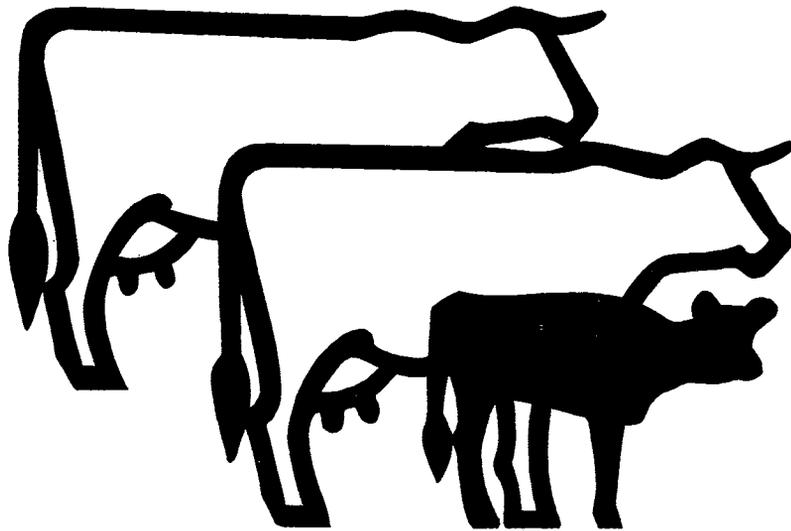


# LIVESTOCK FEED BALANCES FOR THE USSR



Tri-Agency Reading Room  
Date \_\_\_\_\_  
Room 505  
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## ABSTRACT

Soviet official data on livestock feeds, documented estimates of feed use consistent with the official data, and pertinent Soviet definitions and concepts are reported. According to these estimates, consumption of all feeds by livestock increased only 25 percent since 1965 but feeding of grain increased more than 75 percent, an annual growth of almost 10 percent.

Keywords: USSR, feed, livestock, grain balance.

## PREFACE

The feeding of grain in the Soviet Union roughly doubled in the past decade but feeding of protein supplements increased only about 70 percent. Two years ago, that country embarked on a large-scale livestock program that should sustain the demand for high-energy feeds and increase the demand for protein feeds. The measurement of this demand, and the capability of Soviet agriculture to satisfy it, are under review by the Economic Research Service (ERS).

As part of this review, this report (a) assembles published Soviet official data on livestock feeds, (b) develops documented estimates of feed use consistent with the official data, and (c) provides pertinent Soviet definitions and concepts. In addition, rudimentary information is presented on livestock-feed relationships in the United States and the USSR.

A USDA Feed-Livestock Delegation visited the USSR in September-October 1971.\* One objective of this visit was to "develop feed balance data and identify trends among the various feedstuffs." To that end, the Delegation requested the USSR Ministry of Agriculture to provide certain basic information. In December 1971, some of the requested information was supplied to the U.S. Agricultural Attache in Moscow. These data are shown in tables 10 and 11. The Ministry did not provide data on grain fed to livestock (except for grain used in mixed feed), and one of the principal objectives of this report was to develop estimates for this major feed component.

A more detailed study, projecting Soviet supply and demand for feed, is in progress. As a result of this more detailed analysis, some of the estimates herein probably will be adjusted. In this report, an effort has been made to define and discuss areas of uncertainty such as seeding rates, waste factors, flour extraction rates, and changes in stocks. Refinements or adjustments are most likely to occur in these areas.

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## LIVESTOCK FEED BALANCES FOR THE USSR

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### CONFINED FEEDING PROGRAM 1/

In April 1971, the Soviets announced plans to expand large-scale specialized production of livestock products during 1971-75. During this period, 635 specialized dairy enterprises, 307 cattle feedlots, 228 hogfeeding operations, and 585 hatchery and broiler units are being commissioned.

These specialized farms enjoy a high priority in the allocation of equipment, productive breeds of livestock and poultry, balanced (complete) rations, and efficient management. Thus, average feed conversion rates are better on these farms than on diversified farms. In 1970, the following amounts of feed were expended (expressed in kilograms of oat feed units required to produce a kilogram of product):

Commodity	: Collective : and state : farms <u>1/</u>	: State : farms <u>2/</u>	: Specialized : farms <u>2/</u>
Milk.....	1.4	1.25	1.05
Beef, liveweight..	11.5	10.2	8.0
Pork, liveweight..	9.1	7.8	6.0
Poultry meat, liveweight.....	NA	6.4	5.0
Eggs (10).....	NA	3.8	3.0
	:		

NA = not available.

1/ Sel'skoe Khozyaystvo SSSR, Moscow, 1972, p. 344.

2/ Zhivotnovodstvo, No. 12, 1971, p. 3.

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1/ There is no general term adequate to describe this program. In this report, the term "confined feeding" includes a variety of operations ranging from controlled environment facilities for hogs and poultry, to combined milking-parlor concentrate-feeding units for dairy cows, to open feedlot pens for beef cattle and sheep. The term also implies large-scale specialized units.

The methods used by Soviet statisticians to arrive at the above figures are unknown and, therefore, it is not possible to compare the figures with U.S. conversion rates. Furthermore, quality differences in livestock products in the two countries make comparison difficult. The above conversion rates are internally consistent, however, and therefore useful in demonstrating the superior feeding efficiency of specialized farms.

The confined feeding program is an important step toward more specialized livestock production but, except in the poultry sector, the bulk of the livestock industry will remain on diversified farms and small private holdings.

Almost all the planned production increase in the poultry sector will come through expansion of specialized operations. Integrated broiler production, accounting for about 20 percent of total poultry meat in 1970, is to double by 1975. The output of eggs from specialized layer units is to increase from 25 percent of total production in 1970 to 40 percent in 1975.

There are limitations on investment funds and managerial skills, however, and by 1975 only 2 percent of Soviet milk output and only 5-6 percent of red meat production will come from specialized operations: 2/

Commodity	1970		1975 Plan	
	Total	Specialized farms	Total	Specialized farms
	<u>Million tons</u> <u>1/</u>			
Milk.....	83.0	--	100.0	2.1
Red meat (carcass weight).....	11.2	--	14.6	0.8
Poultry meat (carcass weight).....	1.1	0.2	1.4	0.4
Eggs (billions).....	40.7	10.7	52.0	19.2

-- = negligible.

1/ Tonnage figures in this report are metric.

A significant share of livestock output still originates on small private holdings. In 1971, private plots accounted for 35 percent of the meat (including poultry), 35 percent of the milk, and 50 percent of the eggs produced. 3/ Most of the remainder is produced on diversified state and collective farms.

