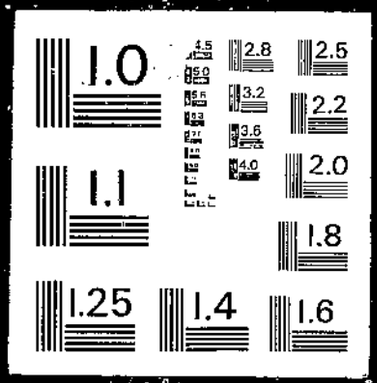
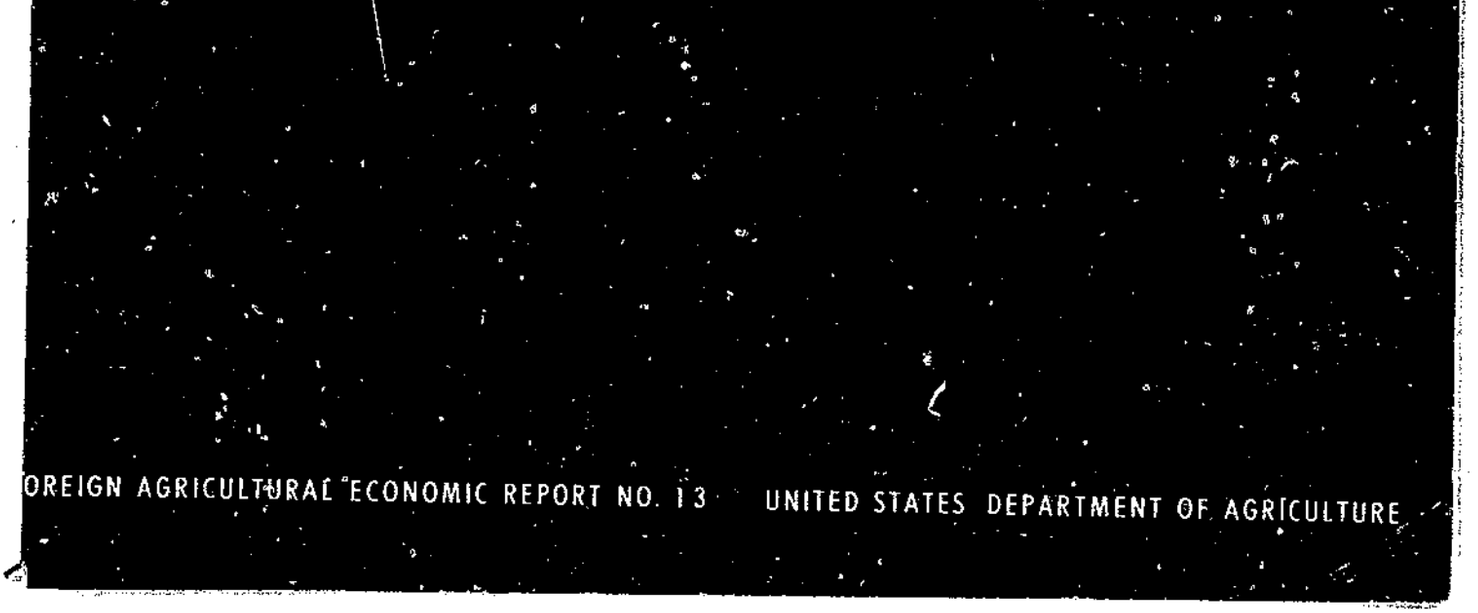
USDA/FAER-13

SOVIET AGRICULTURE TODAY: REPORT OF THE 1963 AGRICULTURE EXCHANGE DELEGATION. (Foreign Agricultural Economic Report). Washington, DC: Economic Research Service. Dec. 1963.



Report of 1963 Agriculture Exchange Delegation

SOVIET AGRICULTURE TODAY



FOREIGN AGRICULTURAL ECONOMIC REPORT NO. 13 UNITED STATES DEPARTMENT OF AGRICULTURE

The delegation was composed of Secretary Orville L. Freeman; Dorothy Jacobson, Assistant to the Secretary; Willard W. Cochrane, Director, Agricultural Economics; Byron T. Shaw, Administrator, Agricultural Research Service; Kenneth L. Bachman, Director, Development and Trade Analysis Division, Economic Research Service; Walter M. Carleton, Associate Director, Agricultural Engineering Research Division, Agricultural Research Service; Lazar Volin, Chief, East European Branch, Economic Research Service; John C. McDonald, Special Assistant to Director, Information Division, Foreign Agricultural Service; Eugene T. Olson, Special Assistant, Soviet and East European Agricultural Affairs, Foreign Agricultural Service. In addition, G. Stanley Brown, Harry E. Walters, and Theodora Mills, East European Branch, Economic Research Service, participated in the preparation of the report.

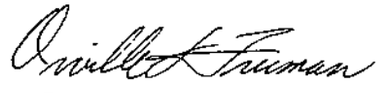
The following reports of previous USDA exchange groups have been published: Cotton in the Soviet Union; Crops Research in the Soviet Union; Economic Aspects of Soviet Agriculture; Entomology in the Soviet Union; Forestry and Forest Industry in the USSR; Grain Marketing in the Soviet Union; Livestock in the Soviet Union; Soil Salinity and Irrigation in the Soviet Union; Soil and Water Use in the Soviet Union; Veterinary Science in the Soviet Union; Livestock and Livestock Products in the Soviet Union. A report on grading and exporting Russian wheat is being prepared.

FOREWORD

American agriculture is playing an expanding role in the international economy, and world markets are of increasing importance to American agriculture. Any sound approach to the problems of agriculture in the United States therefore involves knowledge and understanding of conditions affecting agriculture in all parts of the world. We need to know about scientific and technological developments in agriculture throughout the world. We also need to know how economic and political conditions in other countries are affecting agriculture today, and will do so in the future.

Agriculture plays an important role in the national economy of the Union of Soviet Socialist Republics. Consequently, the U. S. Department of Agriculture has sent a number of technical study groups to the Soviet Union, under provisions of agreements between the United States and the USSR which, since 1958, have provided for exchanges of personnel in scientific, technological, educational, and cultural fields. These study groups have gained much useful information as a result of the exchange.

In July 1963, a USDA exchange delegation, consisting of six scientists and economists, two of my staff members, and myself, completed an 18-day tour studying Soviet agricultural development. The tour included agricultural discussions with Chairman Khrushchev, with Soviet farm officials and agricultural scientists, and visits to some of the major agricultural research institutes and farming areas in the USSR. The members have prepared this report of their observations and study.



ORVILLE L. FREEMAN,
Secretary of Agriculture.

TABLE OF CONTENTS

Washington, D. C.

December 1963

SOVIET AGRICULTURE TODAY

Report of the
1963 Agriculture Exchange Delegation

INTRODUCTION

This is a report on the recent visit by Secretary Freeman and his exchange group to the USSR. But it draws heavily on and in a sense is an updating of the report, "Economic Aspects of Soviet Agriculture," 1/ made by the Agricultural Economics Exchange group following their trip in 1958. Information from that report and other recent USDA studies has been used freely in preparing this report.

As information about the agricultural potentialities of the Soviet Union is far from adequate, we have attempted to piece together our team findings with other available data to arrive at general though tentative conclusions. We hope this report will contribute to a better understanding of the present agricultural situation in the Soviet Union and of the changes that are taking place.

No adequate appraisal of the agricultural situation there or anywhere else can be made without reliable statistics. Many statistical references basic to an understanding of Soviet agriculture are not available. However, an improvement has taken place during the last few years. The USSR resumed publication of annual statistical year books in 1956. Detailed data for recent years on sown acreage, by crops, and on numbers of different kinds of livestock have been published. A great deal of information also has been provided on the different kinds of farms and farm equipment, such as tractors and combines. But data on the farm labor force and on income, expenses, and their distribution are inadequate. The most serious gap is in reliable data on production and utilization of crops.

We have attempted to bridge the statistical gaps on some phases of agriculture by drawing on local data, personal observation, and experience gained from previous visits and studies. The possibility of error in estimates arrived at in this way must be recognized. We are confident, however, that the changes are in the direction indicated in this report.

The central agricultural problem in the Soviet Union in recent years has been that of expanding production of food and fiber. There were substantial increases from 1954 to 1958, but, since 1958, increases in crop and livestock production have been slight. Because of poor crops in 1963, the Soviet Union imported large quantities of wheat.

The fact that the population of the Soviet Union is not only growing, but is also becoming increasingly urbanized as industry develops (table 1) accentuates the need for greater farm output and changes in the composition of farm production. Urbanization not only decreases the manpower on farms, but normally brings with it a desire for higher quality diets. These diets require increased supplies of animal and dairy products, sugar, vegetables, and fruits. Political and phychological factors also have made more urgent the long promised improvement of levels of living.

The agricultural problem in the Soviet Union, therefore, is opposite to that in the United States, where rapid technological progress and high production per man and per acre have resulted in surpluses. In the Soviet Union a battle for bigger crops and more livestock is the story of agriculture today.

1/ Agricultural Research Service. Economic Aspects of Soviet Agriculture. U. S. Dept. Agr. unnumbered publication, 78 p., May 1959.

Table 1.--Population and agricultural production, USSR

Item	Unit	Prewar	1954	1962
Total population	Millions	1/170.6	2/191.0	2/219.7
Urban	do.	1/56.1	2/83.6	2/111.8
Rural	do.	1/114.5	2/107.4	2/107.9
Urban population as percent of total population	Percent	39	44	51
Farm production	1952-54 =100	100	3/100	4/130
Per capita	do.	1/101	3/100	4/112

1/ Census of January 17, 1939, for prewar territory.
2/ Estimates as of January 1 for 1954 and 1962, for present territory from SSSR v Tsifrakh v 1961 godu, Moscow 1962, p. 229.
3/ Average 1952-54.
4/ Preliminary USDA estimates.

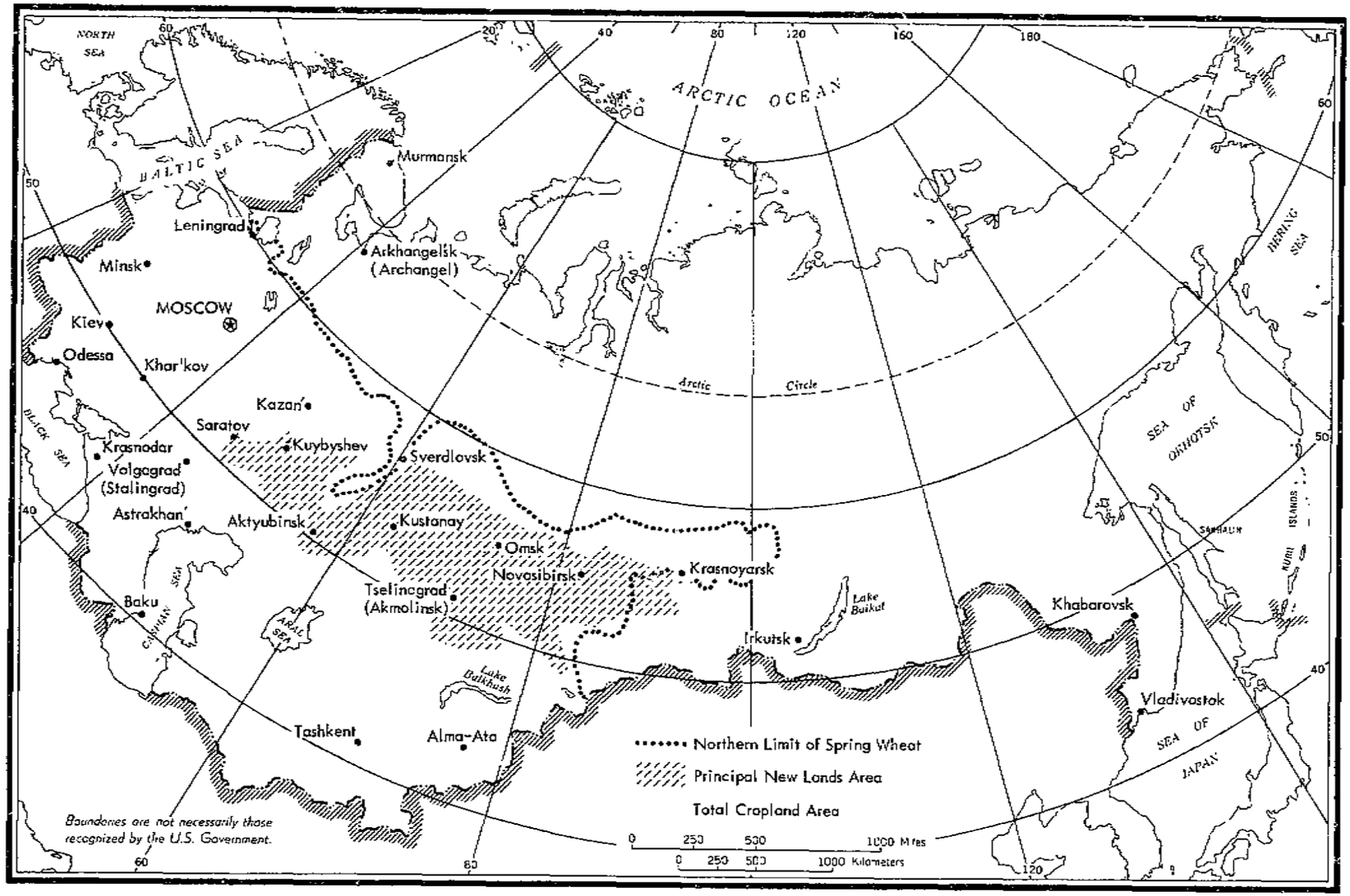
The growth of agricultural production capacity of a country largely depends on the interaction of the natural environment and factors such as the institutional structure of agriculture, organization of farming, labor supply and its motivation, capital equipment, and the status of its agricultural research, technology, farm practices, and farm management. It was with this set of institutional and human-controlled factors that the 1963 survey team was primarily concerned in its investigation.

LAND UTILIZATION

All land in the Soviet Union is the property of the state. Land cannot be legally sold or purchased. The state allots land to various farm enterprises for use tenure which, in the case of collective farms, is supposed to be "in perpetuity," according to Soviet law. During recent years, a large number of collectives were converted into state farms. The private plots of collective farm members are allotted by the collectives. The collective can change the size of the plots or do away with them entirely.

Although the Soviet Union is one of the leading agricultural countries of the world, much of its land is not suitable for farming. Agriculture is confined largely to a heartland represented by a so-called "fertile triangle" (see map). The base of this triangle stretches, roughly, from Leningrad on the Baltic Sea in the north, along the western frontier to the Black Sea in the south. The apex is located at Krasnoyarsk on the River Enisey in central Siberia. To the north is the forest zone, and beyond are the tundra wastes; along the southern and eastern borders are high mountain chains; and in the southeastern parts are large deserts.

But even in the fertile triangle there are important climatic limitations on agriculture. Much of the triangle is characterized by a continental semiarid climate similar to that of the spring wheat region of the Prairie Provinces of Canada and the Dakotas of the United States.



Cropland Areas and Principal New Lands Areas in Soviet Union

How far north the country is located can be best visualized by pointing out that Yalta, at the southern tip of the Crimea, is approximately in the same latitude as Rochester, Minn.

Of the huge Soviet territory of 5,518 million acres, about one-half is devoted to farm enterprises of various kinds (table 2). Of this total area in farms, 1,243 million acres or less than one-half, is classified as agricultural land.

Land classified as arable is the most important agricultural land. It includes the area actually seeded to crops, as well as the summer fallow. Arable land in 1959 accounted for 540 million acres or about 45 percent of the total classified as agricultural land. There were 485 million acres seeded to crops in that year, leaving 55 million acres in summer fallow. By 1961, the arable area was increased to about 550 million acres. The sown area increased to 506 million acres in 1961 and to 534 million in 1962.

A large expansion in sown area took place in the last decade. During 1953-62 the sown acreage expanded 37 percent (table 3). Part of this came from summer fallow and uncultivated land, and some from meadows and pastures.

Table 2.--Uitlization of land in farms in the USSR, end of 1959

Land use	Area (million acres)	Percent of total
Tilled land (including summer fallow)	540.2	21.1
Uncultivated land	27.4	1.1
Meadows	109.5	4.3
Pastures	558.2	21.8
Unspecified	7.9	.3
Total agricultural land	1,243.2	48.6
Forest and other land unsuitable for agricultural use	1,314.1	51.4
All land in farm enterprises	2,557.3	100.0

Sel'skoe Khozyaistvo SSSR, Moscow, 1960, p. 126

Table 3.--Sown area in the USSR, specified years 1940 to 1962 1/

Year	Million acres	Year	Million acres
1940 2/	371.7	1956	481.2
1945 2/	281.2	1957	478.6
1950	361.5	1958	483.3
1951	378.1	1959	485.1
1952	384.9	1960	501.6
1953	388.4	1961	505.6
1954	410.4	1962	533.7
1955	459.2		

1/ Data from official sources. Area for harvest exclusive of winter killed grain not resown in the spring. 2/ Figures for territory within the boundaries of that year and are not fully comparable with those of latter years.

"Uncultivated land" is closely akin to arable land that is not cultivated. It includes some land cropped at one time and then abandoned. It constitutes, of course, the first reserve of potential cropland; that is, land that can be easily converted to use for crops. This area greatly diminished during the past decade, from 67 million acres in 1950 to 27 million in 1959. It was an important source of the large expansion of sown acreage which took place during the period.

The next important categories are those of permanent meadows and pastures, accounting together for over one-fourth of the total farmland and one-half of the agricultural land. A part of this acreage can be easily converted to cropland, and was, no doubt, also a major source of the large increase in the sown area during the past decade, largely in western Siberia and Kazakhstan.

In regions of established agriculture with favorable climatic conditions and fertile soils, such as parts of the Ukraine, Central European Russia, and North Caucasus, great areas of pasture and meadowland have already been converted to plowland. In such regions, therefore, a further substantial increase of the cultivated area at the expense of pasture and meadow is unlikely.

Since the end of the last century, expansion of the crop acreage has taken place on the virgin lands beyond the Volga River and Ural Mountains. Railroad construction at the turn of the century, a more active colonization policy of the Russian Government following the revolution of 1905-06, and other factors led to a large stream of peasant migration to these regions during the decade preceding World War I. Large mechanized state farms were established in the eastern regions in the 1930's. Finally, in 1954, a new campaign for acreage expansion was initiated by Khrushchev and, in the course of a few years, about 100 million acres of new land were put under cultivation in these regions.

Climatic conditions in these areas--prolonged drought, short growing season, and inclement weather during the harvesting season--result in low and fluctuating crop yields. This is true of most of the potential additions to the cultivated areas in the Soviet Union. Better production practices, such as increased use of summer fallow, improved tillage practices, and weed control measures may help to improve grain yields in this semiarid zone. But grain yields are likely to remain substantially lower than in the more humid regions.

An additional 260 million acres also classified as agricultural land are not included in the area possessed by farm enterprises. Most of this land is in the state land reserve. Nearly three-fourths of it is in Kazakhstan and eastern Siberia, and is probably largely marginal for crop production.

Despite the large arid zones in the Soviet Union, the irrigated area is relatively small. In 1957, about 23 million acres of farm land had an irrigation network, of which 17.8 million acres were actually irrigated. Thus, the acreage actually irrigated amounted to only about 3 percent of the arable land.

While the total sown area increased by 90 million acres between 1953 and 1957, the irrigated area increased by only 1 million. The irrigated area is concentrated principally in the central Asiatic cotton-growing republics and in the trans-Caucasus republics specializing in the production of cotton, fruits, and tobacco.

During the last years of Stalin's rule, a program to irrigate 15 million acres in the southeastern and southern European USSR was initiated. This effort has been largely abandoned since Stalin's death. One project, now in a construction stage and mentioned to us specifically by Premier Khrushchev, is irrigation of 250,000 acres in the Crimea. Extensive irrigation developments in the traditional irrigation regions of Soviet Central Asia also were mentioned. On the whole, however, the Soviet Government has not relied on large and costly irrigation projects, which would raise crop

yields materially. Instead, during the past decade the Government used the method of expanding acreage in the semiarid zones.

There are strong indications, however, that increased emphasis may be given to irrigation in the next few years. In fact, a new program of irrigation for the production of grain was announced in September 1963 following the very poor grain crop. An area of 6.4 million acres with an existing irrigation system is to be devoted to grain in 1964. In addition, new irrigation development to be used for grain production is planned on an area of 6.9 million acres within the next few years.

Potentialities doubtless exist for a sizable expansion of the irrigated area although such programs will involve large investments.

The subhumid zones include many of the most fertile areas of the country. Most of the expansion in crop acreage has taken place in these zones, including the recent program of bringing under cultivation large tracts of virgin land. So far, irrigation has not played a significant role in the subhumid zones. Irrigation could become important, however, in the basins of the Volga, Don, and Dneiper Rivers.

In the western and north-central European regions of the USSR, a considerable acreage of marshland and swamps can be turned into productive meadows, pastures, and cropland. Indications are, however, that reclamation operations are proceeding slowly. In 1956, the area being drained was reported at about 14 million acres.

Doubtless, a considerable area of marginal land, even without irrigation and drainage, could be pressed into cultivation. The economic criteria that normally inhibit the use of such arable land in other countries are less operative in the Soviet economy, though somewhat greater attention now is being paid to the economics of production. Recent Soviet official pronouncements, including oral statements to the exchange group, now uniformly stress increasing crop yields particularly with the increased use of chemical fertilizers as the best way to increase production--not more expansion of crop acreage. Soviet officials even envisage a possible reduction of crop acreage in 10 to 15 years.

ORGANIZATION OF FARMING

An American agriculturalist, accustomed to the family farms in the United States, cannot help but be startled by the large size of the farms in the Soviet Union. In the United States, farms are increasing in size and in capital equipment, to be sure, but most of them are operated by a single family with a little hired labor. Farms in the Soviet Union are huge, both in terms of land area and of the labor force used. Furthermore, all land is nationalized, and agriculture has been collectivized, with the exception of small household plots.

There are three types of farm units in the Soviet Union: collective farms (kolkhoz, singular; kolkhozy, plural), state farms 2/ (sovkhoz, singular; sovkhozy, plural), and the small private plots permitted members of collective farms, state farm employees, and certain other categories of workers.

2/ In addition to state farms, there are many small state-owned agricultural enterprises connected with various institutions and organizations not classified as state farms. Usually, they are grouped together under the category "state farms and other government farms."

Collective Farms

The collective farm is the dominant type of farm enterprise from the standpoint of number of units, share of the agricultural labor force, area sown, and output. The collective farm dates from the 1930's when the independent small farmers were forced to pool their land and capital into nominal but essentially state-controlled cooperatives.

Housing of members of collective farm. Kuban Collective, Krasnodar area.

Theoretically, a collective farm is a producer cooperative managed by a "democratically elected" chairman and board of directors. In practice, party-state supervision of collectives is stringent, extending to the selection of managerial personnel and operational details. In effect, collective farms are subject to most of the controls imposed on state enterprises. Collectives differ from state farms in two important respects: (1) Members of collective farms are not wage employees, but residual sharers in income of the individual collectives; and (2) investment in collective farms is not financed from the state budget but from the income of the individual collectives.

In Stalin's words, the "first commandment" of the collective farm is the delivery of agricultural products to the state. After fulfilling its obligation to sell stipulated quantities at fixed prices to the state, and of providing for its seed and feed requirements, any remaining production can be sold on private markets. From the total income received, production expenses must be met and approximately one-quarter to one-third of the monetary income is set aside for investment. The remainder of the income is used to compensate members of the farm for their participation in the work.

The peasants on collective farms, both male and female, work in the fields under the direction of managers and supervisors, just as workers do in Soviet factories. Payments to the workers vary with the skill required and the amount of labor accomplished. The payments are determined by a cumbersome procedure, resembling a piece-rate system. There has been a drive in recent years to simplify this system of payment by doing away with the preliminary calculation of earnings in terms of

"workday" units 3/ and abandoning payments-in-kind. Another intention is to make payments more regularly and frequently, instead of relying on an end-of-year distribution. The goal is a regular cash wage, which has been adopted--in part at least--by approximately 20 percent of the collective farms. Differentiation of payments, according to skill and amount of work, continues with the shift to a cash wage.

A related development has been emphasis on economic incentives to farmers by increasing the very low prices paid by the state for compulsory delivery of farm products. A portion of the resulting augmented farm income has been used to increase payments to collective farm members.

Closely related to the complicated system of wage payments is the system of detailed cost accounts apparently kept on all collective and state farms. We gathered that some Soviet Union economists feel these are overcomplicated and should be simplified.

A large number of collective farms have been merged in recent years to form larger collectives, or were converted into state farms. The total number of collective farms thus dwindled from more than 240,000 at the beginning of 1940 to 40,600 at the beginning of 1963.

Acreage in collective farms has been declining substantially. The sown area in collective farms decreased from 326 million acres in 1953 to 273 million in 1961. Nearly all the decline in sown area occurred since 1958. The sown area in state farms increased from 45 million acres in 1953 to 216 million in 1961.

Concurrently, the average size of collective farms increased considerably. In 1962, each collective farm had, on the average, approximately 400 households, 15,500 acres of agricultural land (including a sown area of 7,000 acres), 960 cattle (including 340 cows), 790 hogs, and 1,680 sheep and goats. Some of the farms are considerably larger. Thus, in 1959, 40 percent of the collective farms had a sown area of 5,000 acres or more, and 11 percent had a sown area of more than 12,500 acres. The average size of a collective farm also varies from region to region, as shown in tables 4 and 5. Yet the striking contrast with the size of farms in the United States remains.

The 1958 exchange group of U. S. agricultural economists observed:

"We gained the impression that in striving for bigness, per se, farm efficiency was neglected. Even with brigade subdivisions, much time is consumed in going to and from places of work. Although Soviet agricultural authorities stress increasing efficiencies associated with larger sizes of operations in discussing desirable sizes of farms, their thinking is in terms of very large units by U. S. standards. They did state, however, that some of their largest farms, up to 150,000 hectares

---

3/ Each task or operation (so many hectares of plowing, planting, or harvesting, for instance) has, under this system, its value in terms of "workday" units, which increases with the overfulfillment of the task and decreases with its underfulfillment. The total number of workdays thus earned during the year by all members is divided into various components of income designated for distribution among the membership after all expenses and obligations are met. If the value of a workday in a particular collective--and it differs from farm to farm--is established at X units of grain, Y units of potatoes, and Z rubles per year, the member who is credited with, say, 200 workdays will earn 200 X + 200 Y + 200 Z. Those who are credited with 220 workdays or 180 workdays will correspondingly receive more or less grain, potatoes, and cash. Instead of receiving all their earnings in a lump sum at the end of the year, farm members in a number of collectives are now receiving part of their earnings on a monthly or quarterly basis. A certain proportion of the advances paid by the Government for products acquired from collectives must be used for the purpose of paying collective farm members.

