



Title: GRASS FIELD ROTATION IN GRAIN SOVKHOZES (USSR)

Source: Sovetskaya Agronomiya, No 9, 1949, Russian monthly periodical

UNCLASSIFIED

CONFIDENTIAL

GRASS FIELD ROTATION IN GRAIN SOVKHOZES

M. M. Brozgul'

Grain sovkhozes are successfully utilizing the grass field system of soil cultivation. Field and feed crop rotation has been introduced in sovkhozes to diversify their development.

Sovkhozes are also planting tree shelter belts on a large scale. Shelter belt planting was carried on before the war over large areas, especially in grain sovkhozes. In the Ukrainian SSR, 70 percent of the planting is done in grain sovkhozes and in Krasnodar Kray, 80 percent. In Rostov Oblast, 70 percent of the planting is in sovkhozes.

During the postwar period, shelter belt planting was revived. In 1948, tree planting in Ukrainian SSR sovkhozes was 14 percent above that of previous years, in Stavropol' Kray 20 percent, and in Rostov Oblast, 17 percent. Many sovkhozes have forest zones bordering all crop rotation fields. In 1947, the sovkhoz Kuban had 327 hectares in its forest zone, the Primalkinskiy Grain Sovkhoz 208 hectares, and the Tselinskiy Grain Sovkhoz 158 hectares. The Gigant Grain Sovkhoz had 367 hectares in its forest zone in 1947 and 600 hectares, in 1949.

Experience of the sovkhoz Gigant, as of other sovkhozes, shows the favorable influence of forest zones upon grain harvests.

At present, sovkhozes are planting trees for forest zones on a large scale and are undertaking field and feed crop rotation systems according to a decree of the Soviet of Ministers USSR and the TsK VKP(b) entitled: The plan for field shelter belts, introduction of grass field rotation systems, and the construction of ponds and reservoirs in order to guarantee high and stable harvests in steppe and forest steppe areas of European USSR. Rotation systems already in operation are proceeding according to plan and with due consideration to the economic and natural conditions of each sovkhoz.

CONFIDENTIAL

CONFIDENTIAL

Crop rotation in grain sovkhozes is worked out so that as large an area as possible is planted with the most essential grain crops. Little variety is to be found in the number of crop rotation fields; 9 and 10 field systems provide the basic patterns. At the same time, the great differences in soil-climatic conditions of areas where grain sovkhozes are located influence grass field rotation and crop distribution.

Most field grass rotation systems on grain sovkhozes have two fields of perennial grasses and two fields of plowed fallow. Two such sections make it possible to distribute advantageously 5-6 fields of grain crops, of which 4-5 fields are winter and summer wheat. Perennial grasses restore soil fertility while the two plowed fields make possible systematic removal of weeds from fields. Crop rotation in grain sovkhozes is represented by the following plans, applying to various regions of the Soviet Union.

In the Northern Caucasus region, Crimean Oblast, Ukrainian SSR and Moldavian SSR, the following grass field rotation systems have been adopted:

Crop Rotation No 1: (1) black fallow (2) winter wheat (3) summer wheat and summer grains with additional mixtures of perennial grasses (4-5) perennial grasses (6) summer wheat (7) winter wheat (8) black fallow (9) winter wheat (10) 75 percent winter wheat and 25 percent sunflowers.

Crop Rotation No 2: (1) black fallow (2) winter wheat (3) barley with additional sowings of mixed perennial grasses (4-5) perennial grasses (6) summer wheat (7) winter wheat (8) black fallow (9) winter wheat (10) summer wheat, 10-25 percent sunflower seed.

Crop Rotation No 3: (1) black fallow (2) winter wheat (3) winter wheat with additional sowings of mixed perennial grasses (4-5) perennial grasses (6) summer wheat (7) winter wheat (8) black fallow (9) winter wheat (10) 75 percent winter wheat, 25 percent sunflower.

CONFIDENTIAL

CONFIDENTIAL

Crop Rotation No 4: (1) black fallow (2) winter wheat with additional sowings of perennial grasses (3-4) perennial grasses (5-6) summer wheat (7) black fallow (8) winter wheat (9) summer wheat, summer grains, and sunflowers.

Sovkhozos in Krasnodar Kray and southern Rostov Oblast use the first type of crop rotation.

