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Soviet Agriculture: Reviewing a Core Program

A Research Paper

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GI 83-10038
February 1983

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Soviet Agriculture: Reviewing a Core Program

Key Judgments

Information available as of 10 February 1983 was used in this report.

A 15-year effort to develop the agricultural base of the Russian Nonchernozem Zone[1] (RNCZ)—a vast region incorporating 13 percent of the area and 23 percent of the population of the USSR—was launched with much fanfare in 1976. It constitutes the largest single agricultural development effort Moscow has undertaken since the New Lands program in the 1950s. Under the program, agricultural production in the zone is slated to more than double by 1990, with major increases in grain output as well as in other crops. To accomplish this, the program calls for heavy capital investments, widespread land reclamation, increased use of fertilizers, and the building of large-scale, highly mechanized, and specialized agricultural enterprises. So far the program has been a failure on almost every score. Farm output in the zone has actually declined since 1977, and the rate of decline was sharper than for Soviet agriculture overall. During 1976-80 the zone accounted for only 14.5 percent of total Soviet agricultural production, well below the planned share and less than the contribution the region made during the 1971-75 period.

The decline in agricultural production, paralleled by lagging progress in construction, mechanization, and land reclamation, has occurred despite heavy investment. During 1971-75, RNCZ agricultural investment totaled 19.7 billion rubles, 15 percent of the investment in agriculture for the country as a whole. During 1976-80, investment rose to 31.9 billion rubles, almost one-fifth of the USSR total. Despite the failures of the last half dozen years, we see no slackening in investment. During 1981-85 the area's agriculture investment is scheduled to increase by 23 percent, compared to an 11-percent increase for the USSR overall.

The principal reasons for the program's failure are the dismal climate and the low quality of the region's soils. Beyond this the area suffers from shortages of skilled farm labor and the backwardness of Soviet agrotechnology. No less important in explaining the limited progress of the program is the inferiority of the area's rural infrastructure, the improvement of which remains a prerequisite to the realization of agricultural production goals established for the RNCZ

Given the size of investment in the RNCZ and the scope of its development plan, some enhancement of the area's contribution to the USSR's farm economy is inevitable. The draining and irrigation of limited tracts of land

[1] Literally "nonblack soil" zone

seem within reason, but the 1990 target for land reclamation will not be met. New villages of several thousand people each will be created, but the larger "agro-cities" are not within reach. Because of shortfalls in the road construction program, only a skeletal system of all-season interfarm roads will exist by 1990. Both farm machinery and fertilizer deliveries will increase substantially but will nevertheless be inadequate to meet the farm output goals planned for the end of this decade.

Although the regime recently reaffirmed its intention to make the USSR self-sufficient in grain and livestock production, it will not be able to do so any time soon. The reality of recurring large crop shortfalls, to which the RNCZ annually contributes, has forced the USSR to become a heavy, if irregular, buyer in world agricultural commodity markets.

to acquire the latest in Western agricultural and food processing technology. Subjects of interest include seeds of new varieties, advanced fertilizer production processes, improved livestock breeds, and food processing systems. Neither the outright purchase nor the acquisition of Western agrotechnology, however, is likely to result in significant and lasting improvements in Soviet agricultural production. This would require fundamental changes in the Soviet system, but none appear to be forthcoming, either in the much ballyhooed Food Program or elsewhere

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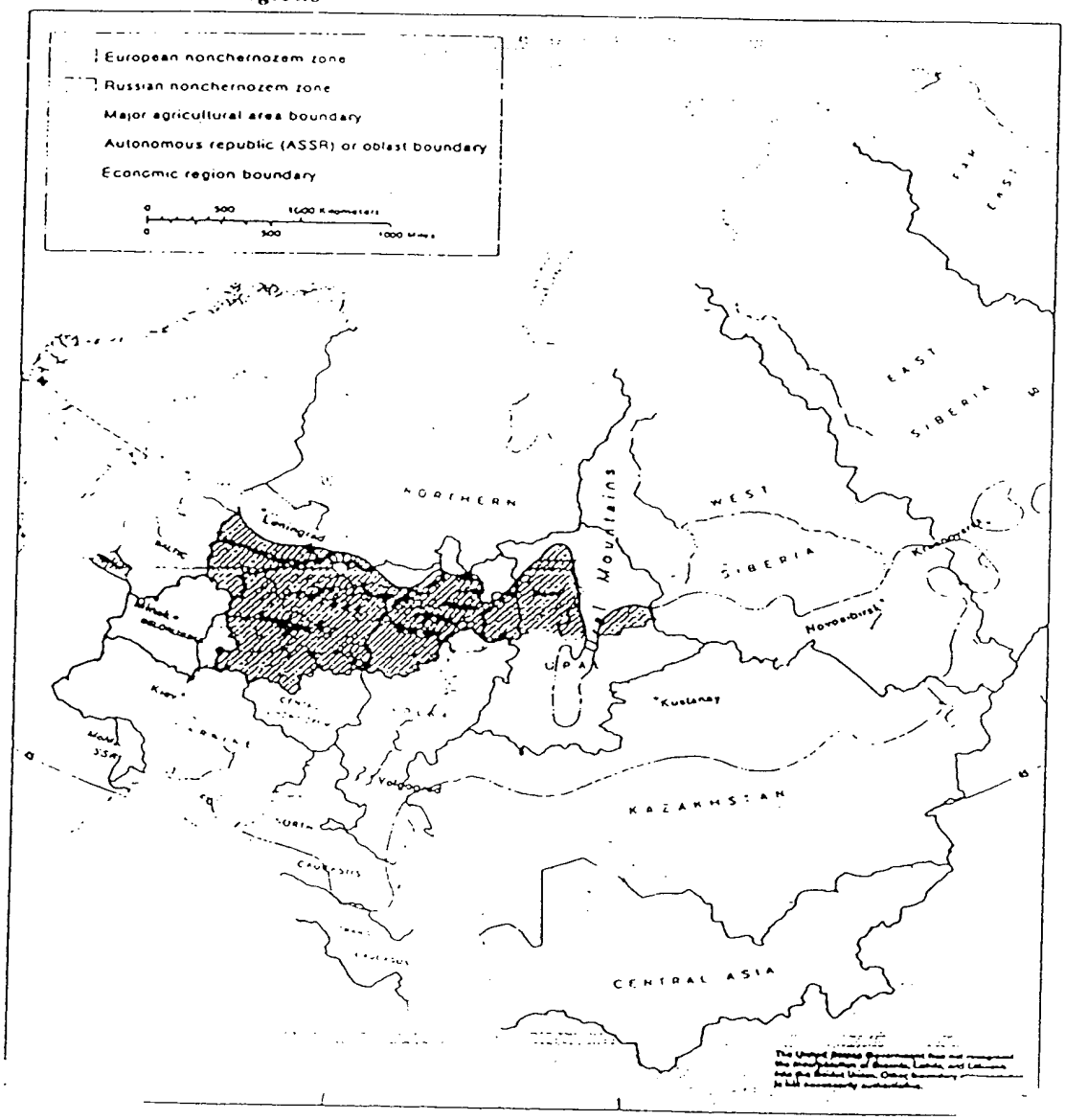

Soviet Agriculture: Reviewing a Core Program

Introduction

The Soviet Union is committed to a highly touted program to develop agriculture in the Russian Nonchernozem Zone, based on the policy that each region should become self-sufficient in food production to the extent possible. By devoting special attention to agricultural development in the RNCZ, the Soviets expect to substantially increase production and maintain a highly stable, "guaranteed" output of crops and livestock. The Soviet perception of the RNCZ's agricultural potential is heavily predicated on making better use of the zone's relatively high average annual level of precipitation, but ignores other factors that do not favor agricultural production.