(about 370,000 acres), are considered to be too large. The present sizes are probably influenced more by the greater ease of centralized management and control than by economies associated with size of operation. Large farms mean fewer units of contact for state direction of planning and operation; also fewer managers will be needed to translate the overall plans into specific operations."

Although the problem of the optimal size of farm enterprises has received more attention in the Soviet Union press and literature since 1958, we found that the tendency toward giantism persists. In evaluating the appropriate size of farms, Soviet officials reported that attention is given to community factors, such as community buildings and schools, as well as to the production factors. Possibly a countervailing development is the emphasis on a smaller operating unit--the so-called "complex brigade"--within the giant farms. Each "complex brigade" or division is supposed to have its own crop area, livestock, machinery, labor force, and managerial personnel.

Table 4.--Percentage distribution of collective farms by size of sown area, selected regions of the USSR, 1959

Sown area per farm	All USSR	North-western	North Caucasus	Western Siberia
	Percent	Percent	Percent	Percent
500 hectares (1,236 acres) and under	13.6	46.0	30.2	4.4
501 to 1,000 hectares (1,238 to 2,471 acres)	18.3	30.8	8.9	4.6
1,001 to 2,000 hectares (2,473 to 4,942 acres)	27.9	20.1	6.8	12.5
2,001 to 5,000 hectares (4,944 to 12,355 acres)	29.2	3.0	13.4	37.7
Over 5,000 hectares (12,355 acres)	11.0	0.1	40.7	40.8
All collective farms	100.0	100.0	100.0	100.0

Sel'skoe Khozyaistvo SSSR, Moscow, 1960, p. 55.

Table 5.--Percentage distribution of collective farms by number of households, selected regions of the USSR, 1960

Number of households per farm	All USSR	North-western	North Caucasus	Western Siberia
	Percent	Percent	Percent	Percent
100 and under	10.7	42.3	12.1	10.9
101 to 200	24.7	37.9	15.0	28.7
201 to 300	20.3	11.8	13.3	29.0
301 to 500	24.0	6.7	19.7	22.4
501 to 750	13.8	1.3	16.7	7.3
751 to 1,000	4.2	---	9.4	1.3
Over 1,000	2.3	---	13.8	0.4
All collective farms	100.0	100.0	100.0	100.0

Sel'skoe Khozyaistvo SSSR, Moscow, 1960, p. 54.

Since 1958 tractors, combines, and other machinery have been owned by collective farms, instead of by special state enterprises--machine tractor stations (MTS). The MTS serviced collective farms and also functioned as an important local agency of party-state control over collective farming. This system of dual farm management or, as Khrushchev put it, "two bosses on the land," created a great deal of friction and inefficiency and made it difficult to pinpoint responsibility. The transfer of machinery to collective farms seemed advantageous--even though a further financial obligation was placed on the collectives for the purchase, upkeep, and operation of the machinery. Overall readjustment, apparently, has been beneficial, though the problems of machinery repair and of spare parts continue.

With approximately 54 percent of the total sown area and 45 percent of total animal units (cow equivalents), collective farms produced approximately 44 percent of total agricultural output in 1962, according to official Soviet statistics. Collective farms are less important in livestock production than in crop production. In 1962, collectives accounted for 57 percent of gross field crop production, but only 31 percent of livestock production (table 6).

State Farms

State farms, by Soviet definition, are "highly mechanized state agricultural enterprises. All their work is subordinated to the interests of the socialist state and is conducted strictly on the basis of the national economic plan . . ." Thus, state farms have the same status as factories, retail shops, or any other state enterprise in the Soviet Union. Everything produced by state farms is the property of the state; their profits--if any--are channeled into the state treasury, and their losses are covered by the state budget. As in industry and almost all other sectors of the economy, except collective farms, state farmworkers are wage employees of the state.

As of January 1, 1963, there were 8,571 state farms in the Soviet Union, compared with 4,857 at the beginning of 1953. The increase of more than 75 percent in the number of state farms resulted from: (1) establishment of state farms in the New Lands area, which was brought under cultivation during the last decade; (2) establishment of specialized meat, dairy, and vegetable state farms around major urban centers; and (3) conversion of collectives into state farms.

Table 6.--Number of farms and percentage distribution of land, livestock, and output, by farming sector, USSR, 1962 1/

Item	Unit	State farms 2/	Collective farms	Total socialized sector	Private plots
Number of farms	Units	8,600	40,600	49,200	25,800,000
Agricultural land area	Percent of total	49.5	49.1	98.6	1.4
Sown area	do.	42.7	54.0	96.7	3.3
Cattle	do.	26	45	71	29
Cows	do.	20	35	55	45
Swine	do.	29	45	74	26
Sheep and goats	do.	28	47	75	25
Agricultural output	do.	24	44	68	32
Field crops	do.	27	57	84	16
Livestock products	do.	22	31	53	47

1/ USDA preliminary estimates based on official Soviet data. 2/ Includes a number of small state-owned agricultural enterprises not classified as state farms.

State farms are even larger enterprises than the collectives and our comments on the size of the farm enterprise apply even more to state farms. In 1962, they averaged approximately 800 employees, 70,000 acres of land (including 25,000 acres sown to crops), 2,500 cattle (including 875 cows), 1,960 swine, and 4,800 sheep and goats per farm. Although state farms accounted for approximately 43 percent of the total sown area and 27 percent of total animal units (cow equivalent) in 1962, they produced only one-quarter of the total agricultural output, according to official Soviet statistics. Many of the state farms are in semiarid regions of low and unstable yields.

The rapid growth of the state farm in recent years poses the question of whether the expected eventual conversion of collective farms into the "highest type of socialist agricultural enterprise," as the state farm is ranked in Soviet theory, is in the offing. Despite the continuing expansion of the state sector at the expense of the collective sector, the current official line continues to reflect the position established by Khrushchev at the 22d Party Congress in October 1961. At that time, he asked for concurrent development of collective and state farms and called the collective farm "the school for Communism in the countryside." It appears that the Government is not willing to assume responsibility for the wage and investment bills of the collective farm sector as it does for the state farm sector.

Private Sector

A peculiar feature of the Soviet farm economy is the coexistence of giantism and dwarfism. Side by side with the large-scale socialized agriculture of collective and state farms is a private sector of small garden plots--averaging approximately two-thirds of an acre--which the regime permits members of collective farms, employees of state farms, and certain other members of the citizenry to maintain.

Although these plots constituted only 1.4 percent of the total agricultural land area and 3.3 percent of the total sown area in 1962, they accounted for about a third of gross agricultural output--including almost half of the total output of livestock products.

The inordinately large share of total output produced in the private sector is, in large measure, due to the intensity of livestock production in this sector. In 1962, 45 percent of all cows and 26 percent of all hogs were in the private sector. The share of poultry numbers on private plots was even greater, amounting to approximately three-quarters of all poultry in the Soviet Union. Private plots also are important sources of potatoes and vegetables, accounting for 64 and 45 percent, respectively, of total production of these commodities in 1961.

Much of the feed required for privately owned livestock must be obtained from collective and state farms. Collective and state farm pastures and, in some areas, summer fallow are used for grazing privately owned livestock. Some feedstuffs are distributed to members of collective farms as payment for their work. Thus, to an important degree, livestock on the private plots is produced from feed and fodder from state or collective farms.

The practice of feeding cereal products purchased in state stores to privately owned livestock has persisted for a number of years. In an attempt to curb this practice, the Government enacted a series of decrees during 1962, which stipulate fines or imprisonment for violators.

The small private sector is ideologically considered to be a temporary appendage to the collective farm economy. The Soviet expectation is that the socialized sector ultimately will provide an adequate supply of agricultural products, and that the private sector will wither away. Yet the private sector, linked with the institution of the farmers' free markets, has played a significant, though diminishing, role in the national food supply, as well as in the income of the peasants for the last 30 years.

In several of the areas visited, regulations reportedly limited severely the number of livestock that could be kept privately.

As private farming competes with socialized agriculture for the workers' time and is one of the last vestiges of private enterprise, it has been a thorn in the Kremlin's side. Historically, Soviet policy toward the small private sector has oscillated between encouragement, when the food situation was especially difficult, to toleration and even hostility when conditions improved. Thus, during the early years of the post-Stalin era, when the Government was coping with difficulties on the agricultural front, private farming was actively encouraged. But this attitude, particularly toward private livestock farming, has changed since the late 1950's, when the agricultural situation improved.

Although private plots are an anomaly under the Soviet system, it is unlikely that the Kremlin will mount an intensive drive for their elimination within the next few years for two reasons: (1) At the present stage of the development of socialized agriculture, private plots are too important as a source of "quality" foodstuffs, e.g., vegetables and livestock products; and (2) the regime recognizes them as part of the price of the socialization of agriculture in that they make socialized agriculture more acceptable.

CROP PRODUCTION

Grains account for more than half the acreage of sown cropland in the Soviet Union. Grain production in 1962 totaled about 110 million metric tons, compared with about 165 million in the United States.

Wheat accounts for half of total grain production in the Soviet Union. In contrast, wheat accounts for only about one-fifth of total grain production in the United States. The Soviet Union is the world's largest wheat producer, and has exported substantial quantities of wheat in recent years. Only in 1963 was the Soviet Union a large importer of wheat.

The Soviet Union's emphasis on wheat reflects both climatic and economic forces. A relatively small amount of the land has climate suitable for the production of corn. Despite recent increases, corn currently accounts for less than 15 percent of the grain production in the USSR. The production of grain for feed also is related to the levels of livestock production. Livestock and livestock product output in the USSR is still at a relatively low level, and heavy dependence is placed on roughage feeds.

In recent years, there has been a substantial increase in the acreage of corn for green feed and silage, and some increase in the acreage of corn for grain (table 7). This has been accompanied by some reduction in the acreage of oats, rye, millet, and grasses, and increases in the sown area. The acreage under wheat increased by about 75 million acres from 1950 to 1958, then slightly decreased. The acreage increased again in 1962 but remained slightly below the previous record of 170 million acres in 1957.

Total grain production has increased nearly 40 percent since 1950 (table 8). Most of this is associated with the increased grain acreage, but yields apparently have increased gradually since 1950 (table 9).

Potatoes continue as an important food and feed crop in the USSR, accounting for about 5 percent of the cropland acreage. Production of potatoes is more than 5 times that in the United States. More than half of the potato acreage was on the private plots of peasants and workers.

Table 7.--Acreage sown to selected crops in the USSR, selected years 1950 to 1962 1/

Crop	1950	1951-55	1956-60	1961	1962
	Million acres				
Wheat:					
All	95.1	122.3	158.7	155.6	166.5
Spring	64.2	80.5	119.6	112.9	121.8
Winter	30.9	41.8	39.1	42.7	44.7
Rye	58.3	52.7	43.3	41.3	41.7
Barley	21.3	23.2	25.4	33.1	40.0
Oats	40.0	39.5	35.1	28.4	17.0
Buckwheat	7.4	6.6	4.8	4.7	5.7
Corn for all purposes	11.9	12.3	(55.6)	(63.5)	(91.7)
Corn for grain	2/	2/	14.4	17.8	17.3
Millet	9.4	11.9	11.9	9.4	10.6
Total, major grain crops 3/	243.4	268.5	293.6	290.3	298.8
Potatoes	21.3	21.1	23.3	22.0	21.5
Annual grasses (including corn for green fooder)	17.3	23.0	58.0	50.2	n.a.
Perennial grasses	27.7	36.8	36.3	47.9	38.5
Silage crops (including corn)	3.2	7.8	22.4	25.5	n.a.
Sugarbeets for sugar	3.2	3.8	6.1	7.7	8.2
Sunflowers	8.9	9.6	9.9	10.4	10.8
Flaxseeds	5.6	4.4	4.9	4/4.0	4.2
Cotton	5.7	5.8	5.3	5.8	5.9
Total, specified crops	336.3	380.8	458.8	463.8	
Total, sown crop acreage	361.5	404.2	486.0	505.6	533.7

1/ Official Soviet sources.
2/ Not shown separately prior to 1956.
3/ Includes corn for grain, but excludes corn for all other purposes.
4/ Flax for fiber only in 1960 and 1961.

Table 8.--Estimated production of selected crops, USSR, selected years 1950 to 1962 1/

Crop	1950	1951-55	1956-60	1961	1962
	1,000 metric tons				
Wheat, all	27,800	36,627	52,910	52,200	54,431
Rye	18,400	17,252	15,280	15,300	13,717
Oats	12,600	12,339	11,700	8,800	6,387
Barley	7,400	7,961	9,840	11,270	15,676
Corn for grain	6,640	5,730	7,326	12,700	11,431
Total, selected grains	72,840	79,910	97,056	100,270	101,642
	1,000 bales				
Cotton	5,100	6,500	6,918	7,060	6,720

1/ USDA estimates.

Table 9.--Yields of selected crops, USSR, selected years, 1950 to 1962 1/

Crop	1950	1951-55	1956-60	1961	1962
	Bushels per acre				
Wheat, all	10.7	11.0	12.2	12.3	11.9
Rye	12.4	12.9	13.8	14.3	12.9
Oats	21.0	21.3	23.3	22.1	22.2
Barley	16.5	16.4	17.3	18.3	21.8
Corn for grain	22.0	19.8	23.9	28.2	26.0
	Bales per acre				
Cotton	0.89	1.20	1.32	1.22	1.16

1/ USDA estimates.

Sunflowers for oil, cotton, sugarbeets for sugar, flax for fiber, tea and tobacco are the major industrial crops grown in the USSR. In total, they account for more than 5 percent of the sown acreage and for a large part of the fertilizer used.

Production Practices and Yields

The 1958 Exchange Study Group reported that "crop production practices have undergone significant changes in the USSR in recent years." These changes have continued.

There has been a steady increase in mechanization. Although much hand labor was observed in weeding and hoeing, progress was apparent in mechanization of the handling of corn silage and grain straw, cross-cultivation of corn, and planting of monogerm sugarbeet seed. Very little use of herbicides for weed control was observed, however.

Crop yields are substantially affected by weather in the USSR, and yields were unusually high in 1958. Yields since then have varied greatly by crops and areas. In 1962, yields of wheat, rye, and oats were all below the 1956-60 average. Total grain production was less than 5 percent higher in 1962 than in the 1956-60 average, reflecting largely a small increase in total grain acreage. Weather in 1963 has been unusually adverse in extensive areas of the USSR, and reports indicate grain production will be substantially below the 1956-60 average.

Nevertheless, it seems apparent that there has been considerable experience gained in the use of fertilizers and other improved practices on grain and feed crops, hybrid corn, and improved varieties of wheat, sugarbeets, and sunflowers. Significant from the standpoint of possible future increases in crop yields and production is the rapid rate of adoption of improved crop varieties, recommended rates of fertilizer application, and more intensive land-use practices on farms we visited in the Krasnodar and Ukraine areas, where production conditions are relatively good.

More definitive evaluations can be made in terms of some of the more important crops.

Wheat.--About three-fourths of the acreage is planted to spring wheat. More than half this acreage is grown in the New Lands areas of western Siberia and Kazakhstan. Conditions in these spring wheat areas are roughly comparable to the brown soil zone of Saskatchewan, Canada. Rainfall in the New Lands is limited,

generally averaging under 16 inches. In about 40 percent of the New Lands the average rainfall is less than 12 inches. The New Lands areas also are subject to wide variations in rainfall from year to year, and the growing season is relatively short and variable.

Under the New Lands program, about 100 million acres have been brought under cultivation during the past 10 years. This new land is similar to dryland areas in Montana and Saskatchewan. Much of it is marginal, from the standpoint of both rainfall and growing season, although the soils are generally deep and fertile. Yields fluctuate widely and are generally low in comparison with other areas. A considerable part of the region is subject to wind erosion.

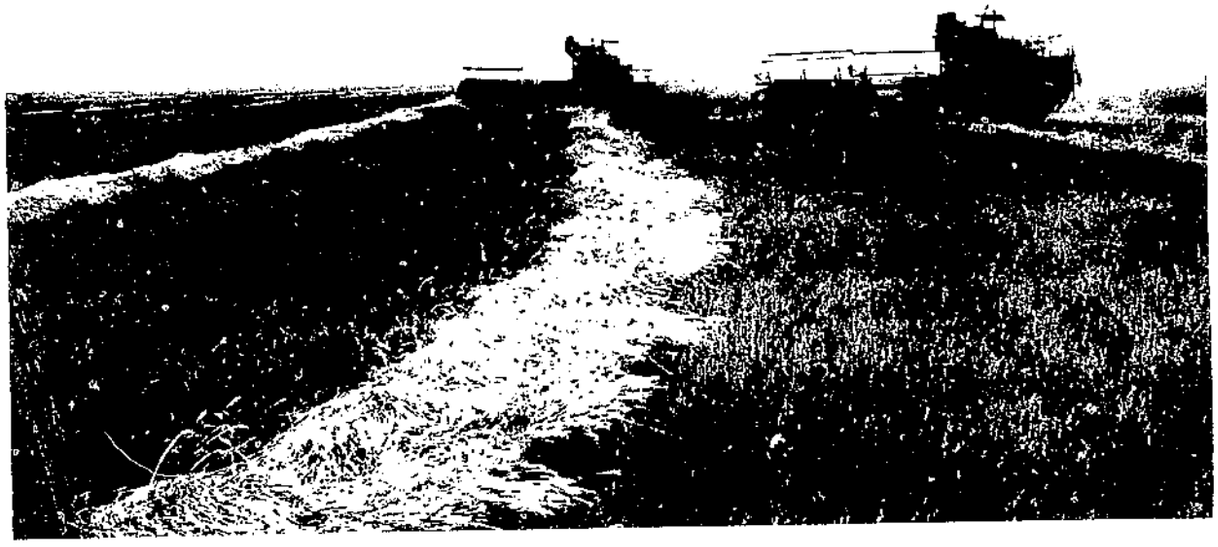
Opening of the New Lands, despite their marginal character, helped to achieve a rapid increase in grain production. State grain procurements during 1954-61 averaged 14.3 million metric tons more than in 1953, an increase of 46 percent. Grain from the New Lands accounted for 13.7 million tons, or 96 percent of the total average increase in state procurements. Annual grain procurements averaged 4.3 centners per hectare in the New Lands during 1954-61. In terms of wheat, this would be the equivalent of about 6.4 bushels per acre. The predominance of the New Lands in the increase in the state procurements of grain is due in part to the fact that comparatively less grain is required in the New Lands region--for food and feed--than in the established agricultural areas.

Wheat yields in the USSR were relatively good in 1956 and 1958, but have been somewhat lower since. Yields in 1961 and 1962 were about the same as the average for 1956-60. Yields in 1963 were very low over most of the New Lands area, and concern is being evidenced over dust storms. More recently, import by the Soviet Union of large quantities of wheat has substantiated the earlier indications of low yields in 1963.

On the New Lands farm visited near Orenburg, however, the wheat was in relatively good condition--though not fully ripened at the time of our visit. Indications were that yields would probably average about 15 bushels this year. Production practices used in this region differ considerably from those now used in similar areas of the United States and Canada. Wheat is grown on 80 percent of the crop land. Very little of the land is fallowed. Land is deep plowed with a moldboard plow to a depth of 11-12 and 9-10 inches, respectively, in alternate years. Not only is the land plowed much deeper than in the United States, but much more cultivation of the plowed land is practiced.

Wheat is seeded at a depth of 1 1/2 to 3 1/2 inches, depending on moisture. Deep furrow drills are not used, and seeding rates are over 2 bushels per acre. Windrowing and combining are used. Immediately after harvest, the straw is gathered and stacked. In similar areas in the United States deep furrow drills are used and seeding rates average about a bushel to the acre. We believe that the cultural methods could be improved to reduce costs, conserve moisture, and increase yields per seeded acre of wheat. More specifically, study and experimentation with alternative tillage methods, deep furrow drills, herbicides for weed control, and the the fallowing of wheat land or rotating with other crops would appear desirable.

At present, there appears to be little interest in the Orenburg region in either summer-fallowing wheat land or rotating with peas or other summer row crops. In part, this may reflect the general emphasis on reducing low-yielding crops and fallow. Similarly, little or no attention in this region is being given to the alternatives to moldboard plowing that are being increasingly used in the United States. We understood the use of fallow and stubble mulching is being experimented with in some other regions. Few if any herbicides are used for weed control. We also noted that the rangeland in the Orenburg area was considerably underutilized. Shortage of water for livestock was mentioned as a factor. Also, preoccupation with wheat production may be a factor.



Two combines cutting and windrowing grain at Adamovski state farm in New Lands area about 180 miles east of Orenburg.

In general, we believe that insufficient attention has been given to crop practices in the New Lands region to conserve moisture, control weeds, reduce erosion, and lower production costs. It is perhaps of some interest to note that the estimated 1958-62 average USSR spring wheat yield of 10 bushels per acre is about the same as the U. S. average in the late 1930's. Yields of spring wheat were also highly variable in the United States during the 1930's, averaging only about 4 1/2 bushels per planted acre in the 1934 and 1936 drought years. Yields of wheat in the four major spring wheat States of the United States now average over 18 bushels per seeded acre, due in large part to increased fallowing of wheat land and better seeding and tillage methods. At the same time, labor and machinery costs have been substantially reduced.

Methods of accumulating and conserving moisture and reducing wind erosion are needed, particularly in the New Lands wheat region. Such methods are not now practiced to any substantial extent. Extremely wide variations in yields are likely to continue in the New Lands areas unless more emphasis is given to developing systems of farming that will conserve and accumulate moisture. Soil damage from wind erosion could become serious. The use of summer fallow would probably mean somewhat lower total wheat production. But, as in similar areas in the United States and Canada, use of summer fallow, stubble mulching, or other appropriate moisture-conserving methods would seem likely in many areas to increase substantially the stability and efficiency of wheat production as well as the yield per planted acre. Increased use of herbicides also would appear likely to increase yields and reduce costs.

Winter wheat production is concentrated in the Ukraine, Moldavia, and the North Caucasus region. Yields in the Ukraine and North Caucasus average well above those in the spring wheat producing areas. Average yields of over 35 bushels of wheat per acre were reported in the Krasnodar area. Despite a severe winter in the Kiev area, wheat yields were estimated to average about 25 bushels per acre. At Krasnodar, considerable emphasis was placed on the yield advantage of a new variety, "Beardless-1," introduced 3 or 4 years ago and now being grown extensively in the area. This variety is reported to be more responsive to fertilizer and more resistant to lodging, shattering, and rust than the varieties previously grown.

Other Small Grains.--Rye, oats, and barley are the other major small grains grown. Acreage sown to these crops totals about two-thirds the acreage planted to wheat.

While rye is an unimportant crop in the United States, it is an important bread grain in the USSR. It is grown principally on the podzolic soils of the northwest and central regions of the European USSR. Rye is a hardy, drought-resistant crop, well adapted to soils of low fertility. Rye acreage declined substantially during the 1950's, but has remained at a little over 40 million acres in recent years.

Barley and oats are grown principally for livestock feed. Barley acreage has been increasing, and now about equals the acreage in rye. Acreage of oats, on the other hand, has decreased by about the same amount as the increase in the acreage of barley.

Corn.--Corn formerly was a minor crop in the Soviet Union but, beginning in 1955, the acreage has increased significantly. The introduction of hybrid corn was delayed considerably because of the widespread acceptance by Soviet officials of the Lysenko theory, according to which crops improve through the adaptation of the plant to the environment. In recent years, the production of hybrid seed has been greatly expanded.

Government programs have emphasized corn to bolster the supply of livestock feed and to permit further expansion of the livestock industry. Increases in corn acreage have come at the expense of oats, rye, grasses, and summer fallow land. Much of the expansion occurred in the Ukraine and North Caucasus.

Yields of corn for silage in the Ukraine and North Caucasus are good--running up to 24 metric tons per acre, according to Soviet officials. These areas also produce considerable corn for grain but the yields of wheat would appear to compete favorably with the yields for corn on much of the land. The climatic conditions are not as favorable in the Ukraine and North Caucasus as in the Central Corn Belt of the United States. Lack of rainfall which was reported in these areas at the time of our visit in July continued in August and has apparently reduced 1963 corn yields.

Considerable corn for grain is grown in subhumid areas of the USSR. Experience in the United States suggests that other crops would give higher yields. For example, in the warmer parts of these areas, grain sorghums appear preferable.

In recent years, corn has been grown as a fodder crop in areas where it will not mature. Consequently, some corn is grown in nearly all farming areas. In the northern areas, it is planted only for silage and green or cured fodder. It seems doubtful that over a period of years corn will produce more feed per acre than alternative forage crops in the northern farming areas.

Potatoes.--Potatoes are grown both for food and livestock feed in the USSR. The acreage of potatoes is about 15 times as large as that in the United States, where yields are higher, per capita consumption is lower, and fewer potatoes are fed to livestock. This is one of the few crops in which private farming is significant. Nearly half of the potato acreage is on the private plots.

Yields in terms of food or feed volumes produced per acre from potatoes are high relative to grains. But potatoes require much more labor to produce, especially with the methods commonly used in the Soviet Union.

Machine methods of growing and harvesting potatoes were observed on some of the collective and state farms. In general, however, production practices are unmechanized, and the use of fertilizer is limited. Most of the potato plants observed appeared to be diseased.

Cotton.--The Soviet Union is now second only to the United States in cotton production. In 1962, cotton was grown on about 5.8 million acres, all under irrigation. The Soviet Government plans to increase the acreage as new irrigation is developed. Most of the cotton is produced in the Uzbekistan Republic and the adjacent central Asiatic Republics. About two-thirds of the cotton is grown in Uzbekistan. The 1962 yield averaged about 1.2 bales of lint per acre. The yield was expected to be somewhat higher in 1963 as a result of a more adequate supply of water for irrigation.

As all of the cotton is grown under irrigation, cotton yields should be compared with those in the southwestern irrigated areas in the United States. The reported yields are substantially below the yields in the irrigated areas in this country. The growing season in Uzbekistan frequently is cut short by cool weather in the spring and early fall.