Winter wheat comprises 40 percent of this rotation system. Sometimes winter grains replace summer grains in the third field, and summer wheat is sown after the top layer of soil in the seventh field is turned over. This combination is less satisfactory, since perennial grasses in this case are sown underneath the winter wheat and this is unfavorable for the grasses. At present, additional sowing of grasses for fall planting is done only in exceptional cases. If sunflowers are added to crop rotation, they are planted in the tenth field where they occupy from one fourth to one half the area.

In central Rostov Oblast, there are more fields of summer wheat and the leading type of crop rotation is the No. 2 system where winter wheat is reduced to 30 percent and summer wheat is increased to 20 percent.

Most of the winter wheat (47-50) is sown according to the third system of rotation. In the driest Stavropol Kray regions and in northern Rostov Oblast, summer wheat is sown on the top layer and on the turned over soil.

In this case, the order of rotation is as follows: (1) fallow (2) winter wheat (3) barley and grasses (4-5) grasses (6) summer wheat (7) summer wheat (8) fallow (9) winter wheat (10) summer wheat. Winter wheat comprises 20 percent of this sowing.

In grain sovkhoses of Kharkhov, Stalino, and Dnepropetrovsk oblasts, crop composition is as follows: (1) fallow (2) winter wheat (3) winter wheat with additional sowing of mixed perennial grasses (4-5) grasses (6) summer wheat (7) winter wheat (8) fallow (9) winter wheat (10) grain

CONFIDENTIAL

CONFIDENTIAL

fodder 75 percent and sunflower 25 percent. This rotation system provides for stubble sowing of perennial grasses in years when fall sowing after a dry spring is not possible. In some grain sovkhozes in Stalino Oblast, Ukrainian SSR, where nurse crop sowings are unreliable, grasses are sown without nurse crops and the rotation system has the following composition: (1) fallow (2) winter wheat (3) sowings of perennial grasses without nurse crops (4-5) grasses (6) summer wheat (7) winter wheat (8) fallow (9) winter wheat (10) 75 percent winter wheat and 25 percent sunflower.

In grain sovkhozes located in dry regions, because of the need to maintain two fields raising perennial grasses and in order to place fields sown in close to fallow fields, 10-field crop rotation is replaced by 9-field rotation: (1) black fallow (2) winter wheat with additional sowings of perennial grasses (3-4) perennial grasses (5) summer wheat (6) winter wheat (7) fallow (8) winter wheat (9) winter wheat and feed crops. In this system, fallow and perennial grasses occupy up to 22 percent of the area, as against 20 percent in the 10-field systems. Grass is sown in fallow fields and develops well during the first period of growth. In arid regions where winter wheat can be sown only in fallow fields, crop rotation can only be set up as follows: (1) fallow (2) winter wheat with additional sowings of perennial grasses (3-4) perennial grasses (5-6) summer wheat (7) fallow (8) winter rye (9) oats and barley. This system of rotation is found in Stalingrad Oblast. Here one field of fallow is often planted with winter rye instead of winter wheat.

In the Volga region of Saratov Oblast, where the dark chestnut soils grow grass mixtures of which the basic component is agropyron and where the process of growing perennial grasses and forming a rich soil layer is slow, crop rotation includes three fields of perennial grasses. It has the following crop distribution: Crop rotation No. 6: (1) black fallow (2) winter and summer wheat with additional sowing

CONFIDENTIAL

CONFIDENTIAL

of perennial grasses (3-5) perennial grasses (6) summer wheat (7) summer wheat (8) black fallow (9) winter rye (10) barley and oats.

Grain sovkhozes of Siberia and Northern Kazakhstan having the same number of fields plant only one fallow field of rye, the only winter grain sown, and summer wheat after the second fallow, to which perennial grasses are added. At present, winter wheat is distributed among the stubble of summer wheat after the second fallow according to the Lysenko method, and there are two fallow fields of winter wheat in the rotation system.

Siberian sovkhozes have the following grass field rotation systems: Crop rotation No 7: (1) clean fallow (2) winter rye (3) summer wheat with additional sowing of perennial grasses (4-5) perennial grasses (6) summer wheat (7) summer wheat (8) clean fallow (9) summer wheat (10) oats and barley.

