

SOVIET UTILIZATION OF FOOD:
FOCUS ON MEAT AND DAIRY PROCESSING

Kenneth Gray
U.S. Department of Agriculture

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The Soviet Union is the world's largest producer of cow's milk, but only 60% of the protein in this milk is consumed directly by humans. The fraction that is lost is equivalent to 65% of the value of the total protein in all meats of all types that Russians consume. The comparable fraction of protein in US-produced milk that is consumed by humans is over 90%. Also, although the USSR is obviously a great milk-producing nation, it converts only about 7% of its milk to hard, whole-milk cheese. The comparable figure for the European Economic Community (EEC) is 24%.

This paper is about the Soviet Union's current desire to extend processing and increase the utilization, or final usability, of food production for its citizens. In a report to the 27th CPSU Congress, General Secretary Gorbachev noted that reducing field and farm product losses during harvest, transportation, storage and processing could increase food consumption in general by 20%. Gorbachev reported a belief that the expenditures to eliminate losses after production were one-half to one-third of the cost of having farms produce more raw materials.²

The new Party Program, in a section entitled, "structural reorientation of social production," emphasizes a general reorientation of investment for the economy as a whole toward processing and consuming branches and away from extractive and primary industries.

Accordingly, the current Soviet plan for the Soviet food complex decreases the share of investment that is destined for farm production itself, but keeps investment in the food complex at one-third of total investment. Thus investment in food processing is to increase, with a priority for investment in machine-building for the food industries.

The next two sections of this essay use United Nations data to examine Soviet meat and milk utilization and compare the Soviet position as producer, processor, and consumer with other nations. The last section of the paper presents a critical evaluation of current Soviet plans to correct problems in the food industry through new plan directions.

The question is: What can we learn about the Soviet food complex by comparing it with the experiences of the rest of the world? Another question is: What do Soviet experts learn from such comparisons? This is an old Soviet tradition, beginning with Lenin's writings on American agriculture, and it is certainly a practice that has been continued in the USSR in the past several years and impacts upon the current five-year plan.

How useful is information about foreign experience to Russian policy makers? Looking at Western agribusiness or food complexes, the Russians can see fully-functional, integral systems. The products, equipment and processes of Western agribusiness are visible, but the complex, interdependent "circuitry" behind what is visible often is not. Some Soviet adaptations, such as the modern poultry industry, have been successful, but others often have failed frequently because this invisible circuitry was overlooked.

"Missing" or weak products, industries, and so forth, which have not been thought of or nurtured by the Soviet planning system, have been called "x-products" and "x-industries." There are very many of them, and they are interconnected and "wired in series" among themselves. In the present case, many of these "x-activities" involve light industry and trade; they are the activities of transporting commodities through time and space. They are activities which Soviet planning has typically eschewed.

In addition to comparative data available from the United Nations statistical agencies and published Soviet writings, this paper utilizes yet another source: Interviews conducted with former Soviet citizens who, before

emigrating during the later half of the 1970s to the United States, worked in various positions, mostly technical, in the Soviet meat and milk processing industry. This information adds a flavor of reality to what could otherwise be an excessively academic treatment, and it provides a quite unofficial, eyewitness view. The view indicates that, although there is promise of improving food provision through increased attention paid to processing, the seeds of diminishing returns are already apparent in processing.

Meat Production and Utilization

Milk and meat are joint in production, and meat and milk products are also substitutes in consumption. Dairy utilization cannot be discussed apart from meat utilization.

The commonly-held view of the Soviet meat situation is one of shortages and lags well behind expectation and plan. International comparisons modify this view a great deal. By the second half of the 1970s, despite the "plateau" in production growth, per capita meat consumption was only about one-half that of the US, but it was "not that bad" when compared with European consumption patterns. While nations such as France, Belgium and the GDR consumed half again as much meat per capita as the USSR, some rather rich nations, such as the United Kingdom and Sweden, consumed only 10% to 15% more.³

Much of the very apparent "shortage" of meat in the Soviet Union is explained by the official policy of fixed retail prices, which have not changed from the nominal level of 1963.

Table 1 shows the standing of the USSR in the relative, per capita consumption of beef, pork, poultry, sheep and total meat according to Economic Commission for Europe (ECE) data for 1981-83. By 1975-79, Soviet beef consumption had reached 25.5 kilos, up 7.5 from the 1966-68 level. The USSR,

in beef consumption in 1981-83, ranked 6th of 26 European countries. Total consumption of red meat and poultry of 55.8 kilograms (ECE definitions) placed USSR consumption 22nd of 25 European nations, but it was nonetheless within 20% of the median value. Per capita meat consumption has continued to grow each year since 1983.⁴

The utilization issues which are prominent in the Soviet meat-processing journal, Miasnia Industriia, involve the problem of deboning carcasses more thoroughly and the processing of bone and boullion into usable products. One also finds much discussion of additives to *kolbassa* recipes, especially soy flour and dried milk.

But cost reduction dominates most discussions of meat industry economics. The main issues are economies of scale, seasonality, and average weight of animals. Newer and larger-scale plants are viewed as reducing the cost of processing and yielding higher deboning rates as well as higher-value *kolbassa*. Extreme seasonality is seen as undesirable because it forces older, smaller plants into operation in the peak periods. Heavier carcasses are viewed as very advantageous to a meat *kombinant*, for the effective constraint on production of a meat *kombinant* is the number of animals it can slaughter, not the total weight of meat obtained. Storage is also seen as a very considerable constraint on production.⁵

While aggregate utilization issues are not nearly as significant in Soviet discussions of meat processing as they are in discussions of dairy processing, there are many neglected "x" activities, which should concern Soviet authorities.

Annual, per capita data aggregate across a time dimension as well as a geographical dimension, and it is quite obvious that the provision of meat in the Soviet Union is very much unlike the provision of Western countries on both counts. Geographic imbalance is a problem which concerns almost all food

products in the USSR because so much less is spent on packaging, storage, and transportation. These activities affect only trade indices, which count for much less in a nation where managers are oriented toward production and fulfillment of aggregate production indices.

Despite much private and collective-farm market activity, it is quite obvious from both published and unpublished Soviet reports that some areas of the USSR are very much better supplied than others. An average 58 kilograms of meat per person in a country, if maldistributed, is obviously not the same as a situation in which 58 kilograms are available to everyone with the necessary effective demand. Redistribution activities by middlemen in Western economies do add value for this reason, and this is one positive function of the second economy in the Soviet Union.⁶

The aggregation of overall meat measurements over time can mask quite serious flaws. Fifty-eight kilograms of meat available only in spurts are not of the same utility as the same amount made continuously and consistently available at market-clearing prices. Data on seasonal variations in retail sales are not known to this author. However, seasonality and day-to-day interruption in meat supplies, even in well-provisioned cities, are well-known problems.

Figures 1 and 2 show the monthly distribution of meat procurement in the USSR and contrasts this with the much smoother production of meat in the USA. Emigrants from the USSR also speak of great seasonality of work in meat-packing plants (especially the smaller ones which do not have priority access to frozen imported carcasses). They speak of farms "not wanting" to sell when they have feed available, and wanting to sell when they do not. These variations are reflected in the figures.

Part of the Soviet discussion of the reasons for the untamed seasonal supply of animals relates to the elimination of seasonal price variation since 1962.⁷ Certainly, in market economies of the West prices for slaughter animals vary greatly over time, while quantities supplied are steady from month to month. The absence of this pattern in the USSR reflects an obsession with production, and a disinterest in smooth monthly supply to consumers.

As *kolbassa* normally keeps better than unprocessed meat, the absence of an adequate infrastructure at the wholesaling level and of large home refrigerators help explain current plans to increase its share in total output. (Also, *kolbassa* is more remunerative than meat cuts, for it lends itself to processing with less expensive extenders, and variations in formula create new types which can disguise subtle price increases.)

The constant pressure of unsatisfied demand for meat has caused some recent improvements in feed and in its utilization. It has also focused attention on "reserves" implicit in the non-utilization or poor utilization of produced milk.

Milk Utilization in International Comparison

The United Nations Food and Agriculture Organization's Food Balance Sheets for 1975-1977 and for 1979-81 and the United Nations Economic Commission for Europe's publications offer an opportunity to compare the utilization of the nutrient components of milk across a large number of countries, including the Soviet Union. Soviet analysts have themselves made frequent comparisons of Soviet and world dairy practice, and these observations have no doubt contributed to their plans to increase the effective utilization of milk.⁸ Tables 2 through 12 present comparisons of Soviet milk production, consumption, processing rates, and so forth, with levels in many other countries.

Looking at data published annually in the official Soviet statistical yearbook, Narodnoe khoziaistvo SSSR, one readily finds that per capita consumption of "milk and milk products, calculated in terms of milk" is reported (deceptively) to be over 300 kilograms per year, which is greater than US per capita consumption.⁹ In 1975, for instance, 316 kilograms of milk and its products, "converted to milk," were reported consumed. This was very near the goal of 330-340 kilos set for 1990 for the USSR.

Given the Soviet population of 1975 and total milk production of 90.8 million tons, the implied utilization rate of milk consumption is quite high: 88.5% of "milk" was "consumed." This is consistent roughly with the Soviet report to the ECE that somewhat over 10% of milk was fed to livestock.¹⁰ The fact is, however, that while approximately 85% of all butter fat in cows' milk produced in the Soviet Union is consumed by humans, human utilization rates of other major milk solids are substantially less.¹¹

Soviet estimates for the early 1980s roughly corroborate estimates which had been made by FAO, together with the Economic Commission for Europe, on the basis of piecemeal published Soviet information. According to FAO/ECE, at least 38% of Soviet milk protein is fed to animals and 4% is wasted entirely.¹²

Milk protein is a balanced, high quality protein of a value equal to meat protein and superior to plant proteins in that it contains all essential amino acids. The amount of milk protein (principally casein) which is lost to direct Soviet consumption after the butterfat is removed is significant. In 1975-77, it was approximately 1.3 million metric tons, or 12.9 grams per person. This amount was equal to approximately 65% of all the protein in the meat and offal consumed by Soviet citizens in 1976.¹³

Tables 7 and 8 show the extent of milk protein consumed in the USSR and in various countries and major regions of the world. Soviet per capita

consumption is approximately equal to the average for the group of "all developed countries," but, partly because of its better utilization, per capita consumption of milk protein in various forms is greater in Western Europe, Oceania, and Developed North America than in the Soviet Union. In North America, a 40% greater level of utilization is attained despite smaller per capita milk production rates. Very little raw or skimmed milk is either fed to animals or wasted.¹⁴

Tables 8 and 9 compare how milk was utilized in the USSR, Eastern Europe, and Northwest and Southern Europe. "Processing rates" are calculated in Table 8 as kilograms of each product, per ton of total milk produced. The Soviet processing rate for butter alone is the only one of the rates in Table 8 which is in the "ball park" of attainments in Northwest Europe. Four to five times more skim milk powder and cheese are obtained there for each ton of milk produced than in the USSR, and Eastern Europe produces two to three times more of these products for its given milk production. Southern Europe has a lower processing rate for skim milk powder, but this goes along with this region's lesser interest in butter production; the rate of processing milk into cheese is consequently almost six times larger than for Russia.