Moscow has equated the potential impact of this 15-year program (1976-90) to the benefits that were realized from its first regional agricultural project—the "New Lands" program, conceived by Khrushchev in the mid-1950s. It brought some 40 million hectares of unused land into cultivation. However, the successful development of the New Lands—which now account for nearly 70 million tons of grain output yearly or about a third of the average Soviet total—contrasts sharply with the ineffectiveness of the RNCZ program.

The term *nonchernozem* refers to relatively infertile soils with a low potential for agricultural production. Soviet nonchernozem lands extend eastward from the western Ukraine, Belorussia, and the Baltic republics across northern Siberia to the Soviet Far East, covering more than half of the USSR. The Russian nonchernozem program, however, covers only the Northwest, Northern, Central, and Volga-Vyatsk economic regions and Perm, Sverdlovsk, Udmurt, and Kaliningrad Oblasts in the RFSFR (figure 1). The RNCZ covers 280 million hectares and is approximately equal in area to Western Europe or to the United States east of the Mississippi River. It includes some 13 percent of the USSR and 14 percent of all Soviet cultivated land, and contains 23 percent of the country's population. The 14,000 industrial enterprises of the region have a considerable capability for modernizing and servicing the agro-industrial sector.

The RNCZ is situated at the latitude of Canada's prairie provinces. Its climate, however, is more moderate—comparable in temperature to the Dakotas, Montana, and Minnesota and in precipitation to eastern Nebraska and Minnesota, although peak rainfall comes later in the summer. RNCZ soils more closely resemble those of northern Michigan and Wisconsin or New England. In 1977—its best year since the inauguration of the program—the RNCZ accounted for about 16 percent of Soviet agricultural production, about 12 percent of all grain, and 16 percent of all meat. Since then, the zone's absolute production and the value of its farm output have declined (table 1).

Genesis of the RNCZ Program

Planning for the RNCZ program was initiated in April 1971 when a party-state commission was formed to assess the agricultural potential of the area. The plan was finally adopted in July 1974, and work was begun early in the 1976-80 planning period. The program is more ambitious than parallel efforts under way in other Soviet regions. Agricultural inputs and investment funds, for example, are designed to grow faster in the RNCZ than elsewhere. Measures required to expand and maintain the RNCZ agricultural base are, however, considerably more complex than those used to develop virgin and unused parcels in the semiarid, sparsely populated New Lands, to which the RNCZ program is often compared

Table 1
RNCZ: Production of Agricultural Commodities, Selected Years

Year	Gross Agricultural Production (billion rubles, 1973 prices)			Key Agricultural Commodities (million tons)						
	Total	Crops	Livestock	Meat	Milk	Eggs [a]	Grain	Potatoes	Vegetables	Flax [b]
1965	15.0	6.6	8.4	1.6	15.8	5.7	14.1	28.4	3.7	252
1970	17.2	7.2	10.0	1.9	18.1	8.8	18.8	28.6	4.2	242
1971	17.4 [c]	7.2 [c]	10.2 [c]	2.1	17.9	9.7	19.7	27.3	4.2	232
1972	16.2 [c]	5.9 [c]	10.3 [c]	2.1	17.4	10.6	17.3	17.9	3.3	205
1973	18.9 [c]	8.2 [c]	10.7 [c]	2.1	18.3	11.4	21.5	33.7	5.2	164
1974	18.2 [c]	6.8 [c]	11.4 [c]	2.2	19.2	12.5	21.4	20.6	4.3	159
1975	19.2	7.7	11.5	2.4	19.3	13.0	18.8	30.7	4.6	238
1976	17.4	6.5	10.9	2.2	18.4	13.0	26.4	19.2	3.0	186
1977	19.4	7.4	12.0	2.3	19.8	14.2	24.3	25.2	3.4	210
1978	18.1	6.4	11.7	2.5	19.1	15.0	22.7	20.3	3.6	111
1979	18.3	6.7	11.6	2.4	18.5	15.4	17.5	24.9	3.8	132
1980	16.5	5.3	11.2	2.3	17.4	16.2	15.7	16.5	3.5	113
1981	16.9	6.0	10.9	2.3	16.0	17.1	NA	18.0	4.2	92

Sources: *Narodnoye khozyaystva RSFSR v . . . godu*, selected years.
[a] Billion units.
[b] Thousand tons.
[c] Converted from 1965 prices, by interpolating from 1970 and 1975 data in both price weights.

The Scope of the Program

In the absence of a comprehensive planning document, only a sketch of the 15-year RNCZ program can be put together from bits and pieces of information published in a wide variety of Soviet sources. The major goals to be achieved by 1990 include:

- Draining of some 9-10 million hectares, of which 7-8 million hectares are to be drained using buried tiles.
- Irrigation of 2-2.5 million hectares.
- Both draining and irrigation of some lands that are too wet in spring but too dry in summer.
- Other land improvements on 8-10 million hectares, including increased application of lime and fertilizers.