Crop rotation with winter wheat sowing was introduced in 1946 in the Sosnovsk Grain Sovkhozes in Omsk Oblast. By 1949 two acres of winter wheat were sowed in stubble in Omsk Oblast. Here, as in sovkhozes of the southern rayons, 10-field rotation has shown its flexibility; crop distribution can be changed without disturbing the basic aspects of the system. In the Elita and Lesnaya seed raising (grass) sovkhozes, rotation with three fields of perennial grasses was set as follows: Elita Sovkhoz: (1) clean fallow (2) summer wheat with additional sowing of perennial grasses (3-5) perennial grasses (6-7) summer wheat (8) clean fallow (9) winter rye (10) rye and barley.

Elita and Lesnaya sovkhozes: (1) clean fallow (2) winter rye (3) summer wheat with additional sowing of perennial grass (4-6) perennial grasses (7) summer wheat (8) barley and oats.

The 10-field rotation in Elita Sovkhoz was begun on a 3,800 hectare area and the 8-field rotation on a 4,800 hectare area. In Alabatinskiy and Cherlakskiy rayons, located in the extreme south of Omsk Oblast, 10-field rotation with additional sowing of grass with wheat is being

CONFIDENTIAL

CONFIDENTIAL

conducted on clean fallow: (1) clean fallow (2) summer wheat with additional sowing of grasses (3-4) perennial grasses (5-6) summer wheat (7) clean fallow (8) summer wheat (9) oats and barley.

On the whole, all variations of crop rotation in grain sovkhozes are being exhaustively studied according to plans. Seven- and eight-field seed raising rotation systems are designated to grow high quality seeds for various rayons. Sovkhozes which produce marketable grain and have crop rotations systems with a varying number of fields are few in number.

The basic peculiarity of the 10-field grass rotation system is the large number of fields raising perennial grasses and lying fallow. Fields to which soil fertility has been restored and which are without weeds have a 4:6 ratio; that is, there is one field raising grasses or lying fallow to every 1½ fields sown. This is peculiar only to grain sovkhozes and shows the possibility of obtaining high grain harvests from them. At the same time, grain crops occupy as much as 60 percent of the rotation area. These leading grain crops, especially wheat, are planted in the best soil -- in a turned over layer of perennial grasses, or in black fallow. The layer of perennial grasses, as well as fallow, is used for sowing only two crops. This rotation guarantees removal of weeds from fields in a short period of time and also excludes the possibility of choking up fields with weeds provided the right system of soil cultivation is used.

Perennial grass fields are the most important factor in the rotation system. For grass successfully to restore soil fertility, the grass must be provided with best possible conditions for its growth. Agronomists have been working steadily on this problem in its relation to crop rotation in sovkhozes for more than 10 years. Experience has shown that winter grains are the best cover crop; as a result, nearly all rotation systems in the southern regions were based on additional sowings of perennial grasses under a cover of winter wheat.

CONFIDENTIAL

CONFIDENTIAL

In this period the order of crop rotation was as follows:

In the 10-field system: (1) clean fallow (2) winter wheat (3) winter wheat with additional sowing of perennial grasses, etc.;

In the 9-field system: (1) clean fallow (2) winter wheat with additional sowing of perennial grasses, etc.

At present, when high winter crop harvests are choking out cover grasses, most active sovkhos workers agree that grains, especially barley and summer wheat, serve as the best cover crops. The present plan of rotation with additional sowing of perennial grasses under summer crops has ^{been} proved successful and worthwhile by the experiences of hundreds of sovkhoses.

Additional sowing of perennial grasses under winter wheat is possible only in the extreme south of Ukrainian SSR and in the Crimea where the second winter harvest is lower. Another peculiarity of rotation is the distribution of winter wheat.

In the field grass rotation of southern sovkhoses, it is important to harvest and re-sow winter wheat during the same year. Between winter wheat harvesting and the second sowing of winter wheat, a 1½ to 2 month period elapses during which the soil must be cultivated. Usually the system of cultivating these fields depends on the first plowing and cultivation prior to sowing. In addition to this, since fallow fields are sown ⁿ first, the second sowing of winter grain is often delayed. This frequently results in harvests of the second winter wheat crop falling to 60 percent of the winter wheat harvest obtained from fallow.