In the United States, over 90% of the protein in milk is consumed by humans directly in milk products or as dried milk powders used in other foods. In recent years this has amounted to a fairly constant 22 grams of milk protein per day per person, equivalent to the protein present in the average amount of beef consumed per day.

In the USSR, by contrast, where more milk is produced per capita, but a smaller percent of its protein is utilized, per capita daily protein consumption was only 17.6 grams in 1975-77, and it dropped to 16 grams in 1979-81, due to a slump in Soviet milk production and an increase in population.

What explains the 5 to 6 grams per day difference in the diet of an average American versus that of his Russian counterpart? Liquid milk consumption in both countries is about the same (though Soviet liquid milk is more varied in mix). Consumption of cheese made from skim milk is about the same if one counts Russian curd, or cottage cheese. (The Russians consume more cottage cheese, or *tvorog*, and less low-fat mozzarella, etc.) The difference is found in America's greater consumption of whole-milk cheese and of products fortified with skim-milk powder. In the mid-1970s, the typical American consumed yearly 1.5 kilograms of protein in the form of dried skim milk that had been incorporated into manufactured foods. This source was insignificant for human consumption in the Soviet Union.

These comparisons suggest that Soviet utilization of milk protein is relatively poor. This is true relative to the USA, but it is necessary to control for environmental factors. Data from other countries suggest a different view.¹⁵ In 1979-81, there were a number of nations (Table 7) in Europe where the daily per capita consumption of milk protein was less than in the USSR. In addition, a number of West European nations (particularly those with the highest production per capita of milk) had lower direct human milk protein utilization rates than the USSR. (The underlined above is simply the protein consumed by citizens of a country divided by the production of milk protein. No account is taken of changes in stocks, trade, or milk fed and consumed indirectly as other livestock products.)

Consider also Canada, a nation with somewhat the same northern latitude and population density as the USSR, which has about the same per capita production of milk as the USA, and a protein utilization rate (64%) that is considerably lower.

Soviet Discussion of the Problem

Much of the above international comparisons, as well as an understanding of the reasons for the Soviet disadvantageous showing in them, may be found in recent Soviet published articles, in, for instance, the Gosplan journal, Planovoe khoziaisto and the Academy of Sciences journal, Voprosy ekonomiki.

Sergeev, noting a worldwide decline in the level of butterfat extraction per ton of raw milk of 28% and an increase in cheese produced per ton of 26%, complains that in Russia the basic focus of milk processing is still butter. According to him, even so, the rate of growth of butter production also slowed in the 1970s.

The problem has been attributed to four causes: (1) too much irrational use of milk as feed; (2) irrational price incentives; (3) inadequate milk balance accounting; and (4) inadequate investment in milk processing, relative to investment in milk production.¹⁶

Soviet industry reportedly processes (or uses in baking) only a little more than one-third of the skim milk and buttermilk it receives, and only 18% of the whey.¹⁷ These by-products have value as livestock feed and are used as such in many countries, particularly as a source of amino acids which are not present in vegetable proteins. Sergeev notes, however, that Soviet scientific norms for inclusion of milk in livestock rations are too high and, in any case, are exceeded in many periods of the year. Except as an additive source for balancing feed, such uses of milk as feed are not effective. Sergeev points to norms which show that one kilogram of milk protein requires 10 kilograms of vegetable protein to produce; the kilogram of milk, in turn, produces only 85 to 90 grams of protein if fed to cattle, or 145 to 150 grams of pork.¹⁸

To serve as an effective all-season feed additive, milk must be dried. Substitute whole milk (Russian: ZTsM) or a milk/cereal product

("calf-starter" products) are used in modern livestock husbandry to wean calves so that suckled milk is made more quickly available for commercial production. Thus, part of the solution to the problem of increasing the value of milk produced is to make it more valuable as feed.¹⁹

Sergeev points out that government milk reserves are determined by a balance calculated only in milk fat; this limited planning of milk use extends also to the "all-union fund," through which milk products are distributed among republics. The result is apparently a "lumpy" distribution pattern. "Each ton of 82.5% butter delivered is counted as 23.4 tons of milk and counted as just that much milk consumption in the receiving region, even though 22.4 tons of skim milk and buttermilk remain in the producing region."²⁰ (This accounting deficiency is also reflected in the butter-equivalent figures given each year in Narodnoe khoziaistvo.)

In addition to an accounting bias in planning, current commentary also cites faulty pricing as an impediment to further utilization of the non-fat solids of milk. Shlezhevichius says that the "existing price system and payment of subsidies encourages the use of all solid components of milk, except fat, as feed for livestock. The payment to suppliers for milk quality, based only upon fat (not protein), and the correspondingly low price for the by-product (returned to the farm), do not encourage its commercialization."²¹

Given current prices, the feeding of skim milk is inexpensive for the farm, perhaps less expensive per feed unit than any feed other than pasture and one single category of green feed.²² It may be too inexpensive. Calculating it as the cost of whole milk, prorated by the fraction of milk solids, skim milk costs 6 to 7.4 times the 10 rubles per ton which farms actually pay for it. This price is the same as it was in the 1960s; since then the price paid producers for whole milk had increased 2.3 times. Food processors pay 30 rubles per ton for skim milk.²³

The Soviet Campaign for Cheese

A major product which is much more significant in world usage than in Soviet practice is the utilization of milk as cheese. Tables 5, 8, 9, 10, and 11 present the contrast. Whereas 22% of milk produced in Western Europe was reportedly used for cheese-making in the 1970s, the reported figure for the USSR was 6 to 7%.²⁴

As a versatile source of quality protein, cheese has particular additional significance in the Soviet setting as a substitute which can be relatively easily stored and transported to compensate for the seasonal and geographical mal-distribution of meat.

It should be noted that Russians do consume amounts of tvorog equal to approximately the same amounts of whole-milk ripened cheese. Tvorog, sometimes translated as cottage cheese, but probably better translated as quark, can be made from either whole milk or skimmed milk, but is usually made from the latter. It is difficult to get data on tvorog production; apparently much of it is in the private sector. This unripened curd cheese is a first step on the way to the production of ripened "hard" cheeses. It appears, however, that "hard" cheese is almost never made privately. At least, this is what emigrants say, who also report that although other products, including tvorog, are sold on the farm market, сыр or cheese, (which is never taken to mean tvorog) never is.

In recent years, the journal of the dairy industry, Molochnaia promyshlennost', has been filled with articles about the priority of cheese.²⁵ The goal set for the end of the Food Program, 1990, is one million tons of cheese. Figure 3 shows the growth of cheese production since 1965. After faltering in 1980 and 1981, cheese production rose rapidly to almost 800 thousand tons, in 1982-1984. Production reached 814 thousand tons in 1985 and 844 thousand tons in 1986. Officials of the Ministry of Meat and Milk

Production write confidently that the goal of one million metric tons can be achieved by 1990.

Progress toward quite possible achievement of the 1990 goal for cheese production has depended equally upon investment in cheese production facilities and better quality milk. Some of the progress in milk quality (over 80% of State procured milk is now accepted as first class, an increase of 10%) must be attributed to the concentration of milk production upon fewer higher-yielding cows. More intensive and concentrated production makes it possible for milk to be handled more efficiently. In addition, during the 11th plan period, 50,000 facilities for the acceptance, purification, refrigeration and storage of milk were modernized and equipped in the RSFSR alone. Reports on the improvement of milk quality also cite the importance of expansion of rural roads: 50,000 kilometers of intrafarm hard surfaced roads were placed into service in 1981-85.²⁶

Storage, quality, and variety appear to be major problems of the cheese industry. An emigrant who worked in a cheese-storage and processed-cheese manufacturing establishment reports that there is pressure to turn out cheese that has been only slightly ripened. Molochnaia promyshlennost' reports that Uglich, the institute for cheese and butter research, has introduced a new method of ripening cheese in plastic film, which is supposed to shorten ripening time by one fourth and to be equivalent to increasing storage by 10 thousand tons per year. By 1983, 80% of cheese was so ripened.²⁷

Another article stresses that the production of certain varieties of cheese that do not need special storage should be increased. (These are soft and *rassol'nikh* cheeses which are 40% of production in France and the US, but only 14% currently in Russia.)²⁸

Apparently, the quality of Soviet cheese is already much improved; the State is reported to have stopped accepting cheese from 62 enterprises in 1983. The percent of cheese graded highest quality is said to have increased from about 60% in 1975 to 73% in 1983; the target is 80% by 1990.

A Shift in Dairy Products to Allow a Shift in Cattle Specialization?

R. P. Rudenko suggested in 1978 that future growth of beef production should be based on specialized beef types, since the demand for dairy products was more nearly met than that for meat.²⁹ Not all unutilized milk need be consumed directly for the Soviet diet to benefit. Better utilization of the milk that is produced could also allow an actual reduction in total milk production, thereby freeing some feed resources for meat production.