The drainage goal represents 10 times the amount of drained land that was added to the RNCZ network during 1971-75. Moreover, the buried tile method, although minimizing interference with tilling and harvesting operations, is a costly approach to land drainage. The 2-2.5 million hectares in the RNCZ to be developed for irrigation by 1990 represents six times the amount added during 1971-75 and is equivalent to one-sixth of all USSR irrigated land existing in 1975

The RNCZ program also provides for the wholesale restructuring of rural settlements into larger population centers, primarily consolidated residential centers for individual sovkhozes and kolkhozes. One Soviet projection calls for the replacement of the existing 143,000 small, isolated hamlets with 15,400 larger settlements. The object is to improve the quality of rural life, to slow the migration of farmworkers to

Table 2
USSR-RNCZ: Comparison of Planned Expansion in Agriculture During 1976-80

	Past Performance			Planned Expansion		
	USSR	RNCZ	RNCZ as % of USSR	USSR	RNCZ	RNCZ as % of USSR
	Annual Average, 1971-75			1980		
Production of farm products						
All farm products, official measure *(billion rubles, 1973 prices)*	113.7	17.9	15.8	146.5	24.4	16.7
Grain *(million tons)*	181.5	19.7	10.9	235.0	31.0	13.2
Potatoes *(million tons)*	89.8	26.0	29.0	104.0	35.3	33.9
Vegetables *(million tons)*	23.0	4.3	18.8	30.0	6.0	20.0
Meat *(million tons)*	14.0	2.2	15.7	17.3	2.9	16.8
Milk *(million tons)*	87.4	18.4	21.1	102.0	23.0	22.5
Eggs *(billion units)*	51.4	11.4	22.2	66.8	15.6	23.4
Wool *(thousand tons)*	442.1	17.1	3.9	515.0	18.5	3.6
	Cumulative, 1971-75			Cumulative, 1976-80		
New allocations of farm resources						
Gross fixed investments *(billion rubles)*	131.5	19.7	15.0	170.7	35.0	20.5
Tractors *(thousand units)*	1,667.0	287.0	17.2	1,900.0	380.0	20.0
Trucks *(thousand units)*	1,102.0	189.0	17.2	1,350.0	230.0	17.0
Grain combines *(thousand units)*	449.0	73.0	16.2	538.0	94.0	17.5
Fertilizer *(million tons)*	307.0	63.0	20.5	467.0	120.0	25.7
Gross additions to drained land *(thousand hectares)*	4,374.0	953.0	21.8	4,700.0	1,800.0	38.3
Of which:						
By covered drainage	NA	NA	NA	NA	1,265.0	NA
Gross additions to irrigated land *(thousand hectares)*	4,552.0	512.0	11.2	4,900.0	667.0	13.6
Liming of acid soils *(million hectares)*	28.7	15.0	52.3	47.0	22.9	48.7

Sources: *Narodnoye khozyaystvo SSSR v . . . godu*, selected years, *Narodnoye khozyaystvo RSFR v godu*, selected years, and other Soviet press reports.

urban centers in search of nonfarm employment, and to bolster labor productivity in agriculture. All new housing is to have electricity, modern plumbing, central heating, and gas ranges—features now largely absent in rural settlements.

A major part of the RNCZ program is designed to promote the concentration, specialization, mechanization, and industrialization of agricultural production on individual farm enterprises, a goal that is common to all Soviet agricultural regions. Mechanization and larger scale operations, for example, are supposed to permit greater use of specialized, highly skilled labor and, in turn, foster higher productivity per worker. The nationwide goal of stimulating livestock output by shifting herds into specialized, large-scale complexes is being actively pursued in the RNCZ program. Although most complexes in the RNCZ are

expected to obtain feed and replacement animals from member farms in their interfarm or agro-industrial organizations, many receive feedstuffs through state allocations. By 1990 practically all RNCZ beef and three-fifths of RNCZ pork sold to the state are to be produced or fattened at specialized livestock complexes instead of at traditional sovkhozes and kolkhozes.

The RNCZ plan calls for the annual production of most major agricultural products to more than double 1974 levels. Grain production, for example, is to reach 43 million tons by 1990, more than twice the 1971-75 average, while output from other Soviet grain areas is to grow by less than one-third. By 1990 the RNCZ grain area is to exceed 20 million hectares, compared to an average of 15.3 million hectares during 1971-75. The additional area sown to grain will come from an increase in arable land, a reduction in the area devoted to forage crops, and a reduction in the amount of land left fallow. Similarly, by 1990 RNCZ production of potatoes is planned to reach 42 million tons, compared to the 26-million-ton average of 1971-75 and the 21-million-ton average during 1976-80.

After Seven Years: Meager Results

The program for accelerating RNCZ agricultural development has been a failure thus far. According to published Soviet data, farm output in the zone has actually declined since 1977. The RNCZ share of total Soviet agricultural production also declined—from 15.8 percent in 1971-75 to 14.5 percent in 1976-80. This occurred even though the RNCZ is getting a significantly greater share of resources, as shown in the following tabulation:

	RNCZ, as percent of USSR	
	1971-75	1976-80
Allocations of agricultural investments	15.0	18.7
Productive fixed capital (end of period)	14.7	17.0
Agricultural production		
Total	15.8	14.5
Crops	13.8	11.4
Livestock	17.5	17.1

Food Production. According to official Soviet statistics, food production has declined in the RNCZ since the program was initiated. Overall production of crops during 1976-80 declined by 10 percent over the previous five-year period, and the value of livestock production increased only 6 percent; planned growth in these two areas had called for increases in the range of 30 to 60 percent. The increase in the total value of livestock production resulted largely from higher state procurement prices rather than higher output. Meat production increased 5 percent but milk production rose by only 1 percent. Plans had called for production increases of 30 and 25 percent, respectively. Only egg production increased substantially—about 30 percent—but the plan called for a 40-percent rise. At the end of 1981, the number of cattle and sheep was significantly below 1975 levels, reflecting the zone's poor harvests of forage crops. Grains and other concentrated feeds brought in from other regions, however, permitted an increase in swine and poultry numbers

Performance in other food sectors was almost as bad. The production of potatoes and vegetables in the zone declined by one-fifth during 1976-80. By 1980 the RNCZ was producing only 25 percent of all Soviet potatoes and 14 percent of all vegetables, compared to planned shares of 34 and 20 percent, respectively. With the exception of eggs, the RNCZ share of total USSR output of important foodstuffs has gradually declined since the 1961-65 period. Soviet open source reporting indicates that in 1981, the third successive year of unfavorable weather in the USSR, RNCZ production of grain did not increase, although the output of potatoes, vegetables, and forage crops was considerably above the depressed levels of 1980. Preliminary Soviet reporting indicates only limited improvements in RNCZ farm output in 1982.