2/ Zhivotnovodstvo, No. 12, 1971, p. 1. Ekonomika Sel'skovo Khozyaystva, No. 3, 1971, p. 13.

3/ Much of the feed used in the private sector originates in the socialized sector. State and collective farm workers are granted grazing privileges for their private livestock, and a portion of their wages are payment-in-kind in the form of feed. In addition, workers glean state and collective farm fields following the harvest.

## U.S.-USSR RELATIONSHIPS

Year-end livestock inventories (in terms of animal units) in the Soviet Union are roughly equal to U.S. inventories, but U.S. farmers feed out more livestock and produce much larger quantities of meat and poultry products. For example, in 1970/71 (October-September), U.S. farmers fed out more than 100 million hogs; <sup>4/</sup> it is estimated that Soviet farmers fed out only 55 million head that year. In addition, per animal yields of milk, wool, and eggs are higher in the United States. <sup>5/</sup>

Both countries have about the same January 1 inventories of hogs and horses. The United States has more cattle, but the USSR carries many more sheep and a larger number of poultry (table 1 and fig. 1).

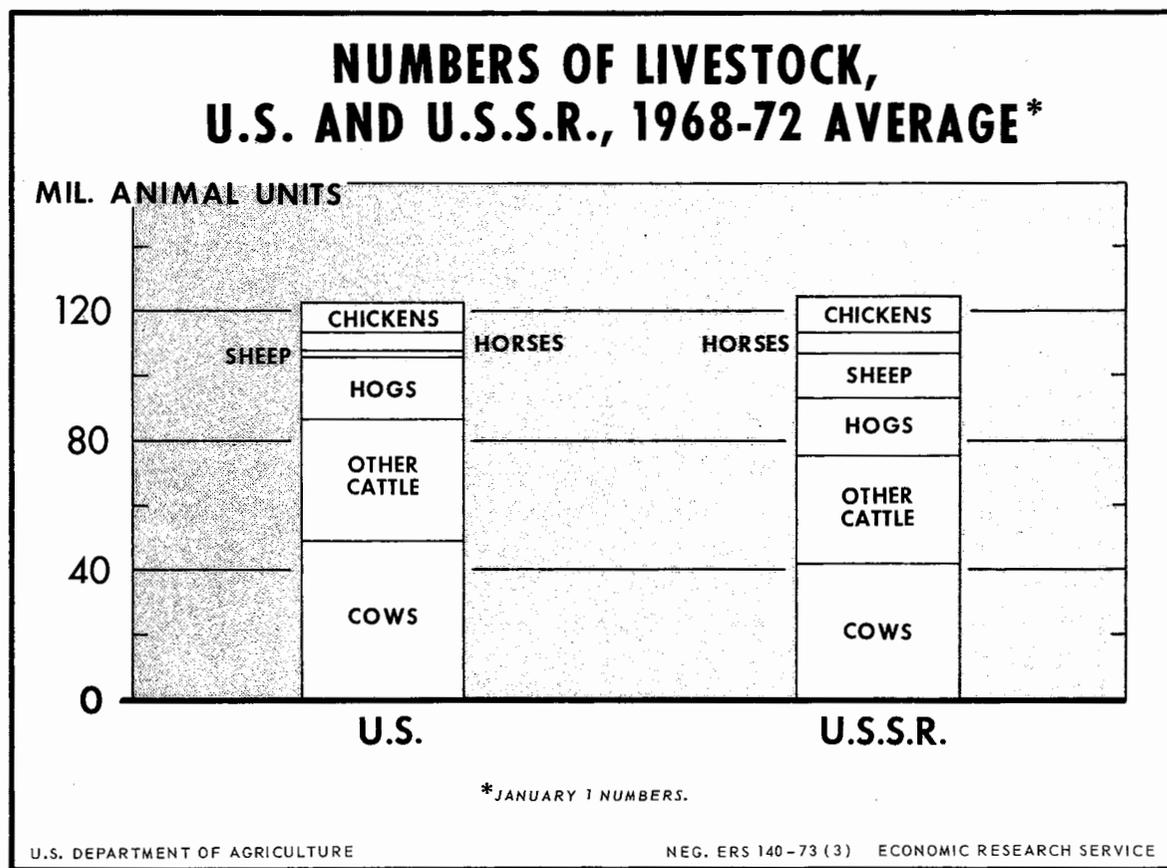


Figure 1

<sup>4/</sup> National and State Livestock-Feed Relationships, 1972 Supplement to Stat. Bul. 446, U.S. Dept. Agr., Econ. Res. Serv., June 1972, p. 48.

<sup>5/</sup> Agriculture in the United States and the Soviet Union, U.S. Dept. Agr., Econ. Res. Serv., Unpublished.



U.S. livestock consume about 35 percent more feed (in feed units) than do Soviet livestock, and the composition of feed is quite different in the two countries. Grain and pasture account for a much larger share of feed in the United States than in the USSR. In the Soviet Union, succulent feeds (silage, green chop, roots, 6/ and melons) are highly significant components of the balance; straw also is important (table 2 and fig. 2)