But here the role of butter attracts special attention, since almost all (some 85 to 90%) of the butterfat of the milk that is produced is used, and there is still a deficit. Given current demand, Table 12 indicates Soviet butter consumption is similar to all of Western Europe, but 10 to 25% lower than Northwest Europe and 70 to 75% less than consumption in Eastern Europe. Butter production would decline were a switch to beef animals engineered. Part of the solution lies in consuming less fat milk, cheese and butter. Part of the solution may also lie in margarine, the consumption of which in many countries is now much greater than that of butter (see Tables 12 and 13).³⁰

Soviet production of margarine apparently equaled that of butter in 1984; it was only 60% as large in 1960.³¹ Soviet margarine quality is reported as very poor. An emigrant who worked next to a margarine plant described it as "evil smelling." He thought the raw material used (animal & vegetable fats) were often spoiled. People bought margarine, he claimed, only because "there was no butter available," not because of lower relative price.

Investment Policy

The technology needed to utilize milk more fully includes improved and expanded refrigeration, transportation, processing and storage. The extent of the inadequacy of refrigeration and transportation is reflected in a recent comparison of the USSR as a whole with the more advanced republic of Estonia. For the USSR as a whole, only 43.6% of milk produced was cooled on the farm, whereas in Estonia 93.3% was cooled on the farm. Also, 23% of the total of milk sold to the government was collected from farms with specialized tank trucks for the USSR as a whole, against 72% in Estonia.³²

These figures, along with the low degree of processing of procured milk, reflect past investment policies. According to a recent article in an Academy of Science journal, the share of value added in the "third stage" of the milk sub-branch (i.e., processing and distribution) should be closer to 70% rather than the 53% it is currently. This same article notes that in the United States food complex in general, two-thirds of the value of food is added in stages beyond the farm gate.³³

The last (eleventh) five-year plan envisioned the growth between 1980 and 1985 of each of the following products:

whole milk products - 13%;
 cheese from whole milk - 31%;
 butter - 16%;
 dry whole milk - 22%;
 canned milk - 21%;
 dried skim milk and substitute whole milk for the feed
 industry - 90%³⁴

The following major projects were reported planned in the 11th plan: the re-equipping or reconstruction of 32% of total capacity in the milk and meat industry; 4 new meat-milk processing complexes; 70 fluid-milk dairies; 27 cheese factories, and 15 butter-making installations.³⁵ At the same time, however, the budget for capital investment in all of the enterprises of the Ministry for Meat and Milk Production, was to increase by only 6%.³⁶

Despite progress, there were early indications that all the investment planned for the milk and other food-processing industries would have to wait until the second part of the present Food Program, that is until the 12th five-year plan (1986-90). This was stated early in 1984 by Mikhail Gorbachev.³⁷ Sergeev noted in 1985 that construction plans for the dairy industry were not being met, and that available "funds" for 1984 were less than in 1983.³⁸

While investment plans appear increasingly difficult to fulfill, the apparent commitment of the Soviet authorities to an eventual re-equipment of food processing (presaging the current plan's emphasis) seemed to be reflected in the approximate doubling of the capital budget of branches producing equipment for food processing (and feed production) for 1983 over 1981.³⁹

In the 12th five-year plan (1986-90), 52% more is being invested in food processing branches of the food complex, and 79 % more is being invested in the meat and dairy industry, as compared to 1981-85.⁴⁰ Given the general outline of the Party Program and of the five-year plan as presented by Gorbachev and Ryzhkov at the Party Congress in March, 1986, it does appear that food processing has come of age.

Intensive Processing in the Twelfth Five-year Plan

"Maximum use of by-products" of extractive industries and agriculture is "one of the important tasks" of the new five-year plan.⁴¹ The Party Program itself, in a section called, "structural reorientation of social production," says:

A top priority is to improve relationships in capital investment in extractive, processing and consuming branches, that is, to effect a reallocation of resources to branches with rapid technological progress.⁴²

The key sector for Gorbachev, as emphasized in his speeches last year, announced in the November draft plan and reiterated in the final plan, is machine-building.⁴³ It is described as the "key" branch in the Party Program, because it is the complex in which technological progress is realized and the 12th five-year plan calls for an increase in capital investment of 1.8 fold. Machine building for the food industry is also to receive a large increase in resources in the 12th five-year plan.

Investment in agriculture, per se, is planned to grow by less than investment in the economy at large. This is news, since investment in agriculture, per se, is considered a "political number" and an announced decline in its planned share is a political event.⁴⁴

The agricultural-industrial complex is to receive "one third of total investment in accordance with the Food Program," but:

within this priority is given to the branches that process agricultural commodities; capital investment in them is to grow by 51 percent, as opposed to a total before of 22 percent. This will enable the correction of serious disproportions which hinder the growth of the final product.⁴⁵

The Machine Building Industry for Food Processing

In an article in Voprosy ekonomiki, Moscow State University economist Anatoly S. Khodzhaev discusses the equipment produced by the food processing industries and the performance of the Ministry for Machine Building for Light and Food Industries (Minlegpromash). He notes the excess demand for equipment, the poor quality and, especially, the lack of a complete assortment (*kompleksnost'*) of equipment. In January 1983, a special session of the Politburo looked at the performance of equipment being produced for the food processing industries. The principal resolution has been to spend more on these industries in the present plan.⁴⁶

For twenty years agriculture has been treated favorably in investment allocations and has experienced declining productivity. Some critical equipment in downstream stages, if completed, might be the missing links that complete the chain and yield very high payoff. This has been the thesis of Soviet "Food Complex" economists.

While some of the criticism of the Soviet production of food processing equipment is more fundamental, most of it at the present time seems to be of the nature that these industries simply need more rubles.

Most of the points contained in the published criticism of Soviet food processing equipment have come out strongly in interviews with former Soviet citizens who were technologists in the food processing industries. But emigrants provide a somewhat different, more pessimistic expectation about current plans.

A. One gets the picture of a dualistic technology available to the industry. On one hand, in large cities such as Leningrad and Moscow, the dairy and meat packing industries have fairly modern, largely foreign equipment. One emigrant, who now works in a similar situation in the US, says there is virtually little difference in equipment between the US and the USSR. Because of labor organization differences, however, far more workers are employed at the same tasks in Leningrad than in the US. In more remote locations in the USSR, the case is quite different.

B. Foreign equipment is always preferred to domestic equipment, even though there is sometimes a problem obtaining spare parts.

C. All who were asked about the Soviet cheese-making industry described it as a very backward process involving women in repetitious manual tasks.

D. Much food processing equipment is very old, dating back decades. There has been sizeable new equipping, but of very poor quality. When an

entirely new line of equipment was installed in a plant that makes processed cheese, it was reported to have failed completely ("became a pile of junk") within a year.

E. There was much repetition of the fact that stainless steel and food grade aluminum was in very short supply in this industry, despite the obvious need for it.⁴⁷

All the above points and more confirm the picture presented in Soviet published sources. There are other observations by emigrants, however, which indicate that the problem involves more than just the low priority of processing.

F. Khodzhaev himself presents data which indicate that in the 1970s, food processing was not starved for resources. In the 1970s, the fixed capital of industry in general increased by 2.32 fold. For the food industry, the increase was 1.98, and for the meat and dairy industries fixed capital increased 2.16 and 2.19 reportedly. This suggests that there has already been considerable investment in certain sub-branches of food processing, and that it has proven ineffective.

G. When funds are made available on a budgetary basis, rather than for profit or loss, they are often misappropriated. One emigrant told a story of a Kiev food plant which scrapped almost new serviceable equipment when it was awarded funds to replace it.

H. The difficulty of getting the Minlegpishchemash to be responsive to food industry needs is discussed by Khodzhaev (p. 88) and is picked up in all conversations with food technologists, except when they talk about equipment produced in their own shops.

The "own production" or vertical integration of the food processing ministries deserves comment. According to one emigrant informant, the design-machine shop of a large meat *kombinant* had become an experimental

factory attached to the Ministry of Meat and Milk industry for the entire Ukraine. The shop made various machines, including, for example, a complete conveyor system for sausage production. The story of this activity contains much of interest.

Why did the *kombinant* decide to produce its own equipment? The question was met with an almost derisive response, even though there were enterprises of Minlegpishchemash in the same city with whom the *kombinant* could have contracted custom work. The choice of own production was for three reasons: (1) the *kombinant* wanted quality; (2) they wanted it cheaper; and, (3) they wanted the job done! (The latter is a common emphatic expression of emigrant technologists talking about why they produced their own equipment.)

The design-machine shop of the meat-processing plant managed to produce a line of processing equipment that was largely copied from known foreign models. Some of the designs were significantly new, however, and were awarded patents. The toughest problem was obtaining "materials," and stainless steel was mentioned particularly, in the interviews. The Ministry of Meat and Milk Production had an allocation of materials for which this enterprise vied. The meat-processing plant apparently had, however, two additional advantages. First, the plant was located in a major industrial city which was headquarters for a "Territorial Administration" (*teritorialnoe upravlenie*) of the state supply system. Materials allocated to local industry, when they were in surplus, could be funnelled preferentially to local industry -- including the local meat *kombinant*. A second, complementary advantage, was the fact that its principal product, *kolbassa*, could be used as a kind of currency. This was used to "grease the wheels" of this semi-formal allocation.⁴⁸

According to my respondents, the Republic Ministry had four such "experimental machinery" plants which had grown up from enterprise shop

status. Vertical integration, or own manufacture, is a solution to the perennial problem of making suppliers responsive to the needs of their customers. The planners' principal objection to it is that it sacrifices economies of scale and standardization. It also probably blurs branch distinctions and complicates input allocations.

In the West, food manufacturers or packaging manufacturers are free to develop their own equipment and then sell it. In other words, once having made the decision to "make" instead of "buy," they can go on to "make and sell," thereby obtaining economies of scale and developing a sideline. This may result in the firm crossing "industry lines," but this makes no difference where the free market allocates material-technical inputs.

I asked whether the meat-processing plant in question ever supplied its quality-manufactured equipment outside of its own republic ministry. The answer was no, for the most part. Such sales were not in its plan, and materials were too hard to get even for the equipment the republic itself needed. An exception was a specialized slaughter-conveyor line for rabbits for use throughout the USSR, but in this instance there were special allocations of materials from Moscow. The success of this exception depended upon initiative from the top. It had to be thought of and put into the plan from Moscow. In most cases, the relative success of an enterprise of this sort is thwarted by the planning system and by plan incentives and does not spread.

Conclusion: Critical Evaluation of the Present Plan

The overall evaluation of current policy is mixed.

