

## Russia: The Market of Purchased Inputs for Agriculture<sup>43</sup>

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### 20.1. Introduction

The Soviet Union was one of the largest producers of agricultural inputs; however, the degree of agrarian sector capitalization remained rather low. The quality of machinery, ways of input distribution to collective and state farms, and also ways of their exploitation, caused an extremely inefficient use on farms. The input/output price ratios established by the state demonstrated to farms a cheapness of received inputs, which also led to the irrational use of them. Price liberalization has caused price ratios to reach world prices. Together with other processes during economic reforms, the rise in input prices has made them unapproachable to agricultural producers in the long term, which in turn led to the de-capitalization of the sector and a reduction of its potential recovery.

State support from the very beginning of the reforms was aimed at compensating farms for the rise in input prices. The considerable means of federal and regional budgets were disbursed for various compensation programs: for use of fuels and lubricants, for fertilizers, for machinery, for heat, and mixed fodder (for some kinds of producers). The prices for electricity and transport were reduced by cross-subsidizing agriculture. However, the efficiency of these measures has appeared to a great extent to be inefficient: de-capitalization of the sector did not slow down.

Against this background, the degradation of input manufacturers, first of all of machinery building, has begun. Mineral fertilizer manufacturers were an exception: they have become an export-oriented sector and do not depend as much on internal demand.

The growth begun in 1999 in the agri-food sector became the cause for growth in the demand for inputs. This in turn has resulted in a rather rapid increase in production of agricultural machinery in Russia. The increasing production of machinery faces institutional backwardness in the input markets and some other problems. The given market is rather badly studied in the literature, i.e., the available articles are predominantly descriptive in nature. The purpose of the present paper is to describe the state of the art of the market for agricultural machinery, fertilizers, and fuels and lubricants; and also to develop a methodology for further research of these markets.

### 21.2. The Characteristics of Internal Demand

#### 23.2.1 The Causes of the De-capitalization of Agriculture

With the beginning of economic reforms, the agrarian sector has been confronted with a whole set of the factors that sharply limited its financial capabilities and actually put it in the state of financial collapse. The basic causes of this were rooted in the

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previous agrarian policy. First of all, all relative prices in the agri-food chain were artificially biased for the benefit of agriculture. The price liberalization of 1992 has resulted in a leap of price ratios toward world prices. Later on, approximately since 1994, (Ошибка! Источник ссылки не найден.), the price increase has become more or less parallel -- the sharp price disparities were not observed any more (Ошибка! Источник ссылки не найден.).

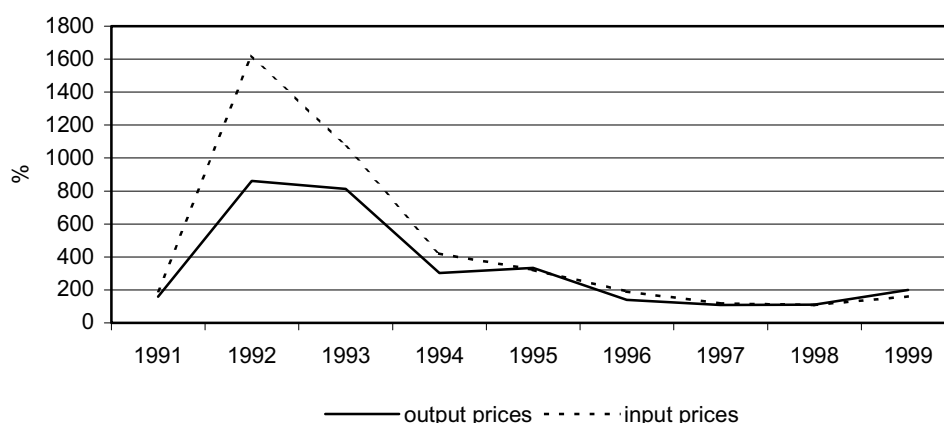
**Table 25. The relative agricultural prices in Russia and the USA**

|                            | 1992  | 1993  | 1994   |
|----------------------------|-------|-------|--------|
| Tractor (70-90 HP) / grain |       |       |        |
| Russia                     | 29-34 | 67-72 | 91-135 |
| USA                        | N/A   | 243   | 228    |
| Truck / grain              |       |       |        |
| Russia                     | 36    | 61    | 107    |
| USA                        | 195   | 208   | 198    |
| Mineral fertilizer / grain |       |       |        |
| Russia                     | 0.2   | 0.5   | 1.2    |
| USA                        | 1.5   | 1.4   | 1.3    |
| Diesel / grain             |       |       |        |
| Russia                     | 0.7   | 1.6   | 2.4    |
| USA                        | 2.2   | 2.1   | 1.7    |
| Gasoline / grain           |       |       |        |
| Russia                     | 0.9   | 1.8   | 2.7    |
| USA                        | 3.5   | 2.8   | 2.4    |
| Gasoline / beef            |       |       |        |
| Russia                     | 0.3   | 0.3   | 0.4    |
| USA                        | 0.3   | 0.2   | 0.2    |

Source: Ministry of Agriculture of the Russian Federation.

However, in one to two years, farms were actually deprived of working capital. Replenishment of working capital is possible if there is an effectively operating credit system. In the initial stage of reforms, there was no such credit. Although the banking system was already reformed at that time, nevertheless hyperinflation and the high interest rates connected with it, and the short terms of the loans, made credit (even seasonal) practically unapproachable for agriculture.

**Figure 8. Changes in the relative prices in agriculture (annual indexes of the output and input prices)**



Source: Computed with the data of Goskomstat.

In addition to this, price liberalization meant as well a sharp reduction of the purchasing power of the population, and therefore, demand for agricultural products. Foreign trade, which was liberalized before 1992, opened the domestic market to imported foodstuffs. The government withdrew from the agri-food distribution field in the first days of the reforms; market infrastructure that would be capable to substitute for the Soviet distribution system was not yet put in place. Under these conditions, imports began to displace domestic producers from the domestic market. As a result of the loss in working capital, farms started to lose revenues, which complicated their financial position even more.

On top of it all, the structural reforms, which together were badly organized and were explained to the population and management at the same time when they began, actually disoriented the managers of farm enterprises. Unprepared to new economic conditions, the managers kept managing in their former ways, which in the majority of cases was pernicious for farms.

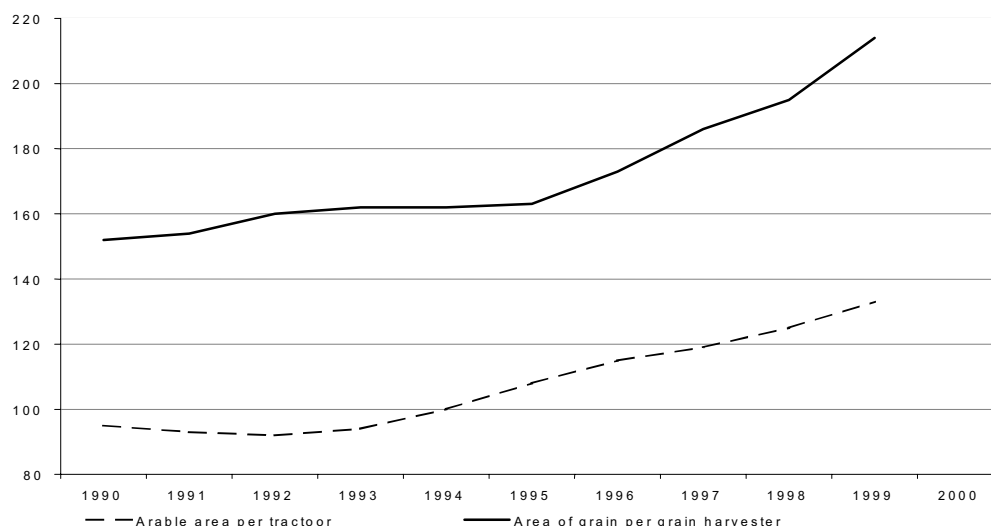
Land, which was not yet put into turnover and had not become recognized for its *de facto* value, was (and generally remains) a free input for farms. The exuberant labor force became precipitately cheaper. All this together led to the result that purchased inputs were substituted by labor and land. Continuing for almost 10 years, this state of the sector has led to its severe de-capitalization, which in its turn, has reduced the liquidity of existing farm enterprises, their credibility, and their ability to get loans using property as collateral (for example, agricultural machinery).

Since 1990, there has been a constant numerical decrease in tractor and harvester inventories on farms and the application rate of mineral and organic fertilizers, one of the major factors in intensive agricultural production. The harvested area per grain harvester in Russia has increased on average from 152 hectares in 1990 to 214 hectares in 1999; arable area per tractor also has increased from 95 hectares to 133 hectares during the same period (**Ошибка! Источник ссылки не найден.**).

Inventories of agricultural machinery have steadily declined for the last few years, though the rate of reduction in 2000 slowed down a little (**Ошибка! Источник ссылки не найден.**).

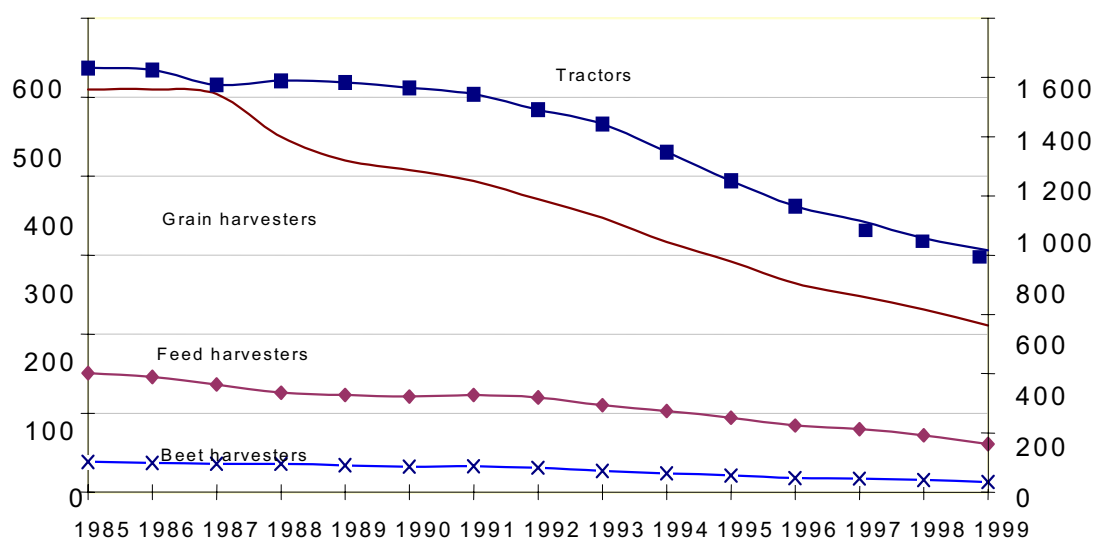
Besides accumulated indebtedness, budgetary debt has led to the situation where even purchases of farm machinery are claimed by the taxing authority to pay off debts.

**Figure 9. Cultivated area per one tractor and one grain harvester, 1990-1999, hectares/unit**



Source: Grain union.

**Figure 10. Inventories of agricultural machinery, 1985-1999, thousand units**



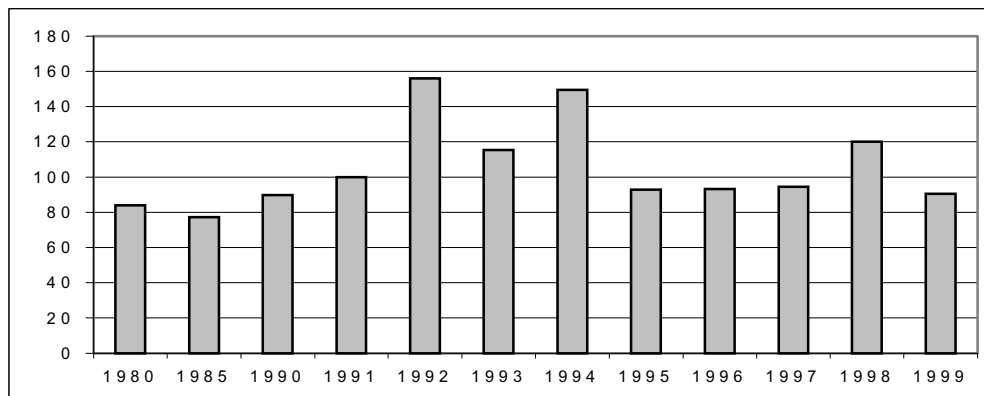
Source: Goskomstat.

### 24.2.2 Productivity of Inputs Use

The rise in input prices during the reforms has resulted not only in the de-capitalization of the sector, but also in the increase of productivity of purchased inputs. It is known that in the Soviet economy, almost the entire annual tractor output was utilized for the replacement of tractors depreciation on the farms. This suggests that machinery was not used on farms, which in turn testifies to their low quality and to careless use. Only up to 80 percent of delivered mineral fertilizers were actually

applied, and since the applications were implemented in a most inefficient way, up to 40 percent of applied fertilizers was lost. Today, once purchased, fertilizers at least are unconditionally applied (**Ошибка! Источник ссылки не найден.**).

**Figure 11. Use rate of mineral fertilizers (share of applied fertilizers in bought fertilizers, percent)**



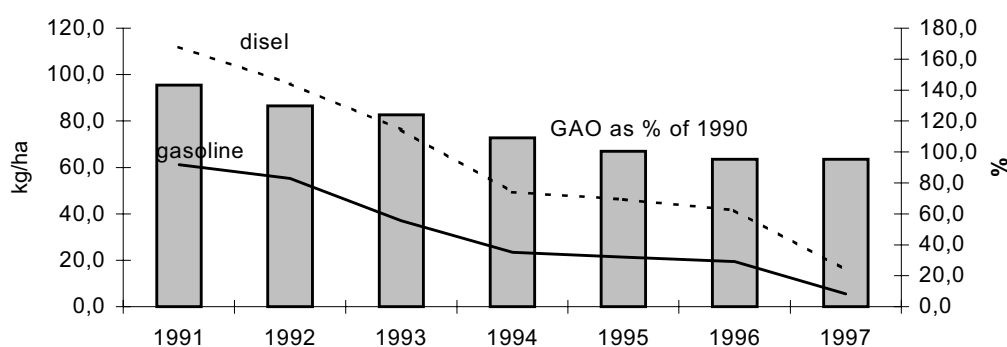
Source: Computed with the data of Goskomstat.

While sown area was reduced by 6 percent from 1991 to 1999 and gross agricultural output (GAO) by 40 percent, consumption of automotive gasoline for the same period was reduced by 81 percent, diesel fuel by 74 percent, electric power by 51 percent. This shows that there has been rational usage on farms<sup>44</sup> (**Ошибка! Источник ссылки не найден.**).

Ratios of land and labor per unit of GAO were growing slightly during the reform years, while ratios of purchased inputs (such as fuel and fertilizers) were falling. In other words, the rate of decrease in production was less than the rate of reduction in the volumes of input use. The same sown area produced much less total harvest because of the sharp reduction in the application of fertilizers, means of plants protection, and elite seeds; however, the same volume of labor and land and almost the same machinery were kept in use. Thus, production became more and more extensive (**Ошибка! Источник ссылки не найден.**).

<sup>44</sup> It is necessary to take into consideration some statistical phenomenon. Statistics of petroleum products and energy use count only use on the farm enterprises for production purposes. In some cases, more than 50 percent of GAO is produced in households and individual farms, but the use of petroleum products and energy for these farms is not calculated. Therefore, the fall in use of inputs per unit of GAO is a little overestimated.

