/ In meal equivalents.

Sources: (17, 19, 28).

Table 22--Production, trade, and domestic use of rapeseed, Poland, 1956-70 and projections to 1980 1/

Year	Production	Imports	Exports	Domestic use
		1,000 metric tons		
1956	46	--	--	46
1957	57	--	--	57
1958	46	--	--	46
1959	75	2/	--	75
1960	84	--	--	84
Average	62	--	--	62
1961	146	--	--	146
1962	206	--	--	206
1963	129	--	--	129
1964	152	4	2/	156
1965	287	10	35	262
Average	184	3	7	180
1966	255	2	50	207
1967	371	2	60	313
1968	406	--	100	306
1969	116	--	48	68
1970	323	--	25	298
Average	294	1	57	238
1975	450			
1980	598			

-- means zero.

1/ In oilseed-meal equivalents converted at the rate of 1 kilogram of rapeseed is equal to 0.57 kilogram of rapeseed meal.

2/ Less than 1.

Sources: (17, 19, 28). Methodology for projections is given in appendix B.

Table 23.--Production, trade, and domestic use of potatoes, Poland, 1956/57-1970/71 and projections to 1980/81

Year 1/	Production	Imports	Exports	Domestic use					
				Total	Seed	Nonfood manufacture	Food	Waste	Feed
	1,000 metric tons								
1956/57	38,052	--	35	38,017	5,428	1,455	6,536	5,708	18,890
1957/58	35,104	2	54	35,052	5,526	1,678	6,624	5,266	15,958
1958/59	34,800	--	91	34,709	5,516	1,717	6,675	5,220	15,581
1959/60	35,698	--	183	35,515	5,576	1,919	6,608	5,355	16,057
1960/61	37,855	--	75	37,780	5,752	1,887	6,592	5,678	17,871
Average	36,302	--	88	36,214	5,560	1,731	6,607	5,445	16,871
1961/62	45,203	1	163	45,041	5,638	2,075	6,678	6,780	23,870
1962/63	37,817	13	411	37,419	5,820	2,071	6,689	5,672	17,167
1963/64	44,868	--	280	44,588	5,680	2,329	6,670	6,730	23,179
1964/65	47,860	--	1,046	46,814	5,660	2,487	6,730	7,179	24,758
1965/66	42,665	1	571	42,095	5,530	2,441	6,733	6,400	20,991
Average	43,802	3	494	43,311	5,681	2,281	6,700	6,570	22,079
1966/67	45,798	1	524	45,275	5,424	2,338	6,646	6,870	23,997
1967/68	48,214	33	486	47,761	5,482	2,437	6,566	7,232	26,044
1968/69	50,280	1	588	49,693	5,440	2,460	6,440	7,542	27,811
1969/70	44,935	--	300	44,635	5,436	2,039	6,421	6,740	23,999
1970/71	50,170	--	590	49,580	5,454	2,415	6,433	7,525	27,753
Average	47,879	7	498	47,389	5,447	2,338	6,501	7,182	25,921
1980/81	56,990			56,990	5,052	2,779	5,656	9,295	34,208

-- means zero.
1/ Year beginning July 1.

Sources: (11, 17, 19, 66). Methodology for projections is given in appendix B..

Table 24.--Average price of selected foods and hours of work required to purchase them, Poland, 1971

Food item	Price per kilogram	Work required to purchase 1 kg. of food item 1/
	Zlotys	Hours
Wheat-rye bread:		
Praski	4.00	.3
Mazowiezcki	5.00	.4
Wheat bread:		
Zywkla	5.00	.4
Wroklawska	10.00	.8
Pork:		
Shoulder	42.00	3.3
Rib	56.00	4.4
Side	30.00	2.3
Beef:		
Roast with bones	30.00	2.3
Roast without bones	42.00	3.3
Veal:		
With bones	30.00	2.3
Leg without bones	50.00	4.0
Shoulder without bones	58.00	4.6
Pork liver	36.00	2.9
Chicken	54.00	4.3
Ham	90.00	7.1
Sausage:		
Zwyczania	44.00	3.5
Mysliwska	100.00	7.9
Milk 2/	3.10	.2
Butter	70.00	5.6
Eggs 3/	2.70	.2

1/ Based on an average salary of 12.6 zlotys per hour of work (assuming a 48-hour work week or 208 hours per month). Data are for wage and salary earners in the socialized sector. 2/ Per liter of milk. 3/ Per egg.

Source: (19).

Table 25--Imports of wheat, feed grain, and rice by country of origin, Poland, average 1956-60, 1961-65, and 1966-70

Import and origin	1956-60 average	1961-65 average	1966-70 average
		1,000 metric tons	
Wheat imports from--	1,330	1,645	1,479
USSR	643	183	1,095
United States	546	462	43
Canada	126	394	176
France	--	340	130
West Germany	--	6	10
Italy	--	9	25
Argentina	--	20	--
Mexico	--	111	--
Other	15	120	--
Feed grain imports from--	422	891	970
USSR	110	377	132
United States	252	218	263
Canada	41	--	30
France	6	63	320
West Germany	--	--	96
United Kingdom	--	5	12
Sweden	--	5	--
Australia	--	6	--
Hungary	--	--	12
Mexico	--	201	--
Other	13	16	105
Rice imports from--	58	66	63
People's Republic of China	37	6	--
United States	--	9	4
Spain	--	5	11
Italy	--	7	2
France	--	--	6
United Arab Republic	--	8	19
Burma	5	11	--
Cambodia	2	9	4
Other	14	11	17

-- means zero.

Source: (17).

Table 26--Imports of oilseed and protein meal by country of origin, Poland, average 1956-60, 1961-65, and 1966-70

Import and origin	1956-60 average	1961-65 average	1966-70 average
	1,000 metric tons 1/		
Oilseed imports from--	67.0	43.0	56.0
United States	2.7	10.1	45.3
Canada	3.3	.7	--
Austria	--	2.2	--
The Netherlands	4.4	.3	--
Denmark	--	.5	--
Sweden	--	.9	--
Switzerland	--	1.6	--
West Germany	--	--	.7
United Kingdom	.8	.9	3.1
People's Republic of China	44.2	3.4	--
India	--	1.6	.7
Guinea	3.2	4.9	.4
Nigeria	1.2	10.3	3.3
Other countries	7.2	5.6	2.5
Oilseed meal imports from--	36.0	111.0	258.0
United States	.6	1.0	73.2
India	19.4	90.1	163.6
Argentina	--	2.4	2.8
Brazil	3.9	2.4	--
France	9.4	--	--
Turkey	1.4	2.3	5.4
Other countries	1.3	12.8	23.8
Fishmeal imports from--	3.0	35.0	102.0
Peru	--	9.5	59.2
Norway	.6	5.2	22.4
Iceland	2.0	4.4	6.9
Denmark	--	6.6	--
Other countries	.4	9.3	13.5

-- means zero.

1/ Protein meal equivalents.

Source: (17).

Table 27--Exports of meat and livestock by country of destination, Poland, average 1956-60, 1961-65, and 1966-70

Export and destination	1956-60 average	1961-65 average	1966-70 average
	1,000 metric tons 1/		
Total meat exports to--	94.4	166.1	168.2
United States	14.0	19.7	25.1
France	.4	.7	7.0
West Germany	15.0	19.2	28.4
Italy	.3	7.1	11.9
Spain	--	6.9	5.9
United Kingdom	46.3	63.5	65.4
USSR	--	18.1	.6
Other countries	18.4	30.9	23.9
Total livestock exports to--	25.6	41.4	34.3
France	--	3.7	4.7
West Germany	8.2	5.1	.9
Italy	4.2	8.8	27.3
Austria	4.2	4.0	--
USSR	--	2.5	--
Czechoslovakia	2.0	1.2	--
Yugoslavia	1.5	1.9	--
Other countries	5.5	14.2	1.4

-- means zero.

1/ Carcass weight.

Source: (17).

Table 28--Imports and exports of livestock for slaughter, Poland, 1956-70

Year	Imports	Exports							
		Cattle	Calves	Other calves 1/	Total cattle	Hogs	Horses 2/	Total	Total 3/
		1,000 metric tons							
1956	--	--	--	--	--	18.7	1.6	20.3	
1957	--	--	--	--	--	10.5	.4	10.9	
1958	--	1.2	--	--	1.2	53.5	1.7	56.4	
1959	--	5.6	--	--	5.6	44.1	8.7	58.4	
1960	--	20.4	0.3	--	20.7	37.6	15.7	74.0	
Average	--	5.4	--	--	5.3	32.9	5.6	44.0	25.6
1961	--	10.6	.5	--	11.1	82.6	18.7	112.7	
1962	--	17.6	.5	--	17.9	58.4	18.6	97.2	
1963	--	17.4	.3	--	17.7	11.0	15.3	44.7	
1964	0.4	24.6	.5	1.7	26.8	11.5	15.3	53.6	
1965	2.4	32.4	.5	6.6	39.5	11.8	12.3	69.2	
Average	.6	20.5	.4	1.7	22.6	35.1	16.0	75.5	41.3
1966	--	24.2	.7	7.8	32.7	3.0	13.7	49.4	
1967	2.3	8.0	1.0	21.4	30.4	2.4	7.2	42.8	
1968	11.2	8.6	1.2	4/44.9	54.7	.4	13.0	68.1	
1969	4.6	9.8	1.6	54.5	66.1	--	15.4	81.5	
1970	10.8	12.0	1.8	71.0	84.8	--	19.1	103.9	
Average	5.8	12.5	1.3	39.2	53.0	1.1	13.7	67.8	34.3
1971									

-- means zero.