One one hand, there is good evidence of measurable imbalances of past investments and thus of results in the food complex. This is clear from comparisons with foreign experience.

There is some reason to think that increased aggregate investment focussed upon previously relatively under-emphasized sectors will have better pay-offs. Better, at least, than increased aggregate investment directed at farming, where returns have already diminished sharply. This is to be expected, for rather large returns did come forth from the investment in farming which surged 20 years ago after Brezhnev's May 1965 plenum on agriculture.

But one can already see signs of premature diminishing returns to this new investment direction. Consider milk protein utilization. There is great variability in direct human utilization rates, and the northwest of Europe, particularly the EEC, may be a very poor model for the USSR. If so, emulation will lead to excesses. Canada, with a climate and population density more like the USSR than the EEC, displays a moderate milk protein utilization rate, higher to be sure, but not much, than the USSR rate. The processing of milk for skim powder and much else in the subsidized EEC dairy economy has been called forth by political objectives in the regions, objectives that can be easily criticized. Some of what happens there proves only what is technically feasible, not what is economically efficient, even for that region itself. (Denmark, for instance, is a "butter economy" like the USSR. It dries very little skim milk, feeding it almost entirely to livestock.)

The US has the world's highest milk protein utilization rates, and it also has the highest milk yields per cow. The Soviet Union has among the lowest yields, even after recent increases. A concentration of milk production is necessary for efficient processing and for high utilization rates. This indicates there is still a lot to do on the farming side in the USSR.

Hopefully, the new direction for investment will not preempt some still-necessary complementary improvements in farming itself. Tables in the

Appendix show that the USSR is still sorely deficient in this area. Balance is needed, but when central decisions result in budgeted outlays, these funds are inevitably spent. A Western businessman, in similar circumstances, would not spend these funds without insisting upon knowing what else would be needed to make the investment a success.

Traditional emphasis preempted investment in the activities which now enjoy favor. The new aggregate emphasis may now preempt still crucial activities in the aggregate which is now less in favor for investment. Preemptive planning always works that way in the USSR.

There is already ample evidence for over-investment, or wrong-headed investment, in dairy and meat processing.⁴⁹ The problem seems to occur especially in very large meat- or dairy-processing plants, where over-concentration results in under-utilization of capital and high costs. This is to be expected in a budgetary, "political" investment system, and it is clear that there will be more cases.

Will the current reorganization in the food complex make any difference?⁵⁰ There is some economic theory that suggests that it might. That is, vertical integration occurs in market economies because of the limitations of market relationships. The formation of the new agricultural "super-ministry," coming in a succession of such events, can be viewed as a vertical merger. These occur in the West, and arguments for the efficiency of them can be based on market imperfections.

In the Soviet case, there are market imperfections. If capital markets, justifying merger, are imperfect in the West, they are practically non-existent in the USSR. Transactions are sometimes difficult in the West, justifying in-house manufacturing or long-term contracts. They are doubly so in the USSR, with its inflexible prices and non-market orientation of planning.

Conceivably, someone responsible for getting food from the field to the table, would, if able, re-allocate resources from where they are redundant to the weakest link in his own chain. The same thing could be hoped for, naively, for central planning -- that is, that it would be coordinated efficiently -- were one not too aware of the great complexities in practice. The Soviet food complex is a huge subset, constituting about 40% of all labor in the entire economy. There may be some payoff to integration (personnel changes, some investment reorientation), but one awaits more fundamental change. If price flexibility is emerging in this complex, it would probably be rated a major change.

One reads in the leading journals about the lack of variety in Soviet cheeses and about plans to increase variety. At the same time, an emigrant respondent who worked in a regional cheese warehouse and central trade depot notes that the *oblast'* was self-sufficient in cheese. It had only the varieties of cheese that it produced itself. No variety was imported. The plans in journals make no mention of this absent transport "x-activity."

The absence of a marketing emphasis (concern for quality, other than the achievement of rigid technical coefficients) in the food-processing equipment industry has been demonstrated. The Ministry for Light and Food Processing Machinery was not placed within the new super-ministry for the food complex. So much for any administrative potential to increase its orientation to the final users of its products through integration.

One interesting thing to watch is whether machine-building enterprises within the food processing and meat and milk ministries will benefit from the investment and priority of the machine-building section. It would also be a significant event were these enterprises encouraged to produce their products for sale outside their own ministries. But this would involve promoting their access to the inputs they would need to do this, and involve their wanting to

extend their own plans. Thus, it would be a major innovation in Soviet industrial management.

A few indications of a fundamentally different approach have come up in Soviet published discussions and in interviews with emigrants. These are merely listed briefly here:

- A. There has been the extension of small scale, reasonably decentralized "agribusiness" activities at the local farm level. These activities utilize labor and raw materials which large, concentrated production units miss. Allowed needed inputs, their production can be marketed through somewhat more flexible cooperative channels.
- B. Private family public catering (cafe) enterprises have been legalized on a small scale in Georgia and on a larger scale as an extension of the collective-farm market outlets of farms in the Baltic republics.

To Soviet specialists who study Western "agribusiness," their own "agri-industrial complex" appears like a dimmed, decimated, electric sign panel compared to a blazing electric sign with a full matrix of multicolored pulsating bright bulbs.

This "APK" (agri-industrial complex) specialist, looking to the West for ideas, sees certain products, processes and even industries that are missing or only feebly present in his own country.

But, imitators may have little idea of the unseen circuitry connecting what is visible on the front side of the sign board. Too frequently, the result of a study of a Western technology complex is to plug a Western bulb into a Soviet socket only to have it glow feebly or not at all.

The circuitry of the market orients activity in the West toward service to the final consumer. This orientation fine-tunes the characteristics of products so that they truly match up with needs of number and size and durability, as well as dependability in time and space. This orientation usually avoids placing resources where they lack necessary complements. It shifts resources and creates new flows of investment which break from traditional patterns and define new courses. These changes create difficulties even for the Westerners who try to measure and describe them. Standard industrial classifications change: industry borders blur, some industries die, others are born.

We can only wait to see what is copied, what is new, and what works in the USSR.

NOTES

1. Thanks are due to Joan Marshall and Veronica Milonas for creating the tables, and James R. Millar and Mary A. Cummings for editing and retyping. This paper was presented at the conference "Agriculture in Gorbachev's 12th Five Year Plan: Opportunities Suggested by Comparative Experience," Kennan Institute for Advanced Russian Studies, Washington, DC, April 3 and 4, 1986.
2. V. Sergeev, "Puti intensivifikatsii molochnoi otrasli," Planovoe Khoziaistvo, 9, 86, p. 107.
3. The figures for meat consumption are based on a carcass weight definition. The veracity of these figures has been examined by the author in "Soviet Consumption of Food," The ACES Bulletin, Vol. 23 No. 2 (Summer 1981). In the process of the Soviet Interview Project interviews, I asked persons who had occupied relatively good positions (in the USSR) to know about the veracity of official published figures. These former Russian citizens usually were unaware of the quantities of meat consumption in Europe in general, and they generally expressed disbelief, for instance, about British consumption figures. But they did not disbelieve Soviet published figures. The definition of Soviet carcass weight (*uboinyi ves*) is clear and seems to be closely adhered to by specialists.

The ECE does discount Soviet figures which include offals and slaughter fat by removing certain percentages for the slaughter fat. Soviet beef carcasses are lighter weight. Given a probably greater relative weight of bones it is not clear that FAO's conversion factor for

carcass beef as containing approximately 14.5% protein (as opposed to 14.7 to 15% for the US and UK) should be used in calculating the protein in these carcasses. (FAO Food Balance Sheets.) This question merits further examination as cattle slaughter weights and meat grades change.

4. There has been some subsequent improvement. By Soviet definition (larger than ECE), per capita meat consumption rose from 58.4 kilos in 1983, to 60.4 in 1984, and to 61.4 in 1985. (Narodnoe khoziaistvo SSSR v. 1985 g.)
5. One emigrant respondent suggested that *goszapasy*, government stores of meat, are considered a liability to a meat *kombinant* because they take up so much precious storage that could be used in the normal trade operations.

While emigrants report actual losses of spoiled meat due to capacity shortfalls that occurred in the distress slaughters of 1963 and 1975, actual non-utilization of aggregate meat seems minor. According to one report, distress slaughter gave impetus to a subsequent expansion of meat processing capacity. The state's concern for processing capacity may constitute a real constraint on extreme distress slaughter rates in the future and thus promote feed-grain imports.

6. An intriguing hypothesis was offered by one emigrant. At least partly informed from the position he had held in the food industry, he claimed that authorities use the all-union food funds deliberately to rotate relative shortages among republics. This causes each region to experience occasional "improvement," even when there is overall stagnation.

7. V.A. Dobrynin, Tsenoobrazovanie: tseny na produkty sel'skogo khoziaistva (Moscow: Tipografiia TSKhA, 1975), p. 47. There were also seasonal prices for seasonal feeder animals prior to 1971.
8. The Soviet Union is not itself a member of the FAO, but it does belong to the Economic Commission for Europe, which cooperates with the FAO in producing studies of food and agriculture for Europe, including the USSR. The USSR has declined to return completed questionnaires to the ECE, but officials have met with ECE staff to discuss the latter's estimates.
9. Narodnoe khoziaistvo SSSR: 1922-1982. (Moscow, TsSU, 1982), p. 447.
10. United Nations Economic Commission for Europe, "Prospects of the Markets in the ECE Region for Meat, Milk and Dairy Products and Feedstuffs until 1985," October 26, 1978, p. 23.
11. Milk by weight is about 13.5% solids. Roughly 4% of milk may be fat, 3-3.5% protein (casein), 5% lactose, plus perhaps 0.5% vitamins and minerals. Butter has virtually none of the solids other than fat; skim milk has virtually all of them. Whey, a product of cheese making, has no fat and little protein, but it is still 5% lactose and has most of the riboflavin, phosphate and calcium that whole milk contains. A few years ago a description of the Soviet milk balance in Planovoe khoziaistvo revealed that, of the protein in milk, only 60% at most went into food uses; and at most only 55% of milk sugar does. Another 1983 publication reported that, of the protein in milk procured by the government for industrial production, only 45% emerges in food products. V. Sergeev, "Ratsional'noe ispol'zovat' moloko," Planovoe khoziaistvo, No. 3, 1983,

p. 67; A. Shlezhevichius, "Razvitie molochnogo podkompleksa," Voprosy ekonomiki, No. 7, 1983, p. 119.