Cotton is fertilized heavily. Some cultural operations are mechanized, but hand-thinning, hand-hoeing, and hand-picking are common. A considerable acreage of cotton is now being checkrowed for cross cultivation. The rows are about 2 feet apart. Although some mechanical cotton pickers are in use, about 85 percent of the cotton is hand-harvested. It is somewhat doubtful whether mechanical picking pays in view of the large labor supply and the relatively low wages paid.

Cotton costs are apparently relatively high; this may be due in part to higher labor requirements than in the United States, particularly for hoeing and chopping, and costs involved in controlling the amount of alkali in the soil.

Sunflowers.--This oil crop is grown on about 11 million acres, and supplies most of the vegetable oil produced in the Soviet Union. Very few soybeans are grown there. The Soviet Research Institute at Krasnodar has made remarkable progress in breeding disease-free sunflower varieties with a high oil content. Production and harvesting operations are fairly well mechanized. Consequently, sunflowers constitute an efficient source of edible oil. Sunflowers are given high priority, but breeding work is underway on many other oil crops. The Soviet Union also is increasing the production of flax and of castorbeans for oil.

Future Expansion of Crop Production

Soviet authorities indicated much attention is being given to rapidly increasing the production and use of fertilizer. In our visit, Khrushchev predicted that by 1970 the USSR would have an annual production of 100 million tons of fertilizer. This compares with chemical fertilizer deliveries (in terms of USSR standard units) of 15 million tons to Soviet agriculture in 1962.

In the Krasnodar, Kiev, and Minsk areas visited, there seemed to be a substantial potential for increasing the use of fertilizer at a faster rate than has occurred since 1958. However, if the target of a more than fivefold increase in the use of fertilizer by 1970 should materialize, it might result in highly inefficient use of fertilizer and lead to insufficient attention to other areas of agriculture in need of improvement. Such a tonnage would be nearly triple present use of fertilizer in the United States and would be many times the amounts that would be used if the crops in the USSR were fertilized at levels of use in comparable North American areas. A large part of USSR cropland is in subhumid areas similar to our Great Plains. In such areas, the potential effective use of fertilizer is much less than in more humid areas. Effective utilization of such an increase in fertilizer would seem likely to require considerable time for: (1) determining appropriate amounts to use in local areas; (2) development of associated changes in cultural practices and crop varieties; and (3) developing irrigation and drainage methods to expand the area where intensive use of fertilizers is logical.

A Soviet study by P. M. Zemsky estimates a "normal" mineral fertilizer consumption of 71 million tons in the "distant future." This projected consumption would

Members of delegation and Soviet officials inspecting cotton field, Research Institute of Cotton Growing, Taskent.

involve an expansion of the crop area by about one-third and considerable reclamation of land by drainage and irrigation. Zemsky's projected rates do not appear unreasonable when compared with present rates in similar areas in the United States. His estimates do assume 100 percent of the acreage fertilized at the indicated rates, whereas in the United States a substantial portion of the farmers do not now use fertilizers on crops such as wheat, rye, oats, barley, and hay in the areas comparable to those in the USSR. While total use consistent with the target for 1970 may prove possible in the distant future, a much more distant time than 1970 would appear necessary to obtain such far-reaching adjustments.

The present planned rate of increase appears to be overambitious. A number of problems are likely to be encountered in obtaining efficient use. We believe, however, that the increased emphasis on use of fertilizer and associated practices is likely to increase crop yields in the USSR more rapidly than in the recent past.

Whether the rate of increase in total crop production that has occurred over the last decade will be stepped up or even maintained is questionable. Much of the increase in crop production during the last decade has been associated with the enlargement of sown acreage; first, by the New Lands program, which added about 100 million acres of subhumid and semiarid land to the cultivated area, and more recently by emphasis on the planting of fallow acreages and double-cropping. No such opportunities exist in the future.

Some further increase in sown acreage may take place if the current emphasis on reducing fallow and increasing double-cropping continues. But there is considerable question as to how much this will increase production. Further, from the standpoint of efficiency, there is a question as to whether it might be more efficient instead to reduce sown acreages somewhat by increasing fallow land, especially in the New Land areas.

A modest program of expanded irrigation and drainage is now being pursued, and recently an expanded program of irrigation development for the production of grain has been announced. However, it seems unlikely that irrigation and drainage will be a major factor affecting crop production in the next few years. Consequently, an increase in crop production at a rate similar to that in the past decade probably would require a more rapid increase in crop yields derived from the increased use of fertilizer, herbicides, and other improved production practices.

We also believe the lack of crop specialization in many areas hinders increases in agricultural production. The lack of specialization in high yielding crops adapted to local areas is to an important extent related to the lack of improved systems of marketing and distribution and the lack of area specialization in livestock production. Little attention has been given to marketing and distribution problems and their effect on production specialization in the USSR.

It appears that crop production in the Soviet Union can be expanded by (1) increasing fertilizer use and improving production practices to increase yields per acre, (2) adding more cropland under irrigation or drainage, and (3) developing improved systems of marketing and distribution that will encourage area specialization in high yielding crops adapted to local areas. The first method is receiving the greatest attention. Recently a program to expand irrigation development was announced. We question whether sufficient attention is being given to the third source of increased output.

The Soviet Union has adequate resources for food grain production, although wide year-to-year fluctuations are to be expected. In considering the need for expanding livestock production and for increasing the yields of wheat in the subhumid areas, it would seem efficient to divert some land from wheat to fallow, pulses, silage, and forage crops. While this may not occur in the immediate future, longer term adjustments in this direction would almost seem inevitable.

LIVESTOCK PRODUCTION

The Soviet Union, with 82 million head of cattle, ranks after India and the United States; is second to China in hogs, with 67 million head; and is second to Australia in sheep, with 137 million head. Yet the nation is continuously short of meat and wool.

The livestock situation has been the cause of much official concern. The problem, as it has been envisaged by the Soviet Government, is that of expanding the output of meat and milk to diversify and improve the monotonous, starchy diet of the people. Repeated emphasis has been given this objective, underlined in 1957 by the Soviet Premier's announced intention of catching up to and outstripping the United States in the early 1960's in per capita output of meat and milk.

Despite this emphasis, the gap between the volume of livestock production in the United States and in the USSR remains large, especially in meat production (table 10). Per capita meat and egg production in the Soviet Union is less than 40 percent and that of milk is about 75 percent of that in the United States.

Attempts at increasing production apparently have fallen short, although livestock numbers have trended upward steadily since 1955 (table 11). But there has been little gain in meat and milk production since 1959. The Soviet Government on numerous occasions has acknowledged the inadequate meat supply and output of meat products, compared to planned goals. The lagging feed supply often has been pointed out as the most serious bottleneck in increasing livestock production. In recent years, there apparently has been a tendency to hold livestock on farms without sufficient regard to feed supply limitations.

Table 10.--Total and per capita production of specified livestock products, United States and USSR, 1961

Commodity	Total production		Per capita	
	US	USSR	US	USSR
	Million pounds		Pounds	
Total meat 1/	35,923	15,914	194.2	72.3
Beef and veal	16,341	5,090	88.3	23.1
Pork	11,412	6,370	61.7	29.0
Mutton, lamb, and goat	832	2,040	4.5	9.3
Poultry meat	7,338	1,984	39.7	9.0
Horse meat (based on 1959 production)	---	430	---	2.0
Lard (based on 1960 production)	2,568	1,170	13.9	5.3
Butter (based on 1960 production)	1,479	1,870	8.0	8.5
Milk, cow (based on 1960 production)	122,920	112,500	664.4	511.4
	Billion eggs		Eggs	
Eggs	63.7	29.3	344.3	137.3

1/ Soviet estimates for beef and veal, pork, and lamb and mutton adjusted to exclude fat and products considered waste in the United States.

Walters, H. E. Agriculture in the United States and the Soviet Union. U. S. Dept. Agr., ERS-Foreign 53, Aug. 1963.

During the past 10 years, the Soviet Union has been striving to increase the feed supply. The first moves were widespread expansion of corn acreage and increased use of corn as silage and grain. In 1962, an extensive restructuring of the cropping pattern was ordered. This involved replacement of summer fallow, perennial grasses and oats, and other crops felt by Soviet officials to be low yielding with corn, sugarbeets for feed, and field peas and beans. It is planned in the course of several years to reduce the acreage of these crops from 89 million acres to 27 million, and also to reduce substantially the acreage of fallow land.

On June 1, 1962, procurement prices for livestock and poultry were increased by an average of 35 percent, and smaller increases were made in the prices for dairy products in an effort to spur production. Increases also were made in retail prices. The increase in prices is expected to stimulate production substantially through increased income to producers. The Soviet Government stated that livestock prices which prevailed prior to the increase were insufficient to cover average costs of production on collective and state farms.

The increased prices apparently have quickened interest in expanding livestock enterprises on state and collective farms. How rapid this increase will be remains to be seen. On several of the farms visited, there was considerable emphasis on improving milk yields, feeding, and production practices, and increasing size of livestock enterprises.

Wages paid to collective farm members are part cash and part food and feed products. A shift from payments-in-kind to cash wages also was noted in several of the areas visited. Soviet officials said that, with this shift, private households would not obtain as much feed from the collectives as they had been getting in the past. Expansion of livestock production on the collective farms, therefore, may be partially at the expense of livestock production of private households.

Table 11.--Number of livestock, United States and USSR, January, 1950-62

Year	All cattle		Cows 1/		Hogs		Sheep		Horses	
	US	USSR	US 2/	USSR	US	USSR	US	USSR	US	USSR
	Million head									
1950	78.0	58.1	23.9	24.6	58.9	22.2	29.8	77.6	7.8	12.7
1951	82.1	57.1	23.6	24.3	62.3	24.4	30.6	82.6	7.0	13.8
1952	88.1	58.8	23.1	24.9	62.1	27.1	32.0	90.5	6.2	14.7
1953	94.2	56.6	23.5	24.3	51.8	28.5	31.9	94.3	5.4	15.3
1954	95.7	55.8	23.9	25.2	45.1	33.3	31.4	99.8	4.8	15.3
1955	96.6	56.7	23.5	26.4	50.5	30.9	31.6	99.0	4.3	14.2
1956	95.9	58.8	22.9	27.7	55.4	34.0	31.2	103.3	3.9	13.0
1957	92.9	61.4	22.3	29.0	51.9	40.8	30.7	108.2	3.6	12.4
1958	91.2	66.8	21.3	31.4	51.5	44.3	31.2	120.2	3.4	11.9
1959	93.3	70.8	20.1	33.3	58.0	48.7	32.6	129.9	3.2	11.5
1960	96.2	74.2	19.5	33.9	59.0	53.4	33.2	136.1	3.1	11.0
1961	97.3	75.8	19.3	34.8	55.4	58.7	33.0	133.0	3/	9.9
1962	99.5	82.1	19.2	36.3	57.0	66.7	31.4	137.5	3/	9.4

1/ Included in all cattle. 2/ 2 years old and over kept for milk. 3/ Beginning in 1961, estimates were discontinued because the number of horses and mules on U. S. farms had declined to such a low level.

Agriculture in the United States and the Soviet Union.--U. S. Dept. Agr., ERS-Foreign 53, Aug. 1963.

The spread between grains and livestock products is much more favorable to farmers in the Soviet Union than in the United States. The corn-hog ratio, for example, in the U. S. Corn Belt commonly varies between 12 and 16 bushels of corn as an equivalent in value of 100 pounds of live hog. At prices reported in Krasnodar and the Ukraine in the summer of 1963, from about 25 to 34 bushels of corn are the equivalent in value to 100 pounds of pork. Similarly, the spreads between grains and chickens and eggs and milk were considerably higher than in the United States.

These relationships suggest that livestock production in the USSR is relatively high-cost and inefficient. Particularly striking to the U. S. visitor is the large amount of labor involved in livestock production. This is due in part to their system of livestock production. On the state and collective farms visited most of the cattle are stall-fed throughout the year. Green feed, roots, tubers, and silage are fed. Feeding and cleaning of stalls usually is done by hand.

On most of the farms visited--all of them probably considerably better than average--at least some of the cows are hand-milked. Even where milking machines are used, labor requirements remain high because of the labor required for other activities, such as feeding and caring for the cows and producing feed. Large quantities of green fodder are fed, adding greatly to labor needed in milk production.

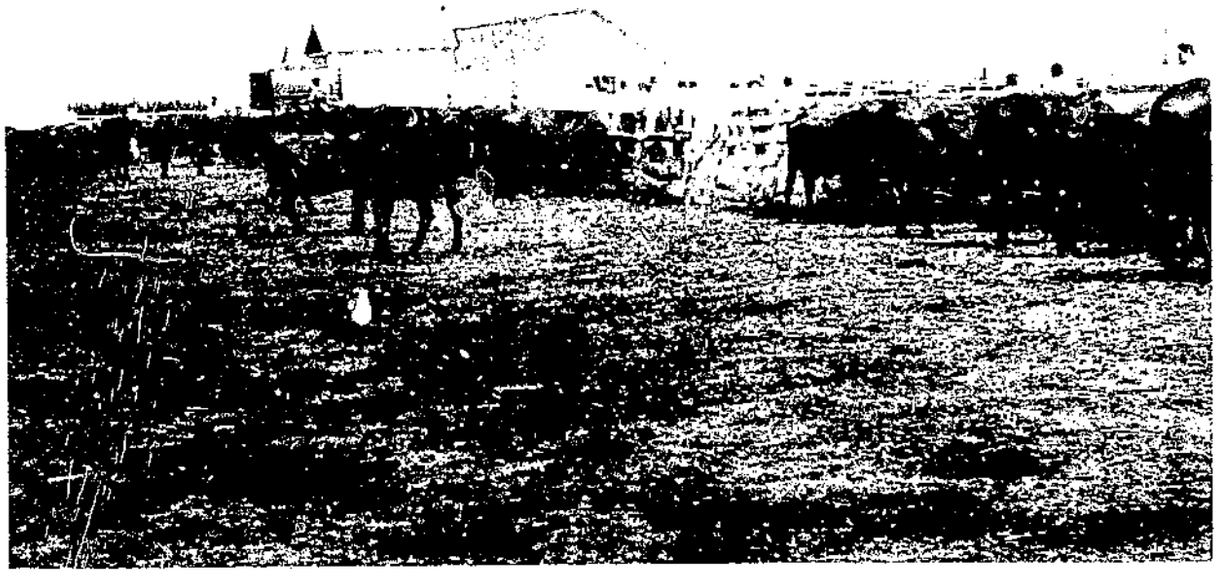
The heavy dependence on green fodder, silage, and root crops presents special problems in the attempt to achieve a rapid increase in livestock efficiency, because of large labor requirements and low levels of milk and meat production per animal. A substantial increase in the use of grain to increase milk and meat output, however, would probably involve a reduction in wheat acreage and exports.

Private ownership of livestock by peasants is still an important factor in Soviet livestock production. But, under the severe limitations imposed by regulations relating to private plots, increases in efficiency are difficult. Livestock practices on individual holdings are, of course, largely performed by hand. The limitations on the size of these enterprises effectively prevent mechanization of operations. Also, as might be expected with the small size of livestock enterprises and the unfavorable conditions under which private production is carried on, the quality of animals leaves much to be desired. Yields of milk and meat obtained by the private households, however, apparently are not much below the relatively low average yield obtained on collective farms.

Marketing and transportation appear to be problems in obtaining regional specialization in livestock production. The USSR has increased the number of meat packing and dairy processing plants, but their capacity is limited. There also is a severe shortage of refrigerated warehouses, which effectively limits the amount of interarea shipment of livestock products. Regional specialization also would involve adequate feed grain supplies for a much increased intrafarm movement of feed at relatively stable prices. According to the finding of a U. S. team of livestock specialists who visited the Soviet Union in 1962, state farms have a certain degree of priority in obtaining livestock feeds procured by the state. No purchases of feed grain were mentioned on the collective farms visited. However, the cost of feed grains to the collectives who do purchase privately apparently is substantially higher than the Government purchasing price in many areas.

Dairying

Among the livestock enterprises, dairying is probably the farthest advanced in the Soviet Union. Dairy cattle are largely dual-purpose breeds--most often the Red Steppe native breed, or crosses of imported and native stock--usually Simenthal (Swiss cross) or Kholmogorsk (Friesian cross).



Herd of dairy cows on collective farm, Krasnodar area.

Dairying is a large-scale enterprise on collective and state farms. Most cattle barns have a capacity of 100 to 200 cows, with 1 to 3 or more barns at each cattle center. Every farm we visited had either a veterinarian or a veterinary technician. Vaccination and disinfection are usually used for disease control. Livestock breeding work is receiving attention but it is not well planned. However, there is much cross breeding, and artificial insemination is reported to be common.

Milk production was reported as averaging about 3,763 pounds per cow in 1962. For collective and state farms, the average was reported at 3,866 pounds. The average on collective farms was 3,717 pounds. In the United States, average milk production per cow in 1962 was about 7,300 pounds.

Reported production per cow on the farms visited by our party was considerably higher than the low national average, and milk yields on these farms apparently were increasing. Average yields of from 6,300 to over 8,000 pounds were reported on the farms visited. However, in several herds it was apparent that some of the animals were old and the quality of the cows was highly variable.

Reported milk yields per cow in the Soviet Union have been declining since 1957; at the same time, there has been a steady increase in number of cows. The extent to which the downward trend in milk yields is associated with a poorer-quality cow, with inadequate feed supplies, or with the tendency for increased use of cattle for meat production was not ascertained.

Meat Production

The Soviet Union is much further behind the United States in the production of meat than in the production of milk. In 1961, total USSR output of dressed meat, including poultry meat, was estimated at about 16 billion pounds. Production in the United States the same year was estimated at 36 billion pounds.

There are no cattle of a purely meat type in the Soviet Union, aside from a few cattle recently imported. Some milk cattle of the dual-purpose type provide reasonably beefy steers and heifers for slaughter. All other beef consumed in the Soviet Union is of dairy origin. The increase in number of livestock and the use of some beef cattle in the New Lands and range areas would appear worthy of consideration. On the farms visited in the New Lands area east of Orenburg, for example, it appeared that full utilization of the grazing land would have involved a considerable expansion in numbers of livestock.

On most of the farms visited, hogs were raised in confinement in barns or yards. In most cases, the farrowing barns consisted of one pen after another, each 6 to 8 feet square. After weaning, the pigs are moved to growing and fattening barns. Several hundred hogs are held in one barn. The hogs may have an exercise lot, and in many areas in the Soviet Union they are grazed.

Much more moist feed is used in the Soviet Union than in the United States. While some grain is consumed, potatoes, pulses, and other feeds are generally important in the ration.

It was evident to us that increased attention, on the farms visited, is being given to improved methods of meat production, particularly hog production. Some of the systems now in operation provide a basis for expecting progress in the efficiency of livestock production in the future. One illustration is a specialized hog farm visited in the Ukraine, which is described in detail in the Appendix, page 79. This farm produces about 30,000 hogs a year. Feeding and feed preparation are mechanized. The feed is cooked, a practice which Soviet officials claim materially increases its digestibility. This farm was also experimenting with adding vitamins as a supplement

to the mash. Total labor requirements under this system were reported to be 5-1/2 hours per 100 pounds of gain. About six feed units (the equivalent of 6 kilograms of oats) are required to produce a kilogram of gain. The manager reported that similar hog farms now are in operation in the Kiev area and that several more are planned.

Poultry production generally has not advanced far in the Soviet Union, but some specialized broiler and egg farms are now being operated. Expansion of such operations would appear to be limited to some extent by the low levels of production of feed grains in the USSR. Large amounts of labor are usually required for both egg and poultry production. Although chickens predominate, ducks and geese are more numerous in the Soviet Union than in the United States. Most of the household poultry flocks range freely and are given little care. They obtain much of their food supply by scavenging.

Dryland grazing areas in the Soviet Union are used mostly for grazing sheep. Some sheep also are raised in the mixed-farming areas. We did not have an opportunity to observe sheep production practices.

Green Chop System

Grazing of livestock, other than sheep, is much less widely practiced in the Soviet Union than in the United States. No fences were seen on the farms visited, and herders tended pastured cattle. Use of corn, small grains, and other crops in a "green chop" was the system observed most often. In operating this system, a succession of crops are cut green and hauled to the barn for feed. Crops used include winter rye or oats and perennial forage during the summer, and corn, pumpkins, squash, and root crops during the fall. This system permits economical use of land, especially in the south where some double-cropping is possible, but under present conditions it is laborious. An extremely heavy tonnage of feed must be cut and fed daily. A large part of the harvesting and feeding is done by hand.

Prospects and Problems of Livestock Expansion

There has been relatively little gain in meat and milk production since 1958, despite the emphasis of Soviet officials on increased livestock production. Yields of both feed and grain crops were unusually good in 1958. Yields of feed crops since 1958 have declined somewhat, and there has been little expansion in total feed production. The stress on increases in numbers apparently has resulted in large numbers of overaged and poorly fed animals and lower milk and meat yields. Also, until recently livestock prices paid by the state on state and collective farms were low relative to costs, and thus did not provide much incentive for increased livestock production.

The recent increase in livestock prices was substantial, and should provide considerable incentive for increased livestock production on state and collective farms. Also, on the farms visited considerable emphasis was noted on artificial insemination and cross-breeding of cattle. Over time, this can be expected to result in improvement in the quality of the cattle.

While future gains in livestock production can be expected, after the adverse effects of the 1963 crop failures are overcome, the supply of feed would seem to be important in limiting the rate of increase. As indicated in the evaluation of crop production, increases in feed output seem likely because of more use of fertilizer and improved practices. But the rate of increase in yields seems likely to be slower than is now visualized by Soviet officials. Since 1959, weather conditions in the Soviet Union have been generally less favorable than in 1958 and may continue significantly to affect the rate of production increases. Potentially, a more rapid increase in feed grain supplies could be obtained by diverting some wheat to feed or substituting barley and sorghums for wheat, but such an adjustment would tend to reduce Soviet wheat exports.

Improvement of livestock production efficiency is perhaps of more importance than expansion of output in the immediate future. Meat, milk, and eggs are high-cost, high-priced products in the Soviet Union. Further, there seem to be formidable problems involved in obtaining substantial improvements in livestock production efficiency.

Improvements in Soviet grain production methods result in large part from adaptation of techniques from the United States and other modernized areas. In livestock, however, the Soviet Union has somewhat different problems, because of heavy dependence on fodder, silage, and root crops. Much research remains to be done on developing efficient methods of converting these feeds into meat and milk.

Probably of more fundamental importance is how well adapted the state and collective farm systems are to the development of improved feed-livestock systems of farming. While some relatively efficient livestock enterprises were observed, the overall impression was that crop production was much more efficient than livestock production. This may be associated with the fact that technological improvements have been generally greater in crop production. In addition, problems of management, skills, and coordination are not as great in crop as in livestock production.

Improvements in marketing and distribution systems to encourage more regional specialization in livestock production also appear important. Because of inadequacies in the marketing system, livestock production is more closely related to local markets in the Soviet Union than it is in the United States.

Efficient expansion of livestock production seems likely to be associated with substantial increases in production in the better adapted areas and enterprises. Such specialization would require considerably increased attention to, and investment in, marketing and distribution systems.

LABOR SUPPLY AND UTILIZATION

The agricultural labor force in the USSR is very large by U. S. standards. It is typified by great seasonal fluctuations in employment, a large number of female workers, and a complex system of classification. Difficulties in the system of classification and a lack of precision in reporting make precise estimates of the actual labor force difficult.

Total Labor Force in Agriculture

On the basis of the Soviet census of 1959, a measure of the total employed population by branch of production is available (table 12). Of the total population of 208.8 million, 99.1 million are designated as "having an occupation." Unlike the practice in the United States, however, in the Soviet census no temporal limitations were imposed on work status of the employed population. Consequently, we believe that the working population reported is substantially larger than the labor force employed at any given time.

The employed population category includes 3.6 million members of the armed forces, and specifically excludes members of collective farm families and members of families of other workers and employees engaged in individual agricultural production (for the most part working on private plots). On this basis, the civilian labor force was 95.5 million in 1959. If people working on private plots had been included, the total civilian labor force would have been 105.3 million. The labor force in agriculture is given as 38.4 million. If the private plot workers are added to this number, the total agricultural labor force totals 48.3 million.

The inclusion or exclusion of family members engaged in private agriculture in the total agricultural labor force is not arbitrary. In official Soviet statistics,

Table 12.--Distribution of the employed population by branch of the national economy, USSR, 1959

Kind of employment	Population
Employed population (excluding members of collective farms and other workers' and employees' families engaged in private agriculture	99,130,200
Employed in branches of material production	80,862,676
Industry, construction, transportation and communication	36,525,187
Agriculture	38,425,967
Trade, including public eating facilities, procurement, and sales	5,170,665
Employed in nonproductive branches (science, art, medicine, finance, credit, planning, etc.)	14,453,128
Soviet armed forces	3,623,000
Unspecified	191,402
Family members (collective farm members, other workers, and employees' families) occupied in private agriculture	9,864,801

Tsentral'noe Statisticheskoe Upravlenie pri Sovete Ministrov SSSR, Itogi Vsesoyunznoi Perepisi Naseleniya 1959 goda, Moscow, 1962, pp. 96 and 104.

these people are excluded in most cases, but are included in other cases. We include them here because the Soviet statistics include the private plot production in total agricultural production, and private output constitutes from 30 to 33 percent of the total. Consistency demands that if production of the private plots is included in total output, then the labor force needed must be included in the total.

According to recent estimates, the total agricultural labor force declined from about 63 million in 1940 to 48 million in 1961 (table 13). The total agricultural labor force reached a low of 48 million in 1953 then rose with the settlement of the New Lands to a peak of about 52 million in 1956. It has fallen rather steadily since that time, and in 1961 was near the 1953 level.

Despite the lack of precision in the Soviet Union's agricultural labor force statistics, one fact stands out which illustrates the country's great dependence upon labor. Every measure of the agricultural labor force shows an increase between 1953 and 1956-58, the years of the largest gains in production. Apparently, it was not possible to redistribute the existing labor force to include development of the New Lands areas. Although there is considerable underemployment in winter, peak periods of production draw heavily on available labor in most regions of the country.

Annual Average Employment in Agriculture

In contrast to the lack of annual statistics for the total agricultural labor force, a number of annual averages for different classifications of agricultural employment are provided. Several of these are shown in table 13.

