



# Markets for Purchased Farm Inputs in Russia

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Russian policy makers argue that agriculture suffers from decapitalisation due to financial constraints faced by producers. This view is the basis for the national agricultural policy, which emphasises reimbursement of input costs and substitutes government and quasi-government organisations for the missing market institutions. The article evaluates the availability of purchased farm inputs, the efficiency of their use, the main problems in the emergence of market institutions, and the impact of government policies. The analysis focuses on five groups of purchased inputs: farm machinery, fertilisers, fuel, seeds, and animal feed. The information sources include official statistics and data from two original surveys.

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## INTRODUCTION

Russian policy makers usually argue that agriculture suffers from severe decapitalisation due to financial constraints faced by producers. This view is the basis of the national agricultural policy, which emphasises reimbursement of input costs to producers and substitutes government or quasi-government organisations for market institutions. The present article evaluates the availability of purchased farm inputs, the efficiency of their use in agriculture, and the main problems in the development of input markets. It analyses supply and demand, the emergence of market



institutions, and the impact of government policies. Purchased farm inputs include a wide range of goods. To keep a proper balance between breadth and depth of analysis, we focus on five groups of purchased inputs: farm machinery (tractors and harvesters), fertilisers, fuel, seeds, and animal feed. Three sources of information were used in the analysis: official national statistics, data from the 2003 BASIS survey of agricultural producers (to evaluate the demand for farm inputs), and data from a 2001 AFE survey of farm machinery and fertiliser manufacturers (to evaluate supply).

In the Soviet period, all sectors of the economy, including agriculture, were served by a state supply system, which delivered inputs in centrally planned quantities and provided financing through state banks. The farms paid lower prices for inputs than the manufacturers' wholesale prices, and the difference was covered from the national budget. The relative input/output prices were kept fixed, favouring agricultural producers at the expense of industrial manufacturers as another way of subsidising agriculture. Price liberalisation after 1991 aligned the terms of trade in agriculture with the average world level.

The inevitable rise in the relative prices of farm inputs led to shrinking machinery stocks and extensification of production, significantly jeopardising the potential for growth. The declining demand for inputs affected the supply of domestically manufactured farm machinery, while fertiliser manufacturers shifted to exports, reducing their dependence on the domestic market. It is only after the 1998 financial crisis that agricultural recovery has spurred a renewed demand for farm inputs leading to a certain growth in domestically manufactured machinery.

## **SUPPLY OF FARM INPUTS**

Farm machinery and fertiliser manufacturing in Russia are highly concentrated industries. Thus, five plants produce nearly 90% of tractors, and just two plants produce 95% of grain harvesters. In the fertiliser industry, 10 manufacturers produce 74% of nitrogen fertilisers, four manufacturers produce more than 70% of phosphorus fertilisers, and just two plants produce the total output of potassium fertilisers. The concentration trend in the farm machinery industry is continuing, as the giant machinery manufacturers have recently begun creating vertical and horizontal holding structures, probably in anticipation of impending competition from importers. Sales of farm machinery are also highly concentrated: in 1999–2000, fully 75% of the market was controlled by Rosagrosnab (a former state monopoly privatised in the mid-1990s) that operated jointly with the regional



administrations; the remaining 25% were sales through agroholdings and other corporate farms. Since 2000 the market share of Rosagrosnab and regional governments has dropped to 55%, primarily due to rapid growth of agroholdings and corporate farms as channels for machinery sales. Independent dealer and service networks also began to develop in 2000, after Rosagrosnab had lost its monopolistic position. These initiatives often followed reorganisation and management shakeup in the manufacturing plant, or takeover by a new investor (as in the Rostov and Krasnoyarsk farm machinery plants). Up to 1999, the standard payment mechanisms were mutual account offsets or barter deals. Since 1999, virtually all payments have shifted to bank transfers.