A tentative calculation based on the figures in Sergeev and Shlezhevichius suggest that only 45% of the protein in milk officially "procured" by the state is utilized by humans, versus approximately 85% of the protein in milk that remains on the farm or in private hands (i.e., is not procured). These milk balances may not be well understood.

12. In the following categories: 9,962 mmt (11% of total milk production) fed as whole milk; 22,280 mmt (24%) fed as skim milk; 2,702 mmt (3%) fed as dried skim milk; 2,734 (3%) wasted as whole milk; and 752 mmt (1%) wasted as skim milk. The totals imply that about 58% of milk protein was utilized by humans in 1975-77; these estimates are in rough agreement with the Soviet estimate of "no more than 60%," published in 1983 (See note 11 above).
13. FAO, Food Balance Sheets (Rome, 1980), p. 958.
14. In the Common Market countries only about 4% of whole milk was fed to animals, versus 11% in the Soviet case. ECE, *op. cit.*
15. I am indebted to Ed Cook, of the International Economics Division of USDA-ERS, for first pointing out some of these cases to me.
16. A. Shlezhevichius, op. cit., p. 119-120.

17. Sergeev, op. cit., p. 67. Some of the whey is used in the Russian soft drink "Bodrost"! The waste of whey is not particularly Russian. Whey drying is expensive, and it has recently been developed in the United States in large part due to regulations imposed against its discharge into streams and rivers.
18. Sergeev, p. 70.
19. The Soviet production of skim-milk powder and ZTsM advanced remarkably during the 11th plan. In 1978-1980 the USSR already produced about as much as did the UK; by 1983 it produced much more. Production increased by 44% in 1983, no doubt aided by increased milk production as well as new plants. Fedorus reported that in the 11th plan over 100 plants designed to produce ZTsM, many of them on an inter-farm enterprise basis, were started. Molochnaia promyshlennost', 1, 84 & 3, 85.
20. Sergeev, op. cit., pp. 71-72.
21. Shlezhevichius, op. cit., p. 126.
22. Sergeev, op. cit., p. 69.
23. Sergeev, op. cit., p. 69
24. ECE, op. cit.
25. A single issue of Molochnaia promyshlennost', No. 3, 1984, was largely devoted to cheese.

26. V. Baturin, "Progress, Problems of Milk, Livestock Procurement in RSFSR." Sel'skoye khozyastvo rossii, No. 10, October 1986, pp. 2-4; translated JPRS-UNE-86-103, 15 December 1986. p. 43 and 45.
27. Sergeev, Molochnaia promyshlennost', No. 1, 1985.
28. Molochnaia promyshlennost', No. 2, 1984.
29. N. P. Rudenko, Novoe v razvitiia miasnogo skotovodstva (Moscow: Znanie, 1978), p. 3.
30. There is a radical difference: Norway, for instance, now consumes four times as much margarine as butter. Table 13 shows some of the possibilities.
31. Narodnoe khoziaistvo v 1984, Moscow, 1985, p. 209.
32. I. I. Fedorus, "Sovershenstvovanie organizatsiiu zagotovok moloka," Molochnaia promyshlennost', No. 8, 1982, pp. 1-5.
33. Shlezhevichius, op. cit., p. 126.
34. S. F. Antonov (former minister of meat and milk industries) in Molochnaia promyshlennost', No. 7, 1982, p. 2.
35. S. F. Antonov, "Vypolnim reshenia noiabr'skogo (1981 g.) plenuma TsKKPSS," Molochnaia promyshlennost', No. 2, 1982, p. 2.

36. Antonov, loc cit.
37. Ekonomicheskaja gazeta, No. 14, 1984, p. 4
38. Molochnaia promyshlennost', 4. 1985, p. 4.
39. Ekonomika sel'skogo khoziaistva, No. 1, 1983, p. 4.
40. Ye. Sizenko, Moscow Agitator, No. 18, September 1986, p. 8-11;
translated JPRS-UNE-86-007, 26 November 1986, p. 36.
41. Report of Chairman of the Council of Ministers of the USSR, N. I.
Rizhkov, Ekonomicheskaja gazeta, No. 22, March 1986, p. 25.
42. Page 9, of the program as it appears in Ekonomicheskaja gazeta, No. 11,
1986.
43. The draft plan from various reports of November 26 and 27, 1985 as
reviewed by Keith Bush in Radio Liberty Research, RL 396/85, November 27,
1985.
44. My own appreciation for the degree of this feeling of the underfunding of
downstream activities and the politics of investment came from interviews
I had while on the American Council of Learned Societies exchange with
the Soviet Academy of Sciences in the period between the 26th Party
Congress and the May 1982 Food Program Plenum.

Some Soviet students of "agribusiness" like V. Demianenko,
"Sovremennye sdvigi v strukture prodovol'stvennogo kompleksa SShA," in

Izvestiia akademiia nauk SSSR: Seriia ekonomicheskaiia. No. 4, 1977, contributed to the policy discussion by providing information on the investment flows in the branches of the US food complex (i.e., input industries, farming, and processing). Other Soviet analysts with Academy of Sciences institutes have compared American farm to retail price spreads to similar Soviet measures of retail cost, and found disapprovingly (to what would have to be the chagrin of people who see the middle man as such a villain in the US) that Soviet agricultural production has "too large" a share and downstream activities, too small a share.

45. Bush, op. cit., p. 26

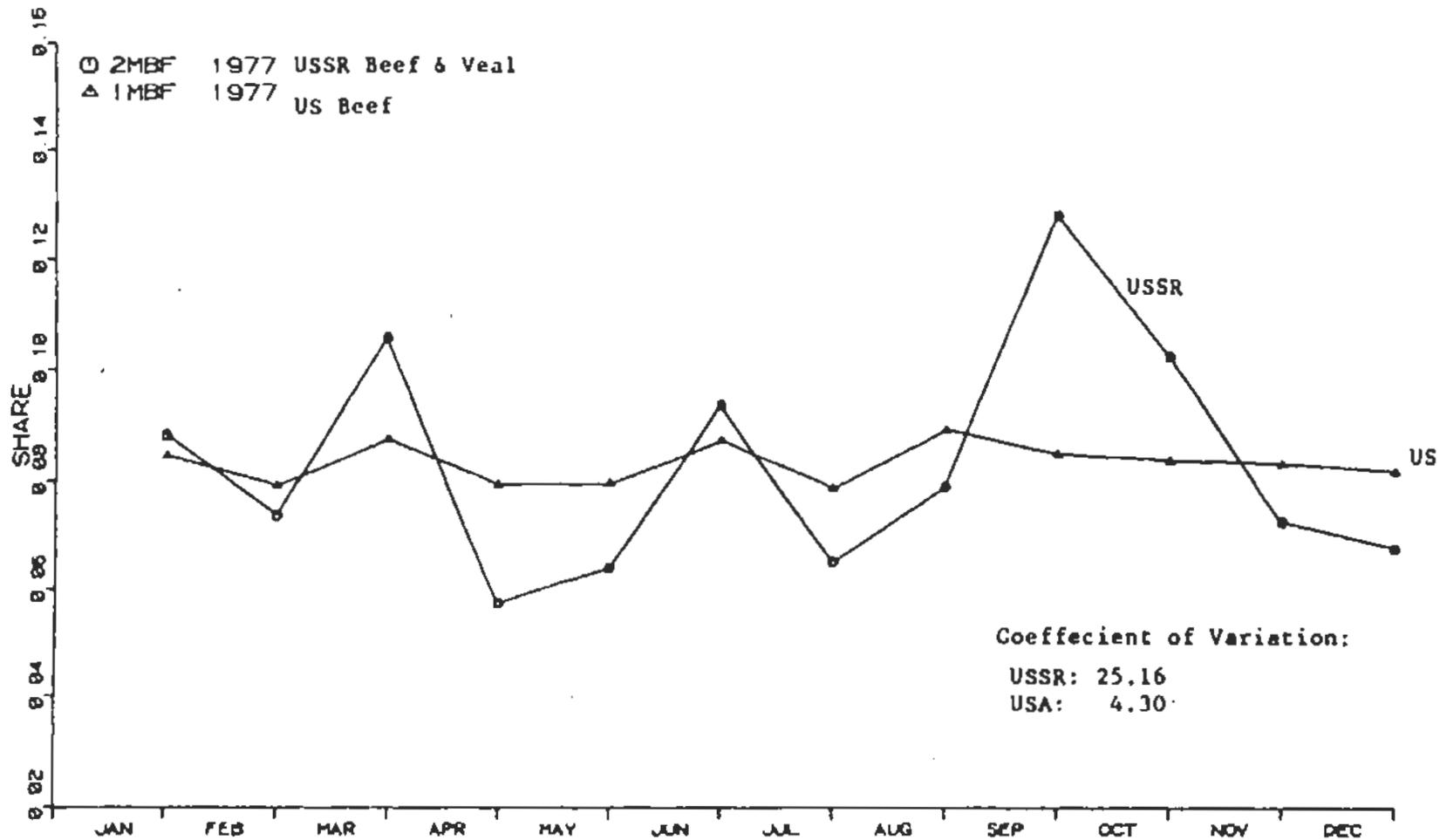
Investment decisions representing, as they do, the results of interest group conflict have been difficult to document in recent years. Investment in the APK has been particularly cloudy; investment figures have been ambiguous so that it is not clear what APK investment actually was in the 11th plan. See, "A Puzzle About Investment," in the Newsletter for Research on Soviet and East European Agriculture, Vol. 5, 4 (December 1983), p. 2 and comment by K. E. Waedekin, Vol. 6, 1-2 (May 1984), p. 2.

46. Khodzhaev, op. cit., p. 86.

47. As an indication of the really serious commitment to the 1982 Food Program, New York Times' Ted Shabad has commented that the specialty metals journals were filled with articles about it.