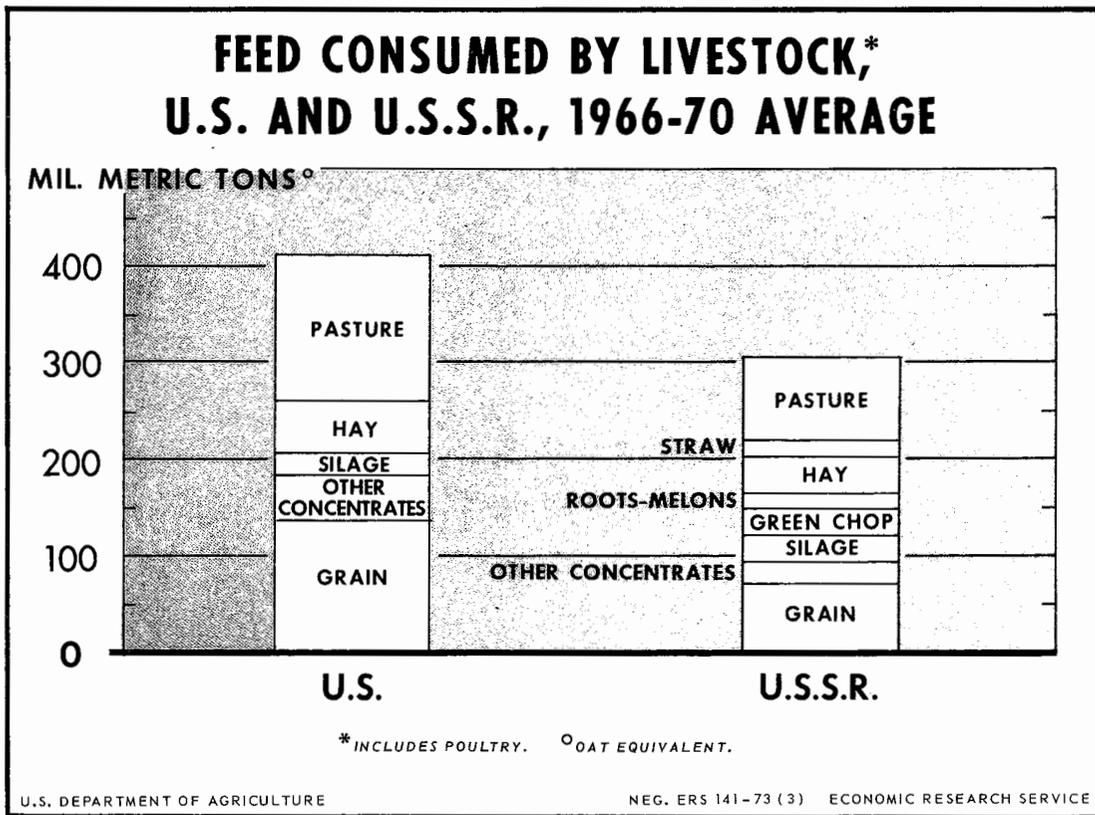


Figure 2

#### SOVIET DEFINITIONS AND CONCEPTS

In the USSR, most feeds are classified as concentrates, succulents, or coarse feeds.

In Soviet usage, the term concentrates refers to "crop" feeds containing more than 0.5 kilogram of digestible nutrients (0.65 oat feed units) per kilogram of feed or--for some feeds that contain less nutrients--no more than 40 percent water or 19 percent fiber. 7/ Concentrates include grain, by-

6/ In physical terms, Soviet stock consume 35-40 million tons of potatoes annually (table 11). The bulk is fed to privately-owned hogs (tables 12 and 13).

7/ Screenings--which contain only 0.62 feed units but are low in moisture and fiber content--are an example of the latter.

Table 2--Feed units 1/ consumed by livestock and poultry, United States and USSR, 1966-70 average

Type of feed	Country	
	United States <u>2/</u>	USSR <u>3/</u>
	<u>Million tons</u>	
Grain.....	139.3	72.5
Other concentrates.....	<u>45.9</u>	<u>22.1</u>
All concentrates.....	185.2	94.6
Silage.....	23.0	28.5
Green chop.....	<u>4/</u>	25.9
Roots and melons.....	--	17.8
Hay.....	51.9	35.2
Straw and stover.....	.9	20.2
Pasture.....	150.4	77.4
Other.....	<u>1.8</u>	<u>5.0</u>
Total.....	413.2	304.6

-- = negligible.

1/ A feed unit is equal in feeding value to a ton of oats.

2/ National and State Livestock-Feed Relationships, 1972 Supp. to SB No. 446, ERS, USDA, June 1972, p. 98. Data presented in corn feed units were converted to oat feed units on the basis of relative values shown in Consumption of Feed by Livestock, 1940-59, Earl F. Hodges, PPR No. 79, ERS, USDA, 1964, p. 40.

3/ Tables 11, 12, and 13.

4/ Included in silage figure.

products of the flour-milling and vegetable oil industries, and dried residues of the starch, beet sugar, and distilling-brewing industries. 8/ Animal protein and synthetic protein are not included in the definition of concentrates.

Succulents are those "crop" feeds with a water content in excess of 40 percent. They include silage, green chop, potatoes, sugar beets, forage roots, melons, wet beet pulp, and distillers' mash.

Coarse feeds have a fiber content in excess of 19 percent. They include hay, straw, and stover.

Pasture and feeds of animal or synthetic origin are not included in any of the above categories. 9/

Feeds are aggregated by converting to "oat equivalents." A feed unit is equal in feeding value to a ton of oats. Relative values for nonconcentrate feeds are shown in table 13. Feed units for selected concentrates follow: 10/

Feed	Moisture content, percent	Feed units per ton
Oats.....	13	1.00
Barley.....	13	1.21
Corn, shelled.....	13	1.34
Ear corn.....	15	1.12
Wheat.....	13	1.20
Rye.....	13	1.18
Feed peas.....	13	1.17
Oat middlings.....	13	.84
Barley feed.....	13	.70
Wheat bran.....	13	.71
Rye middlings.....	14	.76
Screenings.....	13	.62
Distillers' dried grains.....	12	.75
Brewers' dried grains.....	12	.80
Alfalfa leaf meal, dehydrated.....	12	.96
Dried beet pulp.....	13	.85
Feed molasses.....	20	.77
Sunflower oilmeal.....	9	1.09
Sunflower oilcake.....	10	1.02
Cottonseed meal.....	9	1.15
Cottonseed cake.....	10	.96
Cottonseed cake from unhulled seeds..	10	.66
Soybean oilmeal.....	10	1.26

8/ Kormlenie Sel'skokhozyaystvennikh Zhivotnikh, A. P. Dmitrochenko and P. D. Pshenichnyy, Leningrad, 1964, p. 117.

9/ Ekonomika Sel'skovo Khozyaystva, No. 10, 1971, p. 39.

10/ Spravochnik Ekonomista Kolkhoza i Sovkhoza, G. V. Kulik (ed.), Moscow, 1970, pp. 538-539.

There is an apparent anomaly in the "concentrate" entries in table 13. For 1966-70, the feed-unit-per-ton values for concentrates in that table are less than 1.00. Yet grain accounts for the bulk of the concentrates and the above tabulation shows feed unit values greater than 1.00 for grains (except oats). To some degree, these high grain values are offset by values less than 1.00 for millfeeds, screenings, and dried byproducts of the starch, beet sugar, and distilling-brewing industries. A further explanation may be that Soviet statisticians take into account the moisture content in calculating the feed units of grain fed on collective and state farms. Values shown in the above tabulation are for grain with 13 percent moisture content. In actual practice, a great deal of the grain fed has a moisture content above that level and, consequently, a lower feed value. 11/ According to Yugoslav feeding trials, for example, corn with 13.6 percent moisture content has an oat feed unit value of 1.34 but 35-percent-moisture corn 12/ has a value of only 1.00; for barley, an increase of 3 percentage points in moisture content is matched by a decline of 3 percentage points in feed value. 13/

Grain statistics include pulses as well as cereal grains. To the extent that pulses are fed, Soviet "grain for feed" has a somewhat higher protein content than we customarily associate with the term. Pulses account for about 8 percent of the grain used in the Soviet mixed feed industry (table 10).