**Figure 12. Indexes of GAO (as percent to 1990) and gasoline and diesel fuel use per hectare of sowing area**



Source: Computed with the data of Goskomstat.

**Table 26. GAO per unit of selected inputs**

|                                 | 1991  | 1992  | 1993  | 1994  | 1995  | 1996  |
|---------------------------------|-------|-------|-------|-------|-------|-------|
| Cropped area, 1000 RUR/hectares | 0.84  | 0.77  | 0.75  | 0.71  | 0.67  | 0.64  |
| Employed, 1000 RUR/person       | 10.05 | 8.74  | 8.36  | 7.21  | 6.90  | 6.48  |
| Tractors, 1000 RUR/unit         | 72.76 | 68.45 | 68.06 | 64.61 | 65.05 | 64.14 |
| Harvesters, 1000 RUR/unit       | 0.20  | 0.24  | 0.24  | 0.23  | 0.23  | 0.24  |
| Fertilizers, 1000 RUR/t         | 9.65  | 16.05 | 22.81 | 53.07 | 45.53 | 39.69 |
| Gasoline, 1000 RUR/t            | 9.20  | 9.39  | 13.61 | 20.08 | 20.70 | 21.90 |
| Diesel, 1000 RUR/t              | 5.02  | 5.35  | 6.61  | 9.46  | 9.61  | 10.24 |
| Electric power, RUR/kWh-hour    | 1.38  | 1.26  | 1.22  | 1.21  | 1.29  | 1.30  |

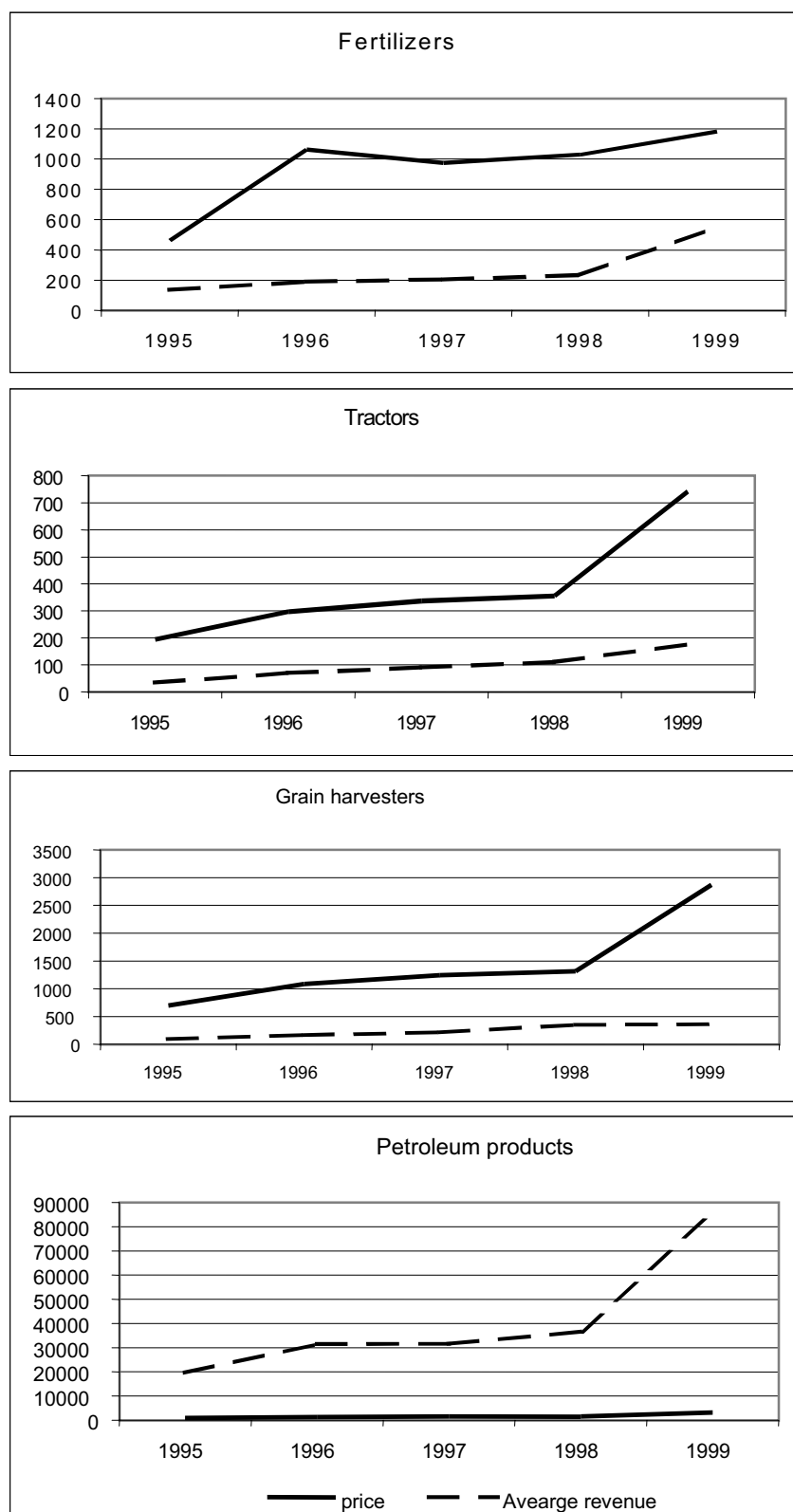
Source: Computed with the data of Goskomstat.

In order to estimate the productivity of inputs in the agrarian sector, we also have compared average revenue of the selected inputs and their average price in the market. **Ошибка! Источник ссылки не найден.** depicts the ratios of average prices of mineral fertilizers, tractors, grain harvesters and petroleum products and their average revenue, computed as the corresponding GAO per unit used. For petroleum products, the application was considered only for diesel fuel and gasoline, while the price also included lubricants. From the Figure, one can see that the factors' revenue was much lower in the second half of the 1990's than their price, except for the average of petroleum products.

From theory, it is known that inputs are allocated efficiently if marginal cost is equal to value marginal product ( $VMP=MC$ ). A production function for all of Russia is necessary to estimate  $VMP$  and  $MC$ . For a large country such as Russia, a set of problems arises, for instance, the problem of homogeneity of this function. In the current phase of our study, we are not ready to address the given problem, therefore we resorted to an approximation. For the average product of the factor ( $AP$ ), we shall consider as a proxy of marginal product (though a more precise assumption is that  $AP > VMP$ ). We shall consider the price of the production factor as a proxy of marginal cost ( $MC$ ). Therefore, **Ошибка! Источник ссылки не найден.** testifies to rather inefficient usage of inputs in agrarian sector. However, the final judging can follow

only marginal analysis which we plan to make in the framework of the future research.

**Figure 13. Comparison of average price and average product for selected inputs in agriculture**



Source: Computed with the data of Goskomstat.

If the ratio of the input marginal cost and its marginal product is opposite, it would be possible to state that this input is underused. In our case, we are faced with the irrational overuse of inputs: the costs per unit of inputs are higher than revenue from this unit. Such a situation is possible only if farms are under soft budget constraints. Below, we shall discuss the program for input cost compensation in agriculture, which will really demonstrate the softness of the budget constraints for the sector.

The situation with petroleum products differs from the situation of other inputs that are reviewed. Having such a price / product ratio, it seems to be reasonable to increase the use of petroleum products in production, thereby increasing profits as average product increases more than costs. But apparently, the complementarity of the factors has an effect: it is impossible to increase consumption of petroleum products, since it is inefficient to increase inventories of tractors and harvesters. In our simplified approach to considering allocative efficiency, neither complementarity nor substitution of inputs is considered.

Apparently, the hardening of budget constraints for producers will lead to more rational inputs use, but it also will cause a decrease in production. Harvey Liebenstein wrote in his famous article about X-efficiency that the welfare effects of reallocating inputs are very small.<sup>45</sup> In our case, it will even cause a dip in production. But it just means that X-efficiency should be increased in Russia's agriculture; it can be achieved by change of the production function, increase in technical efficiency, change of management, etc.

### 2.3 Particularities of Input Acquisition by Farms

In order to understand the major particularities of input acquisition by farms in Russia's agriculture three regions of European part were sampled for survey, that are Pskov, Tambov and Rostov oblasts<sup>46</sup>. The first oblast seems to be strongly marginal in agricultural sense; two others have black soils and good climatic conditions for agricultural production. However, Rostov oblast has the most liberal local agri-food policy while Tambov's agri-food sector is more intensively regulated by the local officials. In each region 11÷25 farms were sampled: all together 32 large-scale farms and 23 private farms were interviewed.

Interviewing the farms we asked them where and with which type of settlements they mostly buy the major inputs – such as fertilizers, plant protection means, seeds, feed, machinery, animals. The survey showed that chemicals and machinery both types of farms acquire from middlemen or (especially in the case of machinery on the manufacturing plants) (**Ошибка! Источник ссылки не найден.**). The pool of the machinery manufactures makes clear that *Rosagrosnab* is the major middleman (see below), so it was a serious intermediate monopoly on this market. However, since the crisis-1998 the farms have become more solvent and have money to pay themselves to the manufacturing plants: purchases from the plants directly have been increasing. It is not surprising that large-scale farms have better opportunity to buy directly from plants as these last ones are prefer to deal with big customer than with small private farm. Relatively high percentage of “other” channels in acquisition of machinery is explained by governmental leasing arrangements. Federal and many of regional

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<sup>45</sup> Harvey Liebenstein, “Allocative Efficiency vs. ‘X-Efficiency,’ ” *American Economic Review* (June 1966), pp. 392-415.

<sup>46</sup> Study was done in the framework of the international project financed by Soros Foundation.



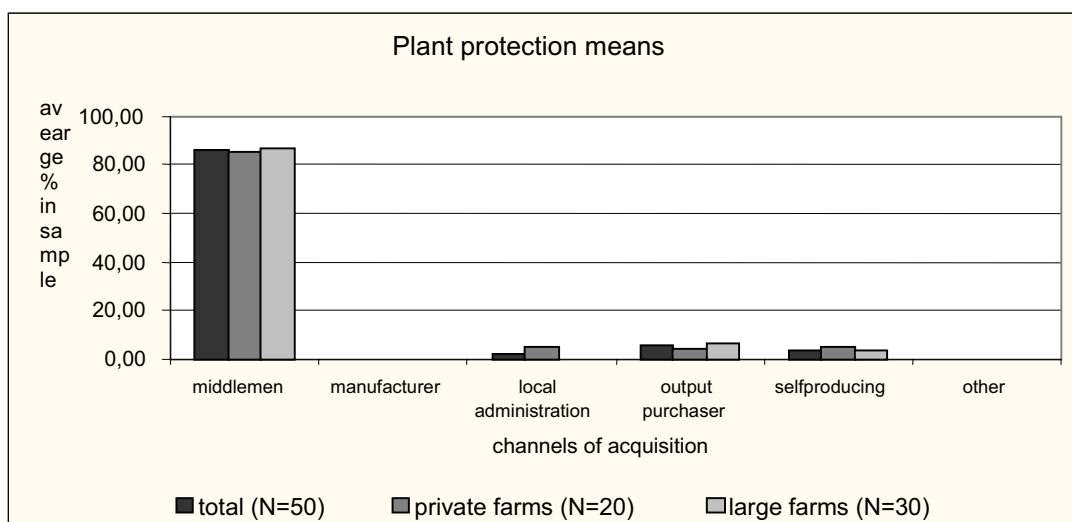
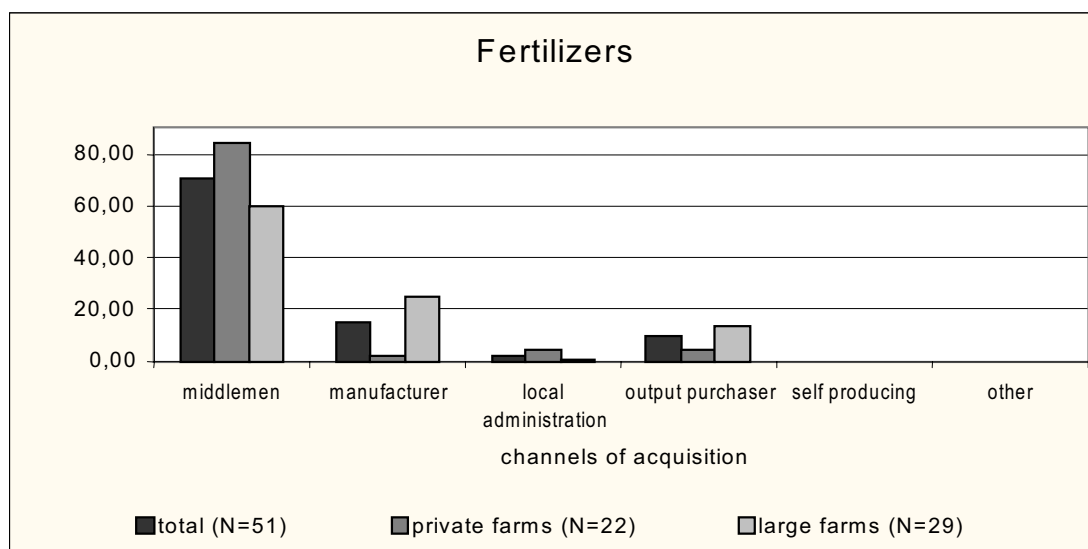
governments run the programme of farm support, which is called “Leasing”(see below). Some private farmers indicated that they got machinery against her asset share when withdrew from the mother large-scale farms. But it is one-time way of getting assets.