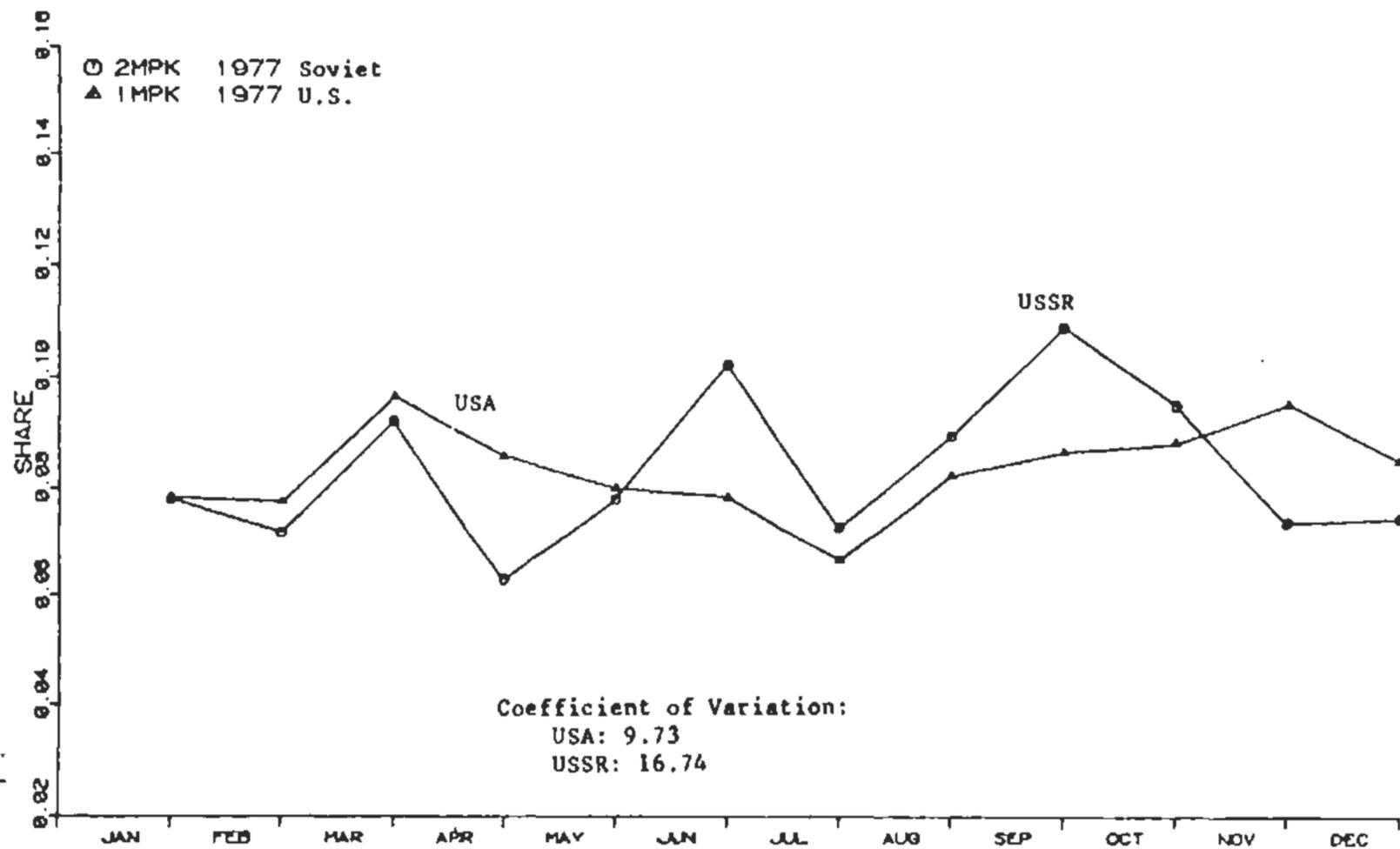
48. An adjacent dairy plant had much less advantage. Meat products are much more monetary, apparently, and there is a constant problem of both organized and unorganized theft. Dairy theft consisted of workers smuggling out sour cream in hot water bottles in their clothing.
49. E.g., I. N. Khrustev, "Ne pererabotali - znachit, poterial," EKO, No. 3, 1985, p. 166-167.
50. For a description of the long anticipated November 1985 formation of the USSR Agro-industrial Committee, see Andreas Tenson, Radio Liberty Research, RL14/86, January 3, 1986.

FIG. 1
 Distribution of Shares of Monthly Beef Production in the US and USSR, 1977



Sources for Figures 1 & 2: Livestock and Meat Statistics (Washington: USDA, 1978) & Ekonomicheskaja Gazeta.

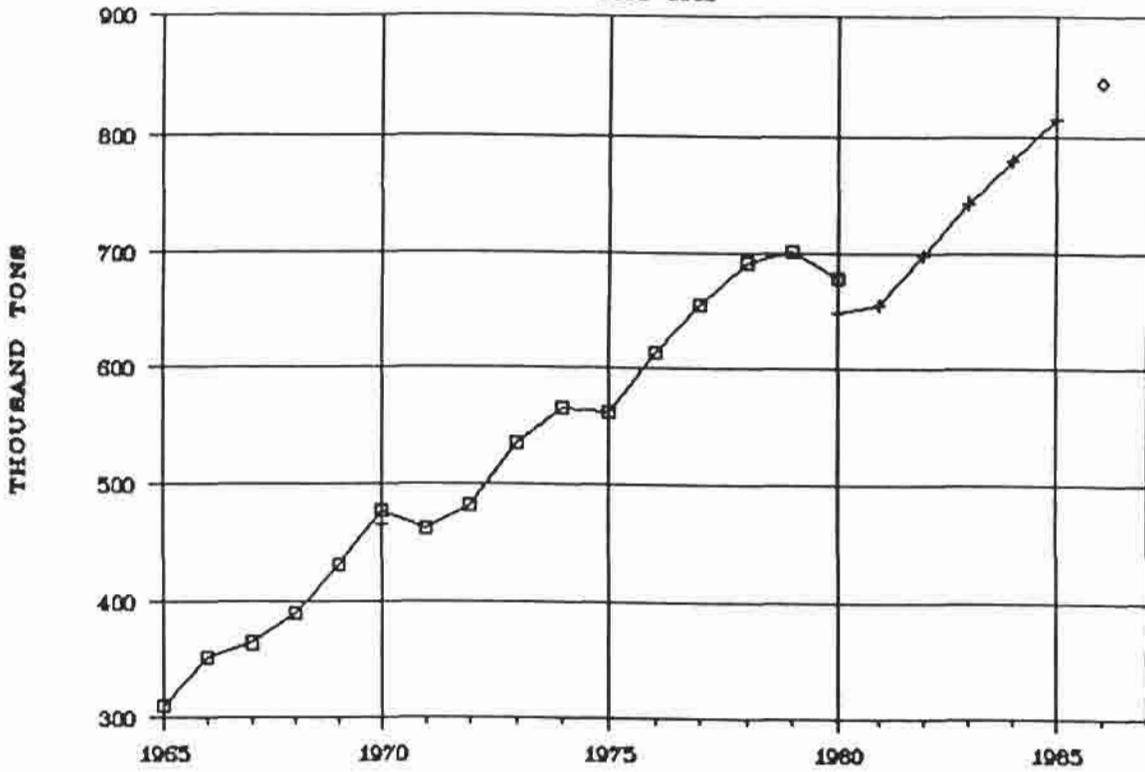
FIG. 2
 Distribution of Shares of Monthly Pork Production in the US and USSR, 1977



SOURCE: Same as Figure 1

FIGURE 3 USSR CHEESE PRODUCTION

1965-1986



SOURCES:

□ NARKHOZ '81

+ NARKHOZ '82

◇ IZVESTIA '87

Table 1

THE USSR AND OTHER EUROPEAN COUNTRIES RANKED BY APPARENT PER CAPITA CONSUMPTION OF RED MEATS AND POULTRY FOR 1981-1983 (KILOGRAMS)

BEEF AND VEAL		PIG MEAT		POULTRY		SHEEP MEAT ^(a)		TOTAL RED MEAT AND POULTRY ^(b)	
RANK	COUNTRY	RANK	COUNTRY	RANK	COUNTRY	RANK	COUNTRY	RANK	COUNTRY
1	FRANCE.....32.1	1	GDR.....37.2	1	SPAIN.....22.7	1	ICELAND.....49.0	1	GDR.....52.7
2	SWITZERLAND.....26.7	2	GFR.....38.0	2	HUNGARY.....21.9	2	GREECE.....13.4	2	FRANCE.....98.5
3	BEL-LUX.....26.6	3	BEL-LUX.....47.5	3	ITALY.....18.4	3	TURKEY.....8.4	3	BELGIUM.....89.9
4	CZECHOSLOVAKIA.....26.1	4	AUSTRIA.....46.2	4	FRANCE.....16.5	4	BULGARIA.....7.8	4	GFR.....81.9
5	ITALY.....26.1	5	DENMARK.....45.0	5	ROMANIA.....16.4	5	IRELAND.....7.6	5	AUSTRIA.....81.1
6	USSR.....24.9	6	SWITZERLAND.....44.3	6	GREECE.....15.0	6	UK.....7.1	6	SWITZERLAND.....80.5
7	IRELAND.....24.7	7	NETHERLANDS.....42.8	7	IRELAND.....15.1	7	NORWAY.....5.7	7	CZECHOSLOVAKIA.....79.1
8	GDR.....24.1	8	CZECHOSLOVAKIA.....41.7	8	PORTUGAL.....14.7	8	FRANCE.....4.2	8	IRELAND.....79.1
9	AUSTRIA.....24.0	9	HUNGARY.....41.6	9	BEL-LUX.....14.3	9	SPAIN.....3.7	9	HUNGARY.....72.6
10	FINLAND.....22.0	10	FRANCE.....37.7	10	UK.....14.3	10	USSR.....3.5	10	NETHERLANDS.....72.6
11	GFR.....21.5	11	POLAND.....34.1	11	BULGARIA.....13.8	11	PORTUGAL.....2.7	11	ITALY.....71.4
12	NETHERLANDS.....18.9	12	SWEDEN.....34.0	12	CZECHOSLOVAKIA.....11.9	12	ROMANIA.....2.7	12	GREECE.....67.2
13	UK.....18.9	13	FINLAND.....33.9	13	YUGOSLAVIA.....11.9	13	YUGOSLAVIA.....2.3	13	SPAIN.....66.5
14	GREECE.....18.5	14	IRELAND.....31.7	14	AUSTRIA.....10.9	14	GDR.....1.7	14	DENMARK.....65.1
15	NORWAY.....18.0	15	BULGARIA.....30.2	15	NETHERLANDS.....10.9	15	BEL-LUX.....1.5	15	ICELAND.....63.0
16	SWEDEN.....17.3	16	ROMANIA.....29.3	16	USSR.....9.9	16	SWITZERLAND.....1.5	16	BULGARIA.....62.6
17	POLAND.....17.1	17	SPAIN.....28.7	17	GDR.....9.7	17	ITALY.....1.4	17	UK.....61.0
18	YUGOSLAVIA.....14.8	18	ITALY.....25.5	18	GFR.....9.6	18	GFR.....0.8	18	FINLAND.....59.4
19	PORTUGAL.....12.4	19	UK.....21.5	19	DENMARK.....8.7			19	ROMANIA.....58.4
20	ICELAND.....11.7	20	GREECE.....19.5	20	SWITZERLAND.....8.0			20	POLAND.....58.1
21	DENMARK.....11.4	21	NORWAY.....19.2	21	POLAND.....6.9			21	SWEDEN.....56.0
22	SPAIN.....11.4	22	YUGOSLAVIA.....18.3	22	SWEDEN.....5.5			22	USSR.....55.8
23	BULGARIA.....10.8	23	USSR.....17.5	23	FINLAND.....3.5			23	YUGOSLAVIA.....47.3
24	ROMANIA.....10.0	24	PORTUGAL.....15.0	24	NORWAY.....2.6			24	NORWAY.....45.8
25	HUNGARY.....9.1	25	ICELAND.....4.3					25	PORTUGAL.....44.8
26	TURKEY.....8.6								
	USA.....41.6		USA.....38.1		USA.....29.1		USA.....8.7		USA ^(c)100.5