1/ Classified as feeder calves. Assumes average live weight of 225 kilograms per animals.

2/ Assume average live weight of 450 kilograms per animal.

3/ Converted to carcass weight, excluding fats.

Source: (17).

Table 29--Imports of meat products, Poland, 1956-71

Year	Total 1/	Fresh frozen pork	Fresh frozen beef	Fresh frozen mutton	Fresh frozen poultry	Canned meat	Canned meat and vegetables	Sausage
				1,000 metric tons				
1956	--	--	--	--	--	--	--	--
1957	7.2	6.9	--	--	--	--	--	--
1958	15.7	12.7	2.5	--	--	--	--	0.3
1959	46.4	23.7	16.1	2.4	--	0.4	0.1	--
1960	18.1	8.3	3.0	.9	--	3.4	.7	.1
Average	17.5	10.3	4.3	.7	--	5.0	.8	.1
1961	9.8	3.7	3.6	.1	--	1.8	.3	.1
1962	5.0	.4	1.8	.3	--	1.6	.8	--
1963	47.6	29.4	16.4	--	--	1.8	.7	--
1964	37.7	22.9	11.9	--	--	1.2	.6	--
1965	39.4	32.2	1.3	1.0	--	2.5	.2	.2
Average	27.9	17.7	7.0	.3	--	2.8	1.2	.9
1966	52.8	26.6	22.2	.6	--	2.0	.7	.2
1967	43.2	32.1	7.8	.7	--	2.3	.9	.2
1968	79.0	72.0	2.5	.7	--	1.6	1.0	--
1969	36.2	31.4	2.1	.4	--	2.8	.8	.2
1970	43.9	37.5	1.6	.8	3.0	1.4	.8	.1
Average	51.0	39.9	7.1	.6	.5	.7	.9	--
1971	152.4	147.1	2.8	--	--	2.8	.9	.1
						2.5	--	--

-- means zero.

1/ Total includes offals.

Source: (17).

Table 20.--Exports of meat products, Poland, 1956-71

Year	Fresh frozen pork	Fresh frozen beef	Poultry	Canned hams	Canned pork shoulder	Bacon	Other 1/	Total
				1,000 metric tons				
1956	4.4	--	8.7	13.0	7.6	48.2	0.6	82.5
1957	1.6	--	10.5	13.3	12.0	49.5	1.1	88.0
1958	1.0	--	12.1	13.1	15.6	48.4	1.3	90.9
1959	--	--	15.2	15.5	16.0	50.5	3.2	100.4
1960	2.0	1.2	14.0	17.2	18.6	47.5	9.6	110.1
Average	1.8	.2	12.1	14.4	13.8	48.6	3.3	94.4
1961	32.3	20.9	19.0	17.3	19.6	48.6	12.6	170.3
1962	28.5	30.0	13.7	16.8	20.6	50.6	11.1	171.3
1963	10.8	17.7	12.1	17.7	23.3	50.8	12.9	145.3
1964	2.1	15.7	15.9	19.8	24.0	52.2	16.4	146.1
1965	40.1	20.4	19.2	22.3	25.6	51.9	17.8	197.3
Average	22.8	20.9	16.0	18.8	22.6	50.8	14.2	166.1
1966	2.4	14.0	18.8	23.2	27.3	52.4	19.9	158.0
1967	5.2	22.2	17.3	24.4	27.6	54.9	22.1	173.9
1968	--	27.5	18.0	24.1	29.2	53.8	23.6	176.2
1969	--	35.6	13.7	23.5	25.3	50.5	27.8	176.4
1970	--	15.0	13.8	23.4	25.4	47.1	31.9	156.6
Average	1.5	22.9	16.3	23.7	27.0	51.7	25.1	168.2
1971	--	15.9	28.7	26.6	26.0	42.0	32.4	171.6

-- means zero.

1/ Includes fresh frozen veal, fresh frozen mutton, horsemeat, rabbit, game, sausage, canned meat with vegetables, processed poultry, and offals.

Source: (17).

Table 31--Exports and imports of principal dairy products, Poland, 1956-70

Year	Exports			Butter imports
	Butter	Prepared eggs	Frozen eggs	
	1,000 metric tons			
1956. . . .	--	0.3	2.1	--
1957. . . .	1.2	0.3	2.0	--
1958. . . .	23.7	0.3	2.2	--
1959. . . .	22.7	0.4	2.9	--
1960. . . .	28.6	0.7	4.4	0.3
Average .	15.2	0.4	2.7	--
1961. . . .	26.7	0.9	5.7	3.0
1962. . . .	27.5	1.3	5.5	--
1963. . . .	18.6	0.9	5.7	4.7
1964. . . .	20.0	1.5	5.3	8.4
1965. . . .	18.3	1.3	6.3	2.4
Average .	22.2	1.2	5.7	3.7
1966. . . .	19.3	1.0	5.4	--
1967. . . .	23.4	1.2	5.2	3.0
1968. . . .	19.6	0.8	5.3	9.4
1969. . . .	--	--	--	--
1970. . . .	--	--	--	--
Average .	12.5	0.6	3.2	2.5

-- means zero.

Source: (17).

Table 32--Equations used to project grain yields in Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation 2/	Units	Projections to 1980
Winter wheat yields	1960-73	.876	1.288	15.883 - .027 SMA + .022 SMJ + .022 SMØ + .060 F	centners/ha.	35.6
Spring wheat yields	1960-73	.884	1.026	21.190 - .041 SMA + .022 SMJ + .046 F	centners/ha.	31.6
Winter barley yields	1960-73	.849	1.322	6.957 - .034 SMA + .082 SMJ + .026 SMO + .059 F	centners/ha.	32.7
Spring barley yields	1960-73	.911	1.148	19.763 - .058 SMA + .051 SMJ + .060 F	centners/ha.	35.7
Rye yields	1960-73	.860	1.152	23.825 + .097 SMJA -.142 SMMAR + .042 F	centners/ha.	23.1
Oat yields	1960-73	.868	1.218	14.573 - .040 SMA + .052 SMJ + .053 F	centners/ha.	31.5
Millet yields	1960-73	.500	.616	11.174 - .002 PA + .011 F	centners/ha.	14.7
Buckwheat yields	1960-73	.560	.468	9.096 - .027 PA - .014 PM + .012 PJL + .003 F	centners/ha.	9.2
Mixed grain yields	1960-73	.723	1.454	14.381 - .020 PA + .002 PJL + .042 F	centners/ha.	27.5

1/ Adjusted for degrees of freedom.
2/ F = fertilizer.
SMJA = January soil moisture.
SMMAR = March soil moisture.
SMJ = June soil moisture.
SMO = October soil moisture.
PA = April precipitation.
PM = May precipitation.
PJ = June precipitation.
PJL = July precipitation.

Table 33--Equations used to project grain area in Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation 2/	Unit	Projections to 1980
Winter wheat area	1960-70	.974	35.095	-3315.770 + 72.072 T	1,000 ha.	2,447
Spring wheat area	1960-70	.530	22.805	776.265 - 7.681 T	1,000 ha.	162
Winter barley area	1965-70	.923	0.858	158.875 - 1.771 T	1,000 ha.	17
Spring barley area	1965-70	.500	72.840	-2159.570 + 42.085 T	1,000 ha.	1,207
Rye area	1955-70	.789	216.129	10309.812 - 91.191 T	1,000 ha.	3,015
Oat area	1955-70	.584	87.148	2955.375 - 22.488 T	1,000 ha.	1,156
Mixed grain area	1955-70	.308	28.686	23.375 + 4.164 T	1,000 ha.	355

1/ Adjusted for degrees of freedom.
2/ T = year.

Table 34--Equations used to project fertilizer production and availability in Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation 2/	Unit	Projections to 1980
Nitrogen production.....	1960-70	.865	95.510	-4450.628 + 76.481 T	1,000 tons	1,668
Log phosphate production..	1955-70	.988	2.479	-87.714 + .046 T	1,000 tons	1,664
Nitrogen consumption.....	1965-70	.984	18.228	-5289.237 + 86.885 T	1,000 tons Kg/ha.	1,662 110
Log phosphate consumption:	1960-70	.992	114.643	-28083.634 + 510.372 T	1,000 tons Kg/ha.	1,883 95
Potash consumption.....	--	--	--	Plan used 3/	1,000 tons Kg/ha.	1,838 122
Lime consumption.....	1965-70	.986	48.397	-10486.904 + 176.285 T	1,000 tons Kg/ha.	3,616 240

1/ Adjusted for degrees of freedom.
2/ T = year.
3/ Source: (32).