In Soviet reports, these figures are derived by taking the monthly average of total employment in agriculture. Because the seasonal variation between very low employment in January and very high employment in July is 50 percent, actual employment is far less than the average during the 6 winter months (November-April) and far more than the average during the 6 summer months (May-October).

Table 13.--Employment in agriculture, USSR, selected years 1940 to 1961

(Millions of persons)

Item	1940	1950	1953	1955	1956	1957	1958	1959	1960	1961
Total agricultural labor force according to western estimates 1/	2/62.7	52.1	48.0	49.7	51.7	50.9	50.2	49.5	3/48.3	3/48.1
Annual average employment in agriculture according to Soviet reports (said to include socialist and private agriculture) 4/	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	33.0	n.a.	31.0
Annual average employment in socialized agriculture (including those not directly involved in crop and livestock production)	31.1	30.7	29.4	30.7	31.5	30.9	30.8	30.0	29.0	28.1
Collective farms	29.0	27.6	25.6	24.8	25.7	24.3	24.9	24.5	22.3	20.7
MTS and RTS 5/	.5	.7	1.2	3.1	2.9	2.6	1.3	.5	.4	0
State farms and other state agricultural enterprises	1.8	2.4	2.6	2.8	2.9	4.0	4.6	5.0	6.3	7.4
Annual average employment in agriculture of persons directly involved with crops and livestock	27.8	27.6	26.2	27.5	28.2	27.5	27.3	26.9	26.1	25.5
Collective farms	25.8	24.8	22.9	22.1	22.9	21.5	22.0	21.5	20.1	18.7
MTS and RTS	.4	.6	1.0	2.8	2.6	2.3	1.0	.2	.2	0
State farms and other state agricultural enterprises	1.6	2.2	2.3	2.6	2.7	3.7	4.3	4.5	5.8	6.8

1/ Diamond, Douglas. The Utilization of Labor in the Agricultural Economy of the USSR, 1925-1959. An unpublished manuscript, Chicago, Feb. 1961, table A, p.iii-iv. 2/ On the basis of present Soviet boundaries. 3/Extrapolated trend of 1956-59. 4/ Data for 1940-1959 from Sel'skoe Khozyaistvo SSSR, Moscow 1960, p. 450; for 1960-61, 1960-61 Narodnoe Khozaistvo SSSR v 1961 godu Moscow, 1962, p. 461. (These figures are averages of very large summer employment and very small winter employment.) 5/ MTS stands for Machine Tractor Stations; RTS stands for Repair Technical Stations.

This field of rye on collective farm near Minsk was cut, tied, and shocked by hand.

On collective farms, for example, employment was 30.7 million in July 1959 and 18.0 million in January, while the annual average was 24.5 million. 4/ In 1959, the summer employment peak was about 25 percent above average, and the winter minimum was about 25 percent below average.

For the years 1959 and 1961, the Soviet Government has published data on annual average employment in all branches of agriculture, including private plots. The average was 33 million in 1959 and 31 million in 1961. Considering the 25 percent fluctuation on collective farms, this would place 1959 peak employment in all branches of agriculture at 41.2 million and the low at 24.7 million. The peak in 1961 would be 38.7 million and the low 32.2 million. 5/

Nature of the Agricultural Labor Force

A number of people on these state and collective farms would not be classified in the agricultural labor force according to the U. S. definition of the term. Such workers include those involved in various service activities, such as teachers, persons working in communal eating establishments, construction and electrical workers, and other specialists. Annual averages in table 13 are given of all persons

---

4/ Sel'skoe Khozyaistvo SSSR, Moscow, 1960, pp.450 and 460-61.

5/ The difference between the 41.2 arrived at in this way and the 48.3 obtained from the census of 1959 leaves 7.1 million persons unaccounted for. It is reasonable to assume, however, that part of this difference is explained by gaps in the data and also that the 48.3 million represents an absolute maximum, which would be attained only under extreme conditions. It should also be noted that only in the last few years has an effort been made to stop the practice of sending large numbers of urban youth to the fields at harvest time. Pressure is now being exerted on individual farms and regions to obtain needed additional harvest labor locally.

engaged in socialized agriculture and of the number engaged directly in crop and livestock production. In 1961, the difference between these two categories was 2.6 million.

The number of females in the agricultural labor force is exceptionally large, comprising about 60 percent of the total. Of the 38.4 million agricultural workers reported as employed in 1959, 20.7 million were female. Of the 9.8 million private agricultural workers, 8.9 million were female.

The importance of females in the agricultural labor force is especially significant because they do most of the low-paid heavy field and livestock work. Teams, the smallest groups of workers, are predominantly female. Brigade leaders (persons directing a number of teams) are customarily males. Males also occupy most of the farm jobs where machinery is used or some degree of skill is involved, as well as most of the administrative and managerial positions. Males are at times sent to work in field teams as a form of punishment.

The Soviet press repeatedly stresses the fact that a serious shortage of young, qualified, male farmworkers exists, and that considerable difficulty is encountered in obtaining skilled farm machinery operators. Much emphasis is also placed on the fact that young people reared and trained in agriculture do not remain in farming.

Obviously, great differences exist between state and collective farms and between different farms and regions throughout the Soviet Union. The more profitable and better-managed farms undoubtedly rely less upon female workers doing hand work and more upon male workers using machinery. However, the averages given above apply to the entire Soviet Union, and are characteristic of every region.

Agricultural Labor Force Comparisons, USSR and U. S.

Much more labor is used in agriculture in the Soviet Union than in the United States. Comparisons of these labor forces are difficult because of differences in terminology and classification. But the total 48.3 million persons reported as working in agriculture in the Soviet Union in 1959 is more than 6 times the U. S. total of 7.4 million estimated by USDA for 1959. 6/

The U. S. figures are an annual average based on employment reported during the survey week each month, and include operators and hired workers who work one or more hours. Family members are included only if they work 15 or more hours during the week. The USSR definition of labor force, consequently, may be somewhat more inclusive than the USDA definition.

A slightly lower ratio than 6 Soviet farmworkers to 1 U. S. worker is obtained if the more restrictive estimates of average annual employment in the USSR and the United States are used. If the 1961 annual average employment of 31 million workers in Soviet agriculture, shown in table 13, is compared with the U. S. estimate of 5.5 million U. S. workers primarily employed in agriculture, a ratio of 5.6 Soviet workers to each U. S. worker is obtained. 7/ Even if the Soviet data are adjusted to include only workers directly engaged in crop and livestock production, the ratio is more than 5 to 1.

The ratio of from 5 to 6 farmworkers in the USSR to 1 in the United States understates the difference in the amount of Soviet labor used relative to output. Crop acreage in the United States is only about 60 percent that of the Soviet Union,

---

6/ Agricultural Statistics 1962. U. S. Dept. Agr., Washington, D. C., 1963, p. 526.
7/ U. S. Department of Labor. Labor Force and Employment in 1961. Spec. Labor Force Rpt. 23, p. A-20.

but this is much more than offset by greater productivity of land and larger livestock production in the United States. Output of grains in the United States, for example, is more than 40 percent larger than in the Soviet Union. Meat production in the United States is more than double the output in the Soviet Union.

The great disparity in farm labor used in the two countries is further emphasized by a Soviet estimate of man-hours required to produce the same quantity of output in the United States and the USSR (table 14). For grain production, according to the Soviet estimates, USSR man-hour requirements are 3.31 hours per 100 pounds of output on collective farms and about 0.85 man-hours on state farms, compared with 0.45 man-hour per 100 pounds in the United States. For meat production, the differences are even larger. Soviet requirements range from 7 times U. S. man-hours on state farms to more than 14 times on collective farms. Labor requirements on the private plots would be expected to be even higher because of the small size of these enterprises.

Table 14.--Average man-hours required to produce 100 pounds of agricultural commodities, United States 1956, and USSR 1956-57

Commodity	Labor expended per 100 pounds of production			Ratio of USSR requirements to US requirements	
	US farms	USSR state farms	USSR collective farms	State farms	Collective farms
	Man-hours	Man-hours	Man-hours		
Grain	.45	.85	3.31	1.8	7.3
Potatoes	.45	1.91	2.31	4.2	5.1
Sugarbeets	.22	.95	1.41	4.2	6.2
Cotton (unginned)	8.52	13.52	19.41	1.6	2.3
Milk	2.13	4.50	6.66	2.1	3.1
Livestock (gain in weight):					
Cattle	3.58	23.58	50.80	6.6	14.2
Swine	2.86	19.50	46.72	6.8	16.3

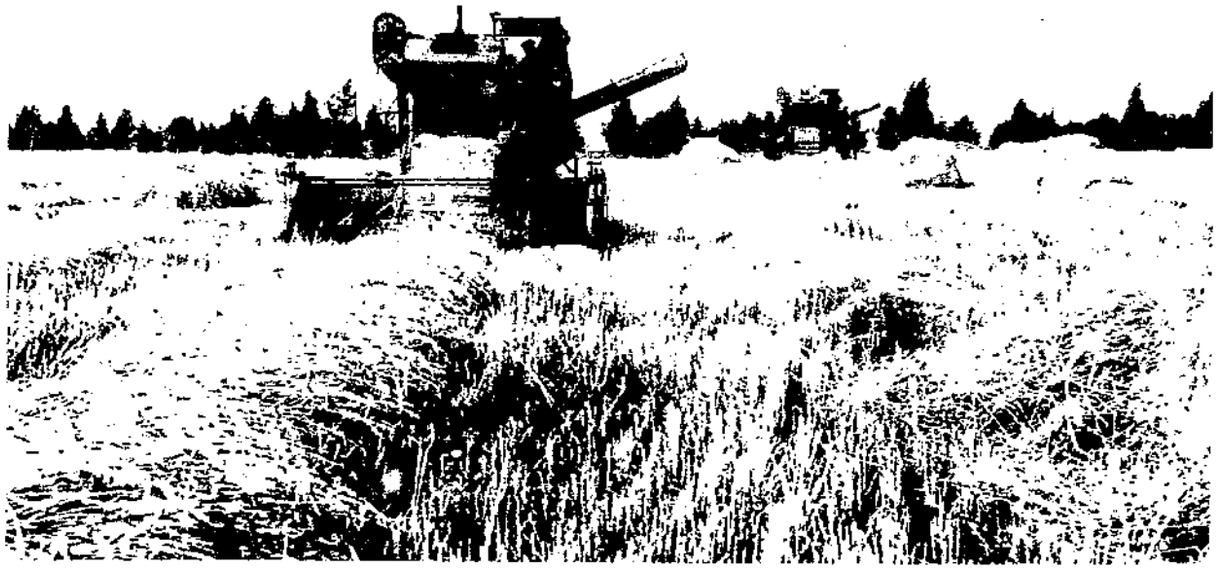
Sel'skoe Khozyaistvo SSSR, Moscow 1960, p. 449. The original Soviet data were in man-hours per centner (220.46 pounds) of production.

Utilization of Labor on Farms

On the collective farms visited, the number of workers ranged from about 750 to more than 3,000. The labor force is organized into a system of brigades, each with a brigade leader. Brigades vary in size, but some have more than 100 workers.

The workers are separated into specialized categories. Three general classes were reported on several of the collectives: field crop workers, animal husbandry workers, and machine workers. Within each of these categories are more specialized categories, such as tractor drivers or dairy maids.

In addition to the brigade leaders, there is a substantial hierarchy of administrative and technical personnel. Agronomists, engineers, and veterinarians are employed to provide technical supervision. Bookkeepers and accountants administer the highly complex system of detailed cost accounts, which are used to establish



Combining field of rye on collective farm near Minsk.

"norms" and to calculate wages and premiums to be received by the workers. One brigade leader, supervising 128 men, reported having two bookkeepers. Officials in the Ukraine reported that management and administrative salaries take from 8 to 14 percent of the wages on collective farms.

Not only is the labor force large on Soviet farms, but it is especially large relative to resources. In the general farming areas in the Krasnodar and Kiev areas, cropland per able-bodied worker on typical farms ranged from 9 to 12 acres. On a typical family farm in comparable areas of the United States, the cropland acreage is at least 6 times this amount. There is a wide variation in Soviet labor use among farms in different areas, as would be expected. In the areas visited, there was a variation from less than 3 acres per worker on an irrigated cotton farm in Uzbekistan to more than 100 acres per worker on a large state farm, producing mainly wheat, in the New Lands area. On each farm visited, however, a substantially larger use of labor was evident than on U.S. farms in similar areas.

At one of the more mechanized dairy operations, total labor requirements (including labor used on feed production) were reported at 57.6 man-days per cow. Assuming 300 workdays per year, this would mean that one person would handle only slightly over 5 cows. Commercial dairy farms of this type in the United States commonly have 20 to 25 dairy cows per worker. The dairy was described as mechanized, but this apparently referred mainly to machine-milking. Milk yields on this farm were about 7,000 pounds--nearly double the Soviet average. This is somewhat lower, however, than the current U. S. average of about 7,300 pounds, and substantially below yields obtained on the better commercial dairy farms in the United States.

Information confirming a large gap between the number of agricultural workers available in the USSR and the number relatively fully employed was obtained on several of the farms. Average employment per worker ranged around 200 to 220 man-days on most of the collective farms we visited. Part of this underemployment is due to the highly seasonal nature of crop production in the USSR. In the Tashkent

cotton region, for example, it was estimated that half the workers are not employed in December. The collective farms recently have been encouraged to keep sufficient labor for seasonal peak needs.

From information furnished and observation on the farms visited, members of our party concluded that, from an economic standpoint, more labor is available than can be effectively employed at reasonable levels of productivity. One indication of underemployment of workers is the frequent use of hand methods in many operations, such as cattle feeding, handling of grain straw, and hand-hoeing and chopping of corn, cotton, and sugarbeets.

While the level of mechanization is improving in many of the areas visited, little concern was expressed by collective farm officials for obtaining associated adjustments in population. Instead, considerable emphasis was placed on brick plants, home construction, and other projects that would more fully utilize labor on farms or in farm-connected activities. We could not adequately evaluate the extent of job opportunities in urban areas, or the extent to which Soviet farm people have an interest in occupational adjustments. But there are some indications of problems. Living conditions remain overcrowded in urban areas. Great emphasis has been given to heavy industry in the Soviet Union, and industry's output has been increasing much faster than employment.

The Soviet labor force increased an average of 1.9 percent a year from 1950 to 1960. The rate of growth in the size of the labor force, however, tended to decline during 1955-60, and is likely to continue to be considerably slower than in the early fifties. Increased migration from rural areas might be necessary, if industrial employment should continue to expand rapidly.

Finally, we wonder whether larger investments in irrigation, farm-associated marketing and processing industries, and building of rural roads would offer opportunities for the increased productive use of agricultural labor.

In summary, it is not difficult to visualize Soviet farming being done with far fewer people. Despite the very large agricultural labor force, workers have not been drawn into nonfarm employment to the same extent as in the United States. According to a Soviet estimate, agricultural employment in 1961 was only slightly less than in 1950. Agricultural employment in the United States dropped 30 percent during this period.

The use of more labor in Soviet than in U. S. agriculture is partly related to the lower level of Soviet mechanization and capital investment in agriculture and partly to the wide availability of labor in rural areas.

As progress continues in mechanization, and especially if increased investments are made in machinery and herbicides, a continued decline in the Soviet farm labor force would seem likely. However, a rapid solution of the substantial problems of underemployment in Soviet agriculture does not seem to be in prospect.

FARM MECHANIZATION

The Soviet Union is making progress in mechanizing its agriculture. The important questions are: How much progress has been made? In what areas has most progress been made? And at what rate is continued progress being made in each of the main areas? The three principal labor-consuming areas in any diversified farm enterprise, whether in the USSR, the United States, or any other country, are: (1) major field crops such as wheat and corn, (2) farmstead operations, that is, meat and milk production and farm transportation, and (3) special crops such as fruits and vegetables.

The USSR has followed the logical procedure of first mechanizing production of the major staple food crops, especially the tilling and harvesting operations. These are also the areas where timeliness of operation is of greatest importance. But Soviet agriculture is a study in contrasts. On one side of a road in Samarkand we saw the latest type tractor with mounted implements, and on the other a small donkey pulling a little carload of hay. In one field of a collective farm near Minsk, we saw acres of shocked grain, the bundles tied with straw. In the next field of the same collective, four very much up-to-date self-propelled combines were working.

Progress in mechanization is reflected in the increased number of machines on farms (table 15). The most rapid progress was made in the last decade, particularly in equipment for the major field crops. The difference between the number of machines on farms and the number needed, as estimated by Soviet officials, indicates a tremendous gap between needs and present availability.

The number of principal machines delivered to farms in recent years is shown in table 16. These figures indicate that deliveries will need to be expanded considerably above the current levels if the large gap between the present number and estimated requirements is to be closed reasonably soon.

Table 15.--Selected machines on farms, Soviet Union, specified years 1930 to 1962

Machine	1930	1940	1950	1960	1962 1/	Requirements
	Thousands					
Tractors, physical units	72	531	595	1,122	1,280	2,696
Grain combines	1.7	182	211	494	553	845
Silage harvesters	---	---	---	121	n.a.	257
Trucks	2.3	228	283	778	840	1,650
Tractor-drawn plows	n.a.	491	519	782	n.a.	1,180

1/ Midyear.

Walters, H. E. Agriculture in the United States and the Soviet Union. U. S. Dept. Agr., ERS-Foreign 53, 1963.

Table 16.--Annual deliveries of selected machines to Soviet agriculture, specified years 1940 to 1962

Machine	1940	1953	1958	1959	1960	1961	1962
	Thousands						
Tractors	20.3	76.2	157.5	144.3	157.0	185.3	206.0
Trucks	17.5	68.9	102.1	76.3	66.1	69.7	n.a.
Tractor-drawn plows	38.4	91.3	160.3	145.1	142.4	133.1	133.7
Grain combines	12.8	41.0	64.9	53.1	57.0	70.0	78.1
Corn harvesters	---	0.5	6.0	0.2	3.6	12.5	26.5
Silage harvesters	---	---	36.4	12.9	13.0	25.5	45.9

The estimates of requirements made by the Soviet Union may be lower than actual needs over the long term. Farm machines in the Soviet Union are not nearly so numerous or of such wide range in size and adaptability as those in the United States.

Cost and Quality of Machines

It is difficult to make dollar comparisons of costs of machines in the USSR and the United States because of such variables as exchange rates and differences in farm prices. One way to approximate costs is in terms of bushels of wheat required to purchase one machine. For example, on the Kuban collective farm near Ust-Labinsk, the prices in bushels of wheat required to purchase certain machines were as follows:

Machine	Approximate price to farm in bushels of wheat
35-50 h.p. Belarus wheel tractor	1,100
55 h.p. track-type tractor	1,280
14-16 ft. self-propelled combine	2,450

U. S. prices in terms of bushels of wheat would be more than double these prices.

The latest USSR tractors, plows, combines, and forage harvesters appear to be well-designed and ruggedly built. And the horsepower of tractors being manufactured is being increased because of desire for larger machines or greater speeds.

Early machines were direct copies of foreign machines, but present Soviet designs are primarily their own. However, because the Soviets do not recognize patent rights of other countries it is easy for them to incorporate desirable features found in machines imported for testing.

As soon as feasible the USSR buys prototypes of new foreign machines and places them at one of the 29 machine test stations. If the machine or parts of it have desirable characteristics, production is recommended.

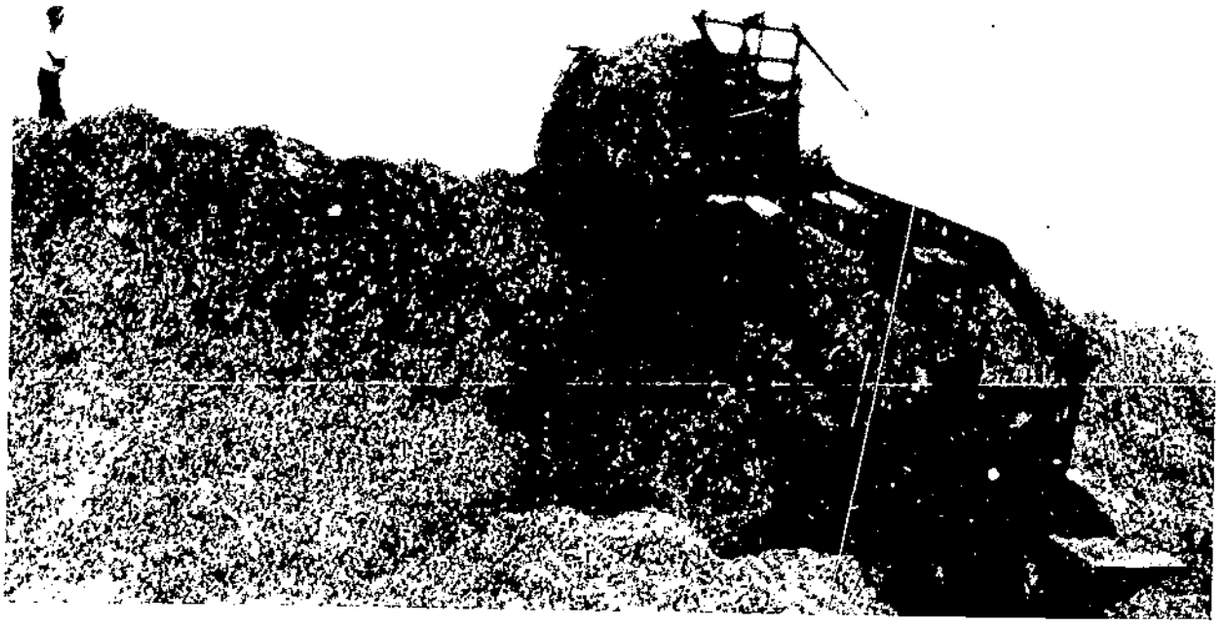
Evaluation of Machines for Field Crops

Although the major problems of developing equipment for the principal field crops have been solved, the Soviets have much to do in developing specialized equipment and cultural techniques for varying climatic and soil conditions. For example, their machines for producing wheat with conventional moldboard plowing techniques are adequate. But they have given little attention to techniques for conserving soil and water, and crop failures are frequent.

Although wheat in the Orenburg area was in good condition at the time of our July visit, the Soviet imports of wheat underline the severity of the crop failures that were experienced further east in the New Lands area. The Soviet Union may have to undergo experiences like those in the U. S. Midwest in the 1930's before being convinced that new equipment and techniques are necessary for dryland agriculture, especially during years of drought. Up to the present, mulch tillage and subsurface working tools, so important in the drier areas of the United States, have not been used much on Soviet farms.

Little chemical weed control is practiced, but this is due to the unavailability of chemicals rather than lack of knowledge of the benefits from pesticides or inability to apply them. The enormous size of Soviet wheat fields would make aerial application of chemicals especially attractive.

Corn machinery is adequate for conventional culture. Much of the corn is cross-checked for purposes of better weed control. Little effort is given to minimum grain tillage practices, but lack of pesticides for weed control is probably delaying this practice. Corn for grain is of minor importance and likely will continue to be, because of climatic limitations to its production.



Grain straw is stacked mechanically on some farms.
State farm in Ukraine.

All cotton is irrigated. The tillage machines are adequate but weed control is hampered by lack of chemicals. For example, on one farm each laborer is assigned 3 to 4 hectares to keep free of weeds when no chemicals are used. When chemicals are used, one worker is assigned 10 to 15 hectares. No opportunity was available to evaluate the Soviet cottonpicker, but reports indicate a picking efficiency approximately equal to that of U. S. machines. A comparative test under U. S. conditons would be interesting, since the Soviet picker uses a vertical spindle, which is entirely different from the U. S. horizontal spindle.

Soviet technicians are well aware of developments in other countries, including those in machine design. For example, two of the earliest major USSR tractor production efforts were put into operation by American companies, duplicating U. S. models and with U. S. technicians assisting. The Soviets now receive American and other foreign literature in great quantities and have liberal translation facilities.

Research institutes for designing machines we visited were staffed with competent individuals. But, as in the United States, several years pass before a finished machine results from a design.

Some U. S. experts feel that the Soviet educational system is so highly specialized that engineers and other technical personnel cannot function in the broad area of agriculture. This does not appear to be true. The institute programs are rigorous and the engineers well trained. A common complaint of the Soviet specialists was that the technical personnel in agriculture, whose training may have been financed by a collective or state farm, migrated to better paying and less controversial occupations.

Equipment and Machinery for Other Farm Operations

Considering the importance of meat and milk to the Soviets, it is surprising that they have given so little attention to farmstead mechanization. About the only labor-saving device seen, even on many of the better farms, was the milking machine--mostly the bucket type.

No arrangements for mechanical feed handling and preparation were observed on the dairy farms, but one outstanding example of mechanization was seen at the state pig farm near Kiev. Nine people took care of feed preparation and feeding of 4,300 hogs, with one man doing all the feeding. Apparently the success of this operation was recognized, because 18 other farms in the Oblast were reported to have built similar installations and 10 others to be making plans to do so.

The Soviets have been giving little attention to development of farm structures, but during the middle fifties they decided that all milking barns should be standardized. Very long stanchion-type barns were designed to hold 200 to 400 head of milk cows. Barns of this type were built on many of the farms, and the difficult problem now is to fit them into an efficient dairy operation.

Farm storage structures for grain are not as important to the Soviet Union as to the United States, because much of the grain is procured by the state. However, more adequate farm storage is needed to handle the grain prior to transportation and to store grain supplies for farm use. Grain procured by the state is stored in central warehouse facilities. We did not appraise these facilities.

Mechanization of on-farm and farm-to-market transportation in the USSR is definitely inadequate by U. S. standards. The Economics Study Group, reporting on their 1958 visit, said that "much of the farm hauling is done by horse and wagon." While this was not noted on our visit in 1963, the more than 9 million horses currently reported on Soviet farms suggests that horses are still a major means of on-farm transportation. Further, the poor condition of rural roads is a severe handicap, both in on-farm and farm-to-market transportation. The relatively few trucks and automobiles make for cultural as well as economic isolation of the rural villages and their inhabitants. There were 840,000 trucks and very few automobiles on Soviet farms in 1962, compared with nearly 3 million trucks and over 4 million automobiles on U. S. farms. Real progress has been made, however, in the last 10 years or so.

There was no visible effort being made to mechanize fruit and vegetable production. Until production of these crops is mechanized, the Soviets will probably have to choose between assigning large numbers of personnel to their production, particularly during harvest, or not having sufficient fruits and vegetables for consumers. The inadequate transportation system also hinders expansion of production.