Alongside the giant tractor and harvester manufacturers there is a group of medium and small plants that manufacture a broad range of farm equipment (mini-tractors, hitched implements, spare parts and components) and accept repair and maintenance contracts. The sales channels of these medium and small manufacturers are much more diversified than those of the giant tractor and harvester plants (Table 1). They began creating own dealer and service networks earlier than the giant manufacturers, probably because their products were never entitled to government support. The wider range and the generally lower cost of equipment manufactured by the medium and

**Table 1:** Sales channels of medium and small machinery manufacturers (percent by volume)

	1998	1999	2000	2001
<i>Mini-tractors</i>				
Regional administration			6	5
Dealers		6	10	8
Commercial firms	5	13	23	19
Corporate farms	33	2		
Peasant farms	32	31	21	17
Household plots	30	38	40	51
<i>Hitched implements, trailers, etc</i>				
Regional administration			4	5.5
Dealers		5	9	9.5
Commercial firms	26	20	20	22
Corporate farms		2		
Peasant farms		25	17	20
Household plots	74	48	50	43
<i>Spare parts, components, assemblies</i>				
Rosagrosnab	90	95	28	40
Dealers			20	10
Commercial firms	10	5	52	50

Source: 2001 AFE survey

**Table 2:** Structure of payments for medium and small machinery manufacturers

	Percent of respondents	Trend
Bank transfers	60	Increasing
Cash payments	17	Increasing
Barter	16	Decreasing
Other	7	Decreasing

Source: 2001 AFE survey

small plants have also resulted in a greater diversity of payment arrangements (Table 2). These manufacturers accept cash payments and continue to rely on barter deals.

During the Soviet period, Belarus and Ukraine were Russia's main sources for farm machinery. After the dissolution of the Soviet Union, imports from countries outside CIS have increased substantially, and in the late 1990s the share of imported tractors was 67%. High price is the main obstacle to wider penetration of imported machinery in Russia. Thus, an imported tractor costs 50% more than a tractor assembled in Russia or CIS. Imported machinery usually has a significant quality advantage, but the cost/benefit ratio still remains better for domestic machinery. Moreover, federal and regional subsidies are available only for domestic machinery. Three major international companies (John Deere, Case, and Claas) are vitally interested in expanding their market share in Russia. So far, however, their attempts to launch manufacturing or assembly plants have not been successful.

Russia is one of the leading fertiliser manufacturers and exporters in the world. It ranks first, second, and fifth in world exports of N, P, and K fertilisers, respectively. About 85% of Russia's fertiliser output is exported and only 10% is sold domestically (the remainder is used for further processing). Similarly to farm machinery, the fertiliser industry has experienced a significant growth since 1998. This growth, however, has not been in response to demand recovery: it is attributable to advantageous world prices and the entire additional output is exported.

All fertiliser plants have been privatised, except those in Bashkiria and Tatarstan. The 2001 AFE survey has shown that in state-owned enterprises the domestic sales are mainly to the regional administration. Private fertiliser manufacturers, on the other hand, sell very little to regional administrations and most of their domestic sales are directly to agricultural producers, without any intermediaries (Table 3). Export accounts are naturally settled by bank transfers (Table 4). Domestic sales, on the other hand, are predominantly in the form of barter transactions (eg, 'fertiliser for grain').



**Table 3:** Sales channels of private fertiliser manufacturers (percent by volume)

	1998	1999	2000	2001
Regional administration	0.05	0.14	0.08	0.05
Corporate farms	5.5	6.7	4	3
Peasant farms	0.02	0.03	0.04	0.04
Exports	94.4	93.2	95.8	96.9