Construction. Soviet sources reveal that compared to the 1971-75 level, capital investment expenditures for the RNCZ agricultural sector during 1976-80 rose 62 percent; the plan called for a 78-percent rise. By way of comparison, total Soviet agricultural investment increased by only 31 percent. While the investment

Table 3
RNCZ: Agricultural Development and Production, 1976-80 Compared to 1971-75

	1971-75	1976-80	Percent Change
Gross agricultural production [a]			
All farm products *(billion rubles, 1973 prices)*	17.9	17.9	0
Of which:			
All crops *(billion rubles, 1973 prices)*	7.2	6.5	—10
Livestock products *(billion rubles, 1973 prices)*	10.8	11.4	6
Grain *(million tons)*	19.7	21.3	8
Potatoes *(million tons)*	26.0	21.2	—18
Vegetables *(million tons)*	4.3	3.5	—19
Flax *(thousand tons)*	199.8	150.4	—25
Meat *(million tons)*	2.2	2.3	5
Milk *(million tons)*	18.4	18.6	1
Eggs *(billion)*	11.4	14.8	30
Wool *(thousand tons)*	17.1	13.5	—21
New allocations to agricultural resources [b]			
Gross fixed investments *(billion rubles, 1973 prices)*	19.7	31.9	62
Tractors *(thousand units)*	287.0	NA	NA
Trucks *(thousand units)*	190.0	NA	NA
Grain combines *(thousand units)*	73.0	NA	NA
Mineral fertilizer *(million tons, standard units)*	63.0	85.1	35
Land reclamation *(gross additions, thousand hectares)*			
Drainage	953.0	958.0	1
Irrigation	512.0	354.0	—31
Liming acid soils *(million hectares)*	15.0	NA	NA
Inventories of agricultural resources [c]			
All productive assets *(billion rubles)*	22.9	35.8	56
All cattle *(million head)*	18.2	18.1	—1
Cows *(million head)*	7.7	7.7	0
Swine *(million head)*	8.3	9.5	14
Sheep and goats *(million head)*	8.0	6.7	—16
Tractors *(thousand)*	354.0	441.0	25
Grain harvesting combines *(thousand)*	94.0	112.0	19
Silage harvesting combines *(thousand)*	35.0	43.0	23
Drained land *(thousand hectares)*	2,071.0	2,721.0	31
Of which:			
By buried tile	1,138.0	1,794.0	58
Irrigated land *(thousand hectares)*	388.0	687.0	77

Sources: *Narodnoye khozyaystvo RSFSR v . . . godu*, selected years.
[a] Annual average output for five-year period.
[b] Total for period.
[c] End of period.

expenditure plan was underfulfilled by 9 percent, cost overruns and unfinished construction led to far greater shortfalls in implementation. For example, only half of the scheduled land drainage and irrigation development was completed. Similarly, gross shortfalls occurred in various projects to reconstruct the RNCZ rural infrastructure—both in new agricultural production and processing facilities and in the massive resettlement program. The intrafarm road construction program is lagging by some 20,000 kilometers because of a lack of organization, plans and designs, resources, and funds.

Fertilizers. Mineral fertilizer applications, planned to double during 1976-80, increased only 35 percent. Applications of organic fertilizer and other agrochemicals were also far below planned levels. During 1976-80 the tonnage of lime applied to RNCZ lands increased by only 70 percent rather than doubling as was planned. Application of 8 to 10 tons of lime per hectare in recent years reportedly reduced soil acidity in Leningrad and Moscow Oblasts by one-half, which partially explains why yields are higher there than in the rest of the RNCZ. Elsewhere, however, the treatment of acid soils has been limited by a shortage of quality liming materials. Indeed, according to Soviet journals, soil acidity is increasing in many RNCZ regions.

Production Associations. As of 1979, the latest year for which we have official Soviet data, nearly 120 interfarm production associations had been organized in the RNCZ for raising and fattening cattle, pigs, and poultry. Of this total, 68 state associations for producing milk, beef, pork, vegetables, fruit, and seeds and 23 enterprises for producing and processing agricultural products have been set up. Except in poultry raising, the increased efficiency and output of livestock products that the modernized, specialized livestock-raising complexes were to have provided are largely absent in the RNCZ (and elsewhere in the USSR).

Like other regions, the RNCZ has encountered unexpected difficulties with this program. Rather than constructing entirely new facilities, some planners believe that more investment should be channeled into modernizing existing farmsteads. According to the Soviet press, two-thirds of all the newly built livestock complexes, feedlots, and poultry farms put into operation in the USSR have not yet reached planned capacity output

Farm Machinery. The increased inventory of standard farm machines does not include all of the kinds of equipment the RNCZ needs. Of an entire series of farm machines planned and designed especially for the RNCZ—including units for constructing drainage, removing brush and stones, spreading fertilizer and agrochemicals, and harvesting grain—only a few have even been tested. Development of machinery designed for the special no-till or minimal tillage practices suitable for use in the RNCZ is grossly lagging. These practices are needed to permit earlier spring seeding in order to, in effect, lengthen the short growing season, to conserve soil and soil moisture, to reduce fuel and other costs, and to minimize agrochemical pollution.

Rural Labor. Rural outmigration from the RNCZ is an acute and worsening problem, far more so than in other Soviet agricultural regions. The zone's rural population has declined to roughly three-fourths of its 1970 level. The latest open source data show that during 1976-79, 426,000 grain combine operators, tractor drivers, and other farm machinery experts were trained in the zone while the number actually working on farms in the RNCZ increased by only 50,000; moreover, 30 percent of the farms lacked enough staff for even a single shift. Although industrial workers are periodically assigned to farm work, farm machinery remains idle for lack of operators. Only 26 percent of the graduates of higher and secondary rural schools within the zone remain to work on farms. About half of the 30,000 personnel recruited annually by farms from professional and technical colleges soon leave for other employment. Some Soviet demographers are now proposing that surplus farm workers in Central Asia be imported into the RNCZ, but only a small number have been relocated so far

Amending the Program

Several policy decisions, announced in the Soviet press during the 1976-80 period, are intended to restructure the development of agricultural operations in the RNCZ and to offer alternative solutions for stemming rural outmigration. The decentralization of light industry and its integration into farm enterprises are being encouraged to provide off-season employment and training for farm workers. In Gorky Oblast, for example, farms have 3,000 such subsidiary enterprises. Funds intended for productive investment are being diverted to provide grants for resettled families, tenure bonuses to encourage rural employment, and courses to train rural workers to run modern farming operations. Wage rates on RNCZ farms and land reclamation projects have been increased to equal those in other high-priority agricultural regions. Finally, Moscow has threatened to punish responsible executives if they fail to improve the pace of agricultural development in the RNCZ.

Plans for 1981-85. Belatedly announced in a decree in mid-April 1981, the Soviet 1981-85 plan targets for the RNCZ countryside clearly indicate that reconstruction—and expected farm output—will not be accomplished within the original schedule, and certain projects may be revised or even abandoned. Despite setbacks, however, the RNCZ program continues to receive high priority. During 1981-85, RNCZ fixed capital investment in agriculture is planned to increase by 23 percent, compared to about 11 percent for all of the USSR. The RNCZ share of USSR agricultural investment is targeted to reach almost 21 percent, compared to 18.7 percent during 1976-80 and 15.0 percent during 1971-75. Whereas the Soviets planned a 35-percent increase in RNCZ agricultural output during 1976-80 over the level reached during 1971-75—and achieved no growth at all—they now postulate only a 30-percent increase by 1985 above the 1976-80 level.