Experience of grain sovkhoses shows that the second harvest need not be smaller than the first. The size of the harvest depends upon the period of cultivation and, especially, upon the time of sowing. In an experimental grain sovkhos in Rostov Oblast, harvests were as follows, depending upon the time needed for completing the work:

CONFIDENTIAL

CONFIDENTIAL

Table I

Previous agricultural activity	Area in Hectares	Period		Winter wheat yield in centners per hectare
		Plowing	Sowing	
2nd sowing	394	20/VIII-14/IX	19-22/IX	13.9
"	191	1-10/IX	11-16/IX	12.7
"	98	15-30/VIII	12-16/IX	22.8
"	277	3-8/VIII	5-8/IX	22.1
"	43	28/VII	9/IX	26.4
Fallow	311	18-26/IX	29/VIII-2/IX	26.4
"	398	18-28/V	27-31/VIII (cross sowing)	27.4

This evidence shows that plowing subsequent to harvesting and an early period for re-sowing winter wheat can increase the second harvest to the average level of harvests received from clean fallow.

The experimental grain sovkhov is located in a region where there are several large-scale grain sovkhoves including the Gigant, Tselinskiy, Sal'skiy, Egorlykskiy, and other sovkhoves, so that the special features of production as well as the results of utilizing various modern agricultural procedures in this sovkhov will be characteristic for the entire group of sovkhoves.

Harvesting and sowing of winter wheat in the same year is quite different in Krasnodar Kray.

In the Kuban Sovkhov, the second winter wheat harvest was almost as large as the harvest from fallow. With the utilization of mineral fertilizers the yield was increased and in some cases exceeded the winter wheat yield obtained from fallow.

The largest winter wheat harvest in 1948 was the second one: a 32 hectare area enriched with 1.7 centners of superphosphate and 0.8 centners per hectare of ammonium saltpeter produced 28.8 centners per hectare of grain; and a 32 hectare area enriched with two centners per

CONFIDENTIAL

CONFIDENTIAL

hectare of ash produced 27.9 centners per hectare of grain.

Osipov, the oldest agronomist of the Gigant Sovkhoz, attempted to increase the second harvest so that it produced as much as the first, and ultimately to eliminate cultivation prior to the second sowing so that sowing in these fields would be done immediately. In 1947, the second winter wheat crop was planted 4-5 days earlier than the wheat sowed in fallow. Because of the earlier sowing, the shoots developed well and were growing leaves when winter set in. The slight delay in sowing winter wheat in fallow ground did not cause its growth to be delayed, and the wheat was in a good condition when winter began. This measure proved to be very effective. In 1947 the second harvest of winter wheat was 50-60 percent of the winter wheat harvest from fallow, but in 1948 it was increased to 80 percent. In 1948, the average fallow harvest of winter wheat per sovkhov was 23.6 centners per hectare and the second harvest, 18.8 centners per hectare.

A further increase in the size of the second wheat harvest can be obtained by using mineral fertilizers as has been shown by the Kuban' Sovkhoz.

The organizational features of successful crop rotation call for a variety of crops and fallow fields which provide conditions for the uniform utilization of tractive force and manpower in separate agricultural periods.

From this point of view, the 9 and 10 field rotation systems of grain sovkhovs are extremely well suited to the natural and economic features of the area.

An analysis of the crop rotation plan worked out in grain sovkhovs of Rostov Oblast shows that when different quantities of winter wheat are sown the uniform distribution of tractor work in the best periods is organized by the 10-field rotation system with 37.5 percent winter wheat and in the drier regions, a 9-field system of rotation with 30 percent winter wheat (plan No 2).

CONFIDENTIAL

CONFIDENTIAL

Crop rotation systems growing larger or smaller quantities of winter wheat and, consequently, those overloaded with summer crops, greatly add to the need of tractors during both spring work and harvesting. Thus, if a 10-field crop rotation system with 37.5 percent winter wheat needs ten S-80 tractors and six U-2 tractors to cultivate its 10,000 hectare area, a 10-field system with 20 percent winter wheat, during a harvesting period for summer grains, needs 14 tractors.

Only two sovkhoses in Rostov Oblast, Imeni Stalin and Morozovskiy, have crop rotation with 20 percent winter wheat.