Table 35--Equations used to project production of selected feedstuffs in Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation 2/	Units	Projections to 1980
Serradella hay production	1955-70	.135	110.331	1225.250 - 9.502 T	1,000 tons	465
Clover hay production	1955-70	.614	475.752	-4599.250 + 130.499 T	1,000 tons	5,838
Meadow hay production	1955-70	.796	945.124	-16,100.831 + 404.485 T	1,000 tons	16,258
Corn for silage & green feed production	1960-70	.263	629.383	-230,628 + 119.363 T	1,000 tons	5,710
Feed beet production	1955-70	.817	645.271	-579,626 + 298.452	1,000 tons	11,308
Pasture area	1965-70	.602	3.680	1502.485 + 2.657 T	1,000 ha.	1,720
Feed pulse production	1960-70	.147	42.066	693.697 - 5.545 T	1,000 tons	244
Milk used for feed production	1955-70	.821	179.814	-1013.273 + 102.961 T	1,000 tons	7,233
Fishmeal production	1960-70	.954	20.132	-178.312 + 3.009 T	1,000 tons	62
Potato yields	1960-70	.656	10.017	-139.437 + 4.644 T	centners/ha.	227
Potato area	1955-71	.810	29.816	3994.030 - 18.545 T	1,000 ha.	2,511
Sugarbeet yields	1960-70	.391	29.594	- 195.681 + 7.500 T	centners/ha.	404.3
Sugarbeet area	--	--	--	--	1,000 ha	400
Rapeseed yields	1960-70	.282	25.816	- 181.925 + 5.245 T	centners/ha.	23.8
Rapeseed area	1960-70	.340	59.635	- 645.713 + 13.590 T	1,000 ha.	441
Flaxseed production	1960-70	.083	6.630	22.932 + .636 T	1,000 tons	74

1/ Adjusted for degrees of freedom.
2/ T = year.

Table 36--Production of feeds other than grain, potatoes, and protein meals, Poland, 1956/57-1970/71 and projections to 1980/81

Item	1956/57	1957/58	1958/59	1959/60	1960/61	1956/57-1960/61 average	1961/62	1962/63	1963/64	1964/65
					1,000 metric tons					
Hay:										
Serradella hay	776	685	708	656	863	738	472	448	647	623
Clover hay	2,628	2,609	2,687	3,360	3,085	2,874	4,200	3,217	3,459	2,682
Meadow hay	6,983	7,065	7,811	7,770	8,150	7,556	9,174	7,747	7,908	7,451
Corn for silage and green feed	(880)	(653)	(710)	(1,625)	4,208	(1,615)	4,120	3,155	3,020	3,400
Feed beets	4,340	5,093	5,607	3,423	5,078	4,708	5,777	5,263	6,689	6,555
Pasture area 1/	1,790	1,790	1,790	1,790	1,790	1,790	1,782	1,802	1,807	1,796
Usable pasture 1/	(20,000)	(20,000)	20,349	20,242	21,244	(20,367)	24,051	20,305	20,675	19,240
Sugarbeet tops and pulp 2/	5,656	6,706	7,416	5,258	9,030	6,813	10,168	8,866	9,382	11,065
Straw	NA	NA	26,900	25,722	28,204	NA	23,509	23,215	18,816	26,591
Cultivated green feed	NA	NA	9,014	8,931	10,160	NA	11,183	10,753	12,020	11,776
Catch crops	NA	NA	5,507	2,971	5,662	NA	5,871	4,633	4,404	4,783
Feed pulses	403	285	343	276	319	325	372	356	336	285
Millfeeds 3/	1,030	987	1,020	958	982	995	997	1,020	1,032	1,006
Milk used for feed	(3,514)	(3,735)	4,183	5,164	5,297	(4,379)	5,453	5,337	5,203	5,235

Continued

Table 36--Production of feeds other than grain, potatoes, and protein meals, Poland, 1956/57-1970/71 and projections to 1980/81--Continued

Item	1965/66	1961/62-1965/66 average	1966/67	1967/68	1968/69	1969/70	1970/71	1966/67-1970/71 average	1980/81
	1,000 metric tons								
Hay:									
Serradella hay	808	600	582	647	525	442	621	563	465
Clover hay	3,989	3,510	4,683	4,314	4,934	3,731	4,474	4,427	5,838
Meadow hay	10,398	8,536	11,491	11,775	12,213	10,927	13,311	11,943	16,258
Corn for silage and green feed	3,175	3,374	3,742	4,553	3,949	4,110	5,684	4,408	5,710
Feed beets	6,605	6,214	7,173	8,198	8,407	7,180	8,182	7,828	11,308
Pasture area 1/	1,673	1,772	1,680	1,682	1,680	1,680	1,694	1,683	1,720
Usable pasture 1/	(17,900)	20,434	18,000	18,000	18,000	18,000	18,150	18,030	18,275
Sugarbeet tops and pulp 2/	10,836	10,063	11,985	13,658	13,024	9,962	11,212	11,968	14,230
Straw	25,510	23,528	10,657	10,117	9,203	10,090	8,500	9,713	10,000
Cultivated green feed	11,350	11,416	15,800	NA	NA	NA	NA	NA	NA
Catch crops	(5,200)	(4,978)	5,443	NA	NA	NA	NA	NA	NA
Feed pulses	412	352	385	359	271	273	298	317	244
Millfeeds 3/	1,003	1,011	1,015	990	978	977	969	986	877
Milk used for feed	5,606	5,366	5,841	6,162	6,211	5,931	6,168	6,063	7,233

NA = Not available.

1/ 1,000 hectares.

2/ 88 percent of sugarbeet production.

3/ Conversion factors from whole grains: Wheat--0.28; barley--0.40; rye--0.30; oats--0.50. Of this 55 percent is assumed to be utilized for feed.

Sources: (19, 40). Methodology for projections is given in appendix B.

Table 37.--Waste factors and oat unit conversion factors used in determining feed availabilities, Poland

Feed	Waste factor	Oat unit conversion
	Percent	
Wheat	5	115
Barley	5	115
Oats	5	100
Rye	5	115
Corn	5	130
Other grain	5	110
Sown hay	10	56
Meadow hay		45
Feed beets	10	12
Potatoes	15	33
Corn for silage and green feed		14
Soybean meal		129
Rapeseed meal		117
Linseed meal		108
Peanut meal		112
Other oilseed meal		112
Fishmeal		111
Sugarbeet tops		15
Straw	50	30
Feed pulses		120
Mill feeds	45	80
Cultivated green feed		20
Catch crops		15

Sources: (7, 40).

Table 38--Oat unit value of livestock feeds, Poland, 1956/57-1970/71 and projections to 1980/81

Item	1956/57	1957/58	1958/59	1959/60	1960/61	1956/57-1960/61 average	1961/62	1962/63	1963/64	1964/65
					1,000 metric tons					
Concentrates:										
Grain	5,811	6,972	8,114	9,115	9,022	7,807	10,146	8,636	9,508	9,042
Oilseed meal and fishmeal	133	231	133	229	354	216	254	408	335	489
Millfeeds	824	790	816	766	786	796	798	816	826	805
Feed pulses	484	342	412	331	383	3 390	446	427	403	342
Milk	582	619	693	739	765	680	795	784	769	778
Hay and straw:										
Cultivated hay	1,715	1,660	1,711	2,024	1,990	1,820	2,355	1,847	2,069	1,666
Meadow hay	3,142	3,179	3,515	3,496	3,667	3,399	4,128	3,486	3,559	3,353
Straw	4,023	4,131	4,036	3,998	3,921	4,022	3,493	4,273	4,189	4,389
Pasture and forage:										
Corn for silage and green feed	7,400	7,300	99	228	589	7.763	577	442	423	476
Pasture			5,087	5,060	5,311		6,013	5,076	5,169	4,810
Green feed			1,802	1,786	2,032		2,237	2,150	2,404	2,355
Catch crops			826	445	849		880	695	606	717
Potatoes	6,233	5,266	5,142	5,299	5,897	5,567	7,877	5,665	7,649	8,170
Feed root silage:										
Feed beets	469	550	605	370	548	508	624	568	742	708
Sugarbeet tops and pulp	848	1,006	1,112	788	1,354	1,021	1,733	1,330	1,407	1,660
Total feed	31,664	32,046	34,103	34,670	37,468	33,990	42,456	36,603	40,112	39,760
Total feed other than grain and protein meal	--	--	--	--	--	--	--	--	--	--

Continued

Table 38--Oat unit value of livestock feeds, Poland, 1956/57-1970/71 and projections to 1980/81--Continued