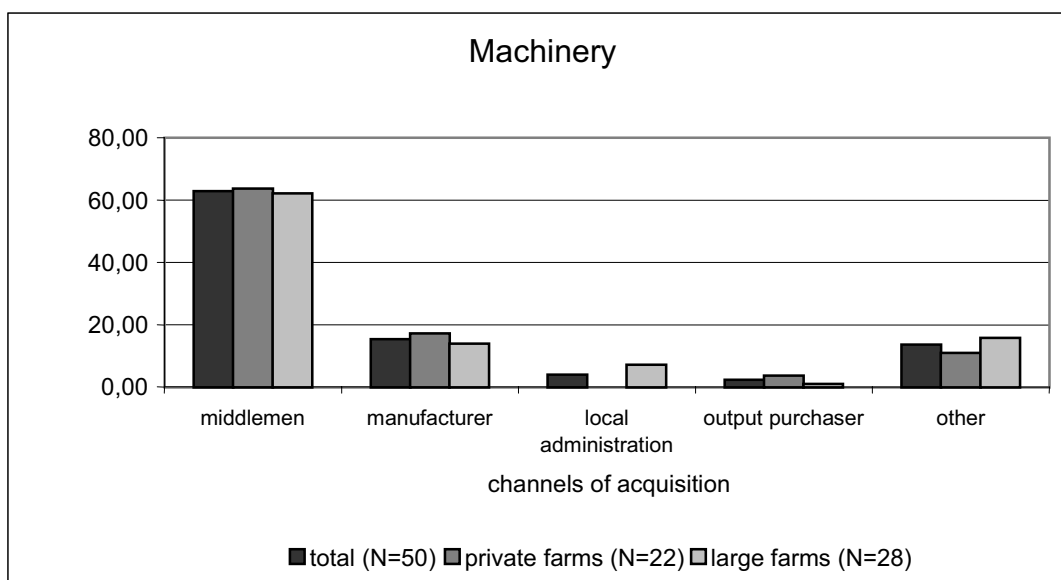
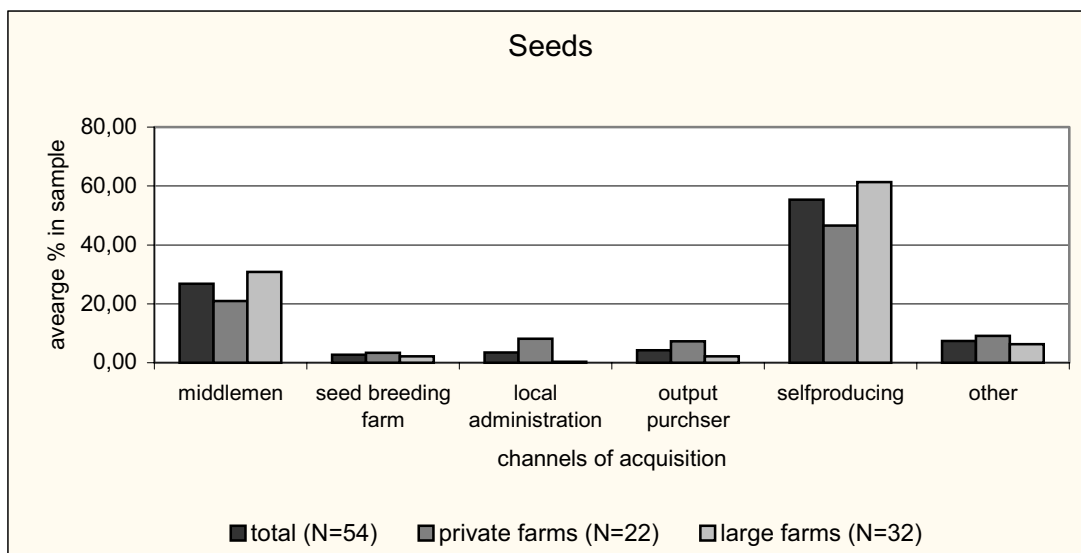
If chemical means and machinery the farms have to buy from outside, the seeds, feed, and remount animals they almost do not buy at all and produce themselves (**Ошибка! Источник ссылки не найден.**). It means quite significant deterioration of technical level of farming. For instance, the farms use their own grain for feeding animals. At the same time, they do not buy additives for this feed, just mill the grain and use it as a feed. Thus, the national output of crushers for such ignorant feed processing has grown by 16 times in the recent years. However, it is obvious that rate of feed conversion in such primitive scheme of fattening is extremely low.<sup>47</sup>

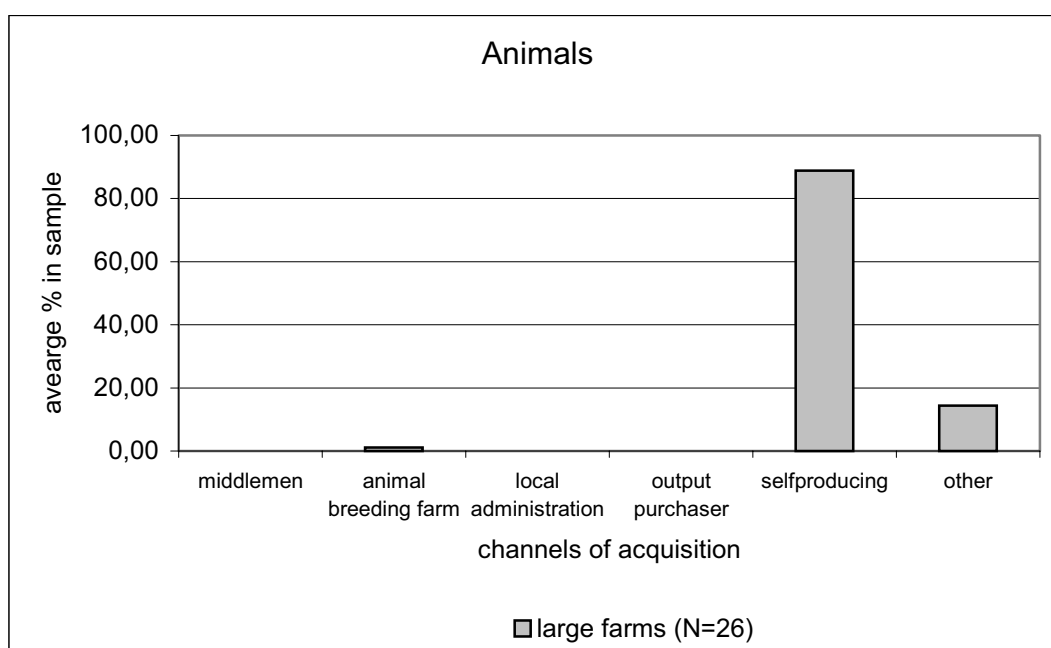
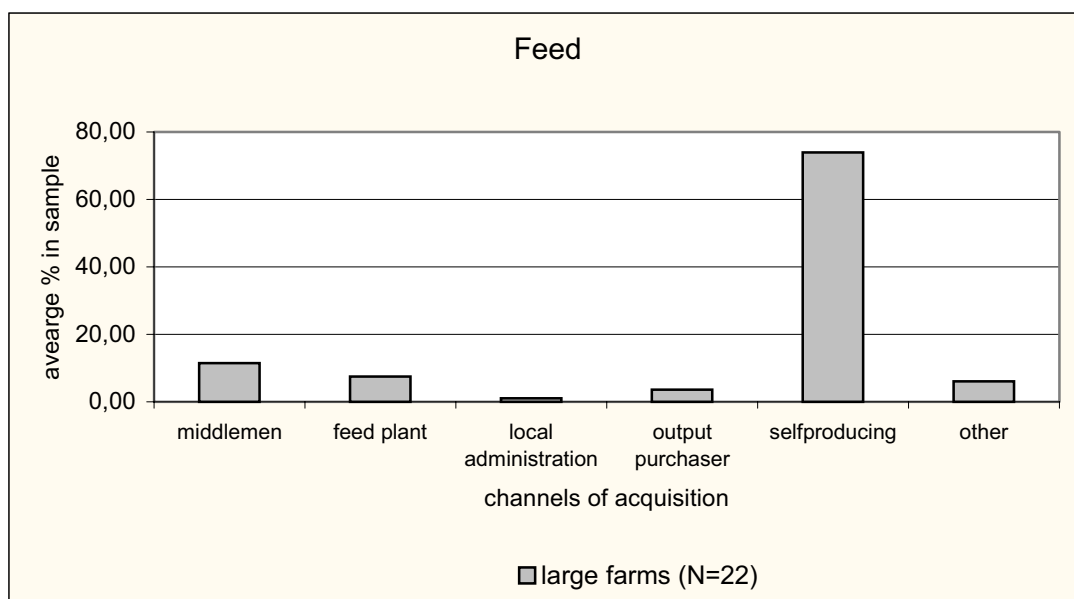
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<sup>47</sup> Our study does not let us information whether this ignorant way of production is a result of unskilled management or because marginal product of industrial feed (mixed feed) is much less that its marginal cost. In the second case the farms' behavior is quite rational.

**Figure 14. Channels of farms' acquisition of major purchased inputs\***





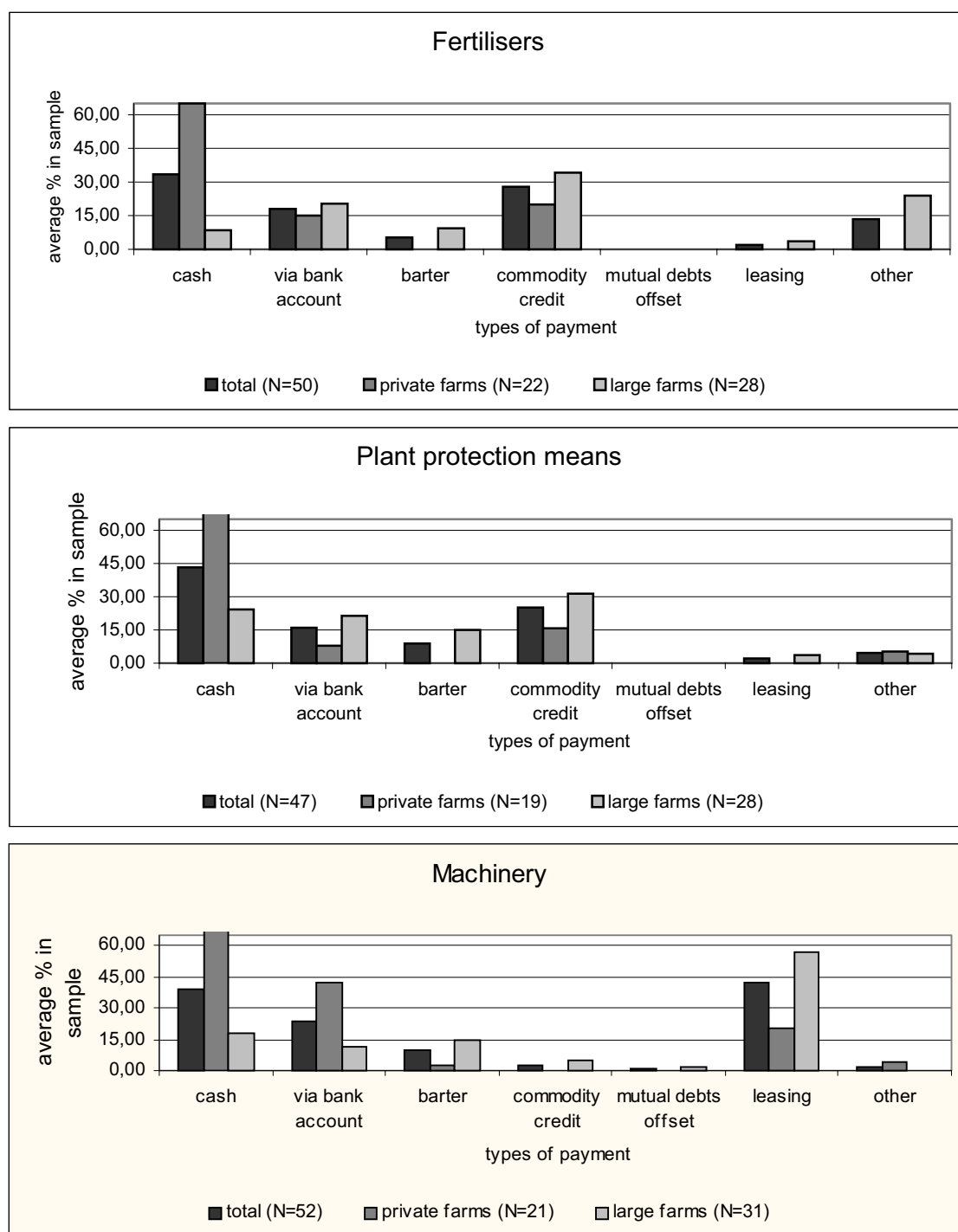


\* - results of survey; N – total number of answers for the question.

It should be noted that the purchasers of the farm product deliver a certain share of inputs to the farms. It is various kinds of commodity credit. Part of that credit is provided in the framework of the governmental (federal and/or regional) commodity credits (see below). **Ошибка! Источник ссылки не найден.** depicts that some of these deliveries are implemented actually in framework of these programs. However, some of these deliveries serve as the indicators of the vertical co-ordination in agri-food chain. Processors and traders faced with the poor market of raw products seek for attaching the producers to them. There are several ways of such vertical co-ordination in current circumstances in Russia, but regarding discussion of channels of inputs acquisition one way is in particular interest: it is deliveries of some inputs to the producer in credit. Data of **Ошибка! Источник ссылки не найден.** display that almost all inputs are delivered to the farms by purchasers except animals. In accordance with theory such vertical integration in food chain is a sign of markets

failure: for purchasers of the raw materials transactions costs on the raw markets are higher than expenses for providing the farms with commodity credit.

**Figure 15. Types of settlements for purchased inputs\***



\* - Results of survey; N – total number of answers for the question.

Another important sign of market failures is diffusion of cash settlements for inputs (**Ошибка! Источник ссылки не найден.**) – 30-40 per cent of settlements are done in cash. Barter deals in 2000 were already significantly diminished after the crisis-1998 (it happened for the national economy as a whole), but prior crisis the barter deals were spread not less than cash deals. These deals are fraught with fraud, tax avoiding and indicates a scope of shadow sector in agriculture.

It is remarkable that the private farms use cash deals much more often than large-scale farms, but on the other side they have much less access to the governmental programs: commodity credits and leasing. The private farms almost do not use barter deals on the contrary with the large-scale farms. Firstly, they have no sufficiently large lots of product for attractive exchange with input sellers. Secondly, barter ratios are normally less favorite for farms and the managers of large-scale farms use barter for rent seeking (barter arrangements are not transparent for the owners of the farm and there is room for fraud).

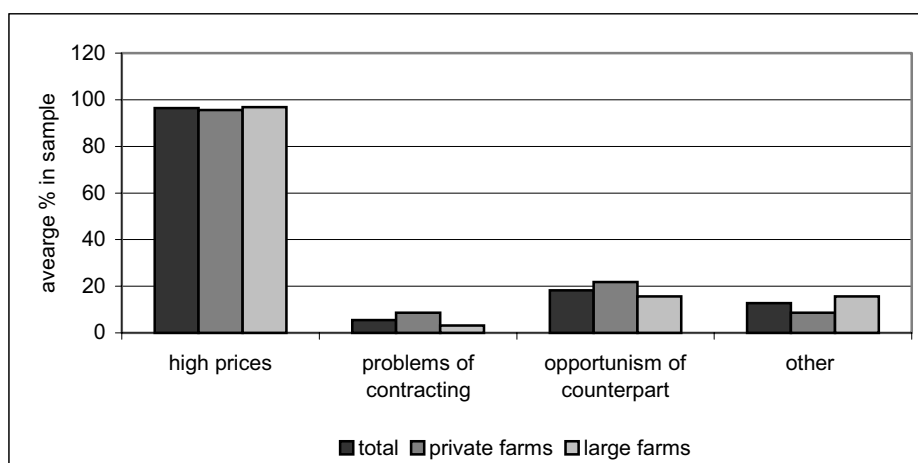
Prior crisis the mutual debt offsets were one of the major kinds of settlements between market agents. There was even a business on arranging such offset chains. Agriculture was not an exception from this practice; the principal difference of this sector from other was that the offset chain normally included budget liabilities to the farms and farms liabilities to the budgets. As the survey shows after the crisis mutual offsets are not used in any significant extent.

Data of **Ошибка! Источник ссылки не найден.** display also the segmentation of the input markets due to the governmental leasing programs: even the large-scale farms acquire less than 60 percent of their machinery via leasing programs and have to buy other more than 40 percent of it on the free market. In accordance with our survey among 29 farms (both private and large-scale) used leasing schemes in 2000 18 farms had acquired machinery via other channels. It means that federal and regional leasing programs together meet the farms' requirements neither in assortment nor in quantities or in assortment and quantities at once.

The sampled farms were also asked what are the major problems they face acquiring the inputs. Their answers are depicted on **Ошибка! Источник ссылки не найден.** One can see that the farms see their major problem in too expensive inputs. As it was shown above an average product of major purchased inputs (fertilizers, tractors, harvesters) significantly exceeds an average price of correspondent input. That means that expensiveness of the inputs is mostly subjective problem for the farms.

It is remarkable that around 20% of farms faced with counterpart's opportunist behavior, and this percentage is higher for private farms than for large-scale farms. Partially it is explained by that fact that the large-scale farms more frequently acquire needed inputs in the governmental supported schemes (leasing, commodity credit programs) where officials serve as a counterpart. On the other side, the smaller private farms are less secure from fraud ceteris paribus.

Among other problems the respondents named most repeatedly low quality of inputs and lack of finance for purchasing (which is the same that high prices of inputs).