An analysis of grass field rotation systems of grain sovkhoses in Siberia shows that crop rotation with two fields of perennial grasses and two fields of fallow makes possible more uniform utilization of tractors in season. Six thousand hectares of rotation area with six fields of grain crops, of which five fields are summer wheat, could be cultivated by nine S-80 tractors; and the 9-field by eight tractors. The periods of the most intense work are harvesting, winter sowing, and plowing of fallow. In Siberia, these work periods follow consecutively; during favorable weather conditions the tractor park works two months steadily. Unfavorable weather conditions lead to interruptions in work and shorten the period when different kinds of work is done. The introduction of self-propelled combines, operating primarily in sovkhoses at present, considerably lengthens the harvesting period and guarantees an early beginning for harvesting fallow. An analysis of crop rotation in grain sovkhoses of the southern and eastern regions of the Soviet Union shows that the introduction of these rotation systems answers the special productive needs of the sovkhoses and completes the tasks which must be done by grain sovkhoses.

Field grass rotation is not an independent part of grain sovkhos field organization, but is only one part of the coordinated field and feed grass rotation system.

Grass rotation areas in grain sovkhoses of different regions are organized as is shown in Table 2.

CONFIDENTIAL

CONFIDENTIALTable 2

<u>Grain sovkhozes</u> <u>(Oblasts and Krays)</u>	<u>Percent of sowing area in crop rotation</u>		
	<u>In fields</u>	<u>Garden plots</u>	<u>Pastures</u>
Krasnodar Kray	90.4	3.6	6.0
Rostov Oblast	89.1	1.3	9.6
Omsk Oblast	86.4	1.3	12.3
Altay Kray	84.0	1.4	10.6
Khabarovsk Kray	84.0	4.8	11.2

The introduction of feed crop rotation makes possible a broader development of livestock raising and scientific utilization of hay, chaff, and other secondary crops.

Good organization of the crop rotation system provides a stable base for the development of grain sovkhozes as multi-branched economic units. Livestock raising per 100 hectares of agricultural area in these grain sovkhozes has the following composition:

Table 3

<u>Grain sovkhozes</u> <u>(Oblasts and Krays)</u>	<u>Head per 100 hectares of agricultural land:</u>				
	<u>Cattle</u>	<u>Hogs</u>	<u>Sheep</u>	<u>Poultry</u>	<u>Horses</u>
Krasnodar Kray	7.7	3.4	5	17.5	1.4
Rostov Oblast	5.1	1.3	21	15	0.9
Omsk Oblast	4.3	0.9	16.5	12.3	1.1
Altay Kray	5.1	1.8	21	11.0	1.2
Khabarovsk Kray	7.0	2.1	5	14.0	0.9

Agricultural land determines the organization of livestock industries to a considerable extent. In regions having large natural pastures, sheep raising, which is important in Rostov and Omsk oblasts and Altay Kray, has developed considerably. Regions restricted by the size of natural pastures have a large meat and dairy industry (Krasnodar and Khabarovsk krays). The size of hog and poultry industries in grain

CONFIDENTIAL

CONFIDENTIAL

sovkhozes can be considerably increased.

As a general rule, each grain sovkhoz, on the basis of grass field rotation systems and scientific utilization of natural feed crop acreage, has all the basic livestock raising industries.

In Krasnodar Kray, the meat and dairy industry, hog industry, and poultry industry are being developed in all sovkhozes and have grown considerably since 1950. The number of grain sovkhozes developing the sheep industry is being reduced due to the fact that these sovkhozes have no natural pastures and it is more expedient to develop the dairy industry in areas where chernozem is sown with grass. In Kurgan Oblast, 23 percent of the grain sovkhozes have no sheep industry. The remaining livestock raising industries are found in all sovkhozes, and the sizes of the hog and sheep industries are increased 58 percent, cattle 2.1 times and the poultry industry 10.9 times. Omsk Oblast has all four industries in all sovkhozes. Apiculture is being increased 7-8 times. In addition to a quantitative increase of livestock, crop rotation has also considerably improved the qualitative indices of livestock products.

The grass field rotation system is accompanied by a scientific system of soil cultivation. Sovkhozes which have mastered rotation also have considerably areas of black fallow and all plowing is done by a plow with a colter. In the leading sovkhozes, Gigant and Tselinskiy, the experimental sovkhoz (Rostov Oblast), Kuban' (Krasnodar Kray), and Vorob'yevskiy (Voronezh Oblast), the black and clean fallow and also fields sowed for the second time are cultivated by plows with colters.