Item	1965/66	1961/62-1965/66 average	1966/67	1967/68	1968/69	1969/70	1970/71	1966/67-1970/71 average	1980/81
	1,000 metric tons								
Concentrates:									
Grain	10,650	9,596	10,334	11,026	12,372	13,910	11,840	11,840	---
Oilseed meal and fishmeal	618	441	611	805	900	689	965	794	---
Millfeeds	802	809	812	792	782	782	775	789	702
Feed pulses	494	422	462	431	325	328	358	380	293
Milk	834	792	871	919	927	934	946	919	1,150
Hay and straw:									
Cultivated hay	2,417	2,071	2,653	2,500	2,751	2,102	2,567	2,514	3,226
Meadow hay	4,679	3,841	5,170	5,298	5,495	4,917	5,989	5,374	6,934
Straw	3,324	3,934	3,197	3,035	2,761	3,027	(3,000)	(3,004)	3,000
Pasture and forage:									
Corn for silage and green feed, Pasture, Green crops, Catch crops	9,958	9,008	11,200	11,700	12,099	11,076	10,739	11,363	16,000
Potatoes	6,927	7,257	7,919	8,594	9,200	7,920	9,158	8,558	11,391
Feed root silage:									
Feed beets	713	671	775	885	908	775	884	845	1,221
Sugarbeet tops and pulp	1,625	1,551	1,798	2,048	1,954	1,494	1,682	1,795	2,134
Total feed	43,041	40,394	45,802	48,033	50,474	47,954	48,625	48,175	69,720
Total feed other than grain and protein meal	--	--	--	--	--	--	--	--	46,051

-- = Not available.

Sources: (7, 13, 19, 40). Methodology for projections is given in appendix B.

Table ".--June 1 livestock numbers used in calculating feed requirements, Poland, 1957-71 and projections to 1981

Year	Cattle	Swine	Sheep	Poultry 1/	Horses
			1,000 head		
1957.	8,265	12,325	4,355	58,130	2,623
1958.	8,210	11,959	4,160	61,560	2,733
1959.	8,353	11,209	4,057	64,990	2,839
1960.	8,695	12,615	3,935	68,420	2,805
1961.	9,168	13,434	3,760	71,958	2,730
Average . .	8,538	12,308	4,053	64,992	2,746
1962.	9,590	13,617	3,502	77,825	2,657
1963.	9,841	11,653	3,295	75,770	2,620
1964.	9,940	12,918	3,244	79,270	2,593
1965.	9,947	13,779	3,266	81,434	2,554
1966.	10,391	14,251	3,358	80,258	2,590
Average . .	9,941	13,243	3,333	78,917	2,603
1967.	10,767	14,232	3,502	81,026	2,643
1968.	10,940	13,911	3,491	80,117	2,672
1969.	11,049	14,356	3,413	84,269	2,633
1970.	10,844	13,446	3,374	85,498	2,585
1971.	11,076	15,243	3,355	88,852	2,501
Average . .	10,935	14,237	3,427	83,952	2,607
1981.	13,720	23,250	2,900	123,780	1,800

1/ January 1 inventory.

Source: (19). Methodology for projections is given in appendix B.

Table 40.--Feed consuming animal units based on June 1 livestock numbers, Poland, 1957-71 and projections to 1981

Year	Cattle	Swine	Sheep	Poultry	Horses	Total
	Feed consuming animal units 1/					
1957	18,811	9,182	1,381	3,139	6,639	39,152
1958	18,685	8,909	1,319	3,324	6,917	39,154
1959	19,011	8,350	1,286	3,509	7,186	39,342
1960	19,789	9,398	1,247	3,695	7,099	41,228
1961	20,866	10,008	1,192	3,880	6,909	42,855
Average	19,432	9,169	1,285	3,509	6,950	40,345
1962	21,827	10,144	1,110	4,202	6,725	44,008
1963	22,398	8,681	1,045	4,092	6,631	42,847
1964	22,623	9,624	1,028	4,280	6,563	44,118
1965	22,639	10,265	1,035	4,397	6,464	44,800
1966	23,647	10,616	1,064	4,335	6,553	46,215
Average	22,626	9,866	1,056	4,261	6,587	44,396
1967	24,505	10,602	1,110	4,375	6,686	47,278
1968	24,899	10,363	1,107	4,326	6,762	47,457
1969	25,147	10,695	1,082	4,550	6,664	48,138
1970	24,680	10,017	1,070	4,616	6,543	46,926
1971	25,208	11,356	1,064	4,798	6,330	48,756
Average	24,887	10,606	1,087	4,533	6,597	47,710
1981	31,229	17,321	919	6,684	4,556	60,709

1/ Converted from official midyear animal inventories with the following conversion factors from inventories to feed consuming animal units: Cattle, 2.276 feed consuming animal units/animal; swine, 0.745; sheep, 0.317; poultry, 0.054; horses, 2.531.

Source: (19). Methodology for projections is given in appendix B.

Table 41.-- Equations used to project nonfood use of selected agricultural products, Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation	Units	Projections to 1980
Total feed requirements	1956-70	.940	195.288	-407.963 +1.848 FCAU	1,000 oat units	71,460
Protein meal as percent of meal plus grain	1956-70	.772	.086	-187.048 + 3.714 T	Percent	10.9
Other Nonfood use of grain	1955-70	.653	1.713	-16,980 + 8.782 T	1,000 tons	408

1/ Adjusted for degrees of freedom.
2/ FCAU= feed consuming animal unit.
T= year.

Table 42--Proportion of protein meal to concentrates in the feed supply, Poland, 1956/57-1970/71 and projections to 1980/81 1/

Year	Percentage of protein meal in feed concentrates
	Percent
1956/57	2.2
1957/58	3.2
1958/59	1.6
1959/60	2.4
1960/61	3.8
1961/62	3.9
1962/63	3.7
1963/64	4.9
1964/65	6.4
1965/66	5.4
1966/67	7.2
1967/68	7.5
1968/69	5.3
1969/70	6.5
1970/71	6.4
1980/81	10.9

1/ Protein meal plus grain.
2/ Projected from the equation the percentage of protein meal in feed concentrates = -187.048 + 3.714 time (R^2 = .772).

Source: Table 38.

Table 43--Equations used to project livestock numbers in Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation 2/	Units	Projections to 1980
Cattle, Jan. 1	1955-70	.954	216.808	-4172.562 + 211.461 T	1,000 head	12,744
Cows, Jan. 1.	1955-70	.610	120.107	2972.687 + 44.147 T	1,000 head	6,312
Sheep, Jan. 1	1960-70	.040	172.452	3412.168 - 11.390 T	1,000 head	2,512
Goats, Jan. 1	1965-70	.835	6.243	738.904 - 8.285 T	1,000 head	83
Log poultry, Jan. 1	1955-70	.891	224.639	409.437 + 132.029 T	1,000 head	119,200
Log Hogs, Jan. 1	1953-73	.921	.021	.117 + .015 PHt-1	1,000 head	23,320
Hens, Jan 1	1955-70	.927	.123	- 3176.402 + 1.645 T	1,000 head	81,277
Log hogs, July 1	1953-73	.882	2.448	.886 + .014 PHt-1	1,000 head	23,250
Sheep, July 1	1960-70	.143	171.064	4691.357 - 22.109 T	1,000 head	3/ 2,900
Cattle, July 1	1955-70	.958	218.190	-4689.187 + 227. 292 T	1,000 head	3/13,721
Laying hens, annual average	1955-70	.812	314.206	-2870.125 + 142.558 T	1,000 head	85,350

1/ Adjusted for degrees of freedom.
2/ T = year.
PHt-1 = procurement price for meat-fat type hogs in the previous year.
3/ 1981.

Table 4.--Procurement price for fat-type hogs, Poland, 1954-72 and projections to 1973-81

Year	Price	Year	Price
	Zlotys per kilogram		Zlotys per kilogram
1954	9.60	1969	18.24
1955	9.73	1970	18.74
1956	9.89	1971	20.13
1957	12.38	1972	25.55
1958	15.17		
1959	14.65	1973	27.58
1960	14.85	1974	1/28.27
1961	15.54	1975	28.98
1962	16.04	1976	29.70
1963	16.00	1977	30.44
1964	16.53	1978	31.20
1965	17.31	1979	31.98
1966	17.81	1980	32.78
1967	17.80	1981	33.60
1968	18.14		

1/ Prices assumed to increase 2½ percent per year during 1974-81.

Source: (19).