**Figure 16. The problems with acquisition of inputs\***

\* - Results of survey.

### 25.2.4 Some Particularities of Demand

The uneasy financial state of the agricultural producers, coupled with indebtedness and blocked accounts, has resulted in the spread of various commodity credit schemes since 1995 (see below). Commodity credits are normally provided by trading firms authorized by the federal or regional bodies (at the expense of the corresponding budgets). However, many trade or processing companies also provide commodity credits to their suppliers of raw materials, which is a form of vertical coordination under scarce raw agricultural products. Commodity credits are provided with inputs in kind. Therefore, such companies demand inputs.

On the other hand, after 1998, vertically integrated holdings -- in which the trade or processing companies act as integrators, gain the rights to land by various ways, and then farm it themselves -- started to develop very rapidly. According to the experts, over 6 million hectares of arable lands is farmed today in this way. Such holdings have become the new mass buyers of agricultural machinery and other farming inputs.

In order to find out the main specifications of this demand, we conducted a small poll among the members of the Grain Union of Russia. The poll has shown the following outcomes.

There are very many grain companies producing grain themselves. This group of the companies consists of small and medium sized trade corporations, the majority of elevators and grain combines, and some representatives of foreign companies. To a word, they say that the elevators and grain combines are not engaged in grain production if they are independent. The representatives of the foreign companies are more and more involved in grain farming (*Cargill, Louis Dreyfus, ASTON* and others purchase inputs and credit the producers with them). Among the large grain houses presented in the Russian market, only *Nidera, Tradingrain* and *Andre* have not joined this process; the last two have greatly reduced their staff in the Russian offices and work on direct contracts for the head offices.

Among the Russian companies, members of the Grain Union's 15 companies positively answered a question on farming land in operations. All companies are going to increase the area in operations. All companies not only produce grain, but also contract with the conventional farms. For this purpose, they use commodity credits. Therefore, their total demand for inputs exceeds the needs of their own

production. All companies purchase domestic agricultural machinery and import from non-CIS countries; imports from CIS countries represent an extremely minor share. Such companies usually do not buy second-hand machinery. Leased machinery also is practically not used; purchases of machinery based upon financial leasing conditions is not widespread. Agricultural holdings prefer to acquire machinery directly for the manufacturers or from their dealers. “Cashless” deals or commodity credits are used most of all in machinery transactions. The machinery owned by the companies is used not only for farming their own areas, but also for rendering of services, and in infrequent cases, for leasing.

The group of grain companies that are not engaging in farming consists of two main sub-groups. The first sub-group includes the companies authorized by the regional administrations. These organizations execute the tasks of local administrations using regional grain funds. The second sub-group consists of large commercial companies that have been in the market for a long time. Both sub-groups provide commodity credits to grain farms, mainly with agricultural machinery and petroleum products. Machinery is purchased from the manufacturing plants or dealers. When purchasing, the groups use non-cash deals first of all, but commodity credits and barter also are rather widespread. The largest companies import machinery from non-CIS countries.

So, vertical integration in the food chain today has become the main channel of providing machinery to the farms. Thus, this level often is second after the manufacturer, as frequently companies - integrators purchase inputs from the dealers. These companies also develop operational leasing, though the experts speak about the ineffectiveness of such leasing under the current conditions. It is quite possible that such companies will become the main subjects of developments of financial leasing in agriculture. The vertically integrated holdings are the main importers of agricultural machinery from non-CIS countries today. In this connection, in order to develop forecasts in the demand for the main inputs, it is necessary to study, first of all, the outlook in demand of this most dynamically developing group of the buyers.

## 22.3. Characteristics of Supply

### 26.3.1 Agricultural Machinery

Due to the sharp dip in the demand for agricultural machinery from farms and the restricted capability to export, there was a collapse in production of agricultural machine-building plants during the years of reform (**Ошибка! Источник ссылки не найден.**). This collapse was even deeper than for other machinery builders or industry as a whole. For awhile, some types of agricultural machinery were not produced in the country.

After the crisis of 1998, growth in agricultural machinery-building began again. In 2000, Russia has manufactured more than 5,500 grain harvesters (that is 2.5 times more than in 1999) and 440 feed harvesters, and 15,000 tractors (an increase over 1999 by 128 percent) (**Ошибка! Источник ссылки не найден.**).

**Table 27. Production and purchases of agricultural machinery, 1985-1999, thousand units**

| Years | Production |                  | Purchases |                  |
|-------|------------|------------------|-----------|------------------|
|       | Tractors   | Grain harvesters | Tractors  | Grain harvesters |
| 1985  | 261.0      | 112.0            | 187.0     | 70.0             |



|        |       |       |       |      |
|--------|-------|-------|-------|------|
| 1986   | 264.0 | 112.0 | 185.0 | 71.0 |
| 1987   | 262.0 | 96.0  | 179.0 | 59.0 |
| 1988   | 253.0 | 71.0  | ...   | 24.0 |
| 1989   | 235.0 | 62.0  | ...   | 39.0 |
| 1990   | 214.0 | 66.0  | 144.0 | 38.0 |
| 1991   | 178.0 | 55.0  | 131.0 | 32.0 |
| 1992   | 137.0 | 42.0  | 65.0  | 17.0 |
| 1993   | 89.0  | 33.0  | 40.0  | 14.0 |
| 1994   | 29.0  | 12.0  | 22.0  | 9.0  |
| 1995   | 21.0  | 6.2   | 10.0  | 4.0  |
| 1996   | 14.0  | 2.5   | 12.8  | 3.3  |
| 1997   | 12.0  | 2.3   | 9.0   | 2.4  |
| 1998   | 10.0  | 1.0   | 6.4   | 0.7  |
| 1999   | 13.0  | 2.0   | 9.8   | 1.6  |
| 2000** | 16.6  | 5.5   | N/A   | N/A  |

\* - in agricultural firms; \*\* - estimation

Source: Goskomstat, Ministry of Agriculture of the Russian Federation.

It is possible to distinguish two basic groups of the agricultural machinery manufactures, both in accordance with volumes of production and with marketing channels. The first group includes the large plants, i.e., giant manufactures of tractors and harvesters: *Volgograd Tractor Plant*; *Chelyabinsk Tractor Plant*; *Altay Tractor*; *Lipetsk Tractor Plant*; *Vladimir Tractor Plant*; *Rostselmash*; and *Krasnoyarsk Harvesters Plant*.

The listed companies make up almost 90 percent of tractors and 93 percent of harvesters. For this group, it is typical that annual production declined after 1991 in the range of 16-60 percent by 1998, after which production has began to rise: tractors by 30 percent in 1999 and 45 percent in 2000; and harvesters by 200 percent in 1999 and 275 percent in 2000. In 2001, these plants are expected to double their output.

The giant plants have the same schemes for marketing of their products. In 1999-2000, the lion's share of their sales was implemented by *Rosagrosnab* along with regional administrations – about 75-76 percent of marketed products. The remaining 24-25 percent came through farm enterprises and commercial firms (holdings), according to expert estimation (especially this latter Figure). The picture starts to vary after 2000: the share of budget organizations (*Rosagrosnab* and regional companies working with the budgetary funds) in marketing has decreased by as much as 55 percent and the share of farm enterprises and commercial firms has increased up to 45 percent. The export of machinery-building production almost was completely oriented to the CIS countries; exports beyond CIS are negligible.

Due to the high dependency of machinery manufactures from *Rosagrosnab* in recent past, only since 2000 have plants developed their own trade network and / or created their own trading houses. Rather often, this follows the reorganization of a company or a change in a management team and owner / investor, e.g., *Rostselmash* and *Krasnoyarsk Plant of Harvesters*.

For the same reason, prior to 2000 it was possible to explain both the relative backwardness of a dealer network and the network of own-service centers. The

emerging developments of regional trade, service, and training centers started in 2000. No one plant has had its own leasing company for very long.

Practically 100 percent of deals are implemented on a cashless basis. It is conditioned by high prices per unit of machinery, i.e., financial impossibility (disadvantage) of the cash payment, and also the refusal of managers to use barter and credit forms of settlements, which is natural due to the great demand for their products in the last two years.

The giant plants have a pricing policy that basically uses fixed prices, which decrease at large volumes and in the non-harvesting seasons (for example, in winter and spring for harvesters). The discounts are applied to the dealers and large buyers.

In the last few years, a common tendency has become apparent in the Russian agricultural economy for the enlargement, merging, and formation of holdings. Thus, since 2000 *Rostselmash* entered the holding *New Commonwealth* and actually has reshaped the market of harvesters. This firm is alone in Russia with a model set that completely encompasses the entire geographic area of the country and effectively harvests crops in different climatic zones and with various yields. In 2000, the Rostov plant has made 2,670 harvesters, 70 percent of which were the model, *Don - 1500*. Also, *Rostselmash* harvesters have begun to return to the CIS markets. In particular, [an agreement was made whereby] assembly production [has begun] for combines of the *Don - 1500* model in the Ukrainian plant *Juzhmash*, where 500 units are expected to be produced in 2001 when the subsequent increase in production is concluded. [Representatives for *Rostselmash* will be opening an office in Kiev].

In October 10, 2000, *Siberian Mechanical Machinery Holding* was established by *Krasnoyarsk Plant of Harvesters*, *Altay Tractor* (Rubtsovsk, Altay territory), and *Altay Diesel Engine* from Barnaul. Also, the administrations of Krasnoyarsk, Altay territories, Novosibirsk, and Omsk oblasts have a 40 percent stake in the shares. These holdings are logical as all 3 plants are the links of one technological chain and do not compete among themselves. The new *Sibmashholding* is going to attract *Novosibirsk Sibsel'mash* in order to complete a technological chain.

In 2000, the joint-stock company *Krasnoyarsk plant of harvesters* has increased the production of harvesters almost threefold. According to a statement made by the managers of the plant, it has produced 3,000 harvesters in 2000 compared to 1,097 units in 1999 (production according to official data was just 2,400 in 2000).

The main task of *Krasnoyarsk Plant of Harvesters* for 2001 is to begin repeating the work of a new harvester *Ruslan* and to manufacture 200 units during the year. The assembly work of these harvesters is planned to start in 2002. This year, this machine is being tested.

The second group includes all remaining plants that were not included in the group of giants, i.e., the small plants of small and medium agricultural machinery. These plants manufacture a broad assortment of machinery for a wide range of customers. Practically all of them produce spare parts, in addition to the major products of specialization. Therefore, a recession on the huge plants affected these small plants, too.

On the other hand, as the main buyers of their production are the farmers and households; since 1998, some of these plants have increased their output almost

tenfold. The expansion was made possible by an growing number of solvent customers .

The rise in production of small and medium machinery, and of towed devices, increased in 1999 by 50-60 percent compared to 1998, and 150 percent in 2000. In 2001, these plants are going to increase their output by 150 percent.

**Table 28. Marketing channels of mini-tractors (percent)**

| Customers                | 1998 | 1999 | 2000 | 2001 p |
|--------------------------|------|------|------|--------|
| Dealers                  |      | 6    | 10   | 8      |
| <b>Rosagrosnab</b>       |      |      |      |        |
| Regional administrations |      |      | 6    | 5      |
| Farm enterprises         | 33   | 2    |      |        |
| Individual farms         | 32   | 31   | 21   | 17     |
| Commercial firms         | 5    | 13   | 23   | 19     |
| Households               | 30   | 38   | 40   | 51     |

p-provisional

Source: Results of poll, April - May 2001.

In marketing the products of these plants, there are two trends: first, marketing of the products of specialization and also of towed devices (**Ошибка! Источник ссылки не найден.** and **Ошибка! Источник ссылки не найден.**); and second, marketing of spare parts (if they are not products of specialization) (**Ошибка! Источник ссылки не найден.**). It is common in both cases that the share of dealers increased during 1999-2000.

At the same time, in the marketing of products of specialization, the share of the regional administrations has become apparent, but they do not participate at all in marketing spare parts. Among the buyers of the first group of products, the share of households has increased the most, the shares of individual farms and commercial firms has been stable, and the share of farm enterprises has decreased. *Rosagrosnab* and commercial firms are the major buyers of spare parts, but commercial firm purchases dominate those of *Rosagrosnab*.

**Table 29. Marketing channels of towed devices (percent)**

| Customers                | 1998 | 1999 | 2000 | 2001p |
|--------------------------|------|------|------|-------|
| Dealers                  |      | 5    | 9    | 9.5   |
| <b>Rosagrosnab</b>       |      |      |      |       |
| Regional administrations |      |      | 4    | 5.5   |
| Farm enterprises         |      | 2    |      |       |
| Individual farms         |      | 25   | 17   | 20    |
| Commercial firms         | 26   | 20   | 20   | 22    |
| Households               | 74   | 48   | 50   | 43    |

p-provisional

Source: Results of poll, April - May 2001.

**Table 30. Marketing channels of spare parts (percent)**

| Customers | 1998 | 1999 | 2000 | 2001p |
|-----------|------|------|------|-------|
| Dealers   |      |      | 20   | 10    |

|                          |    |    |    |    |
|--------------------------|----|----|----|----|
| <b>Rosagrosnab</b>       | 90 | 95 | 28 | 40 |
| Regional administrations |    |    |    |    |
| Farm enterprises         |    |    |    |    |
| Individual farms         |    |    |    |    |
| Commercial firms         | 10 | 5  | 52 | 50 |
| Households               |    |    |    |    |

p-provisional

Source: Results of poll, April - May 2001.

The dealer network and network of own-service centers usually exist for this group of plants and work for 4-8 years. None of the surveyed plants has its own leasing company.

**Table 31. Structure of settlements**

| Types of settlements  | Percent | Tendencies of change<br>("+" = increasing; "-" = decreasing) |
|-----------------------|---------|--------------------------------------------------------------|
| Cashless              | 60      | +                                                            |
| Cash                  | 17      | +                                                            |
| Barter                | 4       | -                                                            |
| Mutual offsets        | 12      | -                                                            |
| Commodity credit      | -       |                                                              |
| Sales in installments | -       |                                                              |
| Others                | 7       | -                                                            |

Source: Results of poll, April, - May 2001.

The range of kinds of settlements is rather broad, which is connected with the reasonable prices per unit of machinery and also with variation of financial conditions of the buyers. The absence of installment sales is explained by the great demand in production the last two years. **(Ошибка! Источник ссылки не найден.)**

In pricing, cash settlements are preferable while the highest prices are set for barter deals **(Ошибка! Источник ссылки не найден.)**

**Table 32. Prices by types of settlements**

| Type of settlements   | Rank (1 – highest price, 7 – lowest price) |
|-----------------------|--------------------------------------------|
| Barter                | 1                                          |
| Other                 | 2                                          |
| Mutual offsets        | 3                                          |
| Cashless              | 4                                          |
| Cash                  | 5                                          |
| Commodity credit      | 6-7                                        |
| Sales in installments | 6-7                                        |

Source: Results of poll, April - May 2001.

The world's top 3 machinery producers – America's *John Deere* and *Case Corp.* and Germany's *Claas* -- are extremely interested in the progression of production in Russia. However, even the modest attempts to set up production in Russia (even "turnkey technology") were not climaxed by any considerable successes. Now the market of the foreign harvesters and tractors is supplied by imports.

*Claas* has conducted a cautious policy. Before the crisis in August 1998 and some time after it, this corporation delivered machinery on leasing terms in the framework

of the German credit line, Hermes. The given fact also is interesting from that point of view that deliveries of machinery were conducted by the affiliated banking company, *SBS-Agro - SBS-Leasing*. An agreement to deliver 100 grain harvesters (*Dominator 204* and *Dominator 208*) to Russia for a total sum of DM28 million (~\$14 million) was concluded. *Claas's* plans concerning assembly of grain harvesters on the Oryol plant *Autosel'mash* have failed: the plant is not able to produce such complicated machinery, even using "turnkey technology".