Scientific plowing is becoming a necessary part of soil cultivation in both fallow and plowed areas as a means of increasing the size of the harvest. Care of fallow includes grubbing and cultivating the soil. The method of cultivation used depends upon the special features of the region and weather conditions. Areas of considerable moisture in Tselinskiy Sovkhoz are used for grubbing fallow.

CONFIDENTIAL

CONFIDENTIAL

Grubbing of stubble is being done on a large scale. Cultivation and harrowing of soil are part of the preparatory work preceding the sowing of summer crops.

As a result of using the scientific system of soil cultivation, sovkhozes have begun to receive higher and more stable harvests (Table 4).

Table 4

Yield in Centners per Hectare	Gigant Sovkhoz		Rostov Experimental Sovkhoz		Kuban' Sovkhoz	
	hectares	percent	hectares	percent	hectares	percent
Below 10	15	0.1	42	0.8	--	--
From 11 to 15	20	0.2	585	10.8	--	--
" 16 " 20	3,094	22.9	469	8.7	589	14.6
" 20.1 " 22	1,404	10.4	1,099	20.3	850	21.1
" 22.1 " 24	7,197	53.2	1,760	32.6	1,298	32.2
" 24.1 " 26	985	7.3	693	12.8	720	17.9
" 26.1 " 28	529	3.9	752	14	504	12.5
" 28.1 and over	272	2.0	--	--	72	1.7
Total	13,514	100.0	5,400	100.0	4,033	100.0

As is evident from the above data, in 1948 large areas produced a harvest of 22-24 centners per hectare. In the Gigant Sovkhoz, more than 50 percent of the area produced 22-24 centners per hectare. In the Kuban' Sovkhoz, no sections produce less than 15 centners per hectare. Thus, harvests of 150 puds or more are usual and are characterized by crops grown in sovkhozes using the crop rotation system. At present, the size of the crop rotation area sown with perennial grasses is near the norm (Table 5).

CONFIDENTIAL

CONFIDENTIALTable 5

Sovkhozoes	Amount expected per hectare in rotation	Amount Received	Percentage	Amount expected per hectare in rotation	Amount Received	Per- centage
Gigant	7,280	6,678	91.7	1,635	485	29.6
Sal'skiy	2,666	2,035	76.3	735	586	79.7
Tselinskiy	4,300	3,186	74.1	1,565	312	19.9
Rostov Experi- mental	3,543	2,643	75.7	525	66	12.6
Kuban'	3,132	2,815	89.8	790	422	53.4
Vorob'yevskiy	922	922	100	150	150	100

By spring of 1950, all sovkhoses will have undertaken field crop rotation.

Feed crop rotation should be undertaken more rapidly during the next 2-3 years. Sovkhoses which have already undertaken crop rotation produce larger harvests (Table 6).

Table 6

Sovkhozoes	Winter wheat harvest in centners per hectare				
	1944	1945	1946	1947	1948
Gigant	12.7	10.2	15.7	13.2	22.2
Tselinskiy	8.9	9.2	16.3	13.7	19.7
Kuban'	11.1	16.8	15.3	17.4	23.0
Vorob'yevskiy	--	9.2	--	12.4	19.8

These harvests are obtained in the largest sovkhoses such as Gigant on thousands of hectares and this gives them special significance. During the short postwar period, the prewar harvest level has already been considerably exceeded. The highest prewar yield was in 1940 when the average winter wheat in the Gigant Sovkhoz was 15 centners per hectare; by 1948 the level of the harvest increased by 3.9 centners per hectare or 26 percent.

CONFIDENTIAL

CONFIDENTIAL

In the Kuban' Sovkhoz the winter wheat yield in 1940 was 20.2 centners per hectare, and in 1948, 23 centners per hectare or 2.8 centners higher.

Although 1946 was extremely dry, big harvests were obtained. The Gigant and Tselinskiy sovkhoses had bigger harvests in 1946 than 1947, when weather conditions were relatively favorable.

Thus, as has been shown by sovkhoses, the grass field system of soil cultivation raises the fertility of the soil which in turn guarantees high and stable harvests irrespective of weather conditions.

- E N D -

CONFIDENTIAL

- 15 -