Soviet "grain" is expressed in terms of "bunker weight," as it comes from the combine, and thus contains a varying amount of trash and moisture depending on harvesting conditions. Lacking an objective method for quantifying year-to-year variations, a standard waste factor of 10 percent was used arbitrarily for each year in the balance shown in table 3. Because the grain "Available for feed and stocks" is a residual, annual deviations from the 10 percent waste factor accumulate in this entry.

The grain balance (table 3) shows a drawdown of 27 million tons in stocks during 1960-63 and a net accumulation of 42 million tons during 1964-72. Several reviewers of this report pointed out that it is difficult to account for such a large buildup in the latter period in view of the large 1972/73 Soviet imports, and suggested that the use of a higher waste factor would cancel much of this buildup. The latter is certainly true--use of a 15 percent waste factor yields an accumulated net drawdown of about 100 million tons of stocks during 1960-72. Given the low production base that prevailed during 1946-59 (an annual average of 90 million tons), it is highly improbable that the USSR could have entered the 1960's with stocks anywhere near the 100 million-ton level.

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11/ By Soviet definition, grain with 40 percent moisture content would still qualify as a "concentrate."

12/ Of course, corn--even ear corn stored in slatted cribs--would not keep at 35 percent moisture for any appreciable time without significant losses.

13/ Norms and Tables for Animal Nutrition, Mihailo Fedorovic-Tome, Miodrag Obradovic, and Darko Stosic, Belgrade, 1967, p. 221.

Table 3--USSR: Grain balance, 1/ 1960-72

Supply and distribution	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	<u>Million tons</u>												
Production <u>2/</u> .....	126	131	140	108	152	121	171	148	170	162	187	181	168
Seed <u>3/</u> .....	21	24	26	24	23	22	22	22	23	22	21	22	22
Waste <u>4/</u> .....	13	13	14	11	15	12	17	15	17	16	19	18	17
Net exports <u>5/</u> .....	7	8	3	5	-2	-4	4	4	7	4	5	-6	(-10)
Industrial use <u>6/</u> .....	3	3	3	3	3	3	3	3	3	3	3	3	3
Food use <u>7/</u> .....	41	42	42	40	43	42	42	42	42	42	43	43	43
Available for feed and stocks.....	41	41	52	35	70	46	83	62	78	75	96	101	93
Stock changes.....	-5	-10	-1	-11	31	-10	22	-3	8	-4	3	2	-7
Feed use <u>8/</u> .....	46	51	53	46	39	56	61	65	70	<u>9/79</u>	93	99	(100)

1/ Waste, net exports, industrial use, food use, stock changes, and feed use include flour in grain equivalent.

2/ Narodnoe Khozyaystvo SSSR, various issues.

3/ Table 4 figures, lagged 1 year.

4/ Estimated at 10 percent of production. See text, page 8.

5/ Vneshnaya Torgovlya SSSR, various issues. Calendar year net exports lagged 1 year. Parenthetic figures are estimates.

6/ Estimate based on Stroitel'stvo Kommunizma SSSR, Vol. 1, 1962, p. 86.

7/ Figures on "grain products consumed by humans" from table 6 were converted to grain at an 85 percent extraction rate (90 percent for the shortage year 1963). See footnote 5 of table 6.

8/ Table 7.

9/ According to the Statement of the Soviet Representatives to the November 1971 meeting of the International Wheat Council in London, about 80 million tons of grain were fed in 1969 and it is planned to feed 110 million tons in 1975.

With regard to the 1964-72 buildup in stocks, a 40+ million-ton stock level does not appear excessive for a country of 250 million people. Canada, a country of 22 million people, had grain stocks ranging from 16 to 34 million tons during 1963-70. Both Canada and the USSR have been traditionally major grain exporters, and both countries produce most of their grain in areas of marginal rainfall. Largely because of fluctuations in rainfall, the following deviations from long-term trend in Soviet grain production have occurred in the past 12 years (in million tons):

1961	+2	1967	-10
1962	+6	1968	+6
1963	-31	1969	-6
1964	+9	1970	+14
1965	-27	1971	+3
1966	+18	1972	-15

The entry "Feed use" in table 3 is the residual after nongrain concentrates are deducted from total concentrates. The list of nongrain concentrates in table 7 is not complete, 14/ thus the grain residual is somewhat overstated.

Seeding of winter grain: Soviet newspapers contain periodic reports on the progress of fall seeding. The dates of these reports vary from year to year but, in table 5, the data were entered according to the nearest date shown in the stub. Data on seeding exclude an insignificant area seeded on private plots. Progress reports giving "total seeded" area were published in 1967, 1969, and 1973. For other years, the totals are estimates based on the rate of fall seeding, using seeding plans and harvested area as guides. The difference between seeded and harvested area represents area winterkilled, grazed, or harvested as forage.

According to official data for 1961-65, the "total seeded" area figures in table 5 may be from 2 to 4 million hectares too low. These official data, in million hectares, are tabulated on the following page. The discrepancy between the tabulated figures and those in table 5 may be because the tabulated data include seeded grain intended for forage while data in table 5 do not. Unfortunately, there is no systematic way to extend the short series and, thus, we are obliged to abide with the series in table 5. Even if we assume, however, that 2-4 million hectares are seeded for forage at double the seeding rate for grain, the "seed" figures in table 4 are only about a million tons too low.

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14/ Data are not available on the dried byproducts of the starch, beet sugar, and distillery-brewing industries. These products are not fed in any large quantities, however. For example, almost all of the beet pulp and brewers' mash is fed in wet form and, therefore, is classified as succulent feed. It is calculated that, in 1966, 1.6 million tons of dried beet pulp (concentrate) and 19 million tons of wet beet pulp (succulent) were fed. *Ekonomika i Organizatsia Otkormochnykh Khozyaystv*, M. V. Pentyuk, Moscow, 1968, pp. 29-31. *Spravochnik Ekonomista Kolkhoza i Sovkhoza*, G. V. Kulik (ed.), Moscow, 1970, p. 539).