*Source:* 2001 AFE survey

**Table 4:** Structure of payments for private fertiliser manufacturers

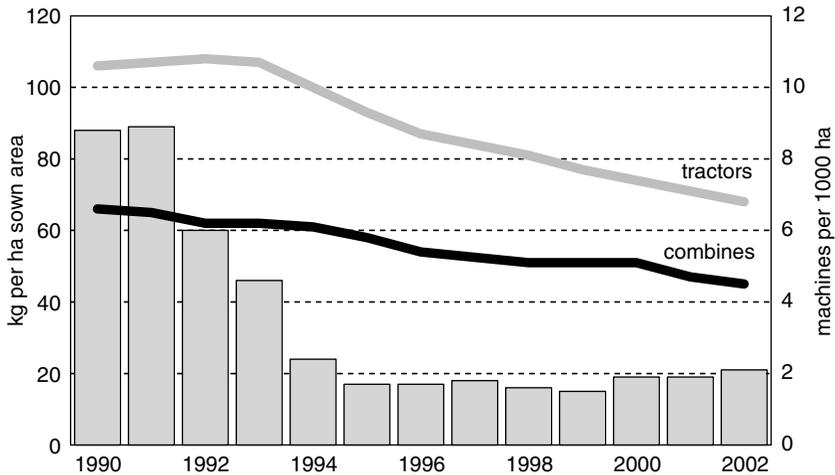
	Percent of respondents	Trend	Prices received
Bank transfers	94	Increases	Lowest
Cash payments	0.1	Decreases	Lowest
Barter	5.9	Decreases	Highest

*Source:* 2001 AFE survey

## DOMESTIC DEMAND

With the onset of market reforms in the early 1990s, agriculture was faced with a severe cash crunch, which bordered on a total financial collapse. Lack of financial resources constrained the purchase of farm inputs, and purchased inputs began to be replaced with land and labour. Land was treated as a free input because of the prohibition of land sales and the long-standing Marxist tradition that did not attach any costs to the use of land; labour was relatively cheap because of the rapid and uncontrolled slippage of agricultural wages (Bogdanovskii, 2005). Russian agriculture was thus launched on the dangerous path of decapitalisation and extensification. The stock of tractors and combines has decreased sharply since 1990; the consumption of fertilisers – the main factor sustaining intensive agricultural production – dropped by a staggering 85% between 1990 and 2002 (Figure 1).

However, price increases have also encouraged a more efficient use of purchased inputs. In the Soviet era, fertiliser losses on farms reached 40% of deliveries, while farm machinery had a very short lifetime because of low quality, careless exploitation, and poor maintenance. Today, all the fertiliser delivered to the farm is actually applied; farm machinery remains in use for a much longer time, and old equipment is often cannibalised for maintenance and repairs. The reduction of fuel and power consumption in agriculture outstripped the decrease in production: while agricultural gross product decreased by 40% between 1991 and 2001, the use of gasoline dropped by



**Figure 1:** Fertiliser consumption (kg per hectare of sown area) and machinery availability (pieces of machinery per 1,000 hectares) for corporate farms, 1990–2002.

Source: Goskomstat, various years

76%, diesel fuel by 63%, and electric power by 51%. These numbers also point to a more efficient use of purchased inputs in agriculture.

In the mid-1990s, growing liquidity constraints and high indebtedness of agricultural producers led to proliferation of various barter arrangements for provision of farm inputs. Federal and regional programmes offer various commodity credits, while traders and processors provide inputs to farms that supply them with produce and raw materials. Even though the farms do not purchase these inputs directly for themselves, the credit commodity arrangements actively influence the market demand for inputs by channeling the actual purchases through market intermediaries. Another active channel for the purchase of farm machinery and other inputs began to develop in 1998 in the form of vertically integrated agroholdings, which purchase these factors of production for their affiliated farms.