Even if the 1981-85 land drainage and irrigation plans are realized, three-fourths of the originally projected 1990 land improvement goals will remain to be completed during 1986-90. Planned 1981-85 fertilizer application is scarcely greater and the area to be treated with lime is 20 percent less than was called for in the 1976-80 plan. RNCZ farms are to receive somewhat more new machinery during 1981-85 than was planned during 1976-80, a period for which actual deliveries have not been reported.

Of the scheduled investment in RNCZ agriculture during 1981-85, expenditures on nonproductive rural construction are to increase by 77 percent, leaving only a 12-percent increase in investments directly related to agricultural production. The 1981-85 plan, however, calls for building only a third as much housing as was scheduled in the 1976-80 plan. The still uncertain direction of the resettlement program is evident in Soviet plans to construct by 1985 one or two model settlements in each oblast—10 years after the initial decision to reconstruct the RNCZ countryside intensively. Although some new villages of several thousand people are being created, the larger "agro-city" types are not expected for 10 to 15 years. Moreover, it is now proposed that houses in abandoned villages be made available to urban workers and pensioners as summer homes or full-time residences. Those individuals, in turn, could be used to supplement the rural labor force seasonally and to carry out private farming.

The Soviets continue to expect RNCZ production of most agricultural commodities to increase at much faster rates than output in the USSR overall, as follows:

Commodity	1981-85 Plan, Percent Increase Over 1976-80	
	RNCZ	USSR
Gross agricultural production	30	12-14
Grain	33	16-19
Potatoes	23	5-8
Vegetables	35	10-13
Flax fiber	54	23
Meat	21	15-18
Eggs	21	5-7
Milk	13	14

RNCZ outputs of potatoes, vegetables, and eggs are to increase by three times and of grain by twice their respective all-USSR growth rates. Only milk production in the zone is to match the national rate of

Table 4
RNCZ: 1981-85 Plan Compared With Previous Plans and Accomplishments

	1971-75 Actual	1976-80 Plan	1976-80 Actual	1981-85 Plan
Gross agricultural output [a] *(billion rubles, 1973 prices)*	17.9	24.4	17.9	23.3
Fixed capital investment in agriculture [b] *(billion rubles, comparable prices)*	19.7	35.0	31.9	39.3
Gross additions to land improvement, *(thousand hectares)*				
Drained land	953.0	1,800.0	958.0	1,410.0
Irrigated land	512.0	667.0	354.0	360.0
Other improvements	NA	3,200.0	1,900.0	2,065.0
Deliveries to agriculture [b]				
Tractors *(thousand)*	287.0	380.0	NA	390.0
Trucks *(thousand)*	190.0	230.0	NA	254.0
Grain combines *(thousand)*	73.0	94.0	NA	104.0
Mineral fertilizer *(million tons)*				
Standard units	63.0	120.0	85.1	125.0
Pure nutrients	NA	27.8	17.0	28.9
Liming *(million hectares)*	15.0	22.9	NA	18.4
Nonproductive rural construction [b] *(billion rubles)*	2.95	NA	5.6	9.9
Housing *(million square meters)*	NA	100.0	22.8	33.5
General schools *(thousand pupils)*	NA	700.0	490.0	NA
Nurseries *(thousand children)*	NA	NA	178.0	230.0
Hospitals *(thousand beds)*	NA	10.0	16.1	19.3
Community centers *(thousand persons)*	NA	350.0	175.0	271.8
Waterlines *(thousand kilometers)*	NA	NA	NA	22.9
Improved roads *(thousand kilometers)* [c]	16.7	50.2	30.0	38.3

Sources: *Narodnoye khozyaystva RSFSR v . . . godu*, selected years; other Soviet press reports.
[a] Average annual.
[b] Total for the period.
[c] The Soviets describe these as "hard surfaced"; actually, most are covered with crushed rock or gravel rather than paved with concrete or asphalt.

increase, but RNCZ meat production is to grow much faster. The zone's meat output in 1985 would have to exceed the 1981 level by 48 percent in order to fulfill the 5-year plan. /

Deficiencies of RNCZ Farmlands

In addition to the many economic and political constraints, the RNCZ program to increase farm output rests on a shaky climatic and agronomic base and is thus unlikely to meet the goals planned for it. The region has a number of handicaps (figures 2, 3, and 4):

- A lack of warmth limits farming to areas well below 60° latitude. Overall, the growing season is much shorter than in most other Soviet farmlands. Only the southern borders of the RNCZ average more

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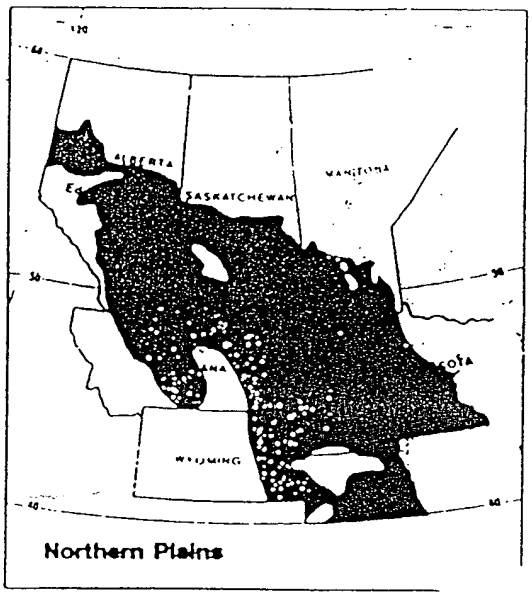
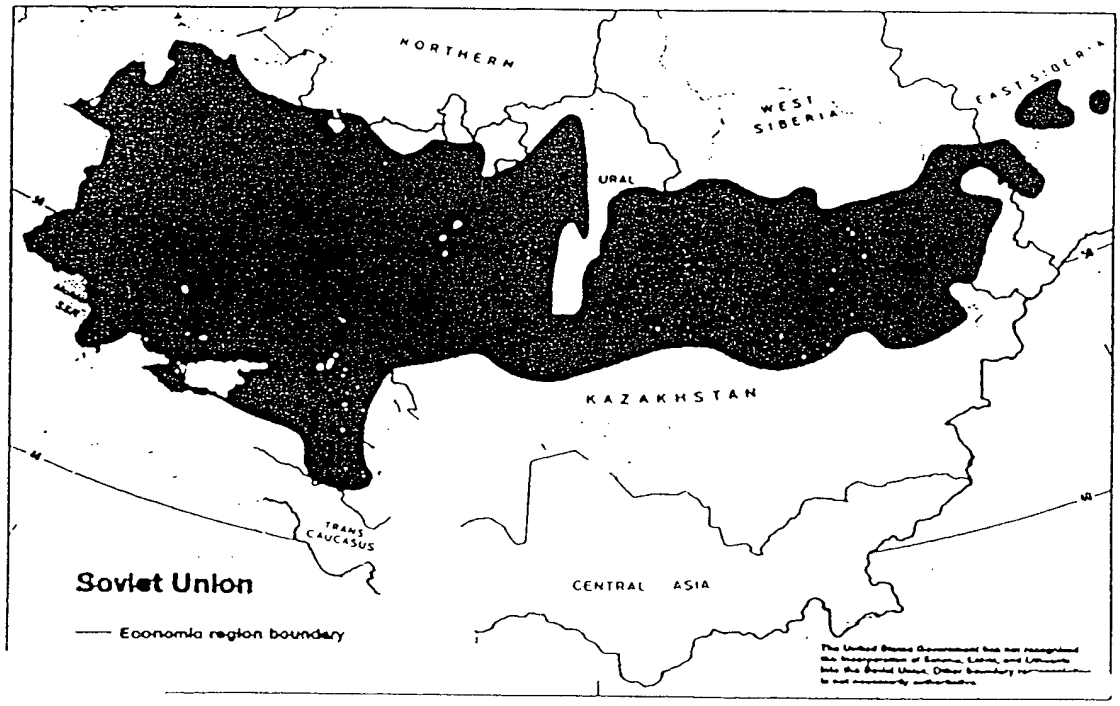