ECE DISCOUNT OFFICIAL SOVIET PRODUCTION DATA (WOOLY) YES) FOR SLAUGHTER FAT BY THESE AMOUNTS:

BEEF—7 PERCENT, PORK—13 PERCENT, AND SHEEP MEAT—4 PERCENT.

• ECE ESTIMATE

(a) FOR NATIONS WITH MORE THAN .8 KILOGRAM; INCLUDES GOAT MEAT.

(b) BEEF AND VEAL, MUTTON, LAMB AND GOAT MEAT, PORK, PLUS POULTRY.

(c) U.S. DATA IS FROM AGRICULTURAL STATISTICS 1984 (WASHINGTON: USDA 1985), PP. 310 & 547 AND IS CARCASS WEIGHT EQUIVALENT, EXCLUDING EDIBLE OFFALS, EXCEPT POULTRY, WHICH IS RETAIL WEIGHT.

SOURCE: ECONOMIC COMMISSION FOR EUROPE, AGRICULTURAL REVIEW FOR EUROPE NO. 27 (NEW YORK, UNITED NATIONS/ECE 1985). APPARENT CONSUMPTION IS CARCASS WEIGHT EXCLUDING SLAUGHTER FAT AND OFFALS, PLUS NET IMPORTS. NO ADJUSTMENT IS MADE FOR CHANGES IN INVENTORIES.

TABLE 2
EUROPEAN MILK PRODUCTION

DAIRY PRODUCT	NW EUROPE	S EUROPE	E EUROPE	USSR
MILK in M.M.T	122	26	40	96
BUTTER (a) in T.M.T.	2407	173	793	1583
CHEESE (b) in T.M.T.	3669	1108	726	726.8
WHOLE MILK POWDER (c)	614	28 (d)	43 (e)	218
SKIM MILK POWDER	2587.2	35.3 (f)	523	437
WHEY POWDER	687 (g)			
CONDENSED MILK	1402 (h)	138.1 (i)	259.3 (j)	445.7 (k)

- (a) For most countries factory butter only.
 (b) Including cottage cheese and in some countries quark and fresh cheese. French processed cheese is not included in the N'western European figure.
 (c) Belgium, France, Netherlands and Yugoslavia include partly skimmed powder
 (d) Southern Europe here includes data only for Italy, Spain and Yugoslavia.
 (e) Only Hungary and Poland are included.
 (f) Portugal and Spain only
 (g) Reporting is sketchy. This figure is for 5 EEC countries: Belgium, France, GDR, Netherlands and the UK.

SOURCE: UNEC Agriculture Review for Europe: Vol. 5, United Nations, 1985

TABLE 3
COW MILK PRODUCTION PER CAPITA*
(Kilograms)

AREA	1978-1980	1981-1983	1984
Western Europe	332.34	349.98	354.57
Northwestern Europe	475.46	502.78	509.28
Southern Europe	141.59	146.35	148.39
Eastern Europe	341.28	363.61	388.29
EUROPE	341.28	352.84	361.64
USSR	349.89	346.91	367.74
USA			259.53 (a)

* FAO PRODUCTION YEARBOOK AND NATIONAL STATISTICS.

(a) Total milk production divided by total population converted to kg:
(135444 million pounds/236681 thousand people) converted to kg

Northwestern European countries include: Austria, Belgium, Denmark, Finland, France, GFR, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Sweden, Switzerland, and the United Kingdom

Southern European countries include: Greece, Italy, Portugal, Spain, Turkey and Yugoslavia

Eastern European countries include: Bulgaria, Czechoslovakia, GDR, Hungary, Poland and Romania

SOURCES: United National Economic Commission for Europe, European Dairy Product Market 1984-1985 (Agri-R.181-Add.1) Geneva, December 1985.

UNESCO Statistical Yearbook 1983; Statistics used.

Agricultural Statistics 1984 (Washington: USDA 1985)
pgs. 321, 324, 382.

TABLE 4
MILK YIELDS PER COW *
(KG PER YEAR)

AREA	1978-1980	1981-1983	1984
Western Europe	3602	3792	3870
Northwestern Europe	4240	4475	4566
Southern Europe	2115	2199	2243
Eastern Europe	2964	3051	3293
USSR	2203	2171	2307
USA	5245	5617	5707 (a)

* FAO PRODUCTION YEARBOOK AND NATIONAL STATISTICS.

(a) TOTAL MILK PRODUCTION PER COW

SOURCES: United Nations Economic Commission for Europe, European Dairy Product Market 1984-1985 (Agri-R.181-Add.1) Geneva, December 1985.

UNESCO Statistical Yearbook 1983; Statistics used.

Agricultural Statistics 1984 (Washington: USDA 1985) pgs. 321, 317.

Table 8
Milk & Milk Products by Country 1978-1980

COUNTRY	Milk Production (M.M.T.)	Butter Production (T.M.T.)	Butter/Milk (k/ton)	Skim Milk Powder (T.M.T.)	Skim milk powder milk (k/ton)	Skim Powder butter ratio	Cheese ^a (T.M.T.)	Cheese/ Milk Powder (k/ton)	Whey Powder (T.M.T.)	Whey Powder cheese ratio	Whole Milk Powder (T.M.T.)
US	60.2	579	9.8	596	9.9	1	1918	31.9			
UK	15.58	164.1	10.8	247.1	15.9	1.5	229.4	14.7	33.3	0.145	22.4
USSR	92.91	1328	14.3	297.7	3.2	0.2	668.4	7.2			222.7
Canada								22			
France	31.01	673.1	18.6	682.7	22	1.2	1028.9	33.2	288.7	0.281	180.3
Italy	10.13	74.1	7.3				512.3	50.6			2.1
Spain	5.87	20.2	3.4	22.3	3.8	1.1	79.7	13.6			7.9
Switz.	3.63	34.6	10.2	31.1	8.6	0.9	120.2	33.1			16.6
Poland	16.93	284.2	15	159.1	9.4	0.6	92.7	5.5			36.7
Ireland	4.85	117.4	24.2	151	31.1	1.3	52.3	10.8			
Netherlands	11.58	198.4	17.1	198.8	17.2	1	432.5	37.3	150.6	0.348	147.8
Finland	3.24	73.4	22.7	67.2	17.7	0.8	69.8	21.5	26.8	0.384	29.2
Sweden	3.39	64.6	19	41	12.1	0.6	96.8	28.6			4.2
Denmark	5.22	28	37.8	60.7	9.7	1.8	197.4	37.8			80.8
Yugoslav	4.28	12.9	3				148.1	34.3			17
Belgium	3.77	74.5	19.8	123.4	32.7	1.7	42.9	11.4	7.1	0.166	36.2
Czech.	5.73	122.5	21.4	110	19.2	0.9	99.7	17.4			
GDR	8.25	279.1	33.8	186.7	22.6	0.7	205.8	24.9			
GFR	23.99	568.7	23.7	674.1	23.9	1	861.9	35.5	118.1	0.139	30.7
Bulgaria	2.19	20.7	9.5	6.9	3.2	0.3	90.9	41.5			
Hungary	2.45	29.9	12.2	31.9	13	1.1	36.2	14.8			3.6
Romania	4.26	39.8	9.3	34.5	8.1	0.9	124.3	293.2			

^a USSR does not include tvorog although the source says it does.

(b) excludes processed cheese.