Utilization of Labor as Affected by Mechanization

In previous sections of this chapter we have discussed the adequacy of Soviet machines and equipment available for producing crops and livestock. What has happened to overall labor requirements as a result of the adaptation of labor-saving machines on Soviet farms? The principal energy-using tasks, such as tillage and harvesting of the major field crops, have been mechanized, and the total number of farm personnel required for these tasks has been reduced. However, the total number of farmworkers has not been reduced proportionately, partly because of high peak labor requirements for certain commodities and lack of mechanization of some operations. Particularly important in this context are the livestock feeding operations, vegetable and fruit production, and control of weeds.

INCOMES, WAGES, AND LIVING CONDITIONS

Published information does not give much insight into incomes and wages of workers in Soviet agriculture. Available data indicate a significant improvement in incomes of farmworkers during the past decade--at least up to about 1957. The relative stagnation in agricultural production since 1957 and the emphasis on capital investment and communal expenditures have undoubtedly limited increases in income

on collective farms. Soviet sources state that between 1957 and 1960, average collective farm payments per member, in money and kind, remained unchanged for the USSR as a whole. In five republics--Ukraine, White Russia, Uzbekistan, Georgia, and Moldavia--payments to members declined from 11 to 29 percent. 8/ Recent upward adjustment in prices will tend to increase incomes for 1962.

On the state farms, workers receive incomes in cash. In recent years, there has been a trend toward increasing cash payments on collectives, and on a minority of the collectives payment is entirely in cash. In 1960, about 68 percent of the income paid out by collective farms was in cash. 9/

In addition to the wages received, workers on collective and state farms are assigned private plots and allowed to keep a small number of livestock. Proceeds from sales of these products are used to supplement incomes received from the farm.

Wages on both state and collective farms are being used as an incentive to increase worker output. Wage payments vary substantially, not only according to type of work or skill but also according to quantity of work done. For many jobs, wages are paid on a piece rate basis. Additional arrangements have been devised on many farms under which workers share the income for work above the quota set for their brigade. These incentive systems vary among the different collective and state farms.

On one collective farm, it was reported that members of a brigade got 50 percent of the state purchase price for the amount produced in excess of the quota. On another such farm, premiums were based on output and production costs. On a state farm, a premium of up to 20 percent of wages was reported.

Incomes on Collective Farms

Interviews with managers of a number of collective farms, which were among the best and most efficient, suggested about the following range of wage scales in terms of total wages including payments in kind:

Field hands	60-70 rubles per month
Dairy maids	80-100 rubles per month
Machinery workers	100-120 rubles per month
Average wage per workday unit	3.5 rubles
Average number of workday units	200-240

Wage payments on these farms probably are substantially higher than average. For example, economists in Uzbekistan reported an average regional wage of 40 to 50 rubles per month for dairy maids. The regional average wage on collective farms in 1962 was reported at 2.47 rubles per day for an estimated 200 to 220 man-days. This would mean a wage of 494 to 543 rubles per year or approximately $548 to $603 per year. Assuming 1.5 workers per household, this would mean a total income of about $900 in cash and kind for collective farm work in this relatively prosperous region.

8/ Khlebnikov, V. O dal'neishem ukrepleni ekonomiki kolkhozov. Voprosy Ekonomiki No. 7, 1962, p. 50.

9/ Golden, R. E. Recent Trends in Soviet Personal Income and Consumption. Dimensions of Soviet Economic Power, Joint Econ. Com., Cong. U. S. 1962, p. 356.

For the USSR as a whole, cash wages per household are considerably lower than these figures indicate. The Soviet Union has never published meaningful wage data for the country or for separate sectors of the economy. Therefore, a comparison between wages in various sectors of agriculture and between agriculture and other sectors must be based upon analysis of scattered information. A number of Western economists have analyzed Soviet wages. Following are estimates, based on these studies, of the wages of collective farmers, state farm workers, and nonagricultural workers:

Employment category	Rubles per year in 1958 1/
Nonagricultural	935
State farm	623
Collective farm 2/	345

1/ 1 ruble equals $1.11 at the official Soviet rate of exchange. 2/ Payments to collective farmers, in money and kind for work in socialized agriculture only.

A number of estimates of the average annual wage of nonagricultural workers have been made. 10/ All of these estimates indicate a wage of about 950 rubles per worker per year.

Payments to workers on collective farms are the most difficult to estimate. Two official Soviet statements indicate 345 rubles per year per worker in 1958. First, Khrushchev stated in 1958: "The total payments to workers [on collective farms] in money and kind increased from 4.75 billion rubles in 1952 to 8.38 billion rubles in 1957." 11/ According to another Soviet source, average payments per worker on collective farms in money and kind did not increase between 1957 and 1960, and payments declined in a number of regions. 12/

On the basis of the first statement, the figure of 345 rubles per worker per year was obtained for 1957 and it was assumed on the basis of the second statement that 1958 income would be the same. If total payments to collective farm members are divided by the number of households on collective farms, average income for work in socialized agriculture would amount to about 460 rubles per household per year. In terms of U. S. dollars, this would mean an annual wage of about $380 per worker or about $505 per household. Our delegation was told that no figures such as those given out for 1957 have been published for later years.

In 1962, a number of changes were introduced to increase incentives for agricultural workers, especially in livestock production and most particularly on collective farms. Beginning June 1, 1962, state purchase prices for livestock products were

---

10/ Some of these are: (1) Nancy Nimitz. Soviet National Income and Product, 1956-1958. Rand Memorandum RM-3112-Pr, June 1962, p. 47. (2) Edmund Nash. Purchasing Power of Workers in the U. S. S. R. Monthly Labor Rev. Apr. 1960, p. 361. (3) Lynn Turgeon. Levels of Living, Wages and Prices in the Soviet and United States Economies. Comparisons of the United States and Soviet Economies, Part I. Joint Econ. Com. Cong. U. S., 1959, p. 329.

11/ Khrushchev, Nikita. Plenum Tsentral'nogo Komiteta Kommunisticheskoi Parti Sovetskogo Soyuza, (Plenum of the Central Committee of the Communist Party of the Soviet Union), 15-19 December 1958. Moscow, 1958, p. 62.

12/ Khlebnikov, V. O dal'neishem ukrupleni kolkhozov ..... Voprosy Ekonomiki (Problems of Economics) No. 7, 1962, Moscow, p. 50.

Nursery on state farm near Kiev.

increased an average of 35 percent--41.9 percent for cattle, 28.7 percent for hogs, 15 percent for sheep, and 52.3 percent for poultry. Prices of agricultural machinery, spare parts, construction materials, and fuels were lowered. The Government also increased the amount of credit available to collectives and reduced some taxes. The combined effect of these price increases and cost reduction was claimed by the Soviets to contribute 2.3 billion rubles annually, or about 25 percent, in additional collective farm income. Khrushchev stressed that part of this income was to go to increase the "material incentives" of the workers. Even if the contribution to income is less than the Soviets estimate, because of state purchases being less, the price changes should contribute to a substantial increase in collective farm income.

A further check on the validity of aggregate estimates of income per household for 1958, in terms of recent levels of wages on collective farms, is provided by comparing tables 17 and 18. In table 17, gross cash income for collective farms is given for recent years, and this income is divided by the number of households to obtain income per farm household. In table 18, taxes, costs of operation, and contributions to the indivisible (capital) fund are deducted from gross cash income of collectives, to obtain the amount going to collective farmers as wages. In 1961, this amounted to 41.34 percent of the total gross cash income, or 343 rubles. Assuming this to be 68 percent of total income in money and kind of collective farmers, annual income per household would be 504 rubles. The money income per worker would be about 375 rubles.

In addition to income from the collective, many members obtain supplementary income from their private plots, livestock, and other work. Some of the products produced on individual plots or received as payments-in-kind for work done on the collective are sold for cash on the free "kolkhoz" market at competitive prices. The opportunities for peasants to make private sales undoubtedly depend on the accessibility of urban centers and the availability of transportation. Nevertheless, such sales are of substantial importance.

Estimates of the cash income received from the sale of farm products vary widely. In Uzbekistan, officials estimated that about one-fourth of the income of members of

Table 17.--Total gross cash income of collective farms, and per household, Soviet Union, in selected years 1940 to 1962

Year	Total gross cash income of collective farms	
	All farms	Per farm household
	Million rubles	Rubles
1940	2,070	111
1952	4,280	215
1956	9,460	476
1958	13,200	701
1959	13,680	742
1960	13,340	781
1961	13,570	830
1962	15,100	930

Narodnoe Khozyaistvo SSSR v 1961 godu, p. 418, and Sel'skoe Khozyaistvo SSSR, 1960, p. 56.

Table 18.--Distribution of total gross cash income of collective farms, Soviet Union, 1952, 1956, and 1961

Item	1952		1956		1961	
	Billion rubles	Percent	Billion rubles	Percent	Billion rubles	Percent
Total gross cash income of collective farms 1/	42.8	100	94.6	100	13.57	100
Withholdings for "indivisible fund" 1/	7.4	17	16.7	17	3.20	23.58
Distribution to collective farm members 2/	12.4	29	42.2	45	5.61	41.34
Amount for farm operating expenses, taxes, ect. 2/	23.0	54	35.7	38	4.76	35.07

1/ Narodnoe Khozyaistvo SSSR v 1961 godu, p. 418, and Sel'skoe Khozyaistvo SSSR, 1960, p. 56.
2/ Official Soviet sources and USDA estimates.

collective farms was derived from sales from private plots. A sample survey indicated that 40 percent of the total income of collective farmers in 1957 and 38 percent in 1958 was derived from sources other than collectives. 13/

In appraising the incomes of the collective farm workers, consideration also must be given to facilities furnished by the collectives. On the collectives visited, part of the income was used to provide pensions, medical services, community facilities, and schools. On some of the farms, money was set aside to provide paid vacations.

13/ Voprosy Ekonomiki, No. 8, 1961, p. 77.

On five of the collective farms visited, we were able to obtain a breakdown of income. Cash wages varied from about 30 to 50 percent of the total cash farm income, pensions were around 3 percent, the investment fund for farm and community improvements ranged from 20 to 30 percent, and operating costs other than wages around 20 percent of the cash income. The remainder went largely for taxes and insurance. In addition to cash wages, most farms reported varying amounts of wages in kind. This exceeded cash wages on one farm.

Family income differences between collective farm households and urban households are striking. In the nonagricultural category of workers and employees, family income in the late fifties has been estimated at 1,400 rubles per year. 14/ The above analysis for collective farm households indicates income in cash and kind of roughly 450-500 rubles a year in 1958-61, plus the net income from private plots. On this basis, income per household on collective farms appears to be roughly half the income per household in urban areas.

Great differences exist in the earnings of collective farms and state farms in the Soviet Union. According to published Soviet data, between 60 and 70 percent of the collective farms sold their milk to the state in 1960 at a price lower than the cost of production. A like percentage of collective farms sold their cattle to the state at prices lower than the cost of production, and from 80 to 85 percent sold their hogs to the state below cost. 15/ Calculated costs of production on the most high-cost collective farms are from 2 to 3 times as high as the state procurement price. Since income is residual after taxes and contributions to the indivisible (capital) fund have been taken out, wages are relatively low on high-cost, low-efficiency farms.

Wages on State Farms

Workers on the state farms are direct employees of the state, and as such, are designated as workers rather than peasants in Soviet terminology. Soviet officials reported that wages on state farms were comparable with wages in industry. The above analysis indicates, however, that on the average a considerable gap separates industrial wages from state farm wages and a like gap separates collective farm wages from the wages of state farm workers. The average wage of state farm workers in 1958 was estimated at 623 rubles per year.

Data obtained on the state farms visited also suggest higher wages per month than on the collective farms visited. Wages reported for field hands ranged from 65 to 100 rubles per month, livestock workers were reported as earning from 80 to 100 rubles, and tractor drivers 100 to 110 rubles. In addition, workers on state farms apparently are employed more nearly fulltime throughout the year than are collective farm workers.

Housing rentals are low, both in rural and urban areas. Each worker household on a state farm is provided with a garden allotment similar to that allocated to a member of a collective farm, but usually smaller.

Other Wage Data

The spread between the lowest and highest incomes is wide in the Soviet Union, and may become wider. A sampling of information available indicates incomes as follows:

14/ Turgeon, L. Levels of Living, Wages and Prices in the Soviet and United States Economies. Comparisons of the United States and Soviet Economies, Part I, p. 329.

15/ Khlebnikov, V., O dal'neishem upkrepleni ekonomiki kolkhozov, Voprosy Ekonomiki, No. 7, 1962, p. 54.

	Rubles per month
Chief animal technician (state farm)	160
Salary of farm manager	250 - 280
Candidate of agricultural science (not head of the department)	250
Doctor of Science	340
Doctor of Science (if head of a department)	430

These data, though inadequate, indicate that the Soviet system provides strong economic incentives through the salary systems for the individual to strive for improvement with some expectation that with proper qualifications, hard work, and the right opportunity he can materially improve his economic status.

Living Conditions on the Farms

Opportunities for observation of living conditions were more limited than for checking on agricultural production, so only a few comments will be made.

The village pattern of rural living antedates the Communist revolution. Prior to the merging and enlargement of collectives, which began in the fifties, usually one village was included within the boundaries of one collective or state farm. Since the merger campaign, a number of villages, sometimes a large number, are included in one collective farm. Smaller villages are built along a road with houses on both sides of the street, and individual private plots of land commonly extend back of each house. Cows and other individually owned livestock are usually sheltered near the house.

Village life provides opportunity for group contacts and accessibility to available community services. These are important, since families on collective and state farms usually have no private means of transportation.

Plots of land allotted to families for production of food crops and livestock were reported as varying in size from 0.4 acre on one state farm to more than an acre on some of the collectives visited. Usually, there are limits to the size of enterprise permitted on these plots. A general pattern of 1 cow, 3 sheep, 1 hog, and a calf up to 6 months old was mentioned on several of the farms visited. The number of poultry was not usually limited.

Household plots and payments in kind enable farm families to be relatively self-sufficient with respect to their food supplies. Families must buy such items as tea and spices, but there is little cash outlay for food.

It should be recognized, however, that care of the plots and of individually owned livestock are time-consuming, hand-labor operations, hardly allowing for the use of improved production practices.

Housing conditions vary greatly among collective farms. Some of the houses are built of adobe brick, plastered on the outside, and often whitewashed. Some of the houses in wooded areas are built of lumber. On some of the farms visited, houses were built of brick. Although some new buildings were seen, many of the houses are old and primitive. The villages lag much behind the towns in housing construction.

On the collective farms, houses are usually individually owned. Loans are made for housing construction. On one farm, houses were being built of brick from a brick plant on the farm. It was reported that housing loans were to be repaid over a 10-year period and would absorb more than half the cash wages received from the collective. However, these farmers felt strongly enough about possessing their own improved housing to undertake the financial burden.

Because women participate so much in work on collective and state farms, and in care of individual livestock and garden plots, they have relatively little time for care of the home and children, in the American sense. Young children apparently are often cared for in day nurseries until they are of school age. When children are old enough, they attend classes 6 days a week.

The more prosperous village communities have a house of culture, or a community center, paid for by the collective farm. The community center is an important gathering place. On farms visited, the center usually included an auditorium for movies and home talent productions, and on some of the farms there were libraries with reasonably adequate collections of books. In addition, there were rooms for meetings of various groups.

Workers on the state farms get paid vacations. Somewhat similar arrangements are made on some of the collective farms we visited. Some of these farms had a vacation "home," built at a resort center from income of the collective.

Workers on the state farms are entitled to the state old age pension, the same as nonagricultural workers. Annual pension payments are 50 percent or more of yearly earnings, depending on length of service and the number and type of dependents. Men are entitled to pensions at age 60, and women at age 55, but many work beyond these ages.

Members of collective farms are not under the state pension system. Old age and disability pensions are provided by setting aside part of the group income of the collective. The pensions are apparently usually below those for workers on state farms. At one of the collectives visited, it was reported that 3 percent of the gross income was set aside for pensions, and that monthly pensions averaged 10 to 25 rubles.

The Government has placed much emphasis on basic education for the entire population. There are schools for children on all the farms we visited.

Some of the collectives provide funds supplementing state scholarship funds, to help outstanding students secure advance education in agricultural science in colleges or technical schools.

The USSR has no exact equivalent of the extension program in the United States. However, technical specialists in different fields of agriculture are attached directly to the collective and state farms.

We visited expositions in Orenberg and Kiev, and also the permanent, nationwide agricultural and industrial exposition in Moscow. All exhibits in these expositions are prepared and kept up by the State. Visitors from all parts of the Soviet Union are constantly attending the Moscow exhibition. A free trip to an exposition is undoubtedly cherished as a reward for exceptional performance. The expositions are constructed on a lavish scale to impress visitors by indicating substantial progress in all fields of agriculture.

ADMINISTRATIVE CONTROL AND PLANNING OF AGRICULTURE

The governmental organization for the administration of agricultural programs in the USSR differs greatly from that in the United States and other Western countries. In the United States, Federal and State Governments are not concerned directly with each farmer's decision-making and management programs. Agricultural responsibilities of the executive branch are discharged largely by the USDA.

In the Soviet Union, direct control over agricultural production decisions is exercised by the Government. Soviet control of agriculture was somewhat relaxed after

closing of the machine tractor stations in 1958. Control became less centralized with the transfer, in the 1960's,of the supervisory functions of the Ministry of Agriculture to the republics. Control was tightened again in 1962, when the administrative organization of Soviet agriculture on the Government and party levels was overhauled from top to bottom.

Administration of Agriculture

In the Soviet Union, several Government agencies have important agricultural responsibilities. The main direction of production and procurement, however, is in the hands of the Ministries of Production and Procurements in each Republic and their local networks. In addition, there are a number of other independent agencies, cooperating with the Ministries of Production and Procurement, which are responsible for special functions, such as research, planning, supply of machinery, and other requisites. The whole administrative structure is headed by the All-Union Committee on Agriculture, the principal agricultural administrative agency under the Council of Ministers of the USSR. Parallel and interrelated with this apparatus of agricultural administration is the party machinery, headed by the Agricultural Bureau of the Central Committe of the Party.

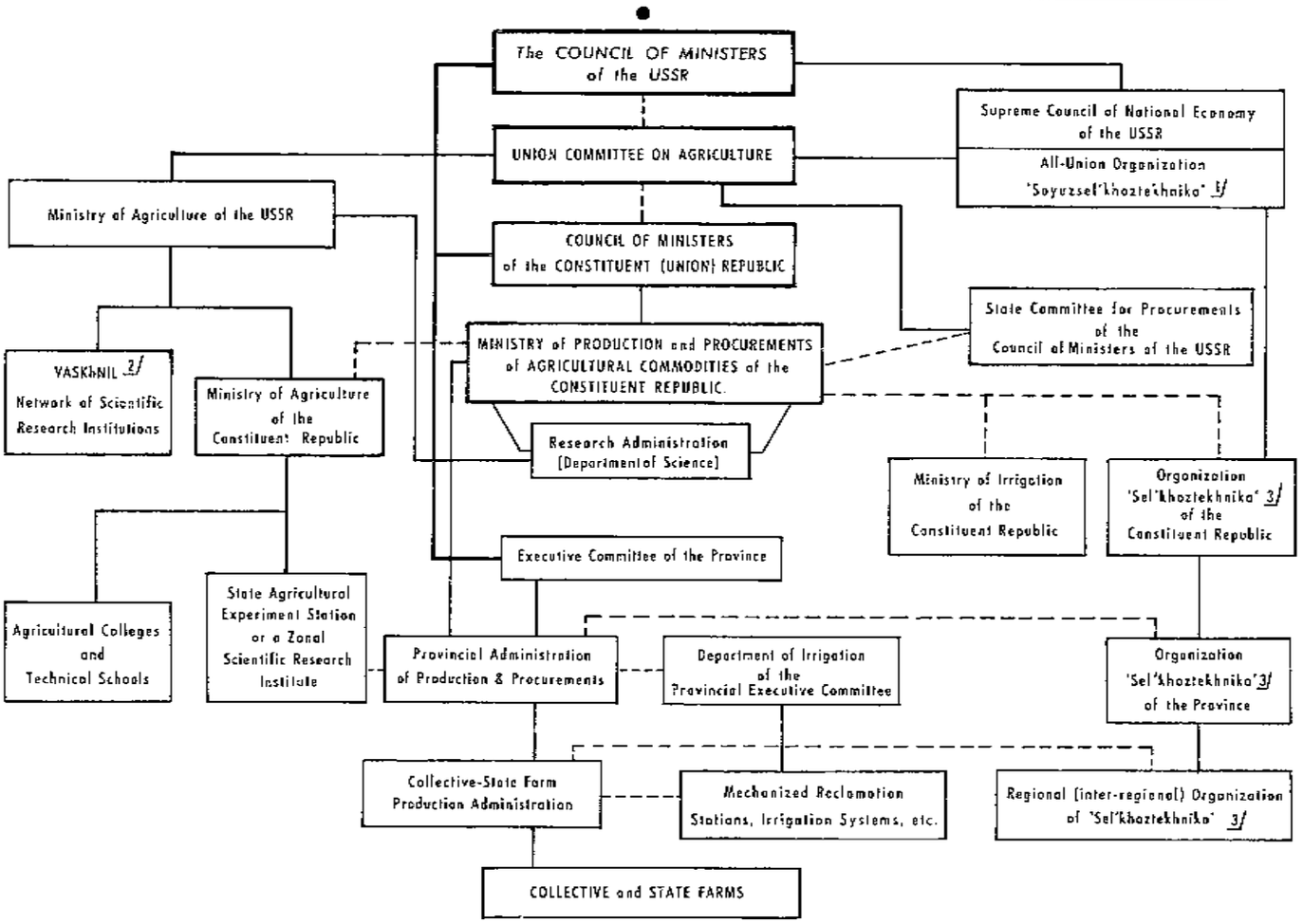
Ministries of Production and Procurements in the republics have their counterparts in each province, or oblast, which are subdivided further into district "production-collective and state farm administrations." The latter are the lowest link in the chain of command but are highly important. Each supervises and gives technical assistance to a number of collective and state farms. There are approximately 1,500 such district agencies, replacing a much larger number of discontinued rayon (county) agricultural organizations.

In addition to this general administrative structure, there are a number of special functional organizations. Thus, research and agricultural education and extension are the responsibility of the Ministry of the Agriculture and of republican ministries of agriculture. The planning apparatus is headed by Gosplan, the state planning committee, under the Council of Ministers of the USSR. Still another important agency is the supply organization (Soyusel'khoztekhnika), with its network of republican, provincial, and local branches which sell and repair machinery and distribute fertilizers and other requisites to farms. A fourth functional organization, the state Committee on Procurement, is charged with central direction of all operations for acquisition of farm products by the state. In various republics, there are ministries (sometimes called committees) of irrigation, with their networks of provincial organs, which are in charge of reclamation centers, irrigation projects, etc.

The complex character of this organizational scheme is accentuated by a parallel party apparatus, which has been superimposed upon it as a result of a far-reaching reorganization of the party administrative setup in the fall of 1962. In accordance with the "production principle" of organization proclaimed by Khrushchev, party organs at almost every level of the administrative pyramid were split into those supervising agriculture and those responsible for industry.

A party committee and its executive officers, the first and second secretaries, are attached to each district production and procurement administration. At the province level, the organization essentially involves the division of the party structure into agricultural and industrial sectors. Division of the party is not as complete at republic level, where "there must be, as before, one central committee for the single leadership of the entire republic." However, two party bureaus--one for industry and one for agriculture--"will function under the leadership of the Central Committee Presidium of the Republic Party." Similar bureaus operate at the highest level; that is, at the level of the Central Committee of the Communist Party of the Soviet Union.

CHART OF THE STATE ADMINISTRATION OF AGRICULTURAL PRODUCTION IN THE USSR



1/ SOYUZSEL'KHOZTEKHNIKA-- All-union agency supplying Agriculture with machinery, fertilizer and other requisites.

2/ VASKhNIL— All-Union Academy of Agricultural Sciences named after V. I. Lenin.

3/ SEL'KHOZTEKHNIKA—Subordinate agency of Soyuzsel'khoztekhnika.

10/21/63

NEG. ERS 2501-63(10) ECONOMIC RESEARCH SERVICE

While we had no opportunity to study actual day-to-day working of this complicated administrative system, we were struck by the multiplicity of interrelated agencies and the apparent division of authority.

Planning of Agriculture

Agriculture, like all other branches of the Soviet economy, is subject to national planning. Prior to 1955, each collective and state farm each year received detailed production plans based on national goals laid down by the Kremlin. These plans stipulated the area to be sown to each crop and the expected yields, the number of livestock to be maintained and their expected productivity, and various production practices to be followed.

In 1955, this procedure was changed. The central Government no longer originates detailed production plans, but establishes overall procurement (purchase) goals for agricultural commodities to be delivered to the state. These goals, or quotas, go down the line to the various lower administrative levels--republics, oblasts (provinces), and districts--until each farm receives its delivery target for the year.

On the basis of these procurement targets, supplemented by local requirements, each collective and state farm formulates a production plan. These plans then go up the line. They are examined and combined with those of other units at each level of the administrative ladder (district, oblast, republic) until they finally reach Gosplan, which is responsible for the preparation of national plans. Gosplan, we were told, also makes independent projections of planned production to aid in analyzing plans received from the republics. We were told that work on the 1964 plan began in March 1963 and that data must be in Gosplan by August 20, 1963.

Gosplan also determines the production of such agricultural inputs as machinery and fertilizer. For the purpose of planning the production of industrial inputs used in agriculture, as in planning generally in the Soviet Union, material or physical balances are utilized. The following description of material balances gives an insight into the technique used by Gosplan in planning production:

> A material balance is essentially a balance sheet of the supply and demand for a given product. At the Gosplan level a separate material balance is made out for each of the centrally allocated commodities...On the left side of the balance, are listed all the sources of the product and on the right side, its uses....On the sources side, the most important category is "production." With most commodities it is often as high as 95 percent of the total supply. "Imports" is usually insignificant. "Other sources" is of varying importance.
>
> The major categories on the distribution side are "production-operation needs" (which includes maintenance requirements) and "construction." The "market fund" denotes that part of the output of the product which is distributed more or less without further processing to satisfy the consumption needs of the people....The "state reserve" is a permanent one, built up as a protection against national disasters, natural or manmade. The "reserve of the Council of Ministers" is an operational reserve to be dispensed during the course of the years to firms which are overfulfilling their output targets and thus are in need of additional input materials, and to firms which did not get supplies which were allotted to them, because of supply failures....
>
> The crucial problem in material balance technology is how are the planned sources and distribution brought into balance when at first there is an imbalance? Usually, the direction of an imbalance is that the

demand for a product is greater than the originally planned supplies. The procedure appears to be that the industrial departments of Gosplan (which are organized along product lines) work on the sources of each product, while the summary departments work on the distribution. The two work closely together in trying to achieve a balance, keeping each other constantly informed of the adjustments each makes. 16/

Though use of modern methods of economic analysis of the input-output type has been increasing in Soviet planning, the emphasis in agricultural planning apparently has been on broad directives, physical concepts, and accounting. The fact that no economic value is imputed to land in the USSR and no interest charge is made for capital no doubt handicaps economic planning and the efficient allocation of resources.