An opposite effect on demand for farm machinery can be traced to changing patterns of machine use in Russian agriculture. In the past, it was taken for granted that each farm had to have a full complement of machinery as prescribed by its technology, land endowment, and the cropping cycle. Even machinery that was needed for a very short time during the year had to be acquired and held by the farm. To this very day, the Ministry of Agriculture continues to calculate sufficiency and shortage of farm machinery based on this ‘total coverage’ approach. And yet this is no longer necessary, because various commercial entrepreneurs (both domestic and foreign) are offering





plots. Peasant farms show a higher frequency of input purchases for most inputs (Table 5). Two notable exceptions are animal feed and mechanical field services. Virtually all household plots purchase animal feed because of their high reliance on livestock production and their small size (leading to insufficient capacity for feed production). Very few households have farm machinery of their own, and this in turn explains the high frequency of household plots that purchase mechanical field services (ploughing, tilling, harvesting). The availability of machinery is highest among the corporate farms, which apparently continue to use the old machinery stocks accumulated during the Soviet period, while peasant farms rely on new machinery acquired during the last decade. Still, 85% of peasant farms have at least one piece of motorised machinery (a tractor, a harvester, a feed combine, or a truck). Overall, the data in Table 5 seem to suggest that the use of purchased inputs increases with the increase of farm size from household plots to corporate farms.

In sharp variance with the Soviet practice, the state no longer plays a major role as a supplier of farm inputs. The share of input purchases from regional authorities is very low (Table 6). The emphasis has shifted to

**Table 6:** Supply channels for corporate and individual farms (percent of inputs purchased from each channel)

	Gasoline		Diesel fuel	
	Corporate	Individual	Corporate	Individual
Regional government	1	4	2	3
Gas station	35	85	23	55
Trade	28	8	30	24
Buyer	20	2	28	4
Mother company	2	–	2	–
Other	14	1	15	14
Total quantity	100	100	100	100

	Fertiliser		Machinery <sup>a</sup>		
	Corporate	Individual	Corporate	Individual	
Regional government	4	1	Leasing	28	21
Gas station	16	17	Manufacturer	14	0
Trade	68	76	Trade, dealers	24	35
Buyer	6	2	Buyer	0	3
Mother company	2	–	Mother company	15	–
Other	4	3	Other farms (used)	19	41
Total quantity	100	100	Total	100	100

<sup>a</sup> Percentage of all reported machinery purchase transactions in the sample (104 transactions for corporate farms, 34 transactions for individual farms).

Source: 2003 BASIS survey



commercial trade channels. These include wholesalers, fertiliser manufacturers, and gas stations. The reliance on commercial suppliers is greater for individual farms (the table combines peasant farms and household plots into one category). Corporate farms have access to two new supply channels that appeared during the 1990s: they receive inputs from buyers of agricultural commodities (dairy and meat processors, vegetable marketers, grain elevators) and also from ‘mother companies’, that is, commercial holding companies that acquire farms as part of their business strategy (Rylko and Jolly, 2005). The reliance on the ‘mother company’ is particularly noticeable for machinery purchases, where fully 15% of the reported transactions are organised in this novel way.

The share of inputs purchased through the mother company is substantially higher in Rostov Oblast, which is a ‘hotbed’ of agroholding activity (Rylko and Jolly, 2005). Thus, holding structures supply 16% of gasoline, 7% of diesel fuel, and 9% of fertilisers to corporate farms in Rostov Oblast (compared with about 2% of these inputs in all the three oblasts surveyed). Together with inputs supplied by buyers of agricultural commodities, the share of vertical integration arrangements in Rostov Oblast approaches 40% of the total quantity of purchased inputs. These new channels may be regarded as part of a trend toward vertical integration of input supply and agricultural production, which has become possible only with progress in market reforms.

The payment arrangements in the survey are primarily cash and bank transfers, with individual farms emphasising cash transactions to a greater extent than corporate farms (Table 7). The prevalence of barter transactions, which characterised the early 1990s, is gone. Mutual offsets of payables and receivables – another payment method that emerged in the atmosphere of

**Table 7:** Forms of payment for fertilisers and machinery in corporate and individual farms

	Fertiliser <sup>a</sup>		Machinery <sup>b</sup>	
	Corporate	Individual	Corporate	Individual
Commodity credit	9	7	8	5
Barter	6	2	4	5
Cash	25	54	22	66
Bank transfers	51	34	51	24
Mutual offsets	9	3	16	0
Total quantity	100	100	100	100

<sup>a</sup> Percent of quantity purchased, as reported by 98 corporate farms and 138 individual farms.