*John Deere* was rather far along in a project to create a joint venture with *Rostselmash*; the *Don-1500* was created on the basis and by analogy with the *John Deere* harvester, although it has undergone considerable changes and adaptations. However, *John Deere* failed to agree with the current management of *Rostselmash*. In addition, it is very difficult for foreign machinery, even assembled in Russia, to compete with Russian-made machinery in terms of price/quality ratio. Therefore, *Rostselmash* has made a decision to start assembly work of harvesters of a new generation.

*Case* studied the possibility of having a joint venture with 67 firms in Russia within 3 years. This resulted in an agreement with the *Saratov Aircraft Manufacturing Plant* to create a joint venture to assemble the grain harvesters, *Case IH*. It is scheduled to manufacture up to 2,000 harvesters of various kinds. However, it is unlikely that this project will actually be carried out. *Case* has declared plans to invest before (for example, about creating co-production at the *Kirov plant* in the Leningrad area), but nothing has come of them. Furthermore, the amount of investment in the *Kirov plant* was about the same as that planned for the *Saratov investment* (US\$200 million).

The attempts to organize so-called "turnkey production" with foreign harvesters with different firms in Russia are a special issue. As already was said above, the schedules of the *Claas* in Oryol have not received further development. The joint-stock company *Kaskade* in Altay territory assembled 11 grain harvesters of *Deutz Fahr*, but further production was stopped due to the lack of demand. The anticipated schedules for organizing the assembly production of Canadian harvesters *Western* with the firm *Ural Harvester* in the Chelyabinsk area were not held.

### 27.3.2 Mineral Fertilizers

Today, Russia is among the world's largest producers and exporters of all kinds of mineral fertilizers. In export of potash fertilizers our country is included in quintuple of leaders, in export of phosphoric fertilizers it takes the second place, and on export nitrogen - the first. The United States and countries in Western Europe are the major buyers of the Russian ammonia.

In 1999, 9 million tons of fertilizers were exported out of 11.2 million tons that were produced. Still, about 700,000 tons were used for further industrial processing of raw materials, and only 1.2 million tons were delivered to farms.

**Table 33. Deliveries of mineral fertilizers 1996-1999, thousand tons of active substance**

|                  | 1996  | 1997  | 1998  | 1999  |
|------------------|-------|-------|-------|-------|
| Russia           | 1580  | 1587  | 1083  | 1216  |
| Northern region  | 37.7  | 33.8  | 33.9  | 28.7  |
| Northwest region | 16.7  | 24.7  | 24.4  | 23.6  |
| Central region   | 213.5 | 241.0 | 185.5 | 231.1 |

|                           |       |       |       |       |
|---------------------------|-------|-------|-------|-------|
| Volga-Vyatka region       | 115.5 | 123.3 | 138.0 | 137.4 |
| Central Black-soil region | 140.7 | 234.7 | 129.3 | 165.0 |
| Volga region              | 389.0 | 384.7 | 234.6 | 193.9 |
| Northern Caucasian region | 211.2 | 216.2 | 144.8 | 203.3 |
| Ural region               | 314.1 | 218.0 | 85.0  | 109.6 |
| West Siberian region      | 35.5  | 50.6  | 39.5  | 53.6  |
| East Siberian region      | 71.0  | 39.9  | 46.2  | 40.7  |
| Far East region           | 32.5  | 11.9  | 12.7  | 16.1  |

Source: Ministry of Agriculture of the Russian Federation.

Application rates of mineral fertilizers are extremely low. According to the group *Azotecon*, Russian agriculture should receive 8.5 to 10.7 million tons of fertilizers annually. Today, only 5 percent of farms apply the necessary quantity of fertilizers, and it is basically the vertically integrated holdings (for example, *LUKoil-market*, *Efko* and others), where purchases of fertilizers are financed by the head companies.

All plants of mineral fertilizers (about 60) can be divided into 3 groups: manufacturers of nitrogen (48 percent), phosphorous (20 percent) and potash (32 percent) fertilizers.

**Table 34. Application of mineral and organic fertilizers per hectare of land of grain crops (without corn) on farm enterprises**

|      | Applied                                         |                             |
|------|-------------------------------------------------|-----------------------------|
|      | Mineral fertilizers<br>(kg of active substance) | Organic fertilizers<br>(MT) |
| 1981 | 47                                              | 1.9                         |
| 1982 | 49                                              | 2.2                         |
| 1983 | 55                                              | 2.5                         |
| 1984 | 62                                              | 2.9                         |
| 1985 | 69                                              | 3.0                         |
| 1986 | 84                                              | 3.2                         |
| 1987 | 87                                              | 3.4                         |
| 1988 | 88                                              | 3.4                         |
| 1990 | 81                                              | 3.3                         |
| 1993 | 44                                              | 2.6                         |
| 1994 | 23                                              | 2.0                         |
| 1995 | 16                                              | 1.5                         |
| 1996 | 17                                              | 1.3                         |
| 1997 | 19                                              | 1.0                         |
| 1998 | 17                                              | 0.9                         |
| 1999 | 16p                                             |                             |

p- provisional

Source: The Center of an Economical Analysis.

In 2000, Russia produced 10.6 million tons of ammonia (raw for production nitrogenous fertilizers), which is 33.4 percent higher than in 1999. The following companies are the major ammonia manufacturers: *Tolliattiazot* (17.6 percent of total production), *Akron* (13.3 percent), *Novomoskovsk Azote* (11 percent), and *Nevinnomyssk Azote* (10 percent).

In 2000, 5.8 million tons of nitrogenous fertilizers were produced, which was 13.5 percent above last year's production. The 10 largest producers of nitrogenous fertilizers of Russia are listed in **Ошибка! Источник ссылки не найден.** The 10 produced 74 percent of total nitrogenous fertilizers and 62 percent of exports.

Among other producers of nitrogenous fertilizers, several plants that sharply increased production volumes in 1999 and 2000 should be mentioned: *Balaklav Mineral Fertilizers*, *Tatazot* (state-owned), and *Bashkiragrokhim Company*.

The growth in production in nitrogen industry, as well as in a whole mineral fertilizers sector, was caused by a favorable situation on the world market and the devaluation of the ruble.

In world production of mineral fertilizers, the share of phosphates is equal to 23 percent. In 2000, Russia produced 2.4 million tons, which is 17.1 percent higher than in 1999 and 30 percent than in 1998. The main (basic) kinds (views) of are: Ammophos, diammonium phosphate, and azotphoska, which represent 86 percent of total phosphoric fertilizers output.

The largest producers of phosphoric fertilizers are: *Ammophos*, *Cherepovets*; *Balakovskiye Fertilizers*; *Voskresenskiye Fertilizers*; and *Akron Holding*.

In general, these companies account for more than 70 percent of production. Besides among the producers of phosphoric fertilizers, others include: *Phosphorite, Kunzucenn; Belorechenskiye Fertilizers, Krasnodar territory; Nevinomyssly Vneshttradeinvest, Stavropol territory; Dorogobuzh, Smolensk oblast; Natty-Phosphat, Moscow oblast; and Meleuzovskiye Fertilizers, Bashkortostan.*

World production of potash fertilizers is unique: they are produced basically in Canada, Russia, Byelorussia and Germany. Thus, Russia and Byelorussia together are the world's 2<sup>nd</sup> largest producers, and first in potash ores.

In 2000, 6.26 million tons of potash fertilizers were produced. Two firms in the Perm oblast manufacture potash fertilizers (chlorkalium): *Uralkaly* and *Silvinit*. Both firms are controlled by *Financial House* and basically work for export.

All plants of mineral fertilizers are privatized, except two plants in Bashkiria and Tatarstan. The predominant part of marketed fertilizers goes for export, and the increase of production practically is completely exported.

The share of farm enterprises in marketed product for private fertilizer plants is stable or has decreased within the range of 4-6 percent annually. The regional administrations have a very minor share in the purchases of fertilizers with less than 1 percent.

**Table 35. Marketing channels of mineral fertilizers**

| Customers                | 1998 | 1999 | 2000 | 2001p |
|--------------------------|------|------|------|-------|
| Dealers                  |      |      |      |       |
| <b>Rosagrosnab</b>       |      |      |      |       |
| Regional administrations | 0.05 | 0.14 | 0.08 | 0.05  |
| Farm enterprises         | 5.50 | 6.70 | 4.00 | 3.00  |
| Individual farms         | 0.02 | 0.03 | 0.04 | 0.04  |
| Commercial firms         |      |      |      |       |
| Households               |      |      |      |       |
| Export                   |      |      |      |       |
| <i>of which</i> to CIS   |      |      |      |       |
| to non-CIS               | 94.4 | 93.2 | 95.8 | 96.9  |

p -provisional

Source: Results of poll, April - May 2001.

The major part of products sold by the state-owned plants is distributed by regional administrations (4-6 percent).

Cashless settlements dominate the deals of private enterprises (92-94 percent). These are conditioned by the specificity of export deals. Mutual write-offs accounted for about 6 percent, which means that all domestic deliveries are settled in this way. Cash settlements for the plants-exporters are not essential (0.1 percent). The implemented poll did not show the deliveries to the commercial firms, but many fertilizers plants have affiliated commercial firms that deliver commodity credits to arms with fertilizers. **(Ошибка! Источник ссылки не найден.)**



**Table 36. Structure of settlements (private plants)**

| Types of settlements  | Percent | Tendencies of change<br>("+" = increase, "-" = decreasing) |
|-----------------------|---------|------------------------------------------------------------|
| Cashless              | 94.0    | +                                                          |
| Cash                  | 0.1     |                                                            |
| Barter                |         |                                                            |
| Mutual offsets        | 5.9     | -                                                          |
| Commodity credit      |         |                                                            |
| Sales in installments |         |                                                            |
| Others                |         |                                                            |

Source: Results of poll, April - May 2001.

At pricing, the plants consider mutual write-offs as the most unfavorable settlement and increase prices for them. **(Ошибка! Источник ссылки не найден.)**

**Table 37. Prices by types of settlements (private plants)**

| Type of settlements   | Rank (1 – highest price, 7 – lowest price) |
|-----------------------|--------------------------------------------|
| Barter                | 2                                          |
| Other                 | 2                                          |
| Mutual offsets        |                                            |
| Cashless              | 1                                          |
| Cash                  |                                            |
| Commodity credit      |                                            |
| Sales in installments |                                            |

Source: Results of poll, April - May 2001.

State-owned plants use cashless settlements most of all, about 55-60 percent. Mutual write-offs account for about 15 percent, commodity credit about 25-28 percent, and barter about 2-3 percent (which is conditioned by their close connection with regional administrations and budget). Cash payments for state enterprises are practically nonexistent **(Ошибка! Источник ссылки не найден.)**

**Table 38. Prices by types of settlements (state-owned enterprises)**

| Types of settlements  | Percent | Tendencies of change<br>("+" = increasing; "-" = decreasing) |
|-----------------------|---------|--------------------------------------------------------------|
| Cashless              | 57      | +                                                            |
| Cash                  |         |                                                              |
| Barter                | 2       | -                                                            |
| Mutual offsets        | 15      | -                                                            |
| Commodity credit      | 26      |                                                              |
| Sales in installments |         |                                                              |
| Others                |         |                                                              |

Source: Results of poll, April - May 2001.

**Table 39. Prices by types of settlements (private plants)**

| Type of settlements   | Rank (1 – highest price, 7 – lowest price) |
|-----------------------|--------------------------------------------|
| Barter                | 4                                          |
| Other                 |                                            |
| Mutual offsets        | 1                                          |
| Cashless              | 3                                          |
| Cash                  | 2                                          |
| Commodity credit      |                                            |
| Sales in installments |                                            |

Source: Results of poll, April - May 2001.

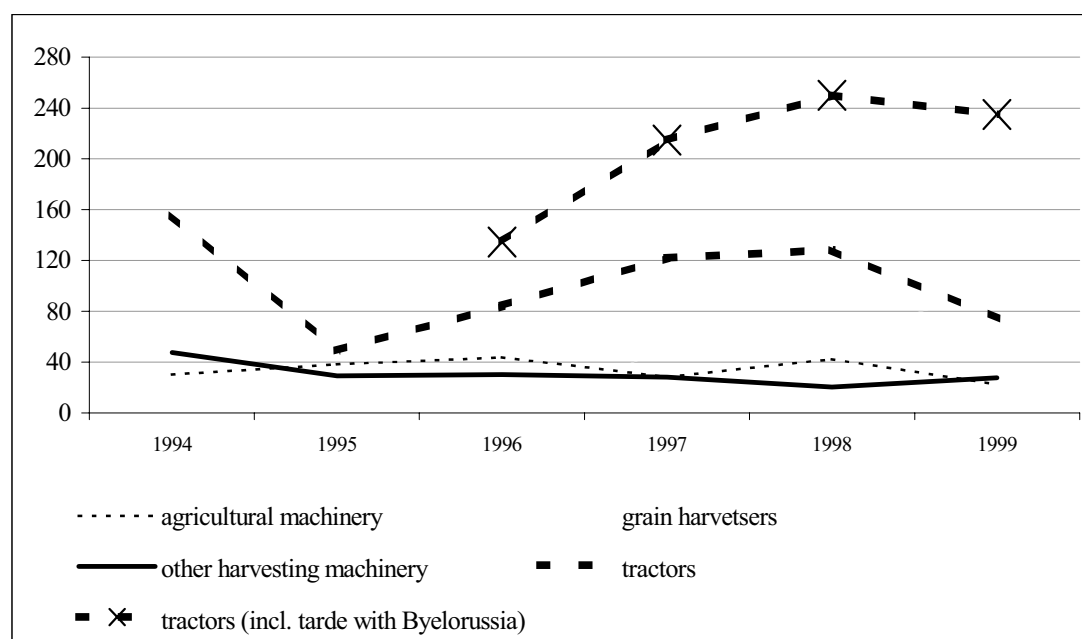
As is apparent from **Ошибка! Источник ссылки не найден.**, barter for the buyers of fertilizers is very expensive. State enterprises work under individual contracts.

## 23.4. Characteristics of Trade in Inputs

### 28.4.1 Agricultural Machinery

During the Soviet period, the lack of agricultural machinery in Russia was compensated by deliveries from other republics. Byelorussia and Ukraine were the main exporters of machinery to Russia. In turn, Russia was the largest producer and supplier of fuels and lubricants, fertilizers, and some kinds of agricultural machinery in the USSR.

**Figure 17. The Russian import of agricultural machinery \*, millions US\$**



\*. Without trade with Byelorussia.

Source: Customs statistics, Goskomstat.

After the USSR's break-up and liberalization of trade, machinery from non-CIS countries has appeared on the Russian market. Over the 1994-1999 period, the value of purchases of agricultural machinery in these countries has grown by 25.7 percent, grain harvesters by 23.6 times, other harvesting machinery by 45 percent, tractors by 14.2 percent, and mowers by 516 percent. The deliveries from CIS countries were essentially eliminated (down by approximately 90 percent, except for trade with

Byelorussia). At the same time, there has been no growth trend in machinery imports (Ошибка! Источник ссылки не найден.). However, a share of imported machinery in total deliveries to Russia's agriculture has increased. So for tractors, this share accounted for more than 60 percent in the late 1990's (Ошибка! Источник ссылки не найден.).