In the United States and other Western countries, interest charges on investments vary with the productive life of the resource and the amount of risk involved. Under the Soviet system, cost comparisons among various types of investments exclude interest charges, and thus do not include an interest charge for the length of time required for the investment to be reflected in production. Soviet cost-return comparisons between a relatively short-term investment, such as fertilizer, and a long-term investment, such as a tractor, consequently are likely to be misleading from the standpoint of indicating the best combination of resources to promote economic development. The cost associated with the amount of risk involved is also excluded in the Soviet calculations.

The variations in prices of agricultural products among areas or zones are based, in part, on average costs of production excluding land rent and interest charges. These variations, however, very imperfectly offset the rent and interest charges that would be involved from the standpoint of differences in production enterprises and areas.

Consequently, planning to maximize economic efficiency would meet with considerable difficulty in the USSR. In practice, Soviet planning is based to a considerable extent on broad directives of the Communist leadership, formalized by decisions of the Central Committee of the party and the Council of Ministers of the USSR.

Officials and specialists who briefed us on planning strongly emphasized the grassroots origin of agricultural production plans, which, with the above-mentioned exception of the procurements targets, are supposed to be developed by farm enterprises. In practice, however, party and Government authorities have a great deal to say about formulation of farm production plans. They do not simply compile and correlate the plans of different farms but must analyze and approve them. An important vehicle of such supervision is the procurement contract between the Government and collective farms for acquisition of farm products. Officials of the districts' agricultural production and procurements administrations not only have the right but the duty to see that production plans of the farms assure the fulfillment of Government procurement goals. Furthermore, ever since the new planning procedure was established in 1955, there have been numerous reports in the Soviet press of local authorities actually imposing plans on collectives. This seems to be particularly the case with respect to targets for livestock numbers, the maintenance of which is often insisted on by local authorities even when shortages of feed and low productivity of the animals have indicated need for reduction.

This illustrates the general problem of arbitrary and frequently harmful bureaucratic interference with farm management which has long plagued Soviet agriculture. Criticism of this situation appears occasionally in Soviet official pronouncements and in the Soviet press, where it recently has been voiced rather frequently by farm managers. It has even been reflected in Soviet novels. 17/

16/ Levine, Herbert S. Centralized Planning of Supply in Soviet Industry. Comparison of the United States and Soviet Economies, pp. 162-164.

17/ Abramov, Fyodor. N. Y. 1963. One Day in the 'New Life' (collective farm).

Independence of collective farms in formulating their production plans is further circumscribed by the necessity to plant crops which are emphasized in the national programs, or face possible censure. The Williams' Grassland Rotation System during the Stalin era and the present emphasis on growing corn throughout the vast country are cases in point.

Production in the private sector of agriculture is not planned by the state. But private output undoubtedly is considered in national production and utilization balances and, therefore, indirectly influences national planning in the socialist sector.

Soviet agricultural planning and programming have been characterized by heavy emphasis on particular problems or aspects of agriculture which were deemed important, at the time, to increase production or efficiency.

For example, early in 1954 the New Lands program was conceived. Between 1954 and 1958, great emphasis was placed on settling the New Lands area, and the program was carried out with speed unmatched in agricultural history. Nearly 100 million acres were settled between 1954 and 1960. In 1955, a corn program was introduced. By 1962, acreage under corn was increased from 4 million to more than 37 million acres.

In 1961, a program to eliminate summer fallow and "low-yielding" grass crops and oats was inaugurated. The goal was to shift about 80 million acres to crops believed to be higher yielding. Prior to the midfifties, however, perennial grasses in rotation held a place of honor in official Soviet agricultural thinking and planning. Our conversations, with Khrushchev indicated that the emphasis may, at present, be shifting to a huge fertilizer program.

In all of these undertakings, methods tend to be standardized and applied throughout the country without sufficient attention to regional differences. For example, in the New Lands area, methods of grain production appear to have been

Combine unloading grain into trucks on farm near Minsk.

highly standardized. Under the corn program, corn has been introduced into all areas with little regard for climatic or soil conditions. Similarly, conversion of fallow land to crops appears to be going on both in the semiarid and the more humid regions. Such practices as checkrowing of crops or double-stage harvesting (windrowing, then combining the grain) or deep plowing apparently reflect the influence of central planning and are applied without sufficient regard to local conditions.

While speed appears to be a feature of the Soviet system, the extent to which such practices actually increase production is questionable because of the highly standardized approaches used. Agricultural planning appeared, from our discussions, to continue to be highly centralized.

Another characteristic of the planning process appears to be the lack of attention to prospective demands. We were surprised, for example, to find that Soviet planners were not concerned with the concept of income elasticity of demand. Preoccupation with physical concepts and lack of a firm economic basis, on both the demand and production sides, for analyzing plans from an economic standpoint appear seriously to limit effectiveness of the planning process.

PRICES, PROCUREMENT, AND MARKETING OF FARM PRODUCTS

The Soviet Government procures agricultural products of state and collective farms for processing and distribution through state stores, stockpiling, and export. Soviet officials referred to the procurement assignments as "contracts." They are signed in the fall for delivery in the subsequent year.

Procurement assignments are determined by the central Government. Such things as prospective needs, production policies, and the past levels of production are considered. These procurement assignments are passed down to the collective and state farms which may suggest changes. The assignments are finally embodied into contracts between the Government and these farms.

The amount of total production procured by the state varies with the crop or livestock enterprise and the farm, and may differ from year to year. Officials said, for example, that grain procurements this year were established at 35 to 40 percent of estimated production but had been higher in some years. Meat procurements from state and collective farms amounted to about 60 percent of the meat production on these farms.

Procurement quotas usually are higher relative to production on state farms than on collectives. Grain procurements normally form a much higher percentage of production in the New Lands areas than in other areas. From 1954-61, more than half the grain procurements came from the New Lands.

Farm Prices

The system of state procurement and pricing of agricultural commodities from the collective farms has undergone various changes, the last basic reform of the system having been decreed in 1958. Since then, agricultural commodities have been purchased by the state from collective farms at prices which are described as "unified," "stable," "flexible," and "zonal." The prices are unified in that there is a basic price for each commodity, stable in that they are intended to remain at the same level for some time, flexible in that annual adjustments can be made for exceptionally good and poor harvests, and zonal in that prices are differentiated geographically to reflect production costs and promote regional specialization.

Procurement prices established by the state for different farm products are designed to offer incentives for changes in the direction of production. For example, the recent increases in prices of meat, milk, and cotton are intended to encourage increases in production. However, the collective farms also are expected to gear production plans to national goals, even though a larger income could be obtained at the established prices by expanding other enterprises. In other words, prices are not considered alone in the allocation of production resources. But they apparently are becoming a somewhat more important factor. Soviet officials indicated that prices are now used as one of the important tools--along with procurement quotas and production goals--to get increases in farm production.

Farm prices of many agricultural commodities have increased substantially since 1953. However, despite the increases during the 1953-61 period, prices did not cover average costs of production of a number of farm products, particularly many livestock products. In 1962 and 1963, further increases in prices of livestock products and cotton were made. Procurement prices paid to collectives for livestock and poultry were increased an average of 35 percent in 1962. Smaller increases were made in prices of dairy products. The most recent increase in state procurement prices was for cotton. Beginning with the 1963 harvest, the average price paid collective farms for cotton was increased by 20 percent for collectives and by 12 percent for state farms.

Another method followed, particularly since 1961, to ease the financial burden of collective farms and improve incentives was to lower prices of various farm inputs. Prices of trucks, tractors, agricultural machinery, fuel, spare parts, buildings, materials, and similar products were lowered. The payment period for machinery purchased from the machine tractor stations was extended. The income tax on proceeds from animal husbandry was reduced by 80 percent. Interest on long-term state loans was lowered, and the state fully assumed transportation costs for delivery of products by collective farms.

In the different zones, prices of most crop and livestock products are set at levels that reflect, in part, the differences in average production cost on collective farms in the zone. Since no charge is made for land rent, lower prices are paid in the better areas.

Prices of ordinary wheat, for example, in the Krasnodar krai, converted to dollars, vary from $1.90 to $2.15 per bushel, depending on the zone. The "base" procurement prices for ordinary wheat vary even more among the republics, ranging from 67 to 85 rubles per metric ton or in terms of U. S. dollars from $2.03 to $2.57 per bushel (table 19). Within each of the Republics, there are also differences between zones. Similar variations among Republics, and within Republics, occur in the prices of rye, barley, oats, and livestock products (table 20). Prices of cattle and hogs are substantially higher in winter than in summer.

While the price variations are substantial, it is very doubtful that they fully reflect differences in costs. On farms visited, all in the better areas, we noted, for example, that reported costs of major crops were relatively low in relation to prices. It does not appear likely that variations in prices are large enough to systematically recover "unearned" increments associated with land productivity. The fact that large disparities exist in income among collective farms has been pointed out in other studies. 18/

18/ Golden, Rachel E. Recent Trends in Soviet Personal Income and Consumption. Dimensions of Soviet Economic Power, p. 356.

Table 19.--Purchase prices for field crops per metric ton, by Republic, USSR, 1962 1/

Republic	Ordinary wheat	Rye	Millet	Oats	Feed barley
	Rubles	Rubles	Rubles	Rubles	Rubles
Russia	77	76	77	50	62
Ukraine	67	64	67	45	52
Belorussia	85	85	80	65	75
Uzbekistan	80	75	80	45	55
Kazakhstan	71	65	70	45	53
Georgia	80	75	80	45	55
Azerbaydzhan	80	75	80	45	55
Lithuania	85	85	80	65	75
Moldavia	67	64	67	45	52
Latvia	85	85	80	65	75
Kirgizia	76	72	76	45	60
Tadzhikistan	80	75	80	45	55
Armenia	80	75	80	45	55
Turkmenia	80	75	80	45	55
Estonia	85	85	80	65	75

1/ These prices in the Russian SFSR, Ukraine, Kazakhstan, and Uzbekistan SSR vary according to zones. The price of rice--around 220 rubles per ton--also varies by zones in the RSFSR. Prices for durum and high-protein varieties of wheat are 40 percent higher than for the soft varieties, and the price for malting barley is 20 percent higher than for soft wheat.

Ekonomicheskaya Gazeta, Sept. 15, 1962.

Table 20.--Purchase prices for livestock products per centner of live weight, by Republic, USSR, 1962 1/

Republic	Cattle of average fatness	Hogs		Sheep of average fatness
		Bacon and fat type	Meat type	
	Rubles	Rubles	Rubles	Rubles
Russia	90	125	105	53.0
Ukraine	88	120	100	51.0
Belorussia	97	135	115	63.0
Uzbekistan	89	135	115	55.0
Kazakhstan	85	125	105	53.0
Georgia	97	135	115	58.5
Azerbaydzhan	97	135	115	58.5
Lithuania	97	135	115	68.0
Moldavia	88	120	100	53.0
Latvia	92	130	110	68.0
Kirgizia	89	135	115	55.0
Tadzhikistan	89	135	115	55.0
Armenia	97	135	115	55.0
Turkmenia	89	135	115	58.5
Estonia	92	130	110	68.0

1/ Purchasing prices per kilogram of live weight: Hens and chickens, 1.40 rubles; geese, 1 ruble; ducks, 1.10 rubles; turkeys, 1.60 rubles; suckling pigs weighing up to 6 kilograms, 1.50 rubles; rabbits (first grade), 0.90 ruble; rabbits (second grade) 0.78 ruble.

Ekonomicheskaya Gazeta, Sept. 15, 1962.

In general, delivery prices paid state farms are lower than the purchase prices paid collective farms, particularly for grain. For example, the lowest "zonal" price for winter wheat from collectives in the Krasnodar krai is 63 rubles per metric ton; the delivery price for state farms is 28.45 rubles.

Prices paid to state farms for livestock products follow the same general pattern as prices paid to collectives, but are about 10 percent lower. Prices paid to state farms for deliveries of cotton are only slightly lower than the purchase price from collective farms. Delivery prices paid state farms for flax, hemp, and oilseed crops are the same as those paid collective farms.

Lower prices are paid to state farms partly because of lower costs on those farms and partly because the state supplies machinery and other production requisites. While losses are absorbed by the state, and do not affect regular wages paid to workers on state farms, profits provide a supplemental source of capital for investment, improvements in living and welfare conditions, and payment of wage bonuses.

Prices received for products produced on the private plots or on collective farms and sold on the private markets are based on competive supply-demand relationships. In general, prices on private markets are higher and product quality is better than on state markets.

Comparison of Farm Prices in the United States and the USSR

Conversion of prices received by collective farms to U. S. dollar equivalents at the official rate of exchange provides only a very rough approximation for measuring differences in farm product prices in the two countries. This is so because of the inadequacy of the exchange rate in reflecting actual differences in purchasing power, and because much of the production in the Soviet Union comes either from state farms or private plots, where the prices received usually differ from those received by the collective farms. Nevertheless, a comparison of prices received by collective farms with prices received for similar products in the United States provides some indication of the differences in prices in the two countries in 1963 (table 21). At the official exchange rate, prices received for potatoes are about the same as in the United States. 19/ Prices of both wheat and feed grains are considerably higher than in the United States. In the USSR, a very substantial premium of 40 percent above the price for ordinary wheat is given for high-protein and durum wheats.

Prices of milk and cotton are more than 50 percent above U. S. prices. The greatest differences are in prices of cattle, hogs, and wool, which are 2 to 3 times the U. S. prices.

The high livestock prices in relation to grain prices are especially significant as an indicator of the relative inefficiency of livestock production in the USSR. Despite these high prices, profits from livestock on the farms visited are generally lower than profits from grain. The larger labor requirements for livestock, at wages generally higher than those paid field workers, result in relatively high production costs.

There is somewhat less difference between the two countries in retail prices of livestock products than in prices received for livestock by collective farms and U. S. farmers. In general, however, Soviet retail prices of farm products are substantially higher and the quality considerably lower than in the United States. Based on data obtained on this visit and a visit in 1962, we conclude that prices of meat, eggs, and butter are at least double comparable prices in the United States. Milk is considerably higher in price and lower in quality than in the United States. While the milk is pasteurized, it has a substantially higher bacteria count than milk in the United States.

19/ Converted at the official rate of 0.9 ruble per dollar.

Table 21.--Average procurement prices received by collective farms in the Soviet Union, and prices received by farmers in the United States, selected products, 1963

Commodity	Unit	USSR prices converted to US dollars 1/	US prices 2/
Grain	Metric ton	$74.70	n.a.
Wheat	Bushel	3/$2.03 - 2.33	$1.75
Barley	Bushel	3/ 1.25 - 1.48	.96
Corn	Bushel	4/1.62	1.19
Potatoes	Cwt.	2.02	1.96
Sugarbeets	Ton	11.85	5/15.00
Cotton (lint)	Pound	6/.50	.32
Meat (live weight)	Pound	.45	n.a.
Cattle (live weight)	Pound	.44	.21
Hogs (live weight)	Pound	.54	.17
Eggs	Dozen	.88	.31
Milk	Cwt.	7/ 6.06 - 8.08	3.87
Wool	Pound	1.55	.48

1/ Based on new procurement prices converted at the official rate of 0.9 ruble per dollar.

2/ July 1, 1963.

3/ Range in the "base" procurement prices for Russian SFSR, Ukraine SSR, and Kazakhstan Republics for ordinary wheat and feed barley, which are the major wheat and barley producing Republics. Durum and "strong" (high protein) wheats receive a premium of 40 percent over ordinary wheat. There are additional price variations by zones in each republic.

4/ Price reported on collective farms in Krasnodar krai.

5/ Estimated price for 1962 crop including payments under Sugar Act.

6/ Estimated equivalent per pound of lint. In USSR, cotton is sold as seed cotton. This price includes seed, but cost of ginning is excluded.

7/ Prices reported on collective farms in Krasnodar krai and Minsk area.

The somewhat smaller margin between farm and retail prices of meat reflects in part the greater amount of bone in the Soviet cuts of meat and the relatively high prices received for fat. Fat in the Soviet Union is sold at the same prices as the best quality meat in the market we visited. In addition, much of the meat is marketed locally, so that such costs as storage and transportation may be less than in the United States. Also, Soviet reports published at the time of the increase in meat prices in 1962 indicate that the cost to the state of purchasing, processing, and handling beef in 1961 was about 18 percent above the retail price. The cost of purchasing, processing, and handling pork was nearly 8 percent above the retail price.

Marketing

There are two marketing systems in the Soviet Union--the state system and the private free-market system. The state assumes the responsibility for transportation and marketing of all products it procures, which constitutes the bulk of the production marketed. These products are distributed to consumers through state stores. In addition, substantial quantities of vegetables, meats, and other farm products are sold on the private markets. A large part of these products come from private plots, but collective farms can sell on private markets after procurement quotas have been met.

Marketing methods and distribution channels for farm products procured by the state can be illustrated by discussing the livestock and livestock product marketing and distribution system. Prices by grades are established by the state. Procurement contracts call for regular deliveries of specified amounts from both state and collective farms to the processor. State-owned processing plants receive raw materials at a specified Government-established price and deliver finished products to stores and other outlets at specified prices, also established by the Government. Deliveries of meat, milk, and similar products are made to various retail outlets in accordance with orders placed by the retail outlets.

Assembly and transportation of privately produced items are left to the individual, but in many towns public facilities are available for retailing. At the private market visited in Kiev, for example, stalls are rented by individuals or by collective farms. Usually the stalls are rented for 1 or 2 days. Apparently there is no refrigeration in the stalls. Meat and vegetables are displayed in the open. Because of the small size of the enterprises operated by private farmers, marketing is in extremely small quantities, and difficulties in assembly, transportation, and storage appear inevitable. Lack of efficient marketing facilities is an important impediment to agricultural progress and improved living conditions in the USSR. Part of this is related to transportation conditions. Many farms are far from railroads. Unimproved roads from farms to urban areas may become almost impassable because of rain or melting snow.

Inadequate refrigeration and storage facilities for livestock products are apparent throughout the marketing and distribution system. Meat processing plants are located in the larger cities because of the lack of refrigeration facilities elsewhere. Live animals are frequently transported long distances by rail, which results in considerable shrinkage and added costs for labor and feed. The lack of refrigerated storage facilities, in turn, must seriously decrease processing efficiency, reduce seasonal availability of fresh meat, and increase spoilage losses.

Fluid milk is commonly transported only short distances to processing plants, usually not more than 50 to 60 miles. The plants produce a number of products in addition to bottled milk, such as yogurt, sour cream, cheese, and sometimes ice cream. Sanitary conditions in these plants, as reported by the livestock and meat exchange group visiting the USSR in 1962, were barely satisfactory and far below U. S. standards.

Farm produce from private plots and collective and state farms on sale at new Kiev central market.

The marketing of dairy products leaves much to be desired. Outside the radius of large cities, milk is separated from the cream on the farm. The cream is then hauled to a creamery, and much of the skim milk is fed to hogs on the farm. This system is similar to that which prevailed in the United States 30 to 40 years ago. It is wasteful of milk solids other than fat--a serious waste for a country that needs to put more animal proteins into its high cereal diet. Transportation of fluid milk from farm to collection center also needs much improvement. Schedules are rigid but involve too much time. And milk is handled under far less sanitary conditions and less controlled refrigeration than in the United States.

Lack of good transportation handicaps farm production operations, but an even worse effect is in forcing geographic patterns of agriculture that are uneconomic. It prevents regional specialization, so necessary to high-production agriculture, by impeding development of an efficient system of marketing.

If it were possible to move Soviet farm products efficiently, much more regional specialization could be introduced into agriculture. Feed grains could be shipped more readily from surplus-producing areas to specialized livestock areas. At present, every area, and nearly every farm, engages in livestock production. In some areas, this is highly uneconomic.

Because of poor transportation and lack of adequate facilities for marketing and storage of many products, consuming centers are virtually cut off from supplies of many types of food that must come from distant sources. Fruit is scarce in much of the northern part of the Soviet Union. Fresh vegetables are scarce except during the local harvesting season. Further, there is relatively little regional specialization in the production of fruit and vegetables compared with the United States.

FOREIGN AGRICULTURAL TRADE

How Foreign Trade Works

Foreign trade of the Soviet Union is a Government monopoly carried out according to annual and long-term plans. The plans are coordinated with bilateral trade agreements, annually negotiated or renegotiated between the Soviet Union and the majority of its trade partners. As the Soviet ruble is not a convertible currency, not even among members of the Soviet Bloc, imbalances in trade must be settled in some Free World convertible currency or gold. This situation forces the Soviet Union to pay constant attention to trade balances and puts a premium on commodities which can be obtained only with convertible currencies. Exports of bread and feed grains by the Soviet Government, despite the needs of the domestic economy, illustrate the emphasis placed on obtaining convertible currency for purchases of industrial equipment and scarce raw materials.

Foreign trade is actually carried out by a number of Government companies, each dealing in special groups of commodities. Prices are negotiated by these trade companies and representatives of the other countries on the basis of Free World prices. The prices agreed upon are not necessarily related to other Government-fixed prices such as retail and wholesale prices. Thus, producers for the export market are neither rewarded nor penalized directly through the export market--nor are import bargains passed on immediately to Soviet consumers.

Size of Foreign Agricultural Trade

Agricultural commodities have accounted for an average of 20 percent of total exports in the 8 years, 1955-62, for which trade data are available and almost 24 percent of total imports. The proportion of agricultural trade to total trade was well below average in 1962, amounting to 18 percent of exports and 19 percent of imports. During 1955-62, agricultural exports increased 69 percent, while total exports doubled. Agricultural imports increased only 45 percent, while total imports more than doubled. Actually, the value of agricultural imports in 1962 was below that in 1961 and 1960. The explanation is that the drop in imports from Communist China was not fully compensated for by large increases in imports of Cuban sugar and Malayan rubber.

Grains

Grains have accounted for over 40 percent of the value of agricultural exports, with wheat predominating (table 22). From 1955 through 1962, grain exports averaged 6.4 million metric tons per year, with a peak of 7.8 million tons in 1961 and a low of 3.2 million in 1956. Wheat exports averaged 4.3 million tons per year during this period (or 156 million bushels). An average of 73 percent of this wheat was exported to Sino-Soviet Bloc countries (including Cuba). In 1962, the latest year for which data are available, wheat exports were above the 8-year average but slightly below the volume in 1961. However, only 67 percent went to the Bloc countries and the balance to the Free World, continuing a trend towards relatively larger exports to the Free World.

In both 1961 and 1962, when Soviet exports of wheat to the Free World were comparatively large (56 million bushels), the greatest amounts went to Western Europe, especially the United Kingdom, and some other countries with which the Soviet Union has trade agreements. Outside of Europe, wheat exports to Brazil have been large (7.4 million bushels in 1961 and 15.2 million in 1962).

Table 22.--Exports of principal agricultural commodities, total and to Bloc, USSR, 1955-62

Commodity and destination	1955	1956	1957	1958	1959	1960	1961	1962
	1,000 metric tons							
Wheat, total	2,035.8	1,452.4	5,450.8	3,878.7	6,052.0	5,624.4	4,800.6	4,765.2
Bloc	1,650.5	547.6	4,573.4	2,836.5	4,365.3	4,279.4	3,275.3	3,216.3
Rye, total	698.9	519.4	440.6	461.0	548.9	682.5	1,088.0	1,300.3
Bloc	576.3	351.3	317.6	341.1	371.4	514.0	856.3	1,094.5
Barley, total	565.0	785.4	1,214.0	278.3	121.6	324.0	1,006.8	466.8
Bloc	496.6	482.8	804.4	144.7	25.4	144.4	301.2	376.5
Oats, total	75.6	164.3	223.5	261.1	131.4	41.5	179.9	25.3
Bloc	38.9	84.9	178.3	137.2	50.1	16.0	120.9	8.9
Corn, total	307.4	293.7	84.6	220.5	154.9	122.2	405.6	1,256.7
Bloc	217.3	244.8	24.5	208.4	53.0	47.7	229.6	1,003.8
Vegetable oils, total	24.0	55.6	47.8	52.2	82.5	91.8	121.8	152.5
Bloc	19.0	52.1	44.8	49.9	73.8	75.4	110.5	117.1
Oilcake, total	146.3	111.8	192.6	365.4	575.2	496.4	386.1	348.6
Bloc	14.4	16.4	14.7	35.7	29.5	30.2	33.2	44.4
Oilseeds, total	66.5	59.8	49.8	47.1	83.3	110.4	120.7	112.7
Bloc	53.4	51.8	49.3	46.1	60.0	74.5	83.1	108.7
Sugar (refined value), total	209.7	174.4	190.5	200.4	197.2	242.9	1/886.3	792.4
Bloc	14.8	12.4	14.0	11.5	10.8	4.5	1/476.3	135.1
Meat and meat products, total	11.1	31.2	76.5	35.3	179.0	78.1	66.0	133.7
Bloc	10.6	31.2	76.5	35.3	175.3	76.3	65.7	130.6
Tobacco (raw), total	4.4	7.5	6.0	6.2	7.1	1.6	2.9	1.8
Bloc	2.3	4.6	4.0	4.0	4.7	---	---	---
Wool (washed), total	14.8	12.8	13.8	17.0	16.9	18.0	28.1	24.2
Bloc	11.3	10.3	11.5	12.4	13.2	15.3	26.0	21.6
	1,000 bales							
Cotton, total	1,547.4	1,421.5	1,463.8	1,427.9	1,582.3	1,795.4	1,757.3	1,578.2
Bloc	1,168.9	1,155.1	1,244.3	1,263.5	1,236.4	1,405.5	1,495.0	1,344.8

1/ Includes 501,000 metric tons of raw sugar (472,600 metric tons refined value).