<sup>b</sup> Percentage of all reported machinery purchase transactions in the sample (104 transactions for corporate farms, 34 transactions for individual farms).

Source: 2003 BASIS survey



severe cash shortages at the beginning of the reform – is still practiced by corporate farms for 10%–15% of their purchases, but practically by none of the individual farms.

Despite anecdotal claims, there is no evidence of price discrimination against individual farmers in input markets. On the contrary, individual farms surveyed generally appear to pay lower prices for inputs than corporate farms, but the differences in most cases are not statistically significant. Only the prices of diesel fuel and concentrated feed are statistically significantly lower for individual farms (but only by about 5%–10%). This may be due to the fact that individual farms purchase these inputs at market prices, whereas corporate farms often receive diesel fuel and concentrated feed as part of government commodity credit programmes, which charge a higher markup.

## **GOVERNMENT SUPPORT PROGRAMMES FOR PURCHASED INPUTS**

Reimbursement of input purchase costs is one of the main tools of government support to agricultural producers. One-third of the agricultural support funds in the federal budget is earmarked for input cost reimbursement. Oblast budgets supplement this allocation in varying degrees depending on regional policy priorities. Cost reimbursement programmes include subsidies for fertilisers, fuel, electric power, elite seeds, and breeding livestock. Soil amelioration activities are also entitled to government support. An important segment of agricultural subsidies consists of programmes that partially reimburse the interest expense of producers on commercial loans (this is the only form of credit subsidy in Russia today). Another category of support programmes provide medium-term loans that allow machinery leasing. These loans are administered by regional leasing monopolies subordinated to the state leasing agency Rosagrolizing and do not go through the government budget (Yastrebova, 2005).

The various support programmes – both federal and regional – typically incorporate conditions that severely restrict the functioning of input markets. Thus, to be entitled to federal subsidies for fertiliser purchasing and machinery leasing, the producer must deal with suppliers and manufacturers from a limited list approved by the government. Most regional support programmes incorporate similar restrictions, although some oblasts with relatively liberal policies (most notably, Vologda and Perm) allow producers to sign contracts with any supplier. Fuel subsidy programmes often take the form of commodity credits, stipulating payment by delivery of farm products (eg, grain) to federal or regional stocks.



The effectiveness of support programmes can be assessed (at least in principle) by comparing the subsidised prices with general market prices. An attempt has been made to conduct such a comparison for the corporate farms in the 2003 BASIS survey. The results are summarised in Table 8 in the form of percentage differences between the subsidised prices and the market prices: positive differences indicate that subsidised prices are higher than market prices (ineffective subsidies), whereas negative differences indicate that subsidised prices are lower than market prices (effective subsidies). We see from the table that input subsidies have a mixed effectiveness record across inputs and across regions. In Rostov Oblast, most subsidised prices appear to be higher than market prices; only the price of leased tractors is less than the market price (the price of subsidised gasoline is essentially equal to market price). In Nizhnii Novgorod Oblast, on the other hand, subsidised fertiliser and fuel are cheaper, while leased tractors are more expensive. In Ivanovo Oblast, subsidised diesel fuel is cheaper, leased harvesters are more expensive, while the price of subsidised gasoline and leased tractors is essentially equal to the market price (there are no general fertiliser subsidies in Ivanovo). As we have noted previously, this price information is highly unreliable: it is based on very small numbers of respondents and suffers from large data errors. Yet even this crude evidence is sufficient to raise serious doubts concerning the effectiveness of input subsidy programmes. There is clearly a strong need for a careful analytical assessment and revision of the existing support mechanisms.