**Table 40. Tractors: share of export in output and import in total deliveries percent**

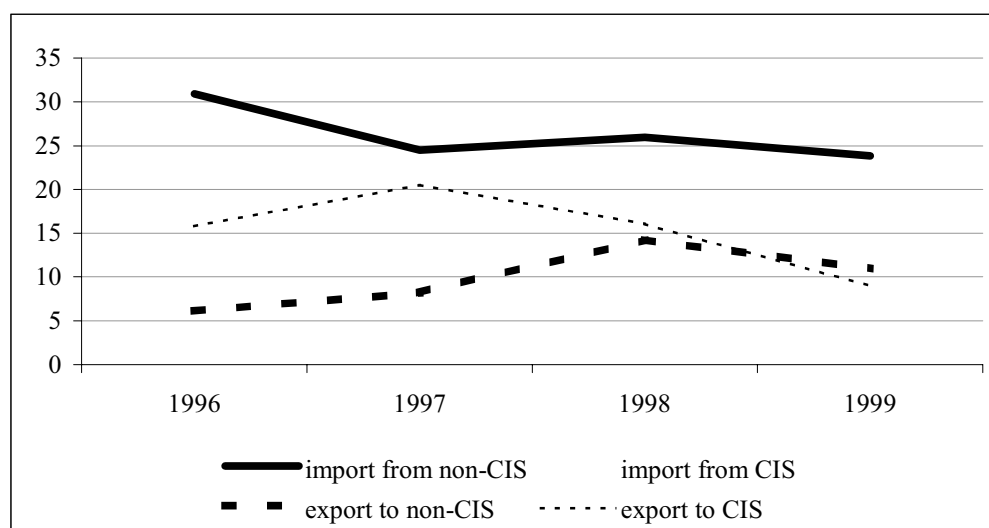
|                             | 1995 | 1996 | 1997 | 1998 | 1999 |
|-----------------------------|------|------|------|------|------|
| Export as percent of output | 39.7 | 35.3 | 21.4 | 46.9 | 42.6 |
| Import in total deliveries* | 14.1 | 49.8 | 58.3 | 51.9 | 67.0 |

\*Deliveries = production + import - export

Source: Goskomstat.

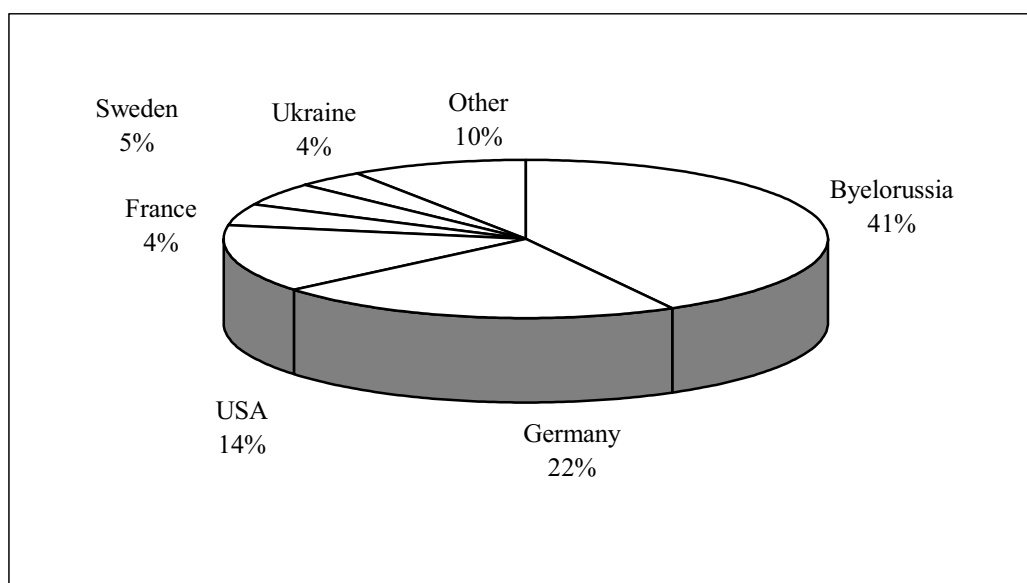
The main cause of low demand on imported machinery made is its price non-competitiveness versus domestic and imported machinery from CIS countries. The average price of a tractor imported from non-CIS countries exceeds the price of a tractor assembled in the CIS by approximately 50 percent (Ошибка! Источник ссылки не найден.). Apparently, imported machines and equipment are higher in quality than domestic equipment, however, the "price / quality" ratio still seems to be favorable for domestic machinery. Besides, domestic machinery is subsidized at both the federal and regional level; its deliveries are implemented in the framework of the leasing schemes, which do not give the buyers a choice in the sellers of machinery (see below).

**Figure 18. Average export and import tractor prices, thousand dollars/unit**



Source: computed with data of Goskomstat.

Despite the lack of conditions favorable for the expansion of imports of agricultural machinery, foreign producers still hope to carve out a niche in the Russian market. Among CIS countries, Byelorussia and Ukraine are the traditional suppliers of harvesters and tractors to Russia (Ошибка! Источник ссылки не найден.). Among non-CIS countries, Germany and United States are the leaders in machinery deliveries to Russia, which are presented by three major world manufacturers: *John Deere*, *Case* and *Claas* (Ошибка! Источник ссылки не найден.).

**Figure 19. Import of agricultural machinery in 1999 by countries\***

\* - A share of Byelorussia is counted on the basis of the Goskomstat data only for tractor import from this country.

Source: computed with the data of Customs statistics.

**Table 41. Imported agricultural machinery inventories by July 1, 2000**

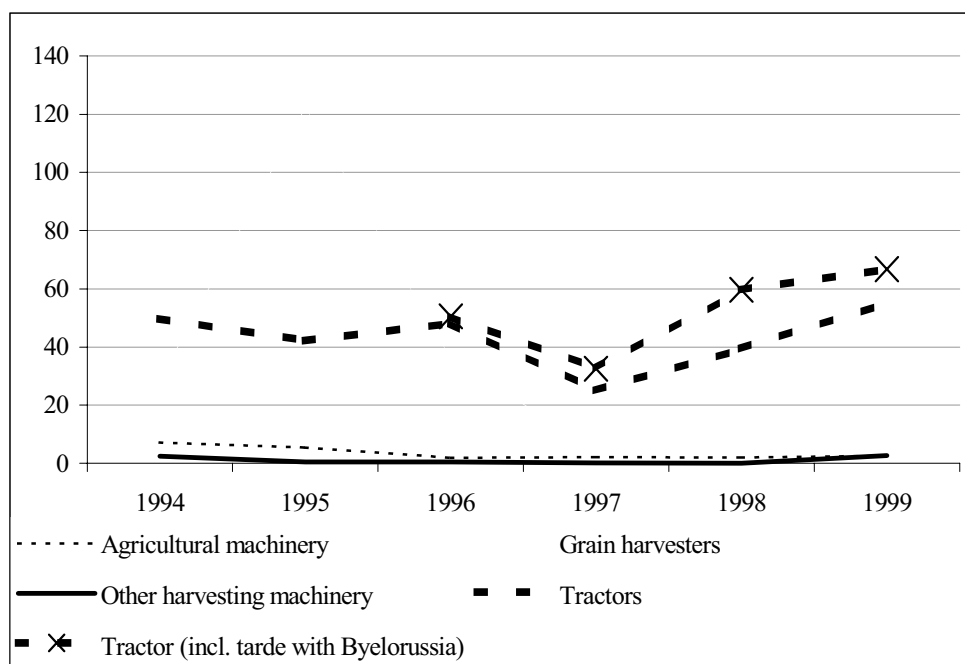
| Company                  | Country | Units | Company                      | Country     | Units |
|--------------------------|---------|-------|------------------------------|-------------|-------|
| <i>Tractors, total</i>   |         | 410   | <i>Feed, total</i>           |             | 1,890 |
| John Deere               | USA     | 112   | Fortstritte                  | Germany     | 367   |
| Fiat                     | Italy   | 96    | Case                         | USA         | 178   |
| Fendt                    | Germany | 75    | Claas                        | Germany     | 83    |
| Case                     | USA     | 55    | Krohne                       | Germany     | 27    |
| Stier                    | Austria | 21    | John Deere                   | USA         | 6     |
| Dotz Far                 | Germany | 4     | <i>Potato, total</i>         |             | 115   |
| <i>Grain harvesters,</i> |         |       | Agrico                       | Netherlands | 40    |
| <i>total</i>             |         | 1,369 | Rumpstadt                    | Germany     | 6     |
| Claas                    | Germany | 527   | <i>Grain seeder,</i>         |             |       |
| Case                     | USA     | 411   | <i>total</i>                 |             | 134   |
| Western                  | Canada  | 133   | John Deere                   | China       | 31    |
| New Holland              | USA     | 123   | Quernaland                   | Norway      | 13    |
| Doitz Far                | Germany | 75    | <i>Other</i>                 |             | 529   |
| Sampo Rosenlef           | Finland | 64    | Mechanica Cheuchleu          | Romania     | 254   |
| Massey Ferguson          | USA     | 26    | John Deere                   | USA         | 181   |
| John Deere               | USA     | 9     | Quernaland Accord            | Norway      | 20    |
| <i>Beet, total</i>       |         | 176   | <i>Sowing complex, total</i> |             | 236   |
| Matreau France           | France  | 80    | Concord                      | USA         | 234   |
| Moreau                   | France  | 72    | <i>Mowers, total</i>         |             | 500   |
| Klein                    | Germany | 10    | Fortschritte                 | Germany     | 356   |

Source: Ministry of Agriculture of the Russian Federation.

The major part of annual output of agricultural machinery is marketed on the domestic market (**Ошибка! Источник ссылки не найден.**). Weak production and poor quality of the domestic machinery handicapped the development of Russian exports of agricultural machinery and equipment. For the first time for many years, in 1998-1999 growth in tractor and agricultural machinery building has begun, which has

seemingly changed the export trend of this production. In 2000, there was no decrease in exports of machinery (**Ошибка! Источник ссылки не найден.**), but Russia still remains a net importer of agricultural machinery.

**Figure 20. The Russian export of agricultural machinery, million US\$\***



\* - Without trade with Byelorussia.

Source: computed with the data of Customs statistics.

**Table 42. Agricultural machinery exports by country, 1999\***

|                                   | Percent |
|-----------------------------------|---------|
| <i>Agricultural machinery</i>     |         |
| France                            | 32.1    |
| Mongolia                          | 16.8    |
| Ukraine                           | 15.1    |
| <i>Grain harvesters</i>           |         |
| Mongolia                          | 46.1    |
| Ukraine                           | 44.9    |
| <i>Other harvesting machinery</i> |         |
| Poland                            | 86.8    |
| <i>Tractors</i>                   |         |
| Hungary                           | 22.0    |
| Iraq                              | 13.8    |
| Ukraine                           | 11.3    |
| <i>Mowers</i>                     |         |
| USA                               | 56.8    |
| Ukraine                           | 14.6    |

\* - Without trade with Byelorussia.

Source: computed with the data of Customs statistics.

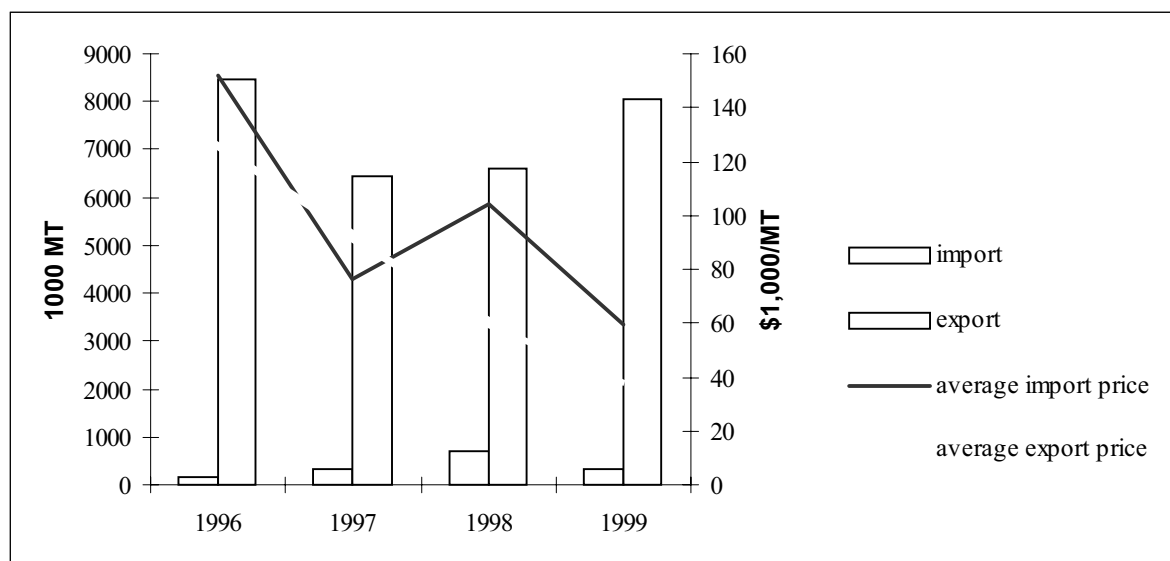
The geographic destinations of the Russian exports of agricultural machinery are rather diverse. Deliveries to non-CIS countries have an essential place in the total

volume of exports. Among CIS countries, Ukraine and Byelorussia are the largest importers. According to Goskomstat data, about 20 percent of tractors was exported to Byelorussia in 1999.

### 29.4.2 Mineral Fertilizers

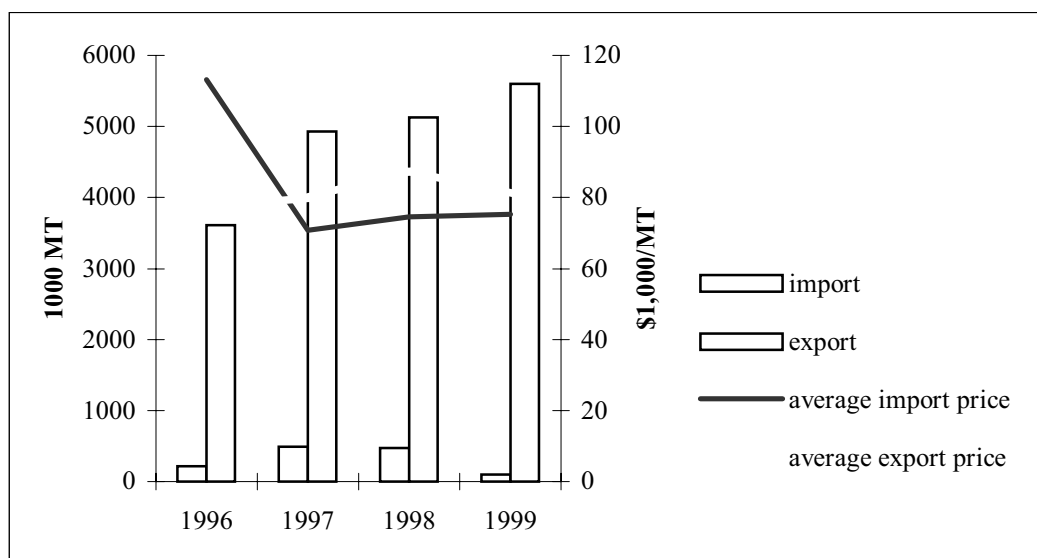
Russia is a net exporter of mineral fertilizers (**Ошибка! Источник ссылки не найден.** and **Ошибка! Источник ссылки не найден.**). Exports of mineral fertilizers exceed imports by approximately 90 percent.

**Figure 21. Russian export, import and average contract prices for nitrogenous fertilizers**



Source: computed with the data of Goskomstat.