Table 45.--Equations used to project Poland's meat production

Independent variable	Time period	R^2 1/	Standard error of estimate	Equation 2/	Unit	Projections to 1980
Beef production (live weight)	1955-70	.958	41.701	-2909.750 + 44.389 T	1,000 tons	1;557
Lamb production (live weight)	1960-70	.147	4.542	84.636 - .600 T	do.	36
Log poultry production (live weight)	1955-70	.984	15.747	-780.000 + 29.744 T	do.	400
Hogs: ratio of slaughter hogs to inventories	1955-70	.039	37.068	1038.562 - .541 T	Percent	.995
Hogs: average slaughter weight	1955-70	.409	2.282	142.125 - .413 T	Kilograms	109
Cattle: ratio of slaughter cattle to inventories	1955-70	.365	31.494	841.433 - 5.183 T	Percent	.426
Cattle: average slaughter weight	1955-70	.920	92.602	-2582.692 + 68.255 T	Kilograms	287.70
Production of other meat	1961-70	.904	50.035	-2042.139 + 53.921 T	1,000 tons	227.0

1/ Corrected for degrees of freedom.
2/ T= year

Table 46.--Ratios of the number of slaughter hogs and cattle to beginning year inventories and average live weight of slaughter hogs and cattle, Poland, 1956-70 and projections to 1980

Year	Ratio of slaughter hogs to January 1 numbers	Ratio of slaughter cattle to January 1 numbers	Average live weight of slaughter hogs	Average live weight of slaughter cattle
	- - - Percent - - -		- - - Kilograms - - -	
1956. . .	.997	.497	118	135
1957. . .	1.011	.523	123	118
1958. . .	1.013	.604	120	125
1959. . .	.959	.590	119	139
1960. . .	1.035	.557	120	144
1961. . .	1.085	.516	117	157
1962. . .	1.021	.520	115	171
1963. . .	.902	.502	113	181
1964. . .	.977	.509	117	192
1965. . .	1.014	.478	115	186
1966. . .	1.019	.463	117	192
1967. . .	1.016	.461	113	209
1968. . .	1.006	.485	113	213
1969. . .	1.013	.510	114	208
1970. . .	.990	.483	113	218
1975. . .	.998	.452	111	253
1980. . .	.995	.426	109	287

Table 47--Equations used to project per capita consumption of selected foods in Poland

Dependent variable	Time period	R^2 1/	Standard error	Equation 2/	Income Elasticity	Units	Projections 1975	Projections 1980
Per capita consumption of--								
Meat without fat	1960-70	.956	3.175	715.717 + 0.147 Y	+.565	1,000 tons	2,148	2,678
						Kg/person	63.2	74.8
Beef and veal	1960-70	.788	275.446	1265.953 + 0.514 Y	+.730	1,000 tons	627.5	812.9
						Kg/person	18.4	22.7
Pork	1960-70	.722	414.997	5339.970 + 0.648 Y	+.433	1,000 tons	1,165.5	1,399.2
						Kg/person	34.3	39.1
Lamb	1960-70	.045	21.473	234.987 -.004 Y	-.133	1,000 tons	23.5	18.2
						Kg/person	.7	.5
Poultry	1960-70	.970	33.343	-304.557 + .0.189 Y	+1.340	1,000 tons	153.7	221.8
						Kg/person	4.5	6.2
Meat without fat	1960-70	.982	2.231	.969 + .002 Y -.003 P_2	--	1000 Tons		
Beef and veal	1960-70	.736	32.692	148.364 + .461 Y +.066 P_2	--	1000 Tons	--	--
Pork	1960-70	.754	44.095	767.548 + 1.085 Y -3.112 P_3	--	1000 Tons	--	--
Milk products (excl. butter)	1960-70	.918	.425	166.991 + 4.256Y/N	.330	Kg/person	287	317
Butter	1960-70	.904	.020	2.010 + .182 Y/N	.611	Kg/person	7	9
Eggs	1960-70	.961	.324	77.914 + 4.852 Y/N	.519	Units/person	216	257
Potatoes	1960-70	991	36.583	267.511 - .032 Y/N	-.320	Kg/person	175	148
Cereals	1960-70	.953	.150	176.732 - 2.030 Y/N	-.210	Kg/person	176.3	166.3
Wheat	1960-70	.556	.382	2607.744 + 1.285 Y/N	.211	Kg/person	102.6	99.5
Rye	1960-70	.877	.257	3717.995 - 2.058 Y/N	-.430	Kg/person	64.7	58.4
Rice	1960-70	.127	.048	97.268 -.055 Y/N	-.438	Kg/person	2.0	2.1

1/ Adjusted for degrees of freedom.
2/ Y = income.
Y/N = per capita income.
P_1 = consumer price index for meat.
P_2 = consumer price for beef.
P_3 = consumer price for pork.

Table48.--Per capita consumption of selected foodstuffs, Poland, average 1956-60, 1961-65, 1966-70, and projections to 1980

Item	Unit	1956-60 average	1961-65 average	1966-70 average	1980
Per capita consumption of:					
Meat without fat	Kg./person	43.3	46.7	52.1	74.8
Beef	do.	10.0	12.3	14.2	22.7
Pork	do.	27.3	27.1	30.0	39.1
Lamb	do.	.9	.7	.7	.5
Poultry	do.	1.4	1.9	2.8	6.2
Other	do.	3.7	4.7	4.4	6.3
Milk products without butter	do.	227	237	260	317
Butter	do.	5.0	4.7	5.7	9
Eggs	Number	136	152	176	257
Potatoes	Kg./person	230	218	203	148
Cereals (grain equivalent)	do.	212	207	191	166
Wheat	do.	90	111	107	100
Rye	do.	111	89	75	58
Rice	do.	2	2	2	2
National income (1965 prices)	Zlotys	357.3	471.9	643.3	1,335.2
Midyear population	Thousands	28,739	30,627	32,002	35,800

Sources: (19, 33, 61).

REFERENCES

(1) Anonymous
Rolnictwo 1-15, July 1968.

(2) Champeau, Harold C.
Trip Notes of the U.S. Feed Grain-Soybean-Wheat Team Visit to Eastern Europe, October 30-November 9, 1971. (Unpublished)

(3) Curtis, Erle T.
"A Pattern for the Compensation of Americans in Foreign Countries," Labor Developments Abroad, Vol. 16, No. 6, June 1971.

(4) Czapkenski, Ryszard
"What Should be Changed in Grain Contracts?" Zycie Gospodarcze, JPRS 53621, June 6, 1971.

(5) Dudjenski, Wladyslaw
"Fertilizers-A Realistic Choice," Zycie Gospodarcze, No. 42, October 15, 1967.

(6) Dzennik, Ludony
Poultry Raising, JPRS Translation 52960, April 2, 1971.

(7) Fedorovic-Tome, Mihailo, and others
Norms and Tables for Animal Nutrition, Yugoslavia, 1967.

(8) Food and Agriculture Organization of the United Nations
World Grain Trade.

(9) _____
Food Balance Sheets, 1960-62, Rome, 1966.

(10) _____
Production Yearbook.

(11) _____
Technical Conversion Factors, 1960-62.

(12) _____
Agricultural Commodities--Projections for 1975 and 1985; Summary and Conclusions, General Outlook for Demand Production and Trade, and Projections by Commodity Groups, 1967.

(13) Foreign Agricultural Service
U.S. Dept. Agr., selected reports.

(14) Gierek, Edward
Speech by the First Secretary of the PZPR Central Committee at the September 9, 1971 National Conference of the First Secretaries of Powiat and Vojevodztwo Committee in Warsaw, Trybuna Ludu, September 10, 1971.

(15) Glos Szeczecinski No. 104
"Where Does Meat Disappear-Slimming Diet for Porkers," May 4, 1971.

(16) Glowny Urzad Statystyczny: Studia i Prace Statystyczny
"Budgets of Worker Families Employed in the Socialized Economy," 1969.

(17) _____
Polskiej Rzecypospolitej Ludowej, Rocznik Statystyki Handlu Zagranicznego, selected years.

(18) _____
Biuletyn Statystyczny, selected issues.

(19) _____
Rocznik Statystyczny, selected years.

(20) _____
Rolniczy Rocznik Statystyczny, Warsaw, 1966.

(21) Gomulka, Wladyslaw
Speech at the Congress of Agricultural Circles, Zycie Warsawy, December 9, 1966.

(22) Gospodarka Miesna
February 1970.

(23) Gucwa, Stanislaw
Article, Chlopska Droga, January 20, 1971.

(24) _____
"Key Problems of Agriculture and Social Progress in the Countryside," Trybuna Ludu, April 21, 1971.

(25) Ignar, Stefan
"Future Problems for Agriculture Foreseen," Wies Wspolczesna, March 1969.

(26) International Labor Office
Bulletin of Labor Statistics, Second quarter, 1971.

(27) International Symposium on Potato Waste
"Total Utilization of Potatoes Including Industrial Wastes Disposal," Fredericktop, New Brunswick, Canada, May 1965.

(28) ISTA Mielke and Company
Oil World (weekly) Hamburg, selected issues.

(29) Jacek, Krystyna
"Incomes of Collective, Private Farmers," Statystyczne Wiadomosci, June 1971, pp. 1-3. JPRS 53876.

(30) Jagielski, Dr. Mieczyslaw
"Development Trends in Agriculture in 1971-75," Polish Economic Survey 4, 1970.