Figure 2
Major Soil Zones

- Chernozem
- Prairie
- Podzolic intergrade
- Chestnut and desert
- Sandy or shallow inclusion

—— Major agricultural area boundary

Scale 1:30,000,000



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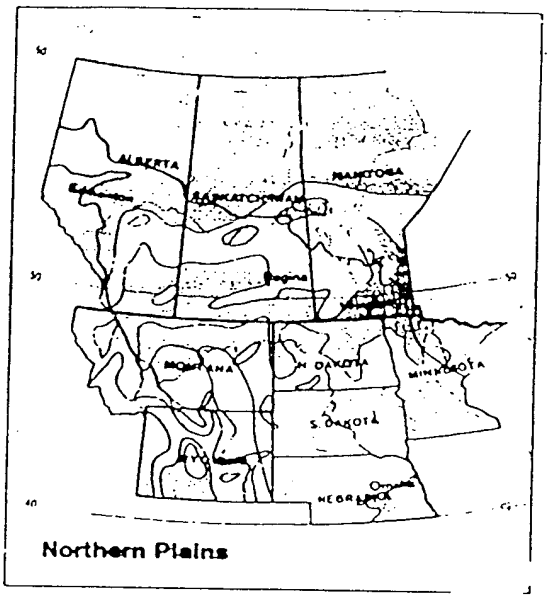
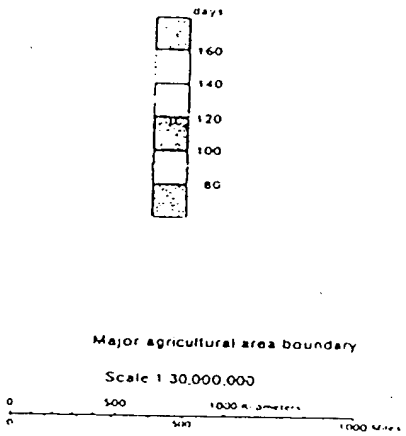
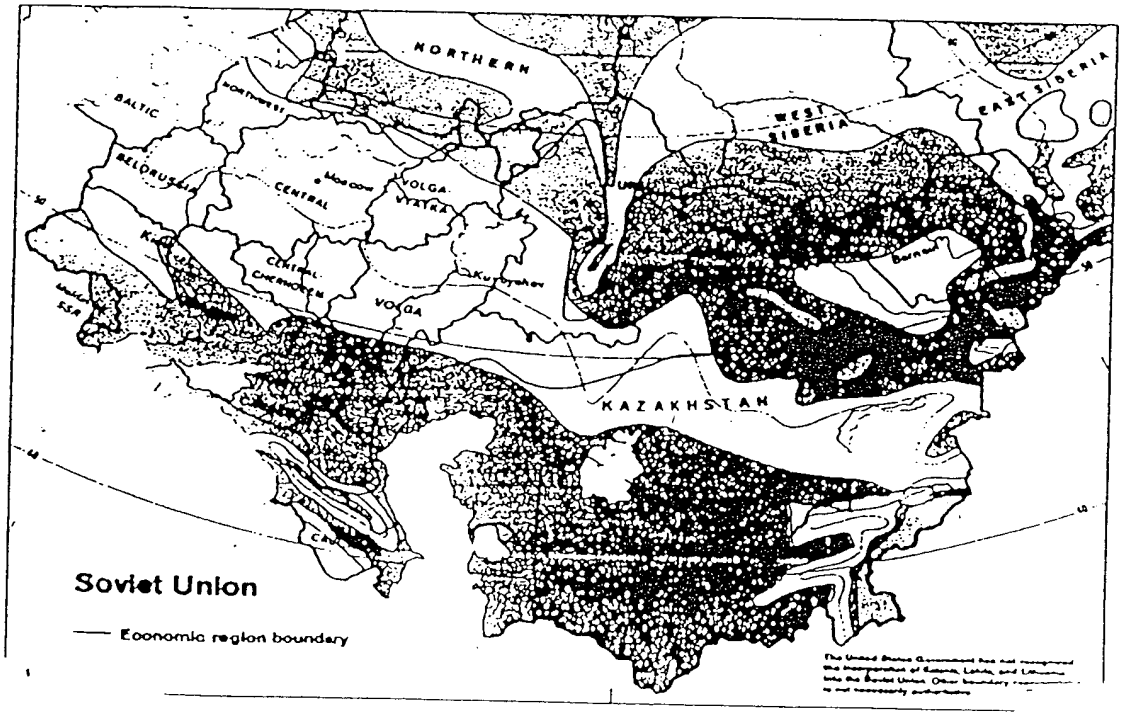


Figure 3
Annual Frost-Free Period





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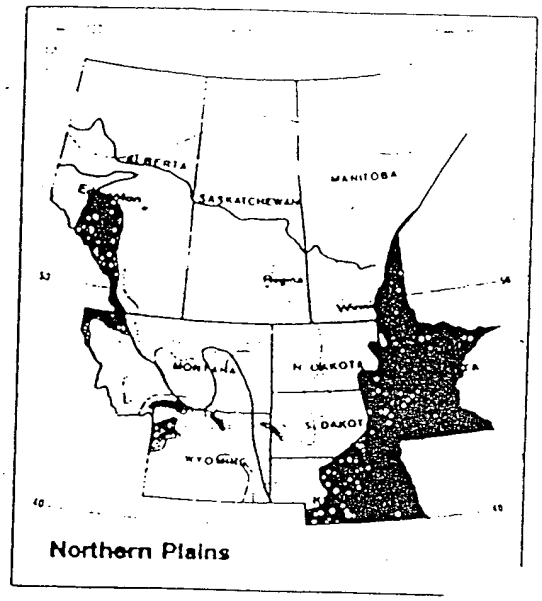
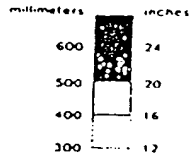