SOURCE: UNCTAD Agriculture review for Europe: vol.5, United Nations, 1985

 TABLE 6
 Meat & Milk Protein Supplied per Person
 Per Day in 1977
 measured in grams

	MILK	MEAT & OFFAL
World	6.9	3.8
USSR(1975-1977)	17.6	20.4
USSR & Eastern Europe	17.8	22.4
All Developing Countries	17.5	26.8
Developing Western Europe	18.4	26.7
Developing North America	22.3	42.2
Developing Oceania	20.9	45.1

SOURCE: FAO Food Balance Sheets (Rome, 1980)

TABLE 7
Per Capita Production of Milk & Protein Utilization 1979-1981

	PER CAPITA PRODUCTION OF MILK (Kilo)	PROTEIN UTILIZATION	DAILY PER CAPITA CONSUMPTION OF MILK PROTEIN	DAILY PROTEIN FROM WHOLE MILK CHEESE
KILOGRAMS OF MILK				
< 200				
Italy	185	92	15.7	6.9
Spain	160	89	12.8	2.0
Romania	182	100	16.7	2.8
Yugoslavia	196	79	13.9	4.7
200-300				
Bulgaria	208	75	14.3	7.5
Hungary	239	65	13.8	3.8
USA	255	90	22.0	5.4
UK	283	72	18.5	4.2
300-400				
USSR	341	52	16.0	2.5 *
Canada	324	64	19.6	5.3
GRF	399	36	18.2	4.9
Czechoslovakia	381	60	19.6	3.1
Belgium	396	60	22.0	9.3
> 400				
Sweden	415		23.9	8.9
Poland	457	60	24.3	4.1
GDR	492	41	17.8	3.4
Switzerland	573	45	23.7	9.5
France	613	42	23.0	13.2
Finland	677	45	17.0	4.9
Netherlands	837	36	27.2	8.2
Denmark	1208	31	27.9	0.1
Ireland	1575	17	23.0	2.3

* From whole milk cheese only. Approximately equal amounts from tvorog makes this figure approximately 5.0

SOURCE: FAO, Food Balance Sheet, 1979-1981.

TABLE 8
Processing Rate 1983
kg/ton of milk

PRODUCT	NORTHWESTERN EUROPE	SOUTHERN EUROPE	EASTERN EUROPE	USSR
Butter	19.7	6.6	19.8	16.5
Cheese	30.1	42.6	18.2	7.6
Whole milk powder	5	1.3 (a)	2.7 (b)	2.3
Skim milk powder	21.2	5.1 (c)	13.1	4.6
Whey powder(d)	7.3	0	0	0
Condensed milk	12.4	7.8	8.4	4.6

(a) Belgium, France, Netherlands, and Yugoslavia include partly skimmed powder.

(b) Hungary and Poland only.

(c) Portugal and Spain only.

(d) Reporting is sketchy. This figure is for 5 EEC countries: Belgium, France, GDR, Netherlands and UK.

* Although the source says it does, the figure from which this is calculated does not include tvorog.

TABLE 9
 Processing rate for other European regions as a
 percentage of the Soviet rate in Table 8 (1983)

PRODUCT	NORTHWESTERN EUROPE	SOUTHERN EUROPE	EASTERN EUROPE
Factory Butter	120	40	120
Cheese	400	560	239
Whole Milk Powder	217	57	117
Skim Milk Powder	460	111	285
Condensed Milk	270	170	183

Processing rate is kilograms of milk product divided by tons of milk produced.
 Derived from Table 8

 Table 10
 Cheese Production, Trade and Consumption in the USSR

	1978-1980	1981-1983	1984
Production*	668.4	699.6	764.1
Trade **			
Imports	8.6	16.2	15.7
Exports	7.6	6.2	4.7
Net	1	10	11
Consumption ***	4.8	5.1	5.4

* FAO Production yearbook, statistical office of the European communities and national statistics, in Th.T.

** United Nation Commodity Trade and Statistics and National Statistics; in Th.T.

*** Statistical Office of the European Communities, OECD and National Statistics; in kg per capita.

Consumption includes approximately one-half tvorog (quark and cottage cheese). Production and trade are whole milk cheese.

SOURCE: United Nations Economic Commission for Europe, European Dairy Product Market 1984-1985 (Agri-R.181-Add.1) Geneva, December, 1985.

TABLE 11
Cheese production per ton of milk production
in USSR and selected regions 1983

KILOGRAMS

United States	33
EC-10	33
Japan	2
USSR	8
Australia	24
New Zealand	18
World Total	22

Calculated from data in FAS Report (WR 37-82)

Table 12
Per Capita Consumption of Butter and Margarine
in Selected Areas (kilograms)

AREA	1978-1980		1981-1983				1984	
	Butter	Margarine	Butter	Index (USSR=100)	Margarine	Index (USSR=100)	Butter	Margarine
Western Europe	5.32	5.18	4.99	92.44	5.29	103.81	5.06	5.36
N'western Eur. (a)	6.37	6.24	5.95	110.13	6.37	124.83	6.03	6.44
Southern Eur. (b)	0.94	0.75	0.99	18.38	0.81	15.79	0.99	0.86
Eastern Eur. (c)	8.61	6.03	9.04	167.38	5.95	116.74	9.29	6.11
USSR	5.5	4.6	5.4	100	5.1	100	5.5	5.3
USA	2.03	5.1	2.12	39.26	4.95	97.06	--	--

(a) Northwestern Europe includes Belgium, Denmark, GFR, Ireland, Italy, Netherlands, UK, Austria, Finland, Norway, Sweden, and Switzerland.

(b) Southern Europe includes Portugal, Spain, and Yugoslavia.

(c) Eastern Europe includes Czechoslovakia, GDR, Hungary and Poland.

SOURCES: United Nations Economic Commission for Europe, European Dairy Product Market 1984-1985 (Agri-R.181-Add.1) Geneva December 1985
Agricultural Statistics 1984 (Washington: USDA 1985) p.144
UNESCO Statistical Review 1983.

Table 13
The USSR and Other European Countries Ranked by Apparent
Per Capita Consumption of Butter and Margarine (kilograms)*

Per Capita Consumption of Butter				Per Capita Consumption of Margarine							
1978-1980		1981-1983		1978-1980		1981-1983					
RANK	COUNTRY	RANK	COUNTRY	RANK	COUNTRY	RANK	COUNTRY				
1	GDR	15.0	1	GDR	15.6	1	Norway	19.8	1	Norway	20.1
2	Finland	11.7	2	Ireland	12.0	2	Sweden	17.1	2	Denmark	17
3	Ireland	11.5	3	Finland	11.3	3	Denmark	16.7	3	Sweden	16.4
4	France	9.4	4	France	9.1	4	Nether'ds	12.2	4	Nether'ds	12.4
5	Belgium	8.9	5	Czech.	8.6	5	Belgium	11.4	5	Belgium	11.9
6	Denmark	8.4	6	Belgium	8.4	6	GDR	10.6	6	GDR	10.6
7	Czech.	7.9	7	Poland	8.2	7	GFR	8.5	7	GFR	8.4
8	Poland	7.9	8	Denmark	7.8	8	Finland	8.0	8	Finland	7.4
9	Switz.	7.3	9	Luxem.	7.2	9	Poland(c)	7.6	9	Poland(c)	7.4
10	GFR	7.0	10	Switz.	7.2	10	UK	6.6	10	UK	7.1
11	Luxem.	7.0	11	Sweden(a)	7.1	11	Austria	5.6	11	Austria	6.3
12	UK(b)	6.6	12	GFR	6.8	12	USSR	4.6	12	USSR	5.1
13	Sweden(a)	6.4	13	UK(b)	5.8	13	Ireland	4.0	13	Ireland	4.2
14	Austria	5.5	14	USSR	5.4	14	France	3.6	14	France	3.7
15	USSR	5.5	15	Austria	5.3	15	Hungary	2.3	15	Hungary	2.4
16	Norway	5.4	16	Norway	4.8	16	Spain	1.4	16	Spain	1.5
17	Nether'ds	3.3	17	Nether'ds	3.4	17	Italy	0.9	17	Italy	0.9
18	Italy	2.1	18	Hungary	2.2						
19	Hungary	2.0	19	Italy	2.1						
20	Yugoslav	1.4	20	Yugoslav	1.4						
21	Portugal	0.8	21	Portugal	0.8						
22	Spain	0.7	22	Spain	0.8						
	USA	2.0		USA	2.1		USA	5.0		USA	5.0

* Statistical Office of the European Economic Communities, OECD and National Statistics.

- (a) Including Bregott
- (b) Including Butter oil
- (c) Edible Oil included

SOURCE: United Nations Economic Commission for Europe, European Dairy Product Market 1984-1985
(Agri-R.181-Add.1) Geneva, December 1985.

Table 13 (Continued)
The USSR and Other European Countries Ranked by Apparent
Per Capita Consumption of Butter and Margarine (kilograms)*

Margarine as a Percentage of Butter and Margarine Consumption			Per Capita Consumption of Butter and Margarine				
	1978-	1981-		1978-1980		1981-1983	Index
COUNTRY	1980	1983	RANK COUNTRY		RANK COUNTRY		(USSR=100)
Austria	50	54	1 GDR	25.6	1 GDR	26.2	250
Belgium	56	57	2 Denmark	25.1	2 Norway	24.9	237
Czech.	***	***	3 Norway	24.4	3 Denmark	24.8	236
Denmark	67	69	4 Sweden	23.5	4 Sweden	23.5	224
Finland	41	40	5 Belgium	20.3	5 Belgium	20.3	193
France	27	29	6 Finland	19.7	6 Finland	18.7	178
GDR	41	40	7 GFR	15.5	7 Ireland	16.2	154
GFR	55	55	8 Ireland	15.5	8 Nether'ds	15.8	150
Hungary	53	52	9 Nether'ds	15.5	9 Poland	15.6	149
Ireland	26	26	10 Poland	15.5	10 GFR	15.2	145
Italy	30	30	11 UK	13.2	11 France	12.8	122
Luxemb.	***	***	12 France	13.0	12 UK	12.2	116
Nether'ds	79	78	13 Austria	11.1	13 Austria	11.6	110
Norway	78	81	14 USSR	10.1	14 USSR	10.5	100
Poland	49	49	15 Czech.	7.9	15 Czech.	8.6	82
Portugal	***	***	16 Switz.	7.3	16 Luxem.	7.2	69
Spain	67	65	17 Luxem.	7.0	17 Switz.	7.2	69
Sweden	73	70	18 Hungary	4.3	18 Hungary	4.6	44
Switz.	***	***	19 Italy	3.0	19 Italy	3	29
UK	50	58	20 Spain	2.1	20 Spain	2.3	22
USSR	46	49	21 Yugosla.	1.4	21 Yugosla.	1.4	13
Yugosla.	***	***	22 Portugal	0.8	22 Portugal	0.8	8
USA	71	70	USA	7.0	USA	7.1	68

*Statistical Office of the European Economic Communities, OECD and National Statistics

- (a) Including Bregott
- (b) Including Butter oil
- (c) Edible Oil included

SOURCE: United Nations Economic Commission for Europe, European Dairy Product Market
1984-1985 (Agri-R.181-Add.1) Geneva, December 1985.