Official Soviet sources.

The Soviet Union, until 1963, was an importer of small and highly fluctuating quantities of wheat (table 23). These imports, predominantly from Canada, were mainly destined for the grain-deficit Soviet far-eastern region. Net exports (after deducting these imports) have averaged about 8 percent of estimated wheat production. The ups and downs of net exports have followed, with a time lag, the ups and downs of production.

The 1963-64 imports were of unprecedented magnitude. They exceeded many times the quantities previously imported. These large imports were caused by a poor crop in 1963 following a succession of mediocre crops and probable serious depletion of stocks.

Exports of other grains (rye, oats, barley, and corn) increased from 1955 until 1958, declined during 1958-60, and rose sharply in 1961 and 1962. On the average, these grain exports totaled 1.8 million metric tons annually from 1955-62, of which about 68 percent went to the Bloc. A record for exports of these grains was set in 1962--more than 3 million metric tons--with the Bloc countries obtaining an unprecedented 82 percent of the total. Difficulties experienced with grain supplies in 1962 by most of these countries undoubtedly accounted for these large exports from the Soviet Union. Inclusion of Cuba in the Bloc countries resulted in the Soviet Union having to export large amounts there in 1961 and 1962. Furthermore, Communist China's agricultural difficulties have resulted in shipments from the USSR. These unusual exports to Cuba and Communist China, in addition to increased exports to the European Bloc countries, cut the proportion of Soviet grain available for export to Free World countries. Exports of grain to the Free World fell back sharply in 1962 from the peak in 1961. The proportion of exports to domestic production for all four of the grains, however, rose from the 8-year average of less than 4 percent to 6.5 percent.

Cotton

Cotton follows grain in relative importance among Soviet exports. Exports in 1955-62 ranged from 1.4 million to 1.8 million bales. The proportion of these exports destined for Bloc countries ranged between about 75 and 85 percent of the total, leaving a minimum of 164,000 bales in 1958 and a maximum of 388,000 in 1960 for export to the Free World. Exports to the Free World have gone principally to Western Europe. The Soviet Union imports cotton, approximately half as much as it exports. These imports totaled nearly 900,000 bales annually in 1959 and 1960, because of large shipments from Communist China. In 1961 and 1962, imports were less than 700,000 bales and were distributed among several developing countries, although Egypt was the principal source. In 1962, imports from Brazil rose very sharply while imports from Egypt declined, though they still remained the major source.

Oilcake, Oilseeds, and Vegetable Oils

The Soviet Union exports oilcake totaling, on the average, over 300,000 metric tons annually, mostly to the Free World. Oilseeds are also exported, but prior to 1961 the Soviet Union was a large net importer, principally from Communist China. Imports of oilseeds from Communist China dropped from over 700,000 metric tons in 1959 to 400,000 in 1960 and then to insignificant amounts in 1961 and 1962. Small amounts of oilseeds were obtained from non-Bloc sources, but in 1961-62 the Soviet Union was a net exporter, chiefly to the Bloc. Except for 1955, when the Soviet Union was a heavy net importer of vegetable oils, trade in these commodities fluctuated closely around the balance point for exports and imports. Communist China was the principal source of vegetable oils prior to 1960, when imports declined. Since 1957, however, there has been a rise in Soviet exports of vegetable oils, principally sunflower seed oil. Exports to both the Bloc and non-Bloc countries have increased.

Table 23.--Imports of principal agricultural commodities, total and from Bloc, USSR 1955-62

Commodity and destination	1955	1956	1957	1958	1959	1960	1961	1962
	1,000 metric tons							
Rubber, total	35.3	140.7	145.5	258.7	242.1	190.9	360.3	361.7
Bloc	1.0	16.9	48.1	36.1	23.9	7.9	---	---
Wheat, total	29.1	443.3	122.1	323.3	246.9	98.0	655.9	45.1
Bloc	29.1	40.8	1.5	40.2	48.0	98.0	167.2	45.1
Rice, total	487.1	637.6	370.5	500.5	689.1	501.1	19.9	337.5
Bloc	292.7	457.6	181.1	472.8	658.4	450.9	19.9	150.2
Coarse grains, total	276.5	50.3	30.4	458.3	9.6	142.4	22.8	1.1
Bloc	275.8	30.1	20.2	211.6	9.5	104.5	3.8	---
Vegetable oils, total	195.3	96.5	45.6	73.3	71.6	59.3	54.4	15.1
Bloc	107.4	87.7	42.9	71.0	68.9	33.5	2.5	0.7
Oilseeds, total	759.9	801.5	716.0	551.7	715.2	418.5	90.2	57.3
Bloc	753.3	796.5	713.9	542.5	710.5	403.6	14.5	1.3
Sugar (refined basis), total	921.7	324.3	625.5	367.7	311.1	1,614.2	3,388.3	2,339.2
Bloc	780.7	323.7	440.7	363.7	311.1	1,604.3	3,387.3	2,338.2
Fresh fruits, total	132.9	157.5	218.1	334.5	301.4	334.8	316.5	345.6
Bloc	81.8	108.2	151.0	254.8	234.9	227.9	193.8	224.2
Dried fruits, total	28.3	37.7	48.0	66.7	54.4	76.7	83.9	77.2
Bloc	4.1	7.8	10.7	12.7	18.5	17.9	20.5	13.3
Meat and products, total	240.8	207.3	116.8	156.6	112.8	66.9	59.7	149.1
Bloc	174.2	156.4	80.7	144.1	96.2	58.8	56.2	56.7
Tobacco, total	55.2	73.3	91.1	84.3	96.6	74.2	57.8	66.6
Bloc	50.4	64.5	82.1	71.3	85.9	62.6	44.7	38.1
Wool, total	46.5	48.5	57.3	55.2	57.8	61.5	55.3	48.6
Bloc	27.5	25.5	24.2	21.0	22.2	20.9	16.8	14.5
	1,000 bales							
Cotton, total	91.4	236.1	499.7	652.7	874.0	886.9	650.4	689.9
Bloc	---	4.1	3.7	---	328.4	215.4	51.9	37.7

Official Soviet sources.

Rubber

Raw rubber, in terms of value, has been the largest single agricultural commodity imported by the Soviet Union--accounting for over 12 percent of total agricultural imports in 1955-62. Imports have averaged over 200,000 metric tons, and were over 360,000 metric tons in 1961 and 1962. About 70 percent of these imports came from Malaya, costing the Soviet Union convertible currency. This may explain why, despite the sharply rising trend, imports have decreased when prices increased and vice versa.

Sugar

Over the years, the Soviet Union has been an exporter of domestic beet sugar and a larger importer of raw cane sugar from Cuba. Until 1960, exports were around 200,000 metric tons and imports over 400,000 metric tons a year, in terms of refined sugar. The Soviet Union increased imports in 1960, to 1.6 million metric tons and in 1961 to 3.4 million metric tons. The decline of sugar production in Cuba reduced the volume of imports to about 2.3 million metric tons in 1962. These large imports were associated with increased exports of sugar by the Soviet Union, which rose from 243,000 metric tons in 1960 to 886,000 in 1961, and 792,000 in 1962.

Livestock

Imports of livestock products, in terms of value, were important in 1955, 1956, and 1958--when net imports were large. In 1959-62, the Soviet Union was a net exporter. Trade is chiefly with the Bloc.

Trade in meat and meat products, a major component of the category mentioned above, can be discussed in terms of volume. The Soviet Union was a net importer in 5 of the 8 years and a net exporter only in 1959, 1960, and 1961. A sharp increase in imports from 60,000 metric tons in 1961 to 149,000 in 1962 was primarily from non-Bloc countries. But the large rise in meat exports was in shipments to the Bloc, where meat shortages were reported in a number of countries.

Other Commodities

The volume of trade in rice, wool, tobacco, and fruits is given in the accompanying tables. Volume data for some commodities were difficult to obtain, although the trade was not insignificant; this applies to exports of bristles and imports of raw hides, and coffee, cocoa, and tea.

Soviet-US Agricultural Trade

Agricultural commodities are important in the small trade between the USSR and the United States, although the average was only less than $25 million each way during 1955-62. Agricultural commodities accounted for 24 percent of Soviet exports to and 42 percent of imports from the United States. Commodities in this agricultural trade have varied. For example, tallow was a major agricultural import in 1957 and 1961, and unimportant or nonexistent in other years. The Soviet Union has exported cotton linters and waste, wool, bristles, animal hair, and casings to the United States. Soviet imports from the United States have been raw hides, inedible animal fats, and, occasionally, seeds for planting, eggs for hatching, and fruits.

DEVELOPMENT OF AGRICULTURAL RESEARCH

The Soviet Ministry of Agriculture has responsibility for all agricultural research and extension work in the country. Similar responsibilities are given to the respective ministries in the republics. In the Soviet Ministry of Agriculture there is a Department of Science, which has operational responsibility for research. Also within the Ministry is an All-Union Academy of Agricultural Sciences, which is the planning body for science programs.

Five of the republics have Ministries of Agriculture which are subordinate to the Soviet Ministry of Agriculture. In these, agricultural research is organized on the same pattern as in the All-Union Ministry. In the other republics, agriculture is a department in the Ministry of Production and Procurement. Agricultural research is handled by these departments, but is coordinated with other agricultural research by the All-Union Ministry of Agriculture.

The All-Union Academy of Agricultural Sciences has major responsibility for making long-term plans for agricultural science to fit into overall plans of the USSR. There are three plans--a 15-year plan, a 7-year plan, and a 2-year plan (this last plan is for the 2 years at the end of the 7-year plan). Membership is made up of outstanding scientists in the country, and it is a great honor to be elected to it. The Academy is divided into bureaus for each major scientific field.

Types of Research Establishments

All-Union Research Institutes

At the top of the agricultural research program are 34 All-Union Institutes, such as Plant Protection, Sugar Beets, Oil Crops, Mechanization, and Plant Industry. These institutes have responsibility for all work in their field throughout the country. Most institutes have substations where research is done in addition to the work at headquarters. For example, the All-Union Institute of Plant Industry in Leningrad has 20 plant introduction stations throughout the USSR.

The All-Union Scientific Research Institute of Agricultural Economics in Moscow was created in April 1955. The Institute is studying ways to improve farming, including farm technology, calculation and reduction of the production costs of farm products, labor remuneration and management, agricultural prices, and capital investment in collective and state farms.

Republic Research Institutes

Each republic has a number of research institutes concerned with local agricultural problems. Most of the institutes work on a commodity basis, such as corn or sugarbeets, but some, such as the Krasnodar Agricultural Research Institute, work on all agricultural problems. In contrast to the All-Union Research Institutes, which are financed from allotments from the Government, most republic institutes get some or all support from sales receipts and operate relatively large farms. For example, the Krasnodar Agricultural Research Institute operates approximately 7,500 acres of land. It receives 40 percent of the sales receipts from the farm products sold in addition to a direct allotment of funds from the republic. A considerable part of the staff's time is spent in farming activities and in conferring with personnel on collective and state farms.

Institutions of Higher Education

There are 94 institutions of higher education which conduct agricultural research along with teaching. They are similar to our land-grant schools.

How the System Works

There are 1,400 centers of agricultural research in the USSR. The task of coordinating them is a big one. An example of how the system works is in the field of agricultural engineering. Within the current plan developed by the All-Union Academy of Agricultural Science, the All-Union Institute of Mechanization is assigned agricultural engineering research for the whole country. The Institute, in turn, assigns subordinate responsibilities to the 14 Zone Institutes of Mechanization (republics) and to the agricultural engineering departments of other institutions, such as the Sugar Beet Institute, and to the agricultural engineering departments of the institutions of higher education. There are 250 such subordinate groups with special research responsibilities.

Research projects are developed at each institution. When a project clears the scientific committee at the institution, it is referred to the Ministry of Agriculture for coordination with the work of other institutes in the republic. After revision as needed, the project is submitted to the All-Union Institute of Mechanization. When the project is approved for a definite time period, funds and equipment are allocated. Annual reports of progress are required on technical matters and semi-annual reports on financial matters.

Publications on research require approval of the scientific committee at each institution, but not at higher levels. Papers are published in the journals of the scientific societies, as in the United States. Most Soviet scientists are no longer inhibited by the Lysenko theory, although some investigators still explain their results in his terms.

Evaluation of USSR Agricultural Research

Time available for study of research facilities was limited, but the following impressions were formed:

1. The quality of research and the capability of scientists vary greatly within and among Soviet institutes. The Soviet Union has many first-rate scientists. Research and the scientists at the All-Union Institutes visited were generally good. With some exceptions, such as the Krasnodar Agricultural Research Institute, the work of the institutes serving separate republics was of poorer quality than at the All-Union Institutes. Nearly all work at the republic institutes was applied research or service work, such as growing seed and testing varieties.

2. The USSR does a much better job of collecting, abstracting, and distributing world literature on agricultural science than the United States. Russian agricultural scientists are better informed on American research than their American counterparts are on Soviet research.

3. There are great pressures on Soviet scientists for practical findings. As a result, most Soviet research is applied, with a large share being devoted to adapting practices developed in other countries to Soviet conditions. Hybrid corn and agricultural machinery are examples.

4. Most Soviet research is on production problems. Very little work is done on processing, and there seems to be no marketing research. Much of the economics research apparently is devoted to farm accounting. Useful research on national production and consumption shifts appears to be hampered by lack of attention to modern economic theory. The concept of income elasticity of demand, for example, is not used in analyzing prospective consumption demands for agricultural products. Little use is made of the concepts of diminishing returns and marginal analysis.

5. Work on field crop production (corn, wheat, sugarbeets, cotton, and sunflowers) is further advanced than research in other areas. The work on sunflowers (the major oil crop) is outstanding. The work on cotton and sugarbeets is very good.

Large field of sunflowers on collective farm in Krasnodar area. Sunflowers are main source of vegetable oil in USSR.

Large research resources are, and have been for some time, devoted to mechanization, breeding, disease and insect control, and cultural practices of field crops. Work on fertilizers is well underway and will be further strengthened as more fertilizers become available for crop production. Currently, most fertilizer is used on cotton and sugarbeets.

At some research institutes, modern experimental techniques with randomized and replicated plots designed for statistical analysis are in use on field crops, but, for the most part, well-designed field experiments were not observed.

6. While research on livestock production is not as far along as research on field crops, a large coordinated program is being developed. Work on artificial insemination has been underway for many years, and there has been much progress. Current breeding research is not impressive.

4. Most Soviet research is on production problems. Very little work is done on processing, and there seems to be no marketing research. Much of the economics research apparently is devoted to farm accounting. Useful research on national production and consumption shifts appears to be hampered by lack of attention to modern economic theory. The concept of income elasticity of demand, for example, is not used in analyzing prospective consumption demands for agricultural products. Little use is made of the concepts of diminishing returns and marginal analysis.

5. Work on field crop production (corn, wheat, sugarbeets, cotton, and sunflowers) is further advanced than research in other areas. The work on sunflowers (the major oil crop) is outstanding. The work on cotton and sugarbeets is very good.

Large field of sunflowers on collective farm in Krasnodar area. Sunflowers are main source of vegetable oil in USSR.

Large research resources are, and have been for some time, devoted to mechanization, breeding, disease and insect control, and cultural practices of field crops. Work on fertilizers is well underway and will be further strengthened as more fertilizers become available for crop production. Currently, most fertilizer is used on cotton and sugarbeets.

At some research institutes, modern experimental techniques with randomized and replicated plots designed for statistical analysis are in use on field crops, but, for the most part, well-designed field experiments were not observed.

6. While research on livestock production is not as far along as research on field crops, a large coordinated program is being developed. Work on artificial insemination has been underway for many years, and there has been much progress. Current breeding research is not impressive.

No evidence was observed of carefully designed breeding plans. Very little research in livestock feeding and nutrition was observed. Good progress is being made in animal disease research.

7. Research on fruits and vegetables is not advanced. Work observed seemed to be mostly selection and adaptation trials.

8. Soviet officials emphasized the importance of trained agricultural specialists in linking research findings to changes in farm production methods. Technical specialists are employed on the collective and state farms to establish appropriate production methods. Once decisions are made to adopt improved practices or varieties, rather rapid changes are possible.

9. Overall, if the USSR expects to equal the United States in agricultural science, it will have to devote more attention to basic research.

CAPITAL INVESTMENT

The problem of increasing the efficiency of Soviet agriculture has been closely linked with lack of sufficient capital investment. Increasing mechanization and fertilization and making various other improvements depend on increasing the volume of investment. The agricultural investment problem is involved in the general Soviet economic policy regarding allocation of resources--a process in which the heavy and armament industries have been strongly favored.

Agriculture, however, has fared better in terms of investment during the post-Stalin era than before. Recently, the Government has given increasing attention to a higher priority for investment in agriculture. This was strongly emphasized to us by Premier Khrushchev, who particularly stressed increased investment in chemical fertilizers. The need for purchasing fertilizer, feed-mixing plants, and certain types of machinery from Western countries also was mentioned.

Soviet statistics distinguish between two components of agricultural investments: so-called "productive" and "unproductive" investments. Productive investment, which is by far the largest and most significant, consists of expenditures for construction and equipment directly related to production. These include farm equipment (tractors, combines, trucks), storage facilities, barns, irrigation, electrification, and establishment of orchards and vineyards. Unproductive investment includes expenditures for housing, schools, hospitals, and cultural centers (clubs) on state and collective farms. Unproductive investment in agriculture is customarily about 10 to 15 percent of total investment in agriculture (table 24).

State and Collective Farm Investment

Agricultural investment in the USSR comes either from the state budget or the collective farms, both of which have productive and unproductive components. State investment is made directly by the Government and is budgeted in the national plan. It goes primarily to state farms and other state agricultural enterprises and projects. Collective farm investment comes primarily from the income of collective farms, from which a certain proportion is allocated for this purpose to the so-called "indivisible fund." 19/ During the last two decades, about half the investment funds for agriculture have come directly from the state and the other half from collective farms (table 25).

19/ The contribution to the indivisible fund of a collective farm is that segment of the farm's income which is set aside for capital expenditures.

Table 24.--Investment in Soviet agriculture, total, productive, and unproductive, 1951-62

Year	Total investment	Productive		Unproductive	
		Amount	Percentage of total investment	Amount	Percentage of total investment
	Million rubles	Million rubles	Percent	Million rubles	Percent
1951	2,023	1,861	92	162	8
1952	2,130	1,933	91	197	9
1953	2,153	1,910	89	243	11
1954	3,216	2,762	86	454	14
1955	4,365	3,804	87	561	13
1956	4,654	4,024	86	630	14
1957	4,886	4,203	86	683	14
1958	5,500	4,741	86	759	14
1959	5,949	5,071	85	878	15
1960	6,186	5,192	84	994	16
1961	6,890	5,767	84	1,123	16
1962	8,000	---		---	

Table 25.--Productive investment by the state and collective farms, USSR, 1951-62

Year	Total productive investment	State farms		Collective farms	
		Amount	Percentage of total investment	Amount	Percentage of total investment
	Million rubles	Million rubles	Percent	Million rubles	Percent
1951	1,861	1,025	55	836	45
1952	1,933	971	50	962	50
1953	1,910	881	46	1,029	54
1954	2,762	1,536	56	1,226	44
1955	3,804	1,992	52	1,812	48
1956	4,024	2,118	53	1,906	47
1957	4,203	2,343	56	1,860	44
1958	4,741	2,279	48	2,462	52
1959	5,071	2,021	40	3,050	60
1960	5,192	2,471	48	2,721	52
1961	5,767	3,028	53	2,739	47
1962	---	3,695		---	

Inasmuch as the income level of collective farms is largely related to the prices paid by the state for purchases from collective farms, the state indirectly determines the amount of collective farm investment.

Long-term loans represent another form of state investment directly benefiting collectives. State investment in machine-tractor stations and their successors and in irrigation projects benefit collectives indirectly.

Tables 24 and 25 show that there has been a substantial and continuous increase in the absolute amount of capital investment in Soviet agriculture, particularly since the death of Stalin in 1953. 20/ The big increase in investment, however, came during 1953-55. In 1954, agricultural investment increased about 45 percent and in 1955 by more than 50 percent above the 1954 level. Since 1955, the annual increase in investment has averaged less than 10 percent. After 1957, state investment in agriculture did not increase again until 1960, when it rose slightly above the 1957 level and continued to increase in 1961 and 1962.

Collective farm investment showed steady and substantial increases between 1951 and 1959, when annual investment reached 3 billion rubles. It declined somewhat in 1960 and 1961. However, the area farmed by collectives also declined in this period, and the investment per acre farmed increased somewhat.

Increases in collective farm investment from 1951-59 can be largely attributed to two major factors. The first is increases in state procurement prices (purchase prices), which enhanced the income possibilities of collective farms. The second is that the Soviet Government, simultaneously with increasing the prices of agricultural procurements, also increased pressure on collective farms to invest.

The substantial increases in the absolute amount of capital investment in agriculture are impressive and undoubtedly contributed to the considerable increase in production in 1953-58. There are, however, a number of factors which are important to an appreciation of the significance of these changes.

Share of Agriculture in Total Investment

The increase in investment in agriculture has not come about from a reorientation of priorities within the Soviet economy, but from an increase in total investment in the economy. The share of total investment going to agriculture has remained nearly constant. The only substantial increase in the share of total investment going to agriculture took place in 1954-56 (table 26).

In the Soviet Union, where all investment funds are either allocated directly by the state or are influenced indirectly by its policies, the percentage share of agriculture in total investment is one measure of priority. In these terms, the priority of agriculture rose considerably only during the early years of Khrushchev's change in agricultural policy--during the expansion on the New Lands in 1954-56. But by 1957 a decline in the rate of increase was quite clear. Since 1959, the share of agriculture in total investment has not been substantially above the level of 1951-53.

Collective Farm Investment

Over the last two decades, the number of collective farms and the amount of land in these farms has declined. This is a function of amalgamating collective

20/ There is no adequate method for determining depreciation in Soviet agriculture. Therefore, these figures refer to gross investment.

Table 26.--Share of agriculture in total Soviet and state investment, 1946-61

Year	Soviet productive investment in agriculture as a percentage of total Soviet investment	State productive investment in agriculture as a percentage of total state investment
	Percent	Percent
1946-50 average	14.0	7
1951	15.8	9
1952	14.6	8
1953	13.7	7
1954	16.8	10
1955	20.5	12
1956	18.8	11
1957	17.7	11
1958	17.3	9
1959	16.4	7
1960	15.3	8
1961	16.1	9

farms into larger units and the conversion of collective farms to state farms. Below are changes in number of collective farms and sown area for selected years 1940 to 1961:

Year	Collective farms	Sown area on collective farms
	Number	Million acres
1940	235,500	290.89
1953	91,200	326.17
1958	67,700	324.37
1961	40,500	273.29

Because of these changes, the level of productive investment per collective farm or per unit of sown area has risen continuously and more rapidly than the total investment figures indicated (table 27).

Table 27.--Investments of collective farms, per farm and per acre, USSR, selected years 1940-61

Year	Per collective farm	Per acre of collective sown area
	Rubles	Rubles
1940	470	0.4
1953	11,283	3.2
1958	36,366	7.6
1959	57,116	9.5
1961	67,185	10.0

Collective farm expenditures on schools, libraries, hospitals, and other cultural facilities, the so-called unproductive investments, have changed roughly in the same pattern as productive investment.

The major increase in collective farm unproductive investment took place between 1953 and 1956. Since 1959, investment has fluctuated around 400 million rubles per year. The number of collective farm households declined from 19 million to 16.4 million during the decade 1951-61. Gross unproductive investment per household, therefore, rose sharply from around 4 rubles per household in 1951 to about 24 rubles per household in 1961. On several of the farms visited, we were shown rather imposing community centers with auditoriums which could be used for theatrical performances, motion pictures, and dancing. In such a community center on a collective near Kiev, we visited a library, which contained some translations of American authors. This probably is not the general pattern.

State Investment in Agriculture

In contrast to collective farms, both the number of state farms and the amount of sown area per state farm have increased significantly since 1940. Since 1953, the increase in sown area in state farms has grown rapidly due to converting collectives to state farms and establishing new state farms in the New Lands (table 28). As a result, annual additions to gross capital investment in state farms per acre have not been as great as in collective farms but these investments do not include subsidies for operating losses.

Table 28.--Productive investment and sown area in state farms, USSR, 1953-61

Year	Gross annual productive investment	Sown area	Investment per acre
	Million rubles	Million acres	Rubles
1953	198	37,448	5.4
1958	883	129,606	6.8
1959	1,132	133,162	8.5
1960	1,475	166,075	8.9
1961	---	198,318	---

State farms invested much more per acre annually than collectives in the years before 1953. But by 1960 the gross annual investment per acre was identical on both state and collective farms--8.9 rubles per acre. Thus, in the last decade, the relative positions of state and collective farms have changed markedly and the investment gap--on an annual gross basis per acre--has been eliminated, according to Soviet data.

A substantial part of the increased state investment in agriculture has been associated with development of the New Lands. According to recent Soviet data, $4.4 billion were invested in the New Lands by the state during 1954-60. 21/ Total investment probably was substantially higher since these estimates apparently do not include investments made by collective farms. The estimates do not include indirect costs for roads and communal facilities.

21/ Kapital'noe stroitel'stvo v SSSR, Moscow 1961, p. 151.

According to Soviet data, the "net" income to the state from sales of grain procurements from the New Lands from 1954-60 amounted to 7.6 billion rubles. It is not clear, however, to what extent labor and operative costs are deducted from these returns. If, instead, one were to compare the estimated average yield of wheat in the New Lands area, about 10 bushels per acre, during this period with a yield of 7 bushels per acre, assumed to be required to cover seed, wages, machinery operation and depreciation, and other costs, a total farm production return of about 3.5 billion rubles would be indicated for 1954-60. This calculation assumes the present collective procurement price for wheat reflects the farm value of the wheat. Net returns on resource investments in the New Lands also would need to be compared with returns that might have been possible from alternative uses of these resources before the desirability of these investments could be assessed.

The more important question now, however, relates to future utilization of resources in the New Lands. Development of farming methods to ease the effects of drought now seems of major importance. The Soviets hope that the diversified geographical location of grain acreage may mean that poor weather in one place might be offset by good weather in another. However, in establishing the New Lands, it was acknowledged that 1 year in 4 might be poor. These hopes have proved optimistic. In the New Lands region, the last 5 years have been poor relative to yields projected by Soviet officials. In 1963, the Soviet Union was compelled to purchase considerable wheat from abroad--a further indication that the problems of drought and poor harvests are severe.