**Figure 22. Russian export, import and average contract prices of potash fertilizers**



Source: computed with the data of Goskomstat.

The export prices of nitrogenous fertilizers are lower than internal and import prices. Nevertheless, Russia continues to export fertilizer vigorously to other countries. (Ошибка! Источник ссылки не найден., Ошибка! Источник ссылки не найден., and Ошибка! Источник ссылки не найден.).

**Table 43. Average export and domestic prices for mineral fertilizers**

|                                                     | 1996   | 1997   | 1998  |
|-----------------------------------------------------|--------|--------|-------|
| <i>Domestic prices of manufactures, 1000 RUR/MT</i> |        |        |       |
| Nitrogenous fertilizers                             | 814    | 665    | 0.722 |
| Potash fertilizers                                  | 370    | 400    | 0.425 |
| <i>Average export prices, 1000 US\$/MT</i>          |        |        |       |
| Nitrogenous fertilizers                             | 127.3  | 92.5   | 60.0  |
| Potash fertilizers                                  | 77.3   | 79.8   | 87.5  |
| <i>Exchange rate, RUR/US\$</i>                      | 5124.0 | 5785.0 | 9.71  |
| <i>Domestic prices of manufacturers, US\$/MT</i>    |        |        |       |
| Nitrogenous fertilizers                             | 158.8  | 114.9  | 74.4  |
| Potash fertilizers                                  | 72.2   | 69.1   | 43.8  |

Source: computed with the data of Goskomstat.

**Table 44. Russian export nitrogen and potash fertilizers by country, 1999, percent \***

| Nitrogen      |      | Potash        |      |
|---------------|------|---------------|------|
| China         | 39.5 | Turkey        | 15.4 |
| India         | 18.1 | Brazil        | 11.8 |
| Brazil        | 7.8  | France        | 8.0  |
| Singapore     | 6.1  | Poland        | 6.9  |
| Korea         | 4.5  | Peru          | 5.7  |
| <i>Others</i> | 24.0 | <b>Others</b> | 52.2 |

\* - Without trade with Byelorussia.

Source: computed with the data of Customs statistics.

Russia buys more than 90 percent of total imports of nitrogen and potash fertilizers from CIS countries, while about 90 percent of its export go to non-CIS countries. Ukraine is the principal supplier of fertilizers to the Russian market. In 1999, it made up to 53 percent of total fertilizer imports. The geography of exports represent a broader set of countries (**Ошибка! Источник ссылки не найден.**). As a rule, fertilizers were exported to Asian countries.

## 24.5. State Regulation of Input Markets

### 30.5.1 Background Theory

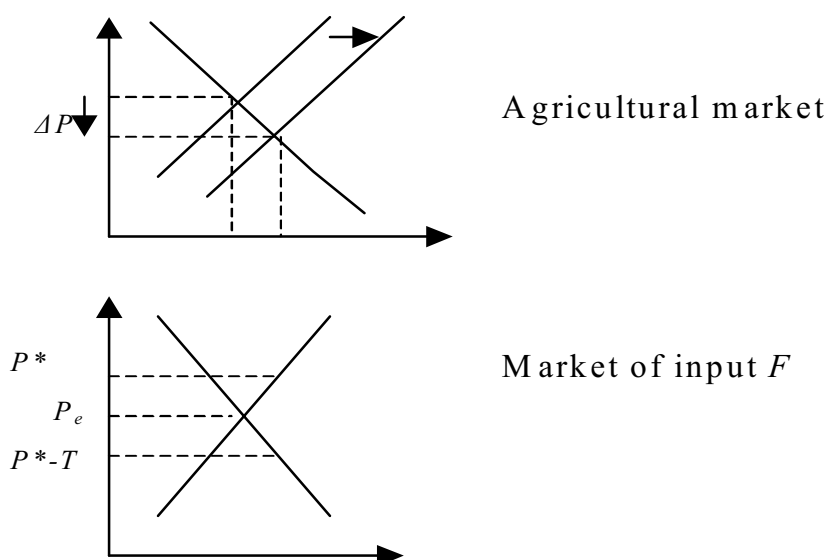
All transitional economies have been confronted with the problem of the increase in price disparity in the agrarian sector. The introduction of input subsidies was the primary reaction in many countries.

In Russia in particular, subsidies were introduced for mineral fertilizers, electric power, fuel for some types of the producers, purchases of breeding cattle, elite seeds, and some other inputs. The government also covered part of the irrigation and drainage costs.

The standard purpose of the given measure is to decrease the costs to the producer, and by doing that, to increase incomes. Often by subsidizing one input, the purpose is to also expand its application and increase the efficiency of agrarian sector. So in Russia, the measures to compensate fuel, energy, and transportation costs are directed at offsetting the price increase of these inputs as a result of inflation. The primary goal of compensating the costs for fertilizers, melioration, breeding cattle, and elite seeds was to increase productivity, which would eventually lead to higher incomes in agriculture.

Let us assume that a government introduces a subsidy for input  $F$  at a rate of  $T$ . Due to that, the equilibrium price adjustment will occur: the equilibrium price goes up to  $P^*$ , the customer of the input (farmer) pays the price  $P^* - T$ . In response to the decrease in the cost of input, the farmer in turn increases her production, and the price for her product goes down (**Ошибка! Источник ссылки не найден.**).

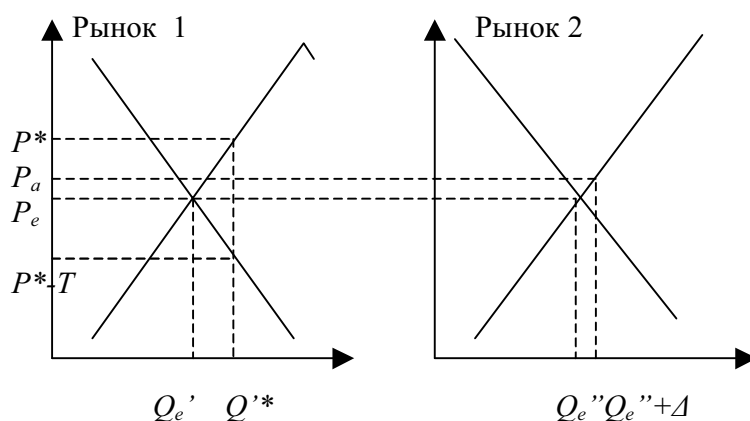


**Figure 23. Input subsidy**

As it is visible from the Figure, the subsidy  $T$  is shared between the producer of input and the farmer. The fall in the price in the input market will depend on the elasticities of supply and demand. In the case where the input supply curve is much less elastic than the demand curve, subsidy  $T$  in the large part will go to the producer of the input; in contrast, a smaller part will go to the farmer. Therefore, when input supply is inelastic, such a subsidy is illogical.

In the above statements, it is assumed that the input is consumed only by those customers to which this subsidy is aimed to support. However, as a rule, inputs have multiple use purposes and can be bought by various groups of customers. Let's assume, there are two groups of customers for input  $F$  and, accordingly, two markets. In market 1, the subsidy  $T$  for given input is introduced, but there is no subsidy in market 2 (**Ошибка! Источник ссылки не найден.**). If there is a free arbitrage between the markets, customers from market 1 can acquire the input at price  $P_e - T$  and then resell it on market 2. *Ceteris paribus*, this activity is more economically reasonable: income from such resale apparently will exceed the income from expanding the production for using additional input  $F$ . Thus, the subsidy will be shared between two types of customers. The proportion of this sharing will depend on the supply and demand elasticities in both markets and from conditions of arbitrage between the two markets. This implies that it is illogical to introduce a subsidy for an input that has multiple use purposes: a noticeable proportion of it will not get to the targeted recipient.

**Figure 24. Input subsidy in case of multiple use of input**



Thus, we have concluded some rules for introducing input subsidies. Such subsidies can be applied under the following conditions:

- input supply has a sufficient price elasticity;
- the input has a specific, single purpose in its application.

The lack of one of these conditions means that the subsidy will not achieve its purpose.

### 31.5.2 Features of Application of a Measure in Russia

Input manufacturing sectors in post-socialist countries, especially in Russia, as a rule are over-monopolized and have rather low elasticities of supply. The outcome of introducing input subsidies results only in price increases without a noticeable expansion of input use from the effect of the subsidies.

#### 31.1. 5.2.1 Mineral fertilizers

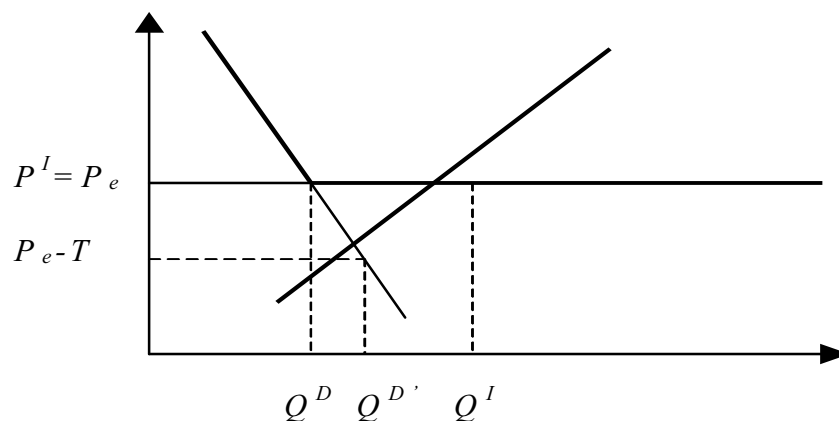
Let's consider one of the steadiest programs of the federal subsidies in Russia -- compensation for the costs for mineral fertilizers. Over all years of reforms, the federal budget has envisaged compensatory payments to farms at a rate of 30-50 percent of the cost of purchased fertilizers. However, the elasticity of fertilizer from this subsidy is very low. Let's try to understand this situation.

The manufacturers of mineral fertilizers practically are not monopolized. Also, fertilizers are typical of specialized inputs for agrarian production. Let's analyze the supply elasticity of fertilizer in the domestic market. Russia is the world's largest exporter of mineral fertilizers, therefore the demand inside is represented by **Ошибка! Источник ссылки не найден.** When the fertilizer price is above world level, demand is determined by demand of domestic customers; when the price approaches the world market price, demand practically becomes unlimited.<sup>48</sup> The equilibrium price in Russia is set on a horizontal section of the demand curve, otherwise there would be no export. In these conditions, producers of mineral

<sup>48</sup> Certainly, Russia is a big fertilizers exporter, and the world demand for Russia can not be, generally speaking, considered as completely elastic. However, apparently the external demand is more elastic than domestic one. Therefore, horizontal representation of the external demand on our Figure can be considered as a weak assumption, which, nevertheless, increase an obviousness of the case.

fertilizers sell on the domestic market at volume  $Q_D$ , and on the external market at  $Q_I - Q_D$ . The world price is an equilibrium price. By introducing the fertilizer subsidy at the rate of  $T$ , demand on the domestic market grows up to  $Q_{D'}$ .

**Figure 25 Compensation of costs on fertilizers in Russia**



The producers of fertilizers theoretically have several options to respond this increased internal demand. At first, they can increase production. This means that farms will receive a cheaper input (the price reduction will be exactly  $T$ ). Secondly, the producers of fertilizers can reduce exports and switch their supply to domestic customers. It is possible to assume that world supply will not be changed noticeably in this case, therefore the world price also will not change, and farms will receive the full subsidy. In practice, neither situation occurs.<sup>49</sup> The increase in the fertilizer production is strongly limited: the current plant capacity practically is used completely, and investments were insignificant during the reform years (**Ошибка! Источник ссылки не найден.**). A different issue is that the supply elasticity of fertilizers is low, depending on demand. Reallocating of fertilizer deliveries from the external market to the domestic market also is unlikely: export deliveries are implemented under long-term contracts, whereas the decisions on agricultural subsidies are made on an annual basis. The risk of sacrificing one's position on the world market for unguaranteed demand from the domestic market is too great for a rational economical agent to consider such a reallocation.

Thus, the increased demand on the domestic market is not satisfied. If there was arbitrage between the domestic and external markets, domestic farms could satisfy their increased demand for fertilizers at the expense of purchases on the world market. However, such arbitrage is impossible because of institutional causes; besides, the subsidies are not extended for imported deliveries. Thus, there is a segmentation of the market: the Russian producers of fertilizers work for two markets -- external and domestic -- and there is no arbitrage between them. Due to the subsidies, a deficit appears on the domestic market, which inevitably should result in increase of the price above equilibrium level (**Ошибка! Источник ссылки не найден.**).

<sup>49</sup> Generally speaking export changes occur but not due to subsidies to agriculture but due to trade causes, i.e. antidumping measure against Russian exporters.

**Table 45. Production and investment in the sector of mineral fertilizers, million tons of active substance**

|                                                 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 |
|-------------------------------------------------|------|------|------|------|------|------|------|------|------|
| Production                                      | 16.0 | 15.0 | 12.3 | 9.9  | 8.3  | 9.6  | 9.1  | 9.5  | 9.4  |
| Putting into operation of production capacities | -    | -    | -    | 0.01 | -    | -    | 0.2  | -    | -    |

Source: Goskomstat.

The empirical data confirm this theoretical conclusion (**Ошибка! Источник ссылки не найден.**). At first, **Ошибка! Источник ссылки не найден.** shows that the actual subsidies do not account for the share of total costs for fertilizers that was envisaged by governmental decisions. Usually these decisions envisaged compensation of 30-50 percent of total farm costs of fertilizers, but in reality this share was just 7.5 percent in 1998. What is even more important is that in 1996 and 1997, the effect of the subsidy was negative: the prices paid by farms were higher than average prices of the fertilizer producers. By virtue of the above-stated reasoning, such a rise in price on fertilizers for agriculture could be a result of subsidies.

**Table 46. Real result of fertilizer subsidies, 1994-1997, million RUR**

|                                                                | 1994     | 1995      | 1996       | 1997      | 1998      |
|----------------------------------------------------------------|----------|-----------|------------|-----------|-----------|
| Costs of fertilizers, prices paid by farms                     | 523565,0 | 1704679,0 | 3498675,0  | 4517317,0 | 4187173,0 |
| Costs of fertilizers, actual domestic prices*                  | 767550,9 | 2195916,7 | 2490085,5  | 3592959,6 | 4738674,0 |
| Subsidy (+)/ taxation (-) for farms (1)-(2)                    | 243985,9 | 491237,7  | -1008589,5 | -924357,4 | 551501,0  |
| Actual subsidies                                               | 182000,0 | 981000,0  | 999800,0   | 719970,0  | 313410,0  |
| Net effect of subsidy (4)-(3)                                  | 425985,9 | 1472237,7 | -8789,5    | -204387,4 | 864911,0  |
| Net effect of subsidy as percent of total costs of fertilizers | 81,4     | 86,4      | -0,3       | -4,5      | 20,7      |
| Actual subsidy as percent of total costs of fertilizers        | 34,8     | 57,5      | 28,6       | 15,9      | 7,5       |

\* - The costs, which farms would pay at average prices of mineral fertilizers on the domestic prices (prices of fertilizers producers)

Source: computed with the data of Goskomstat and Ministry of Agriculture of the Russian Federation.

Since 1999, the scheme of the subsidies on mineral fertilizers has changed. Now the subsidies are given not to the buyers, but to the producers. The producers are selected by tender using the criterion of the lowest [bid] price for delivered fertilizers. The fertilizer producers are interested in this subsidy scheme because with the remaining inflation, they actually get interest-free loans and therefore are willing to supply at a price that does not include interest costs. This new scheme has had a short-run effect in reducing the price of fertilizers. However, in the medium term outlook, it [is likely to establish] a monopoly in the fertilizer sector since each region is bound by a limited number of suppliers, which furthermore get the privilege of interest-free loans.