Table 4--USSR: Seeded area and seed used, 1961-73

Year	: Winter : grain : seeded <u>1/</u>	: Spring : grain : harvested <u>2/</u>	: Corn for : silage and : green chop <u>2/</u>	: Total	: Seed <u>3/</u>
	- - - - - Million hectares - - - - -				Million tons
1961.....	<u>4/</u> (37)	86.6	18.5	142.1	21.3
1962.....	(40)	91.7	30.1	161.8	24.3
1963.....	(46)	96.6	27.2	169.8	25.5
1964.....	(45)	96.1	22.3	163.4	24.5
1965.....	(43)	90.8	20.2	154.0	23.1
1966.....	(39)	89.9	19.9	148.8	22.3
1967.....	39	88.8	19.6	147.4	22.1
1968.....	(37)	88.7	19.0	144.7	21.7
1969.....	36	98.2	18.5	152.7	22.9
1970.....	(40)	89.5	18.0	147.5	22.1
1971.....	(37)	86.4	17.8	141.2	21.2
1972.....	(34)	NA	<u>5/</u> 17.9	(150)	22.5
1973.....	27	NA	NA	(145)	21.8

NA = not available.

1/ Table 5.

2/ Narodnoe Khozyaystvo SSSR, various issues.

3/ Estimated at 150 kilograms per hectare. See text, page 13.

4/ Parenthetic figures are estimates.

5/ SSSR v Tsifrakh v 1972 godu, Moscow, 1973, p. 105.

Table 5--USSR: Winter grain area seeded 1/ and harvested, 1961-73

Reporting date	(Year of harvest)												
	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
	<u>Million hectares</u>												
Sept. 20.....		27.2		33.4	32.0			25.0			27.3	23.6	14.4
Sept. 25.....		28.9			34.2		30.8					27.2	18.3
Sept. 30.....	<u>2/</u> 31.5	30.6		36.5	36.0		32.6	30.5	29.7		29.5		20.9
Oct. 5.....	32.3						34.0		31.7	31.0		29.3	
Oct. 10.....	33.0				38.4						32.5	30.5	23.7
Oct. 15.....				41.2		35.0			34.0	32.6			25.0
Oct. 20.....		36.4	42.0							34.5	33.6	31.8	
Oct. 25.....									35.0	38.5		32.4	25.7
Oct. 30.....							38.0						
Total seeded.....	<u>3/</u> (37)	(40)	(46)	(45)	(43)	(39)	39	(37)	36	(40)	(37)	(34)	27
Seeding plan <u>1/</u> .....	35	38	44		45	43	41	40	39	38	36	35	34
Harvested <u>4/</u> .....	36	37	33	37	37	35	33	33	24	30	<u>5/</u> 32		

Blank spaces indicate data not available.

1/ Sel'skaya Zhizn, Pravda, Izvestiya, various issues.

2/ These entries represent the total area seeded as of the date shown in the stub.

3/ Parenthetic figures are estimates.

4/ Sel'skoe Khozyaystvo SSSR, Moscow, 1971, p. 109.

5/ Narodnoe Khozyaystvo SSSR, 1922-72, Moscow, 1972, p. 239.

Year	Fall seeded <u>1/</u>	Winterkilled <u>1/</u>	Harvested for forage <u>2/</u>	Harvested for grain <u>3/</u>
1961.....	41.5 (37)	1.6	4.2	35.7
1962.....	43.4 (40)	2.6	3.8	37.0
1963.....	48.0 (46)	10.1	4.5	33.4
1964.....	49.0 (45)	8.2	3.6	37.2
1965.....	46.2 (43)	5.2	3.8	37.2

1/ Perezimovka i Produktivnost Ozimyykh Khlebov, I. I. Garus, P. A. Zabaznyy, I. I. Kootun, Moscow, 1970, p. 32. Parenthetic figures are from table 5.

2/ Residual.

3/ Sel'skoe Khozyaystvo SSSR, Moscow, 1971, p. 109.

The seeding rate of 150 kilograms per hectare is somewhat arbitrary. Seeding "norms" for individual grains taken from a 1959 publication 15/ and weighted by the areas seeded to these grains in 1957 gives an average rate of 130 kilograms. A more recent publication 16/ setting "norms for determining seed requirements" indicates an average rate of roughly 200 kilograms. While these norms and requirements obviously influence the actual seeding rate, it is impossible to say how closely these norms are adhered to. The rate of 150 kilograms is very high by U.S. standards, but somewhat low in relation to seeding rates in the United Kingdom and Poland. 17/

Grain products consumed by humans, shown in table 6, was calculated simply by multiplying official Soviet per capita consumption figures by official midyear population numbers. The discrepancy between these figures and total flour production in that table is accounted for by flour fed to livestock, waste, nonfood use of flour (in alcohol, binders, etc.), and net exports of flour. The derived flour extraction rate of 85 percent is high by U.S. standards but is close to the rates found in continental Europe and equal to the rate that applied in the United Kingdom in the post-World War II period. 17/

As shown in table 8, the "calculated supply" of oilseed meal used in livestock feed closely parallels the official data on oilseed meal used in the mixed feed industry. Therefore, it was assumed that all oilseed meal fed to livestock was provided by the mixed feed industry.

15/ Entsiklopedicheskiy Sel'skokhozyaystvenniy Slovar-Spravochnik, Moscow, 1959, pp. 408, 547, 703, 738, 1020.

16/ Spravochnik Ekonomista Kolkhoza i Sovkhoza, G. V. Kulik (ed.), Moscow, 1970, pp. 424-425.

17/ Technical Conversion Factors for Agricultural Commodities, FAO, Rome, 1960, 1972.

Table 6--USSR: Grain products consumed by humans, and production of flour and mill-feeds, 1950-72, selected years

Year	Grain products consumed by humans <u>1/</u>	"Industrial" flour production <sup>2/</sup>	Total flour production <u>3/</u>	Millfeed production <u>4/</u>	Grain used for flour production <u>5/</u>
	<u>Million tons</u>				
1950....	31.0	22			
1951.....		24			
1952.....		26			
1953.....		27			
1954.....		29			
1955.....		32			
1956.....		32			
1957.....		33			
1958.....	35.6	35			
1959.....		36			
1960.....	35.2	35	39	7	46
1961.....	(35.5)	36	40	7	47
1962.....	(35.9)	36	40	7	47
1963.....	36.0	36	39	4	43
1964.....	36.2	34	37	7	44
1965.....	36.0	37	39	7	46
1966.....	35.7	39	41	7	48
1967.....	35.3	39	41	7	48
1968.....	35.4	39	40	7	47
1969.....	35.8	39	40	7	47
1970.....	36.2	42	42	7	49
1971.....	36.5	43	43	8	51
1972.....	(36.9)				

Blank spaces indicate data not available.