Figure 4
Annual Precipitation



Major agricultural area boundary

Scale 1:30,000,000

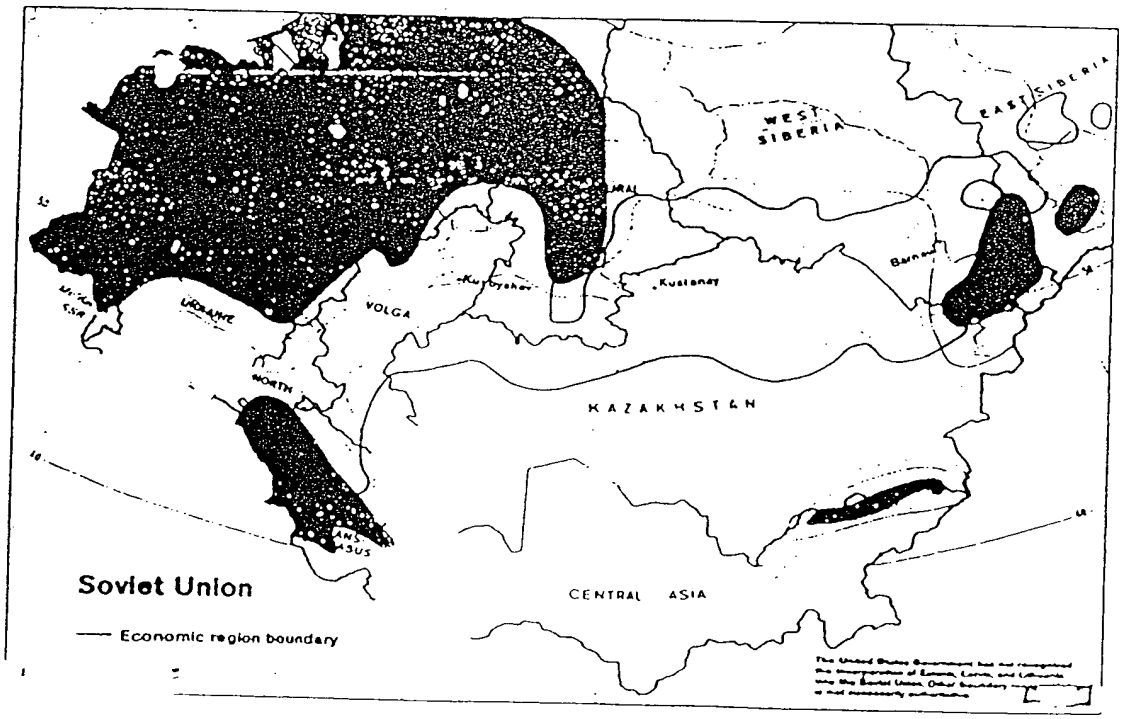


Table 5
RNCZ: Soviet Survey of Farmland Deficiencies

Type of Land	Surveyed Area [a]	Areas That Are [b]				
		Highly Acid	Excessively Marshy	Very Stony	Extremely Sandy	Seriously Eroded
All agricultural land (*thousand hectares*)	49,034	31,308	7,991	1,717	1,148	5,620
Percent of total	100.0	63.8	16.3	3.5	2.3	11.5
Of which:						
Cultivated land (*thousand hectares*)	30,696	27,356	2,145	1,259	662	5,055
Percent of total	100.0	89.1	7.3	4.1	2.0	16.5
Natural pastures and meadows (*thousand hectares*)	17,750	3,699	5,793	408	526	545
Percent of total	100.0	20.8	32.6	2.3	3.0	3.1

Source: A. I. Monov, I. G. Averin, and V. P. Pogozhev, *Sel'skoye khozyaystvo Nechernozemnoy Zony RSFSR*, Moscow, 1978, pp. 12-22, and p. 120.
[a] Surveyed area does not equal areas now held by agricultural enterprises. In 1981 they held 46.9 million hectares of all agricultural land, including 31.8 million hectares of cultivated land.
[b] Any given area may be deficient in more than one form.

than 140 frost-free days per year; near the Urals the average is only 95 days. Moreover, a wide variation in seasonal temperatures produces a high likelihood of damage to growing crops.

- Unfavorable topography and unproductive soils are severe constraints in many areas. The predominantly fragile soils are better suited to forage crops and forestry than to the intensive raising of grains and other food crops. They are acidic, badly leached, and eroded, and their capacity to retain moisture and plant nutrients is limited.

- Although the RNCZ averages more precipitation than most other crop regions, the variability and untimeliness of rainfall limit the benefit to growing crops and often interfere with the timely seeding and harvesting of crops.

- RNCZ farmlands are fragmented by interlocking ravines, swamplands, rivers and streams, and overgrown, stony, sandy, or otherwise inferior lands. RNCZ fields are generally small, irregularly shaped, and relatively unsuited to the use of large farm machinery.

- A short growing season and unstable weather makes the timing of agricultural operations particularly crucial. Fieldwork, however, is frequently not done on time because of shortages of farm machinery and qualified farm labor. Crop losses are relatively larger in the RNCZ than in other USSR farming regions.

Virtually all RNCZ land, even the best, requires some degree of ameliorative treatment to produce at acceptable levels (table 5). According to Soviet reports, some 8-9.5 million hectares, roughly a fifth of all RNCZ farmland, is so wet that the growth of crops is seriously stunted. Additional lands are affected to a lesser degree, making a total of at least 13.8 million hectares, 30 percent of all RNCZ farmland, that is

poorly drained. The extent of wetness along with other related deficiencies limits the use of most of the wetlands to natural meadows and pastures and complicates the harvesting of hay and the grazing of animals. Seasonally wet cropland cannot be tilled and planted until late spring, shortening the growing season and rendering crops vulnerable to early fall frosts. At times, excessive wetness may destroy growing crops or prevent the passage of harvesting equipment.

The most important single natural factor restricting RNCZ agricultural potential is the high proportion of sand in the soils now used or proposed for crop production. Most RNCZ soils contain too much sand and too little clay, which seriously limits their capacity to store moisture and nutrients. Soviet surveys indicate extreme sandiness—85 percent or more sand—on 1.1 million hectares of agricultural land, including 660,000 hectares of cultivated land. Moreover, at least one-third of RNCZ farmland, as much as 14 million hectares, is classified as excessively sandy, more than 50-percent sand.