(31) Jaroszewicz, Piotr
Speech of the Chairman of the Council of Ministers at the Sejm Session, Trybuna Ludu, March 20, 1971.

(32) _____
Assumptions and Proportions of the Plan-Subordinated to the Needs and Desires of Working People, Speech at the IV Plenum of the Central Committee, Trybuna Ludu No. 87, March 28, 1972.

(33) _____
Speech of the Chairman of the Council of Ministers at the Tenth Plenum of the PZPR Central Committee in Warsaw, June 24, 1971, Trybuna Ludu, JPRS Translation 53718, June 25, 1971.

(34) Kapitanowicz, Irena
"Contractual Improvements Explained to Farmers," Chlopska Droga, April 18, 1971.

(35) Kraus, T.
"The Influence of Governmental Policy Measures on Mineral Fertilizer Use in Poland," ECE Symposium of Economic Aspects of the Use of Mineral Fertilizers, May 27, 1966.

(36) Lewandowski, J.
"Labor Productivity in Agriculture Must Increase," Zycie Gospodarcze, JPRS 51472, September 9, 1970.

(37) Lipski, Witold
Agriculture in Poland, 1969.

(38) Madija, Aleksander
Investment Outlays During 1966-70, Wiadomosci Statystyczne Warsaw, August 20, 1971.

(39) Malinowski, Roman
Wies Wspolczesna, September 1972, p. 24.

(40) Mazurkiewicz, E.
"Krajowy Bilans Pasz," Panstwone Wydawnictwo Rolnicze i Lesne, Warsaw, 1969.

(41) Mozolowski, Andrzej and Zarzyski, Juliusz
"Suggestions Offered to Increase Meat Supplies," Perspektywy, March 26, 1971, pp. 29-31.

(42) Okuniewski, Jozef
"Acceleration of the Increase of Animal Production--The Main Task in 1971-75," Zycie Partii, FBIS, July 27, 1971.

(43) _____
Speech on Agricultural Developments before the Sixth PZPR Congress, Warsaw, December 9, 1971.

(44) PAP Dispatch
"Grain Imports Must Continue for Several More Years," Trybuna Ludu, February 9, 1971.

(45) _____
"Government Resolution on Procurement Price Changes for Animals and Milk," March 20, 1971.

(46) _____
"PAP Notes Plans to Reorganize State Farms," February 15, 1973.

(47) Pietrzykowski, Jozef
"Why Is There Still a Milk Shortage?" Zycie Gospodarcze, September 5, 1971.

(48) _____
"How to Increase Milk Production," Zycie Gospodarcze, JPRS Translation 54306, September 19, 1971.

(49) Plominski, Antoni
"Dairy Industry Needs Changes in Economic Policy," Zycie Gospodarcze, JPRS Translation 53024, March 21, 1971, p. 5.

(50) Polish Economic Survey #21, 1970.

(51) Przeglad Gospodarcze
Entire Economy Held Responsible for Food Production, JPRS Translation 53157, April 25, 1971.

(52) PZPR CC Politburo Work XI, PZPR CC Plenum, September 4, 1971.
"Programme of Development of Animal Production Preparations for Central Harvest Festival," Trybuna Ludu, August 28, 1971.

(53) Raczyk, Wlodzemierz
"Hog Production Plan for 1971-75," Przeglad Hodowlany, JPRS Translation 54814, October 1-15, 1971.

(54) Sczemberg, Anna
"Agrarian Changes," Zycie Gospodarcze, JPRS Translation 54476, October 3, 1971.

(55) Sejm of the Polish People's Republic
Resolutions of June 8, 1972 on the 5-year plan for Poland's Socio-Economic Development in 1971-75, Dziennik Ustaw No. 22, June 14, 1972.

(56) Sonta, Jerry
"Decree Encourages Higher Cattle Production," Przeglad Hodowlany, October 1-15, 1971.

(57) Spilsbury, Calvin C.
"The Market for U.S. Soybeans and Soybean Meal in Eastern Europe," U.S. Dept. Agr., Foreign Agricultural Service, FAS M-216, April 1970.

(58) Stepenski, Mieczyslaw
"The Exports of Foodstuffs in 1971-75," Warsaw, Handel Zagraniczny Polish, January 1972, pp. 23-26.

(59) Sztandu Mlodych
"More Meat--More Problems," July 27, 1972.

(60) U.S. Bureau of the Census
Estimates and Projections of the Population and Labor Force of the European Communist Countries 1950-1980. 1971.

(61) U.S. Feed Grains Council
Market Opportunities in Eastern Europe, April 1973.

(62) Wies Wspolczesna
"Private Farms and the Agricultural Situation," Editorial, December 1970.

(63) Wlodzimurz Raczyk
Hog Production Plan for 1971-75, Przeglad Hodowlany, Warsaw, October 1-15, 1971.

(64) Zawelski, Jan
"Mineral Fertilizers in Poland Up to 1975," Polish Economic Survey, November 13, 1970.

(65) Zotov, V. P.
Pishchevaya Promyshlennost Sovietskogo Soyuza, Moscow, 1958.

APPENDIX A: INSTITUTIONAL FACTORS INFLUENCING AGRICULTURAL PRODUCTION DURING 1956-70

Institutional factors have largely set the stage for agricultural output in Poland, but their influence is difficult to quantify. The farm structure, the Government-controlled marketing system, agricultural investment, and the labor supply must all be considered since they have tended to restrict output during 1956-70.

Farm Structure

The Polish Government must formulate its agricultural plans for a farm structure of 3.4 million small, fragmented private farms with limited resources side-by-side with 5,200 large state farms which could enter such large-scale enterprises as feedlots. Farm output gains are being made in both the private and socialized sectors.

Small private farms occupy 85 percent of Poland's arable land and supply 85 percent of the gross agricultural output (19). These farms employ an average of 1.4 persons each and have an average land area of 3.7 hectares. 1/ Some 3 million hectares of arable land are dispersed in a checkerboard pattern, meaning that 3-4 hectare farms often consist of several scattered plots. Fragmentation of Poland's agricultural land into small holdings is one of the main obstacles to efficient farming. The small farm size precludes efficient use of machinery and labor.

Nevertheless, private farms produced 84 percent of the grain in 1971, about the same proportion as their share of arable land and gross agricultural output. The average private farm produced about 4.4 tons of grain in 1971. In proportion to their share of land, private farmers are large producers of rye and oats.

Livestock are largely on the private farms, which have larger than proportionate shares of milk cows, hogs, and horses. The average private farm has three head of cattle and four hogs. Horses are necessary as draft power, while milk and pork provide cash for the small diversified farms. Income derived from milk represents an estimated 18 percent of the private farmers' earnings (47).

The 5,200 state farms--which are under the jurisdiction of the Polish Ministry of Agriculture--are largely in western Poland. They average 416 hectares of arable land, employ an average of 74 persons, and are small compared with state farms in other East European countries. A larger than proportionate share of wheat and barley is produced on state farms. The average state farm produced 500 tons of grain in 1971.

1/ According to (37), the law permits a private farmer to acquire up to 15 hectares of land and to establish new farms within that limit. The 1944 Law on Land Reform prohibited private ownership of more than 50-100 hectares, depending on the region.

State farms have 23 percent of Poland's cattle (other than cows). This disproportionately large share of "other cattle" on state farms indicates the emergence of a beef industry in Poland. As recently as 1960, the state farms' share of "other cattle" was only 15 percent. The average state farm has 330 head of cattle and 187 hogs.

Because of the large capital expenditures involved, further development of confined feeding operations will probably take place on state farms, which have the advantage of receiving preferential treatment for mixed feeds, breeding stock, and other inputs. There are also hog and beef fattening operations under the jurisdiction of the Meat Industry Central, an arm of the Polish Ministry of Agriculture.

Collective farms play a very minor role in Polish agriculture, with only 1.3 percent of the arable land. They average 194 hectares in size and employ an average of 55 workers. In 1971, they accounted for less than 2 percent of Poland's grain output and held about 1 percent of the livestock.

The remaining land is cultivated by agricultural circles. The importance of agricultural circles--Poland's quasi-official cooperatives--extends far beyond their land holdings. They are the principal vehicles for implementing agricultural policy toward private farms at the village level. These cooperatives, which operate in 90 percent of the villages and have a membership of half the peasant farms, have a long tradition in Poland. But since 1959, they have taken on a new role--their major activity has been the replacement of the now defunct machine tractor station system, which provided machine services to private farmers. 2/

Planning and Marketing

The Government, through its 5-year plans and manipulation of the marketing system and prices, still exerts considerable control over farmers' management decisions. Major policy statements covering such broad areas as agricultural structure, production, and finance are typically introduced at plenums and congresses of the Polish United Workers Party (PZPR--the Communist Party) or the United Peasant Party (ZSL). 3/ New policies are implemented through the approval

---

2/ The Fund for Agricultural Development (FAD)--consisting of the profits the Government made by paying less than real value for the compulsory deliveries of farm products--greatly enhanced the role of these organizations. Using capital from the fund to purchase tractors and farm machinery for the circles' common use, the agricultural circles became the principal means of channeling public investment funds into agriculture and introducing mechanization to private farms. (Since 1972, when compulsory deliveries were abolished, funding has been changed. The Government now includes in the farmers' property tax those funds representing the prices paid for purchases over and above compulsory deliveries. From this tax, payments are made to the Fund for Agricultural Development.) The agricultural circles are also engaged in cooperative purchasing of fertilizers and pesticides as well as agricultural processing and extension-type services.