1/ Includes bread in flour equivalent, flour, groats, pulses, and pasta products. Narodnoe Khozyaystvo SSSR, various issues. Parenthetic figures are estimates. 2/ Ibid. 3/ According to Mukomol'noelevatornaya Promyshlennost (No. 11, 1967, p. 2), 95 percent of total flour was produced by the flour "industry." This percent was applied to the year 1966. For each year, it was assumed that the share "industrially" produced increased 1 percent. 4/ Grain used for flour production minus total flour production. 5/ As shown in table 10, an average of 6.25 million tons of millfeed were used in mixed feed during 1968-70. According to Ekonomika Sel'skovo Khozyaystva (No. 4, 1971, p. 28), only 92 percent of millfeeds produced is used in mixed feed--thus, an average of 7 million tons of millfeed were produced in 1968-70. Adding to the 41 million tons of flour produced annually during 1968-70 gives an average grain use for flour of 48 million tons and an extraction rate of 85 percent. The flour figures were converted to grain equivalent at an extraction rate of 85 percent (90 percent for the short-age year 1963).

Table 7--USSR: Grain and other concentrates 1/ fed to livestock, 1960-72

Commodity	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	<u>Million tons</u>												
Millfeed <u>2/</u> .....	6.4	6.4	6.4	3.7	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	7.4
Oilseed meal <u>3/</u> .....	1.8	2.1	2.5	2.5	2.7	3.0	3.1	3.4	3.5	3.5	3.1	<u>4/</u> (3.0)	NA
Alfalfa meal <u>5/</u> .....	--	--	--	--	--	.1	.2	.3	.4	.6	.9	(1.3)	NA
Grain <u>6/</u> .....	45.5	50.8	52.5	46.1	39.1	55.8	60.8	65.0	70.0	79.0	92.8	99.0	NA
Total concentrates <u>7/</u>	53.7	59.3	61.4	52.3	48.2	65.3	70.5	75.1	80.3	89.5	103.2	109.7	NA

NA= not available.

--= negligible

1/ Soviet definition excludes animal protein and synthetic protein.

2/ These figures are 92 percent of the millfeed production figures in table 6. See footnote 5 of that table.

3/ Table 8. As indicated in that table, it may be assumed that all of the oilseed meal fed to livestock is provided by the mixed feed industry.

4/ Parenthetic figures are estimates.

5/ Table 10.

6/ Residual.

7/ Narodnoe Khozyaystvo SSSR, various issues.

Soviet plant breeders have succeeded in increasing significantly the oil content of sunflowerseed. Extraction rates for sunflower oil and meal used in tables 8 and 9 follow:

Year	Oil <u>1/</u>	Percent	Meal <u>2/</u>
1960.....	37.9		42
1961.....	38.4		42
1962.....	39.3		41
1963.....	<u>3/</u> (40.4)		40
1964.....	(41.4)		39
1965.....	42.5		38
1966.....	(43.0)		37
1967.....	43.6		36
1968.....	44.6		35

1/ 1960-62: Maslo-Zhirovaya Promyshlennost', No. 2, 1964, p. 2.  
 1965, 1967: Economic Significance of Sunflowers in the USSR, M. V. Suslov, p. 4. (Third International Sunflower Conference, Aug. 13-15, 1968, Crookston, Minn.). 1968: Maslo-Zhirovaya Promyshlennost', No. 5, 1969, p. 31.

2/ According to Suslov (Ibid, p. 6), in 1968 the oil extraction rate was 44.6 percent and the meal extraction rate 35.5 percent, giving a total of 80. The above rates for meal were obtained by subtracting the rates for oil from a total of 80.

3/ Parenthetic figures are interpolations.

The production of mixed feed shown in table 10 refers to feed produced in state industrial enterprises and excludes on-farm production. In 1970, about 90 percent of the mixed feed was produced in such state enterprises. 18/ In addition to the feed shown in table 10, state enterprises provide farms with pre-mixed vitamin-mineral supplements.

Except for 1970 and the 1975 plan, there are no data on the amount of whole milk fed (table 11). In table 12, an attempt was made to arrive at a series by the residual method. Because this residual is very small relative to total feed, it is very sensitive to accumulated rounding errors in other entries. Therefore, the series on whole milk in table 12 (except for 1970) obviously is unreliable. Note, for example, that the 1962 figure for whole milk is larger in table 13 than in table 12. The opposite should be true.

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18/ Ekonomika Sel'skova Khozyaystva, No. 4, 1971, p. 28.

Table 8--USSR: Oilseed meal production 1/ and utilization, 1960-71

	: Meal	:	:	:	:	:	:	:	:	:	:	:	:
	: extraction:	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
	: rate <u>2/</u> :	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:
	: <u>Percent</u>	: <u>Million tons</u>											
Sunflowerseed.....	<u>3/</u>	1.11	1.41	1.59	1.60	1.49	1.88	1.73	1.85	1.87			
Cottonseed.....	<u>4/67</u>	1.51	1.51	1.59	1.61	1.84	1.87	1.97	2.04	1.98			
Soybean.....	<u>79</u>	.41	.06	.12	.21	.20	.13	.17	.25	.27			
Linseed.....	<u>64</u>	.06	.08	.08	.05	.05	.09	.12	.17	.13			
Peanut.....	<u>5/56</u>	.01	--	.02	.01	.01	--	.01	.01	.01			
Other.....	<u>60</u>	.07	.10	.12	.10	.12	.10	.10	.11	.10			
Total.....		3.17	3.16	3.52	3.58	3.70	4.07	4.10	4.43	4.36			
Production used in live-													
stock feed <u>6/</u> .....		2.38	2.37	2.64	2.68	2.78	3.05	3.08	3.32	3.27			
Exports <u>7/</u> .....		- .50	- .39	- .35	- .19	- .05	- .13	- .39	- .39	- .32	- .32	- .05	- .04
Imports <u>7/</u> .....		0	0	0	0	.01	.09	.06	.06	.09	.08	.10	.09
Calculated supply used													
in livestock feed.....		1.88	1.98	2.29	2.49	2.74	3.01	2.75	2.99	3.04			
Oilseed meal used in													
mixed feed industry <u>8/</u> ..		<u>9/</u> 1.80	2.08	2.48	2.53	2.69	2.98	3.13	3.45	3.47	3.49	3.13	

Blank spaces indicate data not available.

--= negligilble.

1/ Derived from oilseed figures in table 9.2/ Oilworld, various issues,3/ See text, page 16.4/ Including hull meal.5/ From shelled peanuts.6/ According to Ekonomika Sel'skovo Khozyaystvo (No.4, 1971, p. 28), only 75 percent of vegetable oil byproducts are utilized in livestock feed.7/ Vneshnaya Torgovlya SSSR, and Narodnoe Khozyaystvo SSSR, various issues.8/ Table 10.9/ Estimated.