Fertilizer and Machinery Inputs

It has been recognized for years, and is now a central point made by Khrushchev, that Soviet agriculture suffers from inadequate supplies of fertilizer. Just as capital investment in agriculture has increased greatly in the last decade, and especially since 1953, so have the quantities of fertilizer delivered to agriculture.

There was a fairly substantial increase in fertilizer production prior to 1953. The most significant increase, however, took place between 1953 and 1958. Since then, the rate of increase slowed considerably and, in terms of sown area, it increased less than 10 percent between 1959 and 1961. Fertilizer production rose sharply in 1962, however, and a comparable increase is claimed for 1963 (table 29).

Table 29.--Chemical fertilizer delivered to agriculture in the Soviet Union, selected years, 1940-62

Year	Gross weight		Plant nutrients	
	1,000 metric tons	1,000 short tons	1,000 short tons	Pounds per acre
1940	3,159	3,482	797	4.28
1953	6,570	7,242	1,699	8.76
1958	10,626	11,713	2,692	11.14
1959	11,114	12,251	2,821	11.63
1960	11,404	12,571	2,869	11.44
1961	12,073	13,308	2,965	11.72
1962	13,645	15,041	3,365	12.60

The large increase in sown acreage occurring during the 1954-58 period was in the dry regions where fertilizer is not used. So the per acre increase in fertilizer in regions where it can be used was greater than indicated by the figures in table 29. The distribution of fertilizer among various crops, however, is highly uneven.

While we did not observe any instance of misuse of fertilizer, there have been numerous reports in the Soviet press of wasteful practices. Frequently, fertilizer consigned to a collective or state farm has been dumped on a railroad siding, where it stays unprotected for a long time, or is not picked up by the farm at all. 22/ Shortage of transportation or inability to pay for consigned fertilizer were given as explanations.

The stock of machinery in Soviet agriculture has increased substantially in recent years. As with capital investment and fertilizer, the major changes have taken place since 1953 (table 30). During 1953-62, numbers of tractors, combines, and trucks have nearly doubled. But mechanization still has a long way to go in the USSR.

Table 30.--Selected machinery in agriculture, Soviet Union, at end of selected years 1940-62

Machinery	1940	1953	1958	1959	1960	1961	1962
	No.	No.	No.	No.	No.	No.	No.
All tractors:							
In physical units	531	744	1,001	1,054	1,122	1,212	1,280
In 15-hp. units	684	1,239	1,750	1,849	1,985	2,172	2,293
Grain combines:							
Total	182	318	502	494	497	498	553
Self-propelled	n.a.	109	180	200	233	235	n.a.
Trucks	228	424	700	729	778	796	840

The Soviets have often stressed the inadequacy of the existing stock of machinery and have provided estimates of what they consider necessary for performance of farm operations during optimum periods. These estimates indicate need for increases of 60 to over 100 percent in the number of principal farm machines. Even with such increases, mechanization would be at a substantially lower level than in the United States.

Trends in Capital and Other Agricultural Inputs

In the foregoing discussion, certain patterns emerge that are highly significant. It is quite clear that between 1953 and 1958 major increases in capital investment, machinery, and fertilizer inputs took place. At the same time, major increases in land and labor inputs also took place. Sown area increased from 388 million acres in 1953 to 483 million in 1958. Annual average employment on state and collective farms, which had been declining, rose from 29.4 million in 1953 to 31.5 million in 1956 and remained about 31 million until 1959.

22/ One of the best and most recent examples of this comes from the speech of Khrushchev in Volgograd on September 17, 1963, in which he cites examples of fertilizer being dumped at rail points, ". . . the winter snows fall and the children sled down these mountains. And this is not fabrication, but actual fact". (Sel'skaya Zhizn, Sept. 18, 1963, p. 1.)

Because of these increases in inputs and because of a number of other factors--especially increases in agricultural prices, incentives, and favorable weather--major increases in agricultural production took place between 1953 and 1958. Crop and livestock production and livestock numbers all increased substantially.

Much of the increase in capital input went to the New Lands, often to the detriment of established agricultural regions. The reverse was true of chemical fertilizer. After 1958, a general reduction in the rate of increase in inputs took place. The rate of increase in capital investment declined, and the share of total capital investment going to agriculture was returned to its former level. Fertilizer deliveries tapered off in 1958, after rising substantially from 1953. Annual deliveries of farm machinery fell off sharply after 1958, and in 1961 deliveries of truck and tractor-drawn plows were still below the 1958 level. The labor force, which increased after 1953, returned to that level in 1959 and has continued to decline since. The great increase in sown area that was evident between 1953 and 1958--essentially the marginal New Lands--tapered off sharply, and the sown area has increased only gradually since 1959.

Significantly, 1958 was the best crop year in recent Soviet history. Since 1958, the Soviet Union has not attained the 1958 level of production, and output of many crops remains below that level. The weather during 1959-63 was poor, but the stagnation in agricultural output and the arrested growth of inputs are obviously of great significance.

The general impression is that throughout the last decade there was a constant and substantial effort to increase agricultural production. In a number of respects, this is indicated only for 1953 to 1958. Compared with this period, there was in the period 1958-61 a slackening in the rate of increase in all agricultural inputs but no slackening in high output goals. It seems that in 1962 the former upward trend in Soviet active support of increased production was resumed.

It is instructive to compare specified increases in past trends with objectives established by Soviet officials and estimate the length of time to achieve them. Estimated requirements of the USSR for farm machinery called for the addition of 1.5 million tractors, 342,000 grain combines, and 860,000 trucks to the stock by January 1, 1962. It appears that a rate of depreciation of at least 10 percent is applicable to farm machinery in the Soviet Union.

At a rate of 200,000 new tractors a year delivered to agriculture--a rate which is about 20 percent higher than the average for 1958-62 and almost identical to the much increased deliveries in 1962--it would take between 15 and 20 years to achieve estimated requirements. To equal the stock of tractors in the United States would require an additional 10 years. The depreciation rate, as it can be judged from Soviet data, is much less stable for trucks and combines than for tractors. However, if 100,000 trucks a year were delivered to agriculture--about 30 percent more than the average between 1958-61--it would take 15 years to obtain the estimated required number of trucks. This seems roughly to be the case for combines as well. Again, this would be only a fraction of the stocks available to U. S. farmers.

Fertilizer production in the USSR increased substantially in 1962 and 1963. Deliveries of fertilizer to agriculture, in terms of plant nutrients, increased by 400,000 short tons in 1962. A similar increase apparently is occurring in 1963. If this annual increase is maintained, fertilizer deliveries to agriculture in the Soviet Union, in terms of plant nutrients, would reach the 1961 U. S. level of consumption in 10 years. The 1961 level of U. S. fertilization, in terms of plant nutrients per sown acre, would be reached in 25 years. 23/

23/ On September 17, 1963, Khrushchev claimed that total gross fertilizer production in 1963 would be 20 million metric tons. In 1964 and 1965, the plan calls for 29 million and 35 million tons, respectively. If these goals are met, this would be an increase greater than 400,000 tons of plant nutrients per year.

All of these "projections" assume rates of increase substantially higher than the recent rates. They indicate that even with a new, major effort it would still require a number of years, longer than a decade, for the Soviets to obtain the required inputs indicated by Khrushchev.

The foregoing does not consider the problems involved in adequately utilizing these inputs, even if they were provided. Major problems have been encountered in the Soviet Union in the utilization of fertilizer and machinery. It is impossible to do more than suggest that significant utilization problems exist. One thing should be stressed, however. In 1953-58, the great increases in production were accompanied by equally significant increases in inputs of land and a relatively small increase in labor inputs. Additional inputs of land and labor are not likely in the future. Therefore, the major burden for increased production falls upon increases in productivity. This places an even heavier burden on the application and wise utilization of additional capital inputs.

CONCLUSIONS

I

Levels of production and productivity of Soviet agriculture are much below levels in the United States and are not likely to become equal in the foreseeable future. Our family farm system is not only much more efficient than the Soviet system, it is much more dynamic. Lack of the incentives of individual ownership and initiative continues to hinder agricultural progress in the Soviet Union.

II

With average weather, Soviet agriculture today can meet essential food needs at their present dietary levels. The challenge of Soviet agriculture is to meet demands for improved diets which are emerging with industrialization and increases in income. Increased quantities of animal products, vegetables, and fruits are needed. There is a need for substantially increasing supplies of feed concentrates and roughages for livestock production. If the increased food demands are to be met, a fuller utilization of Soviet agricultural capacity is needed.

III

Because of climatic factors, great year-to-year variations can be expected in the production of grain supplies. Large imports of wheat, for example, were needed in 1963, but the Soviet Union was a large exporter of wheat in other recent years. Better dryland farming techniques could substantially reduce these year-to-year yield fluctuations, improve production efficiency, and reduce wind erosion. More adequate reserves and improved transportation and storage facilities also could reduce the impacts of the variations in the production of grain in the Soviet Union.

IV

Livestock products are high priced in the USSR. There are many problems in obtaining needed increases in production and marketing efficiency. The problems of management of large feed-livestock enterprises are formidable. Feed supply continues to be a serious bottleneck. Inadequacies in the systems of marketing, processing, and distributing livestock products also retard efforts to increase the output of these products as well as efforts to increase the efficiency of their production.

V

Agricultural production in the USSR has been characterized during the last decade by noticeable, but spotty, progress. Progress in the form of improved and higher yielding varieties of field crops should be recognized. But the increase in agricultural production was to a large extent the result of spectacular development of the New Lands. Grain production in recent years, however, has been below the level attained in 1958. The 100 million acres of the New Lands developed from 1954 to 1960 include most of the accessible area of noncrop arable land that can be made available without the expense of clearing, drainage, or irrigation. Recent restructuring of crops and increases in the sown acreages seem to have been pushed near, and in some areas perhaps beyond, the efficient limits.

VI

Soviet agricultural leaders recognize that their greatest opportunity for expanding output in the future involves increasing crop yields. Plans are underway to expand fertilizer production; and a rapid increase in its use can be expected. Although the plans for expanding fertilizer production appear overambitious, more fertilizer could be efficiently used to increase crop yields in the higher rainfall areas. Its use in the extensive subhumid zones, however, would be less effective. In general, the efficient use of yield-increasing technologies is often more difficult in regions with limited rainfall and short growing seasons than in the more favorable climatic areas. The USSR has relatively large areas of land subject to these climatic limitations. Rapid expansion of irrigation is now being seriously discussed.

VII

It should be possible to carry out the agricultural production job in the USSR with a much smaller number of workers. Soviet farm workers have not been drawn into nonfarm employment to the same extent as in the United States. The mechanization of agricultural production has been uneven. Many operations, such as livestock feeding and weed control, still require much hand labor. Soviet farm work programs also include a number of low productivity jobs such as the saving of nearly all grain straw and the milking of cows three times rather than twice a day.

VIII

Soviet agricultural planning is too preoccupied with increasing physical production on the collective and state farms to the exclusion of other very important factors. Rational economic planning is hampered by a complicated administrative structure and a price system which fails to reflect conditions of supply and demand. Too little attention is paid to the economic relationships involved in securing low cost, efficient production. Progress is also limited by inadequate attention to improving marketing and distribution systems to promote greater regional specialization in production, and by inadequate and inefficient methods of moving food from farm to consumer.

IX

Too little attention is paid in practice to variations in production patterns and methods needed to meet local conditions. In the recent program to restructure crop acreages, for example, there has apparently been a tendency to advocate reduction in fallow land and grass without due regard to the climatic and other production conditions in local areas. A similar tendency was noted in the promotion of growing

corn in all the areas visited. Farming methods also appear to be too standardized. Insufficient attention, for example, is given to alternative methods of dryland wheat farming; production practices are tied too rigidly to use of the moldboard plow, deep plowing, and almost continuous wheat.

Little variation was noted in feeding and handling practices in dairy production. A new system of hog production developed at one of the farms visited did indicate, however, that efficient livestock production units can be developed in the Soviet Union. One of the important needs is more individual initiative in experimentation with new methods combined with progressive methods of organizing farm production in specific local situations.

X

Substantial investment in agricultural research and in the education of farm people has provided a needed foundation of human capital, which may lead to further progress in Soviet agriculture. Direct association of technically trained people with agricultural production provides, at least potentially, a solid basis for dissemination of improved production practices.

XI

Further substantial agricultural progress in the Soviet Union would involve larger investments in agriculture and more efficient utilization of such investment inputs than in the past. It was indicated to us that investments in agriculture would be increased, particularly in chemical fertilizer, herbicides, and feed mixing industries. It was also indicated that some of the plants and equipment needed to produce these production supplies would be purchased from abroad. Recently, an expanded program of irrigation development was announced. The need for increasing investments in agricultural marketing, transportation, and distribution facilities has not been fully recognized.

XII

Soviet agriculture has potentialities for increasing both farm output and production efficiency if the authorities decide to do it and take appropriate action. The system of huge collective and state operated farms presents great management difficulties, and fails to provide production incentives for farm people that equal the incentives on farms in this country. But past experience indicates that increased output can be achieved if emphasis on agriculture is increased. Some of the recent changes in agricultural policy have emphasized increased production incentives and increased investments in agriculture. But, because the economic objectives of Soviet agricultural policy are so entwined with political and strategic considerations, it is extremely difficult to predict future developments in Soviet agriculture.

APPENDIX 1.--INFORMATION ON SELECTED FARMS VISITED BY THE 1963 SURVEY PARTY

1. Adamovsky State Farm

This farm, organized in 1954, is located about 200 miles east of Orenberg on the edge of the New Lands area. It has 110,000 hectares, with 60,000 cultivated. Rainfall in this area averages about 11 inches per year; about 45 percent falls in May, June, and July. The farm was organized into 5 divisions. The range looked good but was understocked with cattle. The stocking rate was about 1 animal unit to 40 acres. Private plots were allotted to workers, but livestock on these plots were limited to 1 cow, 1 sow, and 3 sheep. Following are data on farm organization and related items:

Total land	acres	275,000
Cultivated land	acres	150,000
Spring wheat	acres	120,000
Corn	acres	10,600
Barley and millet	acres	10,000
Peas	acres	2,500
Sugarbeets	acres	2,500
Cattle	number	2,500
Sheep	number	5,000
Hogs	number	1,000
Poultry	number	20,000
Full-time workers	number	810
Part-time workers	number	600
Acreage per full-time worker	acres	175
Tractor driver wage per month	rubles	110
Milkmaid wage per month	rubles	98

Wages to field hands and dairymaids were reported to average 95 to 100 rubles per month.

The system followed on wheat involved:

1. Plowing during August.
2. Cultipacking in fall.
3. Harrowing in spring.
4. Planting about May 1.
5. Harvesting in July, using windrow method and collecting straw.

Plowing is deep, 11 to 12 inches and 9 to 10 inches in alternate years. Planting depth depends on moisture, ranging from 1.5 to 3.6 inches. A deep furrow drill is not used, and stands were not very even. About 2.? to 2.4 bushels of wheat per acre are planted, with an estimated germination of about 70 percent. Our seeding rate, using deep furrow drills, is less than 1 bushel per acre in comparable areas.

Summer fallowing is not practiced. The reason given was that it increases the yield per planted acre by only about 25 percent and that similar increases can be obtained by alternating with peas. Differences in time of rainfall may explain differences between results on this farm and in a comparable area of the United States.

Estimated wheat yield for 1963 on the field visited was 18 bushels per acre. Yield on the farm would probably average 15 bushels. The soil is deep, rich chernozem. The subsoil is about 28 inches below the surface.

Our recommendations for improvement would be as follows:

1. Investigate whether deep plowing is beneficial and worth the cost.
2. Investigate use of stubble mulch farming to reduce wind erosion, also 1-waying and other methods of land preparation.
3. Use a deep-furrow drill to improve stands and yields.
4. Reduce cultivation of soil; use herbicides for weed control.
5. Enlarge cattle and sheep production on the rangeland.
6. Encourage moisture accumulation, either through fallowing or through rotation with peas.
7. Improve labor utilization.

2. Engels Collective Farm

This farm, located near Samarkand in Uzbek SSR, is in an irrigated cotton area. The crop, livestock, and labor organization of the farm were as follows:

Households	number	417
Capable workers	number	756
Total land	acres	5,440
Cultivated land	acres	4,000
Cotton	acres	2,750
Corn	acres	1,025
Alfalfa	acres	375
Orchard and grapes	acres	100
Cattle	number	1,300
Dairy cows	number	400
Hogs	number	1,000
Chickens	number	2,000
Horses	number	100

The farm was divided into 9 brigades or divisions. Cotton yield was reported at 29 centners in 1961 and 31 centners in 1962, or about 900 pounds of lint per acre.

Income and its utilization were reported approximately as follows:

	Thousand rubles
Gross income	1,440
Operating costs	288
Capital investment	288
Income tax and insurance	139
Welfare fund	43
Distributed to workers	744

Since prices were increased by 20 percent this year, a larger income is expected for 1963.

Average pay in 1963 is 3.5 rubles per workday. There are about 280 to 300 workdays per worker. Pay consists of both cash and kind. It includes a premium of 75 percent of the price received for the product for overfulfilling quotas. About 30 percent of pay is from premiums.

Workers are divided into 6 categories. Pay ranges from 45 to 150 rubles per month, according to category. It also varies with the quantity produced.

There are 5.2 acres of cultivated land per worker. However, this land is irrigated and intensively planted; consequently, labor is judged to be used reasonably efficiently

by Russian standards. Apparently, however, the cotton is picked by hand, and there is no chemical weed control.

It is somewhat doubtful whether mechanical picking would pay, in view of the large labor supply. The main production problem, aside from labor efficiency, appears to be the presence of substantial amounts of alkali soil, which must be treated to produce adequate yields of cotton.

3. Kuban Collective Farm

This farm is located in the Krasnodar area, commonly referred to as the "Corn Belt" of the USSR. Rainfall averages about 24 inches per year. The farm was organized as follows:

Households	number	1,800
Available workers	number	2,600
Total land	acres	31,875
Total cultivated land	acres	30,750
Cultivated land per worker	acres	12
Wheat	acres	10,500
Corn for grain	acres	3,750
Sugarbeets	acres	4,000
Sunflowers	acres	2,170
Hens	number	20,000
Chicks	number	100,000
Cattle	number	7,300
Hogs	number	10,000
Cows	number	2,250
Sheep	number	4,500
Gross cash income	rubles	3,616,000

The remaining 10,330 acres of cultivated land on this farm were used largely for barley, corn for silage, peas, grasses, vegetables, and fruit. Corn for silage is planted as a catch crop following small grain.

About 41 percent of the gross income goes for wages, 25 percent for investment, 15 percent for production costs, 13 percent for taxes, and the rest for welfare and culture.

Reported yields per acre on this farm are very good, running about 50 bushels for wheat, 75 bushels for corn, and 18 tons for sugarbeets. It appeared doubtful, however, whether the 1963 yields of wheat and corn for grain would actually be this high. The yield of silage on the farm is estimated at 24 metric tons per acre. Cows, as in other areas, were dual purpose and of only average quality. The reported production per cow is 6,000 pounds of milk per year.

The farm had 98 tractors and 77 combines, including 18 cornpickers and 13 forage harvesters. There were 46 trucks.

Average wage per worker was about 580 rubles per year, but only 1,700 of the 2,600 workers available were reported as full-time workers. Monthly wages ranged from 70 to 80 rubles for field workers to 110 to 120 rubles for machinery workers and tractor drivers. A total of 22 young people were receiving technical training. They also reported a "rest home" on the seashore. Each worker gets 2 to 4 weeks vacation.

Grain prices tended to be low and livestock prices high. In terms of dollars, wheat prices ran about $1.90 per bushel, and corn $1.40 per bushel, with an additional premium of $4.20 per bushel for hybrid seed corn. Most of the corn for grain was grown from

hybrid seed. Prices of meat-type hogs and beef ranged from 40 to 43 cents per pound. Milk was about $6.00 per 100 pounds, and eggs 90 cents per dozen.

The substantial overhead involved in Soviet large-scale farming is illustrated on this farm, which employs 1 bookkeeper and 19 accountants. The complete cost accounts used in the USSR are very time-consuming.

4. Kievskie State Farm

The Kievskie State Farm near Kiev is a specialized hog farm, selling about 30,000 head of hogs a year. About three-fourths of the hogs are fat-type hogs, and about one-fourth meat-type hogs. Prices received for hogs were 110 rubles per centner for fat-type hogs and 92 rubles per centner for meat-type hogs. A dairy enterprise of about 200 cows is also operated.

The farm has about 5,000 acres of land, of which about 4,400 acres are arable. The major crops are corn, potatoes, sugarbeets, alfalfa and rye for green fodder, squash, beans, and peas.

The team inspected the "yastremshchina" hog fattening division, where the highest level of mechanization has been achieved. At this division, 4,300 hogs were reported. Eleven people were employed in this division. Five were pigtenders, 2 were feed-shop workers, 1 operated the electric feed car, 1 handled the manure, and 2 were foreman-veterinary aides.

The hogs arriving for fattening average about 90 pounds. The fattening period is from 80 to 120 days. The average daily gain is 1.3 pounds per day. The farm reported a pound of gain from 6 feed units, a feed unit being approximately equivalent to a kilogram of oats.

The preparation of feed for the hogs is mechanized. Fodder, root crops, and grain are mechanically prepared, weighed, and fed into a feed digester and mixer, where they are mixed and cooked. The mixed feed includes from 10 to 15 percent yeast fodders to increase the feed value and improve the taste. Biomycin is also added to the feed to increase disease resistance of the hogs.

An electric rail car is used to distribute the feed. The car is filled by being placed under the feed distributor and opening the outlet. Feed flows into the car by gravity. The car is then driven to the barn. Pressure on the outlet levers allows the porridge-like feed to flow into the feed grooves on each side of the car and into the feed troughs in the pig stalls located along both sides of the passage through the barn.

The feeding stalls on each side of the passage have brick floors and outlet channels. Liquid wastes go from the runoff channels into a sewage system. The feed stall is connected to an exercise pen on the outside of the building. Most of the manure is collected in the exercise pens. The crosswire partitions can be moved to wall off the barn and the manure removed with a tractor-operated scraper. The manure is scraped onto a platform at the end of the pens and then loaded onto a dump truck placed below the level of the hog pens.

Considerable emphasis is being placed on mechanizing the production of the feed crops and increasing yields. At present, only part of the feed is produced on the farm.

Wages are paid on a piecework basis. Average wages per livestock production worker were reported at 98 rubles per month of 25 working days. Wages of machinery workers were reported at 105 rubles per month.

Costs of producing pork were reported at 65 kopeks per kilogram. This is equivalent to about 33 cents per pound at the official rate of exchange.

Appendix 2.--STATISTICAL DATA

Table 31.--Reported prices received by selected collective and state farms, USSR, 1963

Commodity	Area of production and kind of farm	USSR prices	
		Unit	Rubles
Wheat	Krasnodar, collective farm	Metric ton	6.3
Corn	Krasnodar, collective farm	Metric ton	5.8
Cotton	Tashkent, collective farm	Metric ton, seed cotton	400
Milk	Krasnodar, collective farm	Liter	.12
Milk	Minsk, collective farm	Liter	.16
Hogs, liveweight:			
Meat-type	Krasnodar, collective farm	Kilogram	.80
Meat-type	Ukraine, state farm	Kilogram	.92
Fat-type	Ukraine, state farm	Kilogram	1.10
Cattle	Krasnodar, collective farm	Kilogram	.86
Eggs	Krasnodar, collective farm	10 eggs	.67

Table 32.--Application rates for fertilizer in the USSR, 1957

Type of crop	Total	Nitrogenous
	Kilograms per hectare	
Cotton	1,020	527
Sugarbeets	850	208
Flax (fiber)	440	101
Potatoes	119	18
Corn	37	n.a.
Grain	12	n.a.

Table 33.--Allocation of productive capital investment in agriculture in the Soviet Union, 1928-60

Period or year 1/	Total productive investment in agriculture 2/	Distribution of productive capital investment in agriculture					
		Construction and equipment investment				Establishing orchards and vineyards 6/	Tractors, machinery, transport equipment, and other farm equipment 7/
		Total 3/	Storage facilities 4/	Irrigation 5/	Electrification		
	Millions of Rubles						
1928-32	1,196	901	39	113	1	17	278
1933-37	2,120	1,492	84	241	5	45	583
1938-41	2,008	1,564	108	321	4	97	347
1941-45	1,724	1,420	64	168	22	100	204
1946-50	5,385	3,541	289	585	199	289	1,555
1951-55	12,270	7,083	485	1,192	281	521	4,666
1956	4,024	2,142	227	259	115	91	1,791
1957	4,023	2,182	192	294	169	113	1,908
1958	4,741	2,405	197	357	183	133	2,203
1959	5,071	2,963	215	393	120	143	1,959
1960	5,192	3,305	232	453	175	159	1,728
1956-60	23,051	13,003	1,063	1,756	762	639	9,589

1/ 1928-32 includes the last quarter of 1928 through 1932; 1938-41 includes 1938 through the first half of 1941; 1941-45 includes the last half of 1941 through 1945.

2/ Includes all Government and collective farm productive capital investment.

3/ Includes storage facilities, irrigation and electrification. The unaccounted-for portion in this total is undoubtedly made up of investment in livestock buildings and other on-farm structures.

4/ Grain warehouses and elevators.

5/ Probably includes such facilities as pumping and local watering facilities.

6/ Also includes "other perennial plantings."

7/ Purchase of tractors, transport equipment, agricultural machinery and equipment and inventories not included in the budget of the construction projects.

Kapital'noe stroitel'stvo v SSSR, Moscow, 1961, pp. 158-59.

Table 34.--Unproductive investment by collective farms in the USSR, 1951-61

Year	Million rubles	Year	Million rubles
1951	74	1957	323
1952	101	1958	355
1953	139	1959	404
1954	199	1960	405
1955	288	1961	380
1956	339		

Table 35.--Number of state farms and sown area in state farms and all state agricultural enterprises, USSR, specified years

Year	State farms	Total sown area	
		State farms	All state agricultural enterprises
	Number	1,000 acres	
1940	4,159	28,562	32,765
1953	4,857	37,448	45,061
1958	6,002	129,606	140,578
1961	8,281	198,322	215,669

END

DATE

FILMED

7-24-79

NTIS