3/ ZSL is second in importance to Poland's PZPR and is a co-ruling party, rather than an opposition party. Its membership is drawn largely from the peasant population and intelligentsia of rural origin.

of the Sejm (the Polish parliament) or through decrees issued by the ministries--the Ministry of Agriculture or the Ministry of Food Industry and State Purchase.

Moreover, the state controls over 1,064,000 hectares of land in the State Land Fund (SLF). This land has been acquired from farmers who have retired or otherwise discontinued farming. Three-fourths of the SLF is leased back to other farms. Much of this land is leased to so-called landless individuals, farmers who have tenure but no clear legally recognized title to all or part of their farms.

The Polish Government's attitude toward agricultural investment has also had a profound effect on agricultural expansion. The share of total investment in agriculture increased from 12 percent in 1956-60 to 15 percent in 1966-70 (a portion comparable to that in other East European countries). Over the 5-year period 1966-70, 161 billion zlotys (in 1971 prices) were invested in agriculture, two-thirds of which was from centralized funding.

As of January 1, 1972, the compulsory delivery system was terminated. But the Government still exerts considerable control through the marketing system. Nearly three-fourths of the grain production is either used on the producing farm or sold on the free market. But through the procurement system, which absorbs the other one-fourth of production, the Government retains a measure of control over the farmers' adherence to production plans and can obtain sufficient grain for its distribution channels. Moreover, the Government in setting its procurement plans decides residually how much grain is left on the farm for feed use.

During 1966-70, grain procurements reached 4.3 million tons, or 25 percent of production, compared with 2.4 million tons or 17 percent of production in 1956-60. During the early 1960's, the increased production of the major grains remained on the farms. Between 1966 and 1970, however, the production increases were absorbed by the Government procurement system. The quantity of grain left on farms increased only moderately, from 11.6 million tons during 1956-60 to 12.7 million tons in 1966-70 (table 5). 4/

Although Government procurement of each of the major grains increased since 1956-60, procurements of wheat increased the most rapidly, tripling between 1956-60 and 1966-70 and making wheat the most heavily procured grain. 5/ Wheat and rye constituted about three-fourths of total procurements in 1966-70, followed by barley, 13 percent, and oats, only 6 percent. Current grain procurement methods include (1) contract sales to purchasing organizations of the Ministry of Food Industry and Procurements, and (2) non-contract (or so-called market) sales.

The contract system has been in existence since 1949, but contracting has really gained impetus only since 1966. In 1971, 31 percent of the state's grain purchases were by contract. Grain contracts are based on area rather

4/ There are indications that since 1970/71, the grain procurements are a declining share of production again--running between 22 and 26 percent.
5/ In terms of Government procurement as a percent of production.

than production. Per hectare deliveries from the contracted land are determined by its production capabilities. The minimum quantity of grain delivered per contract hectare ranges from 8 to 15 quintals, depending on soil quality. Contract prices are set at an attractive level (well above the former compulsory delivery price, but still below the free market price). As an added incentive, fertilizer used on the contracted land is sold at a reduced price to the farmer. Moreover, free transportation of grain from the farms to the procurement points is provided to farms delivering more than 3 metric tons to the state. Commencing with the 1972 crop, grain purchase contracts covered deliveries for periods of 3 to 5 years.

In addition to the grain contracts, the state purchases grain by the "non-contract" system. This method accounted for about one-sixth of the procurement in 1971. Prices are set at or just below the level of the basic contract grain price. Beginning in 1972, however, a cash bonus of 50 zlotys per kilogram of grain delivered in excess of the minimum contract quantity was paid.

Until the compulsory delivery system was abolished, farmers had to sell a specified amount of grain by this method and any contract sales were over and above this basic amount. In 1971, the last year of obligatory deliveries, 23 percent of the grain entering state marketing channels was obtained in this way, while an additional 30 percent was delivered from state farms the same year. Grain is also traded in the free market which exists outside of the Government procurement network. State buyers may also purchase grain on the free market.

In 1971, farm prices of the principal grains were as follows:

Product	Average 1/	Government purchase				Free market
		Compulsory delivery	Contract	State farm	Non-contract	
		Zlotys/quintal				
Wheat	372	240	407	403	387	467
Rye	245	188	304	300	303	370
Barley	361	245	387	345	338	390
Oats	244	160	294	172	286	366

1/ Excluding that paid to state farms.

Livestock products are procured by the Government, but at a much heavier rate than grain. In 1966-70, about 2 million tons of livestock, or 68 percent of production, was purchased by the Polish Government (table 5). Beef continues to be the most heavily purchased livestock product, with 90 percent of production entering the Government marketing system. Increasing amounts of livestock products are remaining on the farms, or being sold outside the Government procurement system, but the on-farm share of output has stabilized or fallen. Since 1956-60, calves and eggs have been the only livestock products with a growing share of production staying on farms.

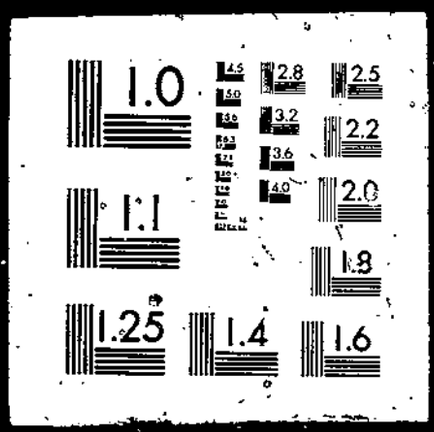
PB84-149962

FAER-99 FEED-LIVESTOCK ECONOMY OF POLAND: PROSPECTS TO 1980, / H. C. COLLINS ECONOMIC RESEARCH SERVICE, WASHINGTON, DC. FOREIGN DEMAND AND COMPETITION DIV. JAN 75 103P

2 OF 2

PB84

149962



Until January 1, 1972, procurement methods for livestock products included contract sales to purchasing organizations of the Ministry of Food Industry and Procurements, non-contract sales, and compulsory deliveries. In 1971, 47 percent of the cattle entering the state marketing system were obtained by contract purchases, 5 percent by non-contract purchases, 21 percent by obligatory deliveries, and 27 percent by deliveries from state farms. In contrast, 84 percent of the hogs were contracted, 7 percent procured through compulsory deliveries, and 9 percent delivered from state farms.

The offer of higher prices for livestock products, coupled with guaranteed availability of specified amounts of feed concentrates at fixed prices, have made contracts attractive alternatives to other means of purchase. The contract system embraces the purchase of cattle, calves, hogs, sheep, and poultry, but not horses.

In non-contract purchases, prices paid for livestock are slightly below contract prices. In the early 1960's, non-contract purchases were more prevalent, giving the state another mechanism besides compulsory deliveries for procurement. Currently, the non-contract system is seldom used for livestock.

The exacting of compulsory deliveries at minimal prices was basic to the Government procurement system. Farmers sold a specified amount of livestock products by the compulsory delivery system, and any contract sales were made after these compulsory quotas were met. Calves were subject to the heaviest obligatory delivery rate. In contrast, obligatory deliveries of milk were abolished in 1957.

In addition to the state procurement system, farmers trade in free markets. Young pigs, draft horses, and milk cows very often do not enter Government trading channels at all.

The complicated livestock marketing structure was accompanied by a complex price system. Until March 1971, the price system included regional price differentials for cattle, hogs, and milk. Currently, a uniform nationwide price system--with quality differentials only--is in effect.

Average prices in 1971 for leading livestock products are shown on the following page.

Labor

Labor is one factor of production which Polish agriculture has in abundance. Nearly 37 percent of the labor force was engaged in agriculture in 1970. People are only slowly leaving the rural areas. The 1970 farm labor force was 87 percent of the 1955 level, and the number of persons working in agriculture will remain near the current level well through 1975. Nevertheless, Poland does have an aging farm population (36). In 1966, more than 23 percent of the farms were held by persons 60 years and older, compared with 18 percent in 1950. Although a high portion of the population is locked into agriculture, a decline in the labor force would mean increased pressure for larger investment at a time when investment demands are too large relative to available capital resources.