Table 9--USSR: Oilseeds processed for vegetable oil, 1960-68 <sup>1/</sup>

Oilseed	Oil extraction rate <sup>2/</sup>	1960	1961	1962	1963	1964	1965	1966	1967	1968
	Percent	Million tons								
Sunflower-seed....	<u>3/</u>	2.64	3.35	3.89	3.99	3.83	4.96	4.67	5.14	5.35
Cottonseed....	<u>4/18</u>	2.25	2.26	2.37	2.40	2.75	2.79	2.94	3.05	2.95
Soybeans.....	18	.514	.074	.158	.268	.259	.162	.218	.319	.343
Flaxseed.....	35	.101	.130	.126	.082	.080	.139	.182	.272	.208
Castorbeans...	45	.017	.008	.023	.016	.037	.049	.063	.054	.065
Peanuts.....	44	.017	.005	.027	.024	.025	.009	.016	.013	.018
Other.....	33	.115	.174	.193	.166	.194	.170	.167	.185	.175

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<sup>1/</sup> Derived from data on the production of vegetable oil by types. Vestnik Statistiki, No. 6, 1969, p.88.

<sup>2/</sup> Oilworld, various issues.

<sup>3/</sup> See text, page 16.

<sup>4/</sup> Maslo-zhirovaya Promyshlennost, No.3, 1963, p.3-4; No. 4, 1968, p. 30; and No. 5, 1969, p. 31.



Table 11--USSR: Feed fed to livestock and poultry, all farms, 1960-71, 1975 plan 1/

Commodity	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1975 plan 2/
	Million tons												
Grain 3/.....	45.5	50.8	52.5	46.1	39.1	55.8	60.8	65.0	70.0	79.0	92.8	99.0	
Millfeeds 3/.....	6.4	6.4	6.4	3.7	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
Oilseed meal 3/.....	1.8	2.1	2.5	2.5	2.7	3.0	3.1	3.4	3.5	3.5	3.1	3.0	
Alfalfa meal 3/.....	--	--	--	--	--	.1	.2	.3	.4	.6	.9	1.3	
Total concentrates 3/..	53.7	59.3	61.4	52.3	48.2	65.3	70.5	75.1	80.3	89.5	103.2	4/109.7	121.5
Fish meal 5/.....	.1	.1	.1	.1	.2	.2	.3	.3	.3	.4	.4	.4	.7
Meat and bone meal 5/.....	.1	.1								.3		.3	.5
Feed yeast 5/.....	--	--	--	.1	.1	.1	.1	.2	.2	.2	.3	.3	1.0
Skim milk 6/.....		19.1	21.8	19.7	21.0	26.3	26.6	27.8	28.4	27.0	27.5		30.2
Whole milk.....											2/11.5		10.9
Silage.....	128.8	153.9	150.0	147.7	144.2	166.7	146.5	147.1	153.6	146.5	156.2	4/154.7	258.1
Green chop 6/.....		140.3	128.7	100.4	115.8	124.5	140.2	139.6	138.6	141.2	159.2		
Potatoes 6/.....		37.9	34.9	27.9	33.0	42.3	39.8	37.0	40.0	38.0	36.9		
Sugar beets, forage roots, & melons 6/.....		28.8	36.2	31.5	31.2	34.8	38.9	38.1	43.1	43.5	44.0		
Wet beet pulp, mash, etc. 7/.....		43.4	34.0	30.8	37.0	48.3	51.2	50.2	52.7	52.2	50.8		
Total succulents.....	431.0	404.3	383.8	338.3	361.2	416.6	416.6	412.0	427.8	421.4	447.1	4/466.3	
Hay 6/.....	69.5	74.6	72.8	69.3	69.8	78.2	78.4	78.4	79.0	79.7	84.8	4/86.5	142.1
Straw 6/.....	67.9	69.3	80.1	77.7	72.5	85.8	87.0	88.5	91.0	88.5	88.3	7/97.8	7/109.3
Total coarse feeds.....	137.4	143.9	152.9	147.0	142.3	164.0	165.4	166.9	170.0	168.2	173.1	4/184.3	251.4
Pasture.....		327.8	349.9	332.9	347.2	373.4	407.6	416.8	414.1	399.7	399.7	4/405.1	

Blank spaces indicate data not available.

-- = negligible.

1/ Narodnoe Khozyaystvo, various issues.

2/ Gosudarstvennyy Pyatiletniy Plan na 1971-1975, Moscow, 1972, p. 175.

3/ Table 7. Soviet definition excludes animal protein and synthetic protein.

4/ Narodnoe Khozyaystvo SSSR, 1922-1972, Moscow, 1972, p. 262.

5/ Table 10.

6/ U.S. Feed Livestock Delegation, Sept.-Oct. 1971. Data provided by USSR Ministry of Agriculture.

7/ Residual.

## FEEDING PATTERNS

During 1961-65, there was very little change in the amount of feed fed to livestock and poultry (table 12). Feed production stagnated because of severe droughts in 1963 and 1965.

Since 1965, feed consumption in the USSR has increased by about 25 percent. Grain accounted for most of this growth. During 1966-71, the feeding of grain increased by more than 75 percent, an annual growth of almost 10 percent (table 11). However, the feeding of high-protein byproduct feeds (oilseed meal, fish meal, and tankage) increased less than 20 percent in that period and the proportion of grain fed in unbalanced rations increased.

Soviet rations are short of protein and therefore wasteful of grain and other feeds. 19/ Soviet nutritionists claim that--if adequate protein were available--the output of livestock products could be increased by one-third and an additional million tons of meat could be produced without increasing the energy intake. 20/

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19/ In addition, losses of nutrients in stored roughage run very high--30 percent for hay and 50 percent for silage. In 1970, 85 percent of the silage was put down in unfaced trenches. *Ekonomika Sel'skovo Khozyaystvo*, No. 10, 1971, p. 13.

20/ *Ekonomika Sotsialisticheskovo Sel'skovo Khozyaystva*, E. S. Karnaukhov and I. A. Borodin (eds.), Moscow, 1970, p. 431.