Soviet surveys also indicate that stones seriously interfere with the productivity of some 1.7 million hectares of agricultural land, including 1.3 million hectares of tilled land. Other statements in the Soviet press describe 300,000 hectares as being extremely rocky, at least 2.5 million hectares of tilled land as significantly stony, and a much larger area of meadows and pastures as rocky to some degree. It is costly to farm stony land because fieldwork must be slowed to prevent farm equipment breakage and operator injury. The abrasive action of stones accelerates wear of tillage surfaces on farm machinery, and machines need to be equipped with costly protective devices.

Within the RNCZ, the Soviets classify some 6 million hectares, mostly cultivated, as seriously damaged by soil erosion, thereby reducing potential crop yields. As much as two-thirds of RNCZ cultivated crops are grown on slopes vulnerable to water erosion, while sandy soils and drained peat soils are particularly subject to wind erosion. Control of erosion is hampered by the use of inappropriate machinery and cropping practices.

Soviet surveys indicate almost two-thirds of all RNCZ agricultural land, including practically all the cultivated land, is highly acidic. Soil acidity interferes with plant metabolism, restricting the availability of nutrients and their assimilation by crops. It can be alleviated by periodic applications of finely ground limestone and other calcium-bearing materials, which benefit yields directly, and also through more efficient use of fertilizers. The supply of industrially prepared lime materials, however, has been limited

According to the Soviet press, more than three-fourths of all RNCZ tilled land and much other RNCZ farmland are classified as low to very low in available phosphorous compared to only one-half of all Soviet tilled land. Like acidity, phosphorous deficiency restricts crop yields directly and limits the uptake of other nutrients. A lack of phosphorous also delays crop maturation, a critical factor in regions with a short growing season. Similarly, most RNCZ mineral soils are deficient in the other primary nutrients—nitrogen and potash—and trace element deficiencies are common on coarse-textured, heavily acid, and poorly drained soils.

Outlook

Comparisons of the RNCZ with other Soviet regions and with analogous regions in other countries suggest that the agricultural potential of the RNCZ is significantly greater than has yet been demonstrated, but well below Soviet expectations. Environmental conditions militate against making the RNCZ an intensive and efficient producer of agricultural commodities. The large capital investments in RNCZ farmland will not increase agricultural output unless accompanied by equally large allocations of agrochemicals, farm equipment, and other supplies. Moreover, much of the rural construction effort is peripheral to agricultural development. More attractive opportunities for skilled workers in the expanding urban and industrial centers of the RNCZ will only worsen the shortage of farm labor in the zone.

The RNCZ program, although still broadly supported, is not without its critics. Thus it will remain vulnerable to priority shifts in favor of other agricultural projects and regional development programs

with potentially better payoffs. Comprehensive programs to develop agriculture in the RSFSR Central Chernozem Region and in Siberia and the Far East were launched in 1981 and 1982, respectively. Although less well endowed than the RNCZ program, these new regional development schemes will be competing with the RNCZ for greater shares of the funds allocated to the Soviet agricultural sector. Moreover, the large share of investment being allocated to USSR agriculture leaves insufficient resources to develop other sectors of the agro-industrial complex in order to utilize farm output more efficiently. One-fifth or more of farm products is now lost during transportation, storage, processing, and distribution.

The future of the RNCZ program is uncertain. Brezhnev, the chief designer of Soviet agrarian policy and mentor of the RNCZ program, can no longer be held accountable for the meager returns from such highly concentrated regional investment schemes as the RNCZ. Andropov has already indicated that the Food Program[3] should be carried out without any foot-dragging but at this early date has not taken a position on the soundness of continuing to develop RNCZ agriculture at such a very great cost to the economy. Unless performance in the zone improves significantly over the next two to three years, the RNCZ effort could very well be scaled back sharply if not scrapped altogether.

Foreign Policy Implications

During the unveiling last May of the Food Program for the 1980s, the Soviets publicly underscored their intention to make the USSR self-sufficient in grain and livestock production. Nevertheless, the reality of recurring crop failures, in the face of a continued commitment toward improving the consumer diet, has forced the USSR to become a major, if irregular, buyer in world agricultural commodity markets. Moreover, the failure of the RNCZ program and of other efforts to increase and stabilize agricultural production has forced the Soviets to hedge their bets by establishing access not only to commodity imports but to Western agrotechnology as well.

Moscow's pursuit of alternative solutions to its food problems seeks to tap Western know-how in several ways. Soviet scientists and agricultural specialists continue to participate in international scientific and technical information exchanges and to negotiate foreign technology purchase agreements. For example, Moscow is currently seeking a license to manufacture the latest in US grain harvesters, the rotary combine. The Soviets are also negotiating with a British firm for the most advanced single cell protein (SCP) technology. SCP can be used as a livestock feed supplement. The Soviets regularly import roughly one-third of their agricultural pesticides—primarily sophisticated types of herbicides, insecticides, and fungicides that they cannot produce on their own. The USSR also recently expanded its fertilizer production capacity, using a wide array of Western technology. Other major purchases have included technology for large cattle feedlots, tractors, forage harvesters, and cotton gin plants.

In a striking shift of emphasis, Soviet [redacted] efforts are now pinpointing Western agribusiness firms. Prompted by Brezhnev's plenum report last May on the Food Program, [redacted] has initiated plans to acquire Western agricultural and food processing technology. Targets of this [redacted] effort include information on hybrid seed, fertilizer technology, improved livestock breeds, food processing systems, and agricultural R&D breakthroughs. Although most of this technology is available through normal trade channels, certain advanced components such as microprocessors for test and analysis systems may require export licenses. Other technologies such as genetic engineering and fertilizer production involve closely held or proprietary information. Even when these goods and technologies are freely available for purchase, [redacted] provide a less expensive conduit for obtaining them, freeing Soviet R&D resources and hard currency for other uses.

[3] "Food Program" refers to the current set of Soviet agrarian policy measures, collectively designed to achieve a better coordinated, more efficient, overall development of the agro-industrial complex. In this way, within resource limits, the Soviets hope to increase farm output and also to reduce losses of agricultural commodities en route to consumers

Moscow's apparent belief that at least a partial solution to its agricultural problem lies in the acquisition of Western technical know-how is highly questionable. Soviet attempts to absorb Western nonmilitary technology generally have been unfruitful, and many of the failures have occurred in the agricultural sector. Foreign agrotechnology innovations usually require considerable modification before they can be successfully adapted to Soviet growing conditions and managerial practices. Despite the fact that the Soviet agro-industrial complex received more than a third of all investments during 1976-80, its disappointing performance persists. This suggests that fundamental changes in the system are necessary, but none appear to be in the offing.