Product	Average	Compulsory delivery	Contract	Free market	State farm	Non-contract
			Zlotys/kilogram 1/			
Cattle	12.77	4.65	16.70	---	18.2	---
Calves	13.28	12.41	---	---	---	---
Hogs, meat lard type	25.55	10.68	26.91		29.33	24.10
Hogs, bacon type	27.28	13.01	---	28.01	28.48	28.72
Chickens	26.87	---	---	---	---	---
			Zlotys/liter			
Milk	3.06	---	---	---	3.00	---
			Zlotys/unit			
Eggs	1.70	---	---	---	1.79	---

1/ In 1971 prices, 24 zlotys = U.S.$1.00; in 1973 prices, 19.87 zlotys = U.S.$1.00.

The large supply of labor on private farms has allowed them to pursue such enterprises as dairying, one of the most intensive sectors of livestock production. Some 140 manhours are needed annually per milk cow (even if milking machines are used and the herd numbers 15 cows or more), while some 30-40 manhours are required per head of cattle raised for beef (48).

APPENDIX B: METHODOLOGY

To establish the base for projection, economic characteristics and policies of Poland during the 1956-70 base period are briefly assessed and estimates made for rates of population and national income growth.

Statistical analyses are used to measure the upcoming changes in Polish agriculture. Grain production projections are based on yield response to fertilizers; meat production is related to time and farm prices. Food use of these products is a function of income, while feed use is a function of livestock numbers and estimated feeding rates. Detailed methodology notes for this study are given below.

Crop production--Grain production was projected to 1980 and compared with official Polish 1975 plans.

Projections of grain production were based on separate functions for yields and planted areas of the individual grains. Yield projections were derived from regression analyses (tables 32 and 33). Corn, millet, and buckwheat areas, however, were held constant. While these minor grains are declining, they are expected to stabilize at a low level, rather than disappear completely. In the grain yield projections, weather variables were taken into account even though normal levels of precipitation and soil moisture were used for 1975 and 1980. These variables were incorporated in order to make the model useful in predicting year-to-year yield fluctuations. In addition to the fertilizer weather models used to project yields in this study, alternative methodologies were tested, including time weather models (for example, winter wheat yield is a function of time, April soil moisture, June soil moisture, October soil moisture) and time trends. Fertilizer application projections were largely based on time trends or log time functions (table 34).

Grain use--Supply and distribution tables were used to determine the feed use of grain (tables 18-20). Other uses were accounted for by the following methodologies:

(1) The following seeding rates were used to determine seed use:

Grain	Kilograms/hectare
Wheat	190
Rye	185
Barley	175
Oats	185
Corn for grain	25
Corn for forage	35
Mixed grain	185
Millet	100
Buckwheat	100

Typical rates on wheat and other grains were determined from balances in (20, pp. 107-108). The typical rate on total grains was used for mixed grain. Rates for barley and oats are from (11, p. 239).

(2) An arbitrary 5 percent of production was allocated to waste for all grains.

(3) Food use was calculated from the official data of per capita consumption multiplied by midyear population.

Because flour consumption is given on a milled basis, the following conversion factors were used for whole grain equivalents:

Grain	Percent
Wheat	72
Rye	70
Barley	60
Oats	50
Other grains	60

These are based on (9). In other grains, 50 percent of the millet and buckwheat was assumed to be used as food.

(4) The principal industrial uses for grain were malt (barley) and grain alcohol (rye). It was assumed that barley converts to malt at 76 percent and 1 ton of grain produces 300 liters of alcohol; about 16 percent of the alcohol came from rye (65, p. 11). To project industrial use of grain, the time trend from 1955-70 data was extended to 1975 and 1980.

(5) During 1956-70, feed use was estimated as the residual of production plus imports less exports, seed use, industrial use, food use, and waste. The projection of feed use of grain is given on pages 22 and 23.

Nongrain Feed Production and Utilization Projections

Meadow hay, cultivated hay, pasture, silage, catch crops, potatoes, feed beets, sugarbeets, and milk were selected as the nongrain feeds to be considered in projecting livestock production. These feeds were chosen to be consistent with the list of feeds incorporated into the GUS feed balance as published in (40, table 32). Where production data were available the official series given in the Polish yearbook was used. Projections of nongrain feeds were mostly extensions of the 1955-70 and 1960-70 linear trends of area and production (table 37). Except for oilseed meal, some losses were taken into account when determining feed availabilities (table 37). Supply and distribution tables were used in determining the feed use of oilseeds and potatoes (tables 21 and 23). The conversion factors used in converting oilseeds to oilseed meal equivalents were from (28). Oilseeds were converted at the rates of 1 kg. soybeans = 0.79 kg. soybean meal, 1 kg. of rapeseed = 0.57 kg. rapeseed meal, 1 kg. linseed = 0.64 kg. linseed meal, 1 kg. peanuts = 0.56 kg. peanut meal, and 1 kg. of other oilseeds = 0.60 kg. other oilseed meal.

In determining feed use of potatoes according to a supply and distribution table, the following methodological notes apply:

(1) For seed use, a seeding rate of 2,000 kilograms per hectare was applied, based on (9).

(2) An arbitrary 15 percent of production was allocated to waste, the same as in (9).

(3) Industrial use of potatoes includes manufacture of potato starch and alcohol. An arbitrary allowance of 60 percent of alcohol production is allotted to potatoes based on (27).

The conversion rate of 110 liters of alcohol per ton of potatoes is based on Soviet rates in (65, p. 111). For potato starch, a processing coefficient of 18 percent was used, based on (11, p. 240).

An arbitrary allowance of 500,000 tons for other industrial uses of potatoes is based on the average difference between potatoes for starch and alcohol in these balances and industrial use in balances in (20, p. 108).

Food use was calculated from the official data of per capita consumption multiplied by midyear population.

Feed use of potatoes was estimated to be the residual of production plus imports less exports, seed use, manufacturing use, food use, and waste. For other feeds, production less waste was assumed to be the amount available for livestock feed (tables 36 and 37).

Grain and Protein Meal Feed Use Projections

To project grain and protein meal feed use, the historical (1956-70) feed supply of grain and oilseed meal was added to the historical supply of non-grain feeds (table 36). To make all feeds additive, every feed was converted to an oat unit equivalent as given in tables 37 and 38. To project total feed requirements, the oat unit value of the feed supply was related to feed consuming animal units (units to make midyear inventories of cattle, swine, sheep, poultry, and horses additive) as given in tables 39 and 40. These values were based on the relationship between the average livestock numbers and the oat units allocated to each category of livestock in (20) for 1961/62-1965/66. The methodology for projecting midyear livestock numbers is given in table 43. Projections for feed requirements based on feed consuming animal units are 71,460 oat units in 1980/81. 6/

The obtaining of grain used for feed and other uses, in terms of tons, from total feed requirements, in terms of oat units, is an arithmetic process, given in the following table:

6/ From the equation: Total feed requirements = -4072.963 + 1,848 feed consuming animal units (R^2 = .940).

Item	1980 projection	Source
Total feed requirements	71,460 oat units	Table 43
Less feed supplies from feeds other than grain and protein meal	46,051 "	Table 40
Grain and protein requirements	25,410 "	--
Grain requirements	22,640 "	
Protein requirements	2,770 "	Table 44
Grain requirements for feed	19,658,000 tons	: 115; Table 39
Protein requirements for feed	2,130,000 "	: 130; Table 39

To project total grain requirements, the grain requirements for feed were added to other uses (table 18).

Grain use	1980
	1,000 tons
Feed	19,688
Seed	1,595
Nonfood manufacture	409
Food	5,554
Waste	1,241
Total	28,487

Total grain use less total grain production yields the net grain imports required in 1980/81 of 3.3 million tons.

Analogously, total meal use less total meal production as given in table 21 gave the projected protein meal net imports of 1,423,000 tons in 1980.

Livestock Numbers Projections

Except for hog numbers, projections for livestock were linear or curvilinear extensions of the historic time trends. Because so many of the 1971 policy changes--including large farm price increases--were aimed at hog production, projections of hog numbers were based on the farm price for meat-fat type hogs. After 1972 it was assumed that prices would increase 2½ percent per annum. On these bases midyear and beginning year livestock numbers were projected (table 43). Horse numbers were assumed to be declining 3 percent per annum.

Meat Production Projections

As with livestock numbers, projections for meat were also linear or curvilinear extensions of historic time trends (table 45). Pork production was

based on projected beginning year hog numbers times projected ratio of slaughter animals to beginning year inventories, times average slaughter weight (table 45).

Milk and egg production estimates are also extensions of time trends.

Meat Utilization

Official meat production data are given on a live weight basis (including exports of live animals) or carcass weight basis including fats. To permit construction of a balance of the production, consumption, and trade of the individual meats, the carcass weight equivalent of meat (excluding fats but including offals) was estimated (tables 10, 11, 15, 16, 17).

Livestock number and meat production projections were made separately and compared by taking slaughtering rates, slaughter weights, and live weight/slaughter weight conversion factors into consideration (tables 2, 46).

To project meat consumption, per capita meat consumption was related to per capita national income (table 47). Projections of meat trade were the difference between production and use. National income data originated from (19) and projections were based on the Polish national plans (33). Population statistics were from (60).

END

FILMED

DATE

3-23-84

NTIS