Table 12--USSR: Feed units 1/ consumed by livestock and poultry, all farms, 1961-71 2/

Commodity	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
	<u>Million tons</u>										
Concentrates <u>3/</u> .....	65.2	66.9	53.9	48.7	65.3	69.8	74.3	78.7	87.7	<u>4/</u> 101.2	107.5
Skim milk.....	2.5	2.8	2.6	2.7	3.4	3.5	3.6	3.7	3.5	<u>4/</u> 3.8	
Whole milk <u>5/</u> .....		1.4	3.8	5.1	2.5	6.1	5.7	5.5	5.4	<u>4/</u> 4.0	
Silage.....	32.3	28.5	29.5	27.4	31.7	27.8	27.9	29.2	27.8	<u>4/</u> 28.9	29.4
Green chop.....	28.1	24.4	18.1	20.8	22.4	25.2	25.1	24.9	25.4	28.7	
Potatoes.....	11.4	10.5	8.4	9.9	12.7	11.9	11.1	12.0	11.4	11.1	
Sugar beets, forage roots, and melons.....	4.6	8.3	6.6	6.6	6.6	5.8	6.1	6.5	6.5	6.6	
Wet beet pulp, mash etc.....	<u>4.3</u>	<u>3.4</u>	<u>3.1</u>	<u>3.7</u>	<u>4.8</u>	<u>5.1</u>	<u>4.5</u>	<u>5.3</u>	<u>5.2</u>	<u>5.1</u>	
Total succulents.....	<u>80.7</u>	<u>75.1</u>	<u>65.7</u>	<u>68.4</u>	<u>78.2</u>	<u>75.8</u>	<u>74.7</u>	<u>77.9</u>	<u>76.3</u>	<u>80.4</u>	
Hay.....	33.6	34.2	32.6	32.1	35.2	34.5	34.5	34.8	35.1	<u>4/</u> 37.6	38.1
Straw.....	<u>17.3</u>	<u>20.2</u>	<u>19.4</u>	<u>18.1</u>	<u>20.6</u>	<u>19.1</u>	<u>20.3</u>	<u>20.9</u>	<u>20.4</u>	<u>5/</u> 20.0	22.5
Total coarse feeds...	<u>50.9</u>	<u>54.4</u>	<u>52.0</u>	<u>50.2</u>	<u>55.8</u>	<u>53.6</u>	<u>54.8</u>	<u>55.7</u>	<u>55.5</u>	<u>4/</u> 57.6	<u>60.6</u>
Pasture.....	68.8	70.0	63.2	62.5	70.9	77.4	79.2	78.7	75.9	75.9	77.0
Fish meal, meat and bone meal, feed yeast, etc.....		1.3	1.9	2.2	2.4	3.1	2.7	2.9	2.9	3.1	
Total <u>6/</u> .....	<u>267.3</u>	271.9	243.1	239.8	278.5	289.3	295.0	303.1	307.2	328.2	344.5
	<u>7/</u> 268.1									<u>7/</u> 326.0	

Blank spaces indicate data not available.

1/ A feed unit is equal in feeding value to a ton of oats.

2/ Tables 11 and 13.

3/ Soviet definition excludes animal protein and synthetic protein.

4/ Gosudarstvennyy Pyatiletniy Plan na 1971-1975, Moscow, 1972, p. 175.

5/ Residual.

6/ Narodnoe Khozyaystvo, various issues.

7/ Total of individual entries.

Table 13--USSR: Feed fed to livestock and poultry on collective and state farms, 1961-70 1/

Commodity	Unit	1961	1962	1963	1964	1965 <u>2/</u>	1966	1967	1968	1969	1970 <u>2/</u>
		<u>Million tons</u>									
Concentrates.....	Feed units <u>3/</u>	46.3	47.1	36.5	33.8	46.3	49.6	53.0	57.7	66.5	77.1
	fu./ton	1.10	1.09	1.03	1.01	1.00	.99	.99	.98	.98	.98
Skim milk.....	Feed units	1.9	2.1	2.0	2.1	2.7	2.7	2.8	2.8	2.6	2.9
	fu./ton <u>4/</u>	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
Whole milk.....	Feed units	1.8	1.8	1.6	1.4	1.7	1.9	2.0	2.1	2.2	2.4
	fu./ton <u>4/</u>	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34
Silage.....	Feed units	31.2	27.1	27.8	25.9	30.1	26.1	26.0	27.0	25.9	27.5
	fu./ton	.21	.19	.20	.19	.19	.19	.19	.19	.19	.19
Green chop.....	Feed units	19.3	17.9	13.3	15.7	16.0	17.2	17.2	17.1	18.1	20.8
	fu./ton	.20	.19	.18	.18	.18	.18	.18	.18	.18	.18
Potatoes.....	Feed units	3.4	2.6	1.6	2.8	3.9	3.5	3.2	3.9	3.6	3.2
	fu./ton <u>4/</u>	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
Sugar beets, forage roots, and melons.....	Feed units	3.1	5.5	4.6	4.2	4.1	3.8	4.1	4.6	4.8	4.7
	fu./ton	.16	.23	.21	.21	.19	.15	.16	.15	.15	.15
Wet beet pulp, mash, etc.....	Feed units	3.6	2.3	2.2	2.7	3.5	3.6	3.2	3.8	3.9	3.6
	fu./ton	.10	.10	.10	.10	.10	.10	.09	.10	.10	.10
Hay.....	Feed units	22.0	21.7	19.6	19.2	20.3	21.0	21.3	21.8	22.0	23.7
	fu./ton	.45	.47	.47	.46	.45	.44	.44	.44	.44	.44
Straw.....	Feed units	13.8	15.6	15.0	13.0	14.9	13.8	14.6	14.8	14.6	14.7
	fu./ton	.25	.25	.25	.25	.24	.22	.23	.23	.23	.23
Pasture.....	Feed units <u>5/</u>	44.9	45.5	44.2	44.0	47.2	51.2	52.5	52.4	50.7	51.0
	fu./ton	.21	.20	.19	.18	.19	.19	.19	.19	.19	.19
Fish meal, meat and bone meal, feed yeast, etc.....	Feed units <u>5/</u>	NA	1.3	1.9	2.2	2.4	3.1	2.7	2.9	2.9	3.1
Total feed units <u>5/</u> .....		191.3	190.5	170.7	167.2	193.0	197.7	202.9	211.3	217.9	234.7

NA = not available.

1/ Sel'skoe Khozyaystvo SSSR, Moscow, 1971. Derived from tables on pp. 332-333.2/ Ekonomika Sel'skovo Khozyaystva, No. 10, 1971, p. 39.3/ A feed unit is equal in feeding value to a ton of oats.4/ Spravochnik Ekonomista Kolkhoza i Sovkhoza, G. V. Kulik (ed.), Moscow, 1970, p. 539.5/ Sel'skoe Khozyaystvo SSSR, Moscow, 1971, p. 332.

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