Since detailed examination of input subsidies produces such a mixed picture, we have combined several characteristics of regional support programmes into a single index that can be used to rank the oblasts by the level of administrative intervention in agriculture (Table 9). Vologda, Nizhnii Novgorod, and Perm appear to be the most liberal oblasts, characterised by the lowest government intervention level. The agricultural policies of

**Table 8:** Subsidised input prices compared with market prices for corporate farms in three oblasts<sup>a</sup>

	Rostov	Ivanovo	Nizhnii Novgorod
Fertiliser	+5.9	NA	-9.8
Gasoline	-0.3	+0.1	-4.3
Diesel fuel	+5.5	-3.1	-4.1
Tractors	-5.1	0.0	+46.4
Grain harvesters	+47.8	+91.0	NA

<sup>a</sup> Price differences in percent:  $\pm$  according as subsidised price higher/lower than market price.

NA: not applicable.

Source: 2003 BASIS survey



**Table 9:** Scores for level of administrative interventions in agriculture and regional wealth in selected regions 2002 (0 – lowest, 3 – highest)<sup>a</sup>

	Vologda	Nizhnii Novgorod	Perm	Ivanovo	Rostov	Chivashia	Chelyabinsk
Intervention level	0.39	1.01	1.02	1.59	1.67	2.20	2.78
Regional wealth	2.75	2.26	3.00	0.00	1.55	0.81	2.05

<sup>a</sup> Intervention level score based on number of support programmes for general services; share of agricultural budget expenditure on food funds; number of restrictive government decisions affecting agriculture. Regional wealth score based on share of transfers from federal budget in regional budget revenues; gross regional product per capita; ratio of average per capita income to minimum standard of living.

*Source:* Calculated by the authors from data provided by regional and federal statistical organs and by the Russian Ministry of Finance

Chuvashia and Chelyabinsk, on the other hand, are highly interventionist. Ivanovo and Rostov fall somewhere in the middle on the administrative intervention scale. Table 9 also shows that, on the whole, rich regions adopt liberal agricultural policies, while poorer regions are more interventionist. This result is based on a very small non-representative sample of 7 out of 77 Russian regions and perhaps we should not be surprised that it is not entirely consistent with other published findings, which usually indicate that agriculturally rich regions are more conservative in their policies. As a result of the different analytical definitions used in these studies, the relationship between agrarian policies and regional wealth requires further study.

## CONCLUSION

In parallel with the development of markets for farm products, we are witnessing the emergence of new market channels for farm inputs. The state no longer has a role as a direct supplier of inputs to agricultural producers. This function has shifted to wholesalers, traders, and manufacturers, who sell mainly for cash and bank transfers, not barter. The strong imperfections that still prevail in input markets have encouraged vertical integration, with fertilisers, fuel, and machinery delivered in substantial quantities through internal channels of large holding structures.

Fuel is the one input that is purchased by most producers. Fertiliser purchases are reported less frequently, whereas seeds and animal feed are mostly used from own production (despite lower quality). It seems that cash shortages are forcing farms to substitute land and labour – the two cheapest factors of production – for some purchased inputs (fertilisers, seeds, feed), a



process that inevitably leads to extensification of farm production and abandonment of productivity improving technologies.

Although the government no longer delivers farm inputs, it has a strong negative influence on input markets through a wide range of federal and regional support programmes. Government-sponsored leasing programmes with their restrictions of approved suppliers and models have created severe obstacles to the development of dealer networks, which will have a detrimental effect on the competitiveness of Russian manufacturers in the long run. The cost reimbursement policy for fertilisers only increased the demand for this input and encouraged the export-oriented manufacturers to raise prices in the domestic market. In regions characterised by lower levels of government intervention we are witnessing significant growth of competitive trading in both machinery and fertilisers.

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