### 31.2. 5.2.2 Fuels and lubricants

Another form of federal subsidizing of inputs for agrarian sector is the so-called “commodity credit,” which was launched in the spring of 1995. Oil companies were given the option to deliver fuels and lubricants to farms as payment for their debts to the federal budget. Farms received in this way the main limiting input for sowing and undertook to pay this debt to the budget at the end of a season. Thus, it is a kind of interest-free credit to the agrarian sector received at the expense of revenue side of the federal budget (that is, at the expense of delaying revenue payments to the budget).

The Ministry of Agriculture of the Russian Federation and the regional officials at once have linked this new credit by farms to deliveries of farm products to the state reserves. Following the Soviet stereotypes, deliveries of petroleum products were allotted by regions and districts, and thereby farms, against the contracts for deliveries of farm products to the state reserves. Oil companies were assigned to the concrete regions. All this was resulted in negative consequences for agriculture, first of all. The deliveries of production to the state reserves are implemented at fixed prices. Assigning the oil companies to the regions has resulted in a monopoly effect, inflating the prices on petroleum products above the average market by 20-30 percent practically everywhere. So it means that terms of trade for farms are worse than on the cash market.

Hence, by receiving petroleum products under the state commodity credit, a farm actually pays definite interest expressed as the difference between the fixed contract relative credit prices for farm products and petroleum products on one hand, and the actual prices for the same products on the other hand.

A survey of the actual cost of commodity credit for the farms in 1995 in the Rostov region has shown that annual interest paid for the state commodity compounded 120-130 percent.<sup>50</sup>

Quite naturally, farms pay some interest for credit. However, in the case with the state commodity credit, the federal budget was a creditor while *de facto* the oil companies received the interest.

The poor harvest of 1995 and the newly introduced scheme that was not working properly led to the result that farms did not pay back the commodity credits. About 2 RUR trillion of the debt was settled by mutual offsets in the liabilities of the federal and regional budgets. The remaining 5 RUR trillion, as well as debts under the centralized credits of 1992-1994 years, at first were prolonged and then written-off.

Commodity credit as it was introduced is an implicit subsidy to the agrarian sector, not reflected in outlays of the budget. In 1995, total agricultural budget was almost equal to subsidies from the revenue side of the budget, that is, commodity credit. In 1997, state commodity credit was stopped, but restored again in 1998. Similar regional programs as the commodity credit program also have begun since 1997. The commodity credit is a serious impediment to the development not only of the real input market in agriculture, but also the product market. The regional authorities not only issue the commodity credits at the expense of the regional budgets, but also are

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<sup>50</sup> Eu. Serova, R.Yanbykh. Agricultural credit in Russia: state and perspectives. – *Issues of economics*, 1996, # 8, pp. 59-73 (In Russian)

liable for the debts for federal commodity credits.<sup>51</sup> It gives them the formal basis for establishing interregional trade barriers and compelling farms to deliver their product to the regional reserves. These measures stipulate markets integration in the country and worsen the terms of trade for agriculture.

### 31.3. 5.2.3 Agricultural machinery

The state program of support of investment process in agrarian sector was launched 1994: it is so-called Leasing Fund. On the means, reserved in the federal budget, *Rosagrosnab*<sup>52</sup> buys agricultural machinery and delivers it to farms on terms of payment by installments. On the first view, the program provides an essential support for investment process in agriculture: in 1994 there was more than 1 trln RUR in the Leasing Fund (**Ошибка! Источник ссылки не найден.**). But the adopted scheme of the program has resulted that machine works and *Rosagrosnab* have become the major beneficence it.

**Table 47. Federal budget outlays to the Leasing Fund,**

|                                          | 1994    | 1995    | 1996    | 1997    | 1998    | 1999    |
|------------------------------------------|---------|---------|---------|---------|---------|---------|
|                                          | Bln RUR | Bln RUR | Bln RUR | Bln RUR | Mln.RUR | Mln.RUR |
| Budgeted                                 | 1,000.0 | 1,351.0 | 2,700.0 | 2,400.0 | 2,000.0 | 2,280.0 |
| Actually financed                        | 1053.6  | 1080.6  | 1928.9  | 736.6   | 1,007.0 | 2,280.0 |
| Actually financed as percent of budgeted | 105.4   | 80.0    | 71.4    | 30.7    | 50.4    | 100.0   |

Source: Ministry of Agriculture of the Russian Federation.

*Rosagrosnab* selected without competition<sup>53</sup> and authorized by the government, orders machinery on machine works and allots it between the subjects of federation. Those, in turn, allot the obtained machinery between districts, which allot them between farms. The assortment of ordered production is established from the central office, therefore it not always responds actual needs of farms. In particular, in 1994, half of the Fund was utilized for purchases of production *Rostselmash* just in order to support this collapsing giant company at that time. It is not difficult to see that such a system is very similar to the Soviet input distribution system. However, what was immanent for the previous economical system, does not work in the modern conditions.

At first, *Rosagrosnab*, the private company, has received the exclusive rights on the market of agricultural machinery. In outcome, the trade margin in its regional branches in the first year of the Leasing Fund has grown up to 30-40percent while national average was about 10-12 percent. In addition to this *Rosagrosnab* has charged the machine works, which products they ordered, with 5percent for «marketing» services. Besides, it has established own insurance company, in which all receivers of leased machinery were obliged to insure, that has resulted in increase of insurance fee verse national average.

<sup>51</sup> Some part of debt for commodity credit of 1995 was re-arranged as promissory notes which were freely quoted on the financial market. Revenues of sales of these notes were to go to the Fund of Soft Credit for Agriculture. There was no transparent and full monitoring of these notes transactions, therefore it is impossible to estimate the results of this program.

<sup>52</sup> Former state-owned, now private agricultural inputs (machinery, spare parts, fuel and some other) supply company.

<sup>53</sup> Last years there are some forma tenders on which *Rosagrosnab* is anyway selected.

Secondly, machinery-building, having received additional effective demand due to the Leasing Fund took an advantage of increase the machinery prices. By some estimates, this growth has compounded up to 20 percent.

Thirdly, the administrative distribution of deliveries was resulted in increase of corruption.

The outcome of introducing this leasing program has not eased the acquisition agricultural machinery for farms.

Payments of debts under this program are extremely low. So, in 1999, only one-third of due payments was paid. Not last role in that the leasing scheme plaid: leased equipment at once becomes the property of a recipient. It is made with the purpose of price reduction of leasing, as farms are released of property tax, while leasing company not. But it causes the financial irresponsibility liability of farms, on the one hand, on the other hand it impedes an emerging of commercial leasing system in the country inhibits.

#### **31.4. 5.2.4 General problems of input cost compensation programs**

The compensation of the cost of inputs for agriculture is implemented not only at expense of the federal budget, but practically all regions. Thus, it is a considerable proportion of the programs in agri-food sector. The regional programs almost everywhere completely patterns federal schemes described above, and are a co-financing scheme for the federal programs. Apart from the lack of these programs, described above, there is one common fault: all programs segment the market of inputs for farms. All programs proceed not from an idea that farms purchase at their discretion needed inputs, and then the budget compensates them a part of the costs, from a system of distribution already cheaper inputs, assortment of which defined by the federal or regional authorities. At first, the assortment of inputs (that specially is essential for agricultural machinery) is determined not by customer. Secondly, the share of compensation does not allow compensation of all acquired inputs (determined in the programs). Therefore, the cheaper inputs should be administratively distributed among farms.

Apart from arising at any distribution rent-seeking, there is a problem of segmentation of the market: a part of inputs the producer receives at one price, another part - at higher price on the free market. For example, in the Perm area in 2000 the regional budget has allotted free of charge fertilizers for 115 million RUR, for another 80 million farms had have purchased at their expanse. Similarly almost everywhere the situation with petroleum products: a part of the petroleum products for farms is subsidized, a part is bought at market price. It is a little differently with agricultural machinery: the majority of farms can not purchase machinery beyond the leasing programs, but leasing programs provide rather limited quantity and assortment of machinery, what does not meet demand.

As a result of such policy there is a possibility of arbitrage between two segments of the input market. The part of fertilizers and especially of machinery moves from the subsidized input market (actually not from the market but centralized distribution of this input) to the free market. The subsidy is shared proportionally to the market power of the agents. If the subsidized mineral fertilizers are reallocated between farms, the petroleum products, as nonspecific input, leave agrarian sector. There is another problem with agricultural machinery: there is a threat that at the end of term of the leasing contract many farms, received machinery with the considerable

discount, will begin to resell it. Again, the harvesters and other specifically agricultural machinery will stay in the sector, but tractors can leave to other sectors (building, forestry, etc.).

Differently, the main input programs do not reach their purpose.

Another problem of these programs - formation and strengthening of monopolies in corresponding input manufacturing and delivering sectors of economy, impediments of development of market institutes (leasing companies, dealer network, etc.), that creates already long-term problems for agri-food sector.

## **25.6. The Program of Further Research of the Input Markets**

This review of the existing level of knowledge about the operations of Russia's purchased input market in agriculture today has been discussed above. Apparently, that it is not enough to comprehend the major laws of their operation and development as well as for policy implications. Therefore, we see following directions of further research in this area.

1. Analysis of productivity of inputs at farm level. As is already apparent, there is three basic farming sectors in the country (small-sized individual producers, large independent firms and firms in frameworks of vertically integrated holdings). The effectiveness of basic inputs needs to be estimated at these three levels. With this purpose, it is proposed on this basis to create sample surveys in 3-5 regions and for 3-5 types of producers in order to construct the representative production functions. This will allow us to evaluate allocative efficiency in agrarian production, to understand the causes of the possible (suspected) ineffectiveness. The estimation will evaluate [measure] the complementarity and substitution between purchased inputs and other factors (labor, lands).
2. Estimation of the elasticity of input demand, depending on the demand for agricultural production; and, a forecast scenario of demand on the basis of the above-mentioned sample survey.
3. Research the input market structure, estimation of monopoly power, supply elasticity of the domestic internal market, and dependence on world markets. An estimation of the capacity of the sector to satisfy growing internal demand for inputs.
4. Analysis of state policies that compensate input costs at the regional level in the sampled regions (welfare analysis).



## 7. Appendices

### Appendix 1. Major tractor manufacturers

| Name of plant                    | Market share, percent |
|----------------------------------|-----------------------|
| <i>Caterpillar</i>               |                       |
| Volgograd tractor plant          | 27.4                  |
| Chelyabinsk tractor plant        | 19                    |
| Altay tractor                    | 10.5                  |
| <i>Wheel</i>                     |                       |
| Lipetzck tractor plant           | 22.5                  |
| Vladimir tractor plant           | 8.4                   |
| Petersburg tractor plant         | 4,5                   |
| Promtractor                      | 1,4                   |
| Transmash, Omsk                  | ...                   |
| <i>Mini-tractors</i>             |                       |
| Kurganmashplant                  | -                     |
| Bashkir machinery-building plant | -                     |
| Kaskade-Perm motors              | -                     |
| Akma, Astrakhan                  | -                     |

### Appendix 2. Major harvester manufacturers

| Name of plant                                                   | Market share, percent |
|-----------------------------------------------------------------|-----------------------|
| <i>Grain</i>                                                    |                       |
| Rostsel'mash                                                    | 49                    |
| Krasnoyarsk harvester plant                                     | 44                    |
| Tula harvester plant                                            | -                     |
| Taganrog harvester plant                                        | -                     |
| Dal'sel'mash, Birobidgan                                        | -                     |
| <i>Feed</i>                                                     |                       |
| Dal'sel'mash, Birobidgan                                        |                       |
| Harvester, Ryazan                                               |                       |
| Belinksel'mash, Penza region                                    |                       |
| Novosibirsk aircraft production association named after Chkalov |                       |
| <i>Special</i>                                                  |                       |
| Taganrog harvester plant (oil crops)                            |                       |
| Krasnodar rice harvesters                                       |                       |
| Kaskade-Perm motors                                             | -                     |
| Akma, Astrakhan                                                 | -                     |

### Appendix 3. Other agricultural machinery manufacturers

|                                                 | Cultivators | Plows | Harrows | Seeders | Towed devices | Spare parts for grain harvesters | Spare parts for feed harvesters |
|-------------------------------------------------|-------------|-------|---------|---------|---------------|----------------------------------|---------------------------------|
| Agromash, Stavropol                             |             |       |         | +       |               |                                  | +                               |
| Aksaykardandetal, Rostov region                 |             |       |         |         | +             |                                  |                                 |
| Bulat, Chelyabinsk region                       |             |       |         |         |               |                                  | +                               |
| Kasyanov auto repair plant, Irkutsk region      |             |       |         |         | +             |                                  |                                 |
| Kirov plant of landcultivating machinery, Kirov |             | +     |         |         | +             |                                  |                                 |
| ISTEK, Stavropol                                |             | +     |         |         | +             |                                  |                                 |
| Kalyazin machine shop, Tver region              | +           |       |         |         |               |                                  |                                 |
| Kalitvasel'mash, Rostov region                  |             |       |         |         |               | +                                |                                 |
| Krasnodarsel'mash                               |             |       |         |         |               | +                                |                                 |
| Krasny Aksay                                    | +           | +     |         |         | +             |                                  |                                 |
| Lyuberty plant of agricultural machinery        |             |       |         |         | +             |                                  |                                 |
| Kaslin machinery-building plant                 |             |       |         |         | +             | +                                |                                 |
| Morozovsksel'mash, Rostov region                |             |       |         |         | +             | +                                |                                 |
| Oryolstroimash                                  |             |       | +       |         |               |                                  |                                 |
| Prioritet, Rostov region                        |             |       |         |         | +             |                                  | +                               |
| Pyazsel'mash                                    | +           |       |         |         |               |                                  | +                               |
| Kamyshlov plant of road works                   |             | +     |         |         |               |                                  |                                 |
| Sibesl'mash, Novosibirsk                        | +           |       | +       | +       |               |                                  |                                 |
| Syzran'sel'mash Samara region                   | +           |       |         | +       |               |                                  |                                 |
| Uryupinsksel'mash, Volgograd region             |             |       |         |         |               | +                                |                                 |

**Appendix 4. Nitrogenous fertilizers manufacturers, 2000**

| Name of plant                       | Annual output, thousand tons | Market share, percent | Export, thousand tons | Share of export in annual output, percent |
|-------------------------------------|------------------------------|-----------------------|-----------------------|-------------------------------------------|
| Akron                               | 852.2                        | 14.7                  | 615.3                 | 72.2                                      |
| Novomoskovsky Azot                  | 525.7                        | 9.1                   | 372.3                 | 70.8                                      |
| Nevinomyssky Azot                   | 515                          | 8.9                   | 187.5                 | 36.4                                      |
| Kirovo-Cherepovetzky chemical plant | 471.9                        | 8.1                   | 237                   | 50.2                                      |
| Berezniky Azot                      | 435.5                        | 7.5                   | 300                   | 68.9                                      |
| Kenerovo Azot                       | 424.6                        | 7.3                   | 235.7                 | 55.5                                      |
| Tolliati Azot                       | 301.5                        | 5.2                   | 224.6                 | 74.5                                      |
| Mineral Fertilizers, Rossosh'       | 282                          | 4.9                   | 161                   | 57.1                                      |
| Kuibyshev Azot                      | 261                          | 4.5                   | 152.3                 | 58.4                                      |
| Nevinomyssky Vneshtreideinvest      | 218.3                        | 3.8                   | 177.7                 | 81.4                                      |
| Total                               | 4287.7                       | 73.9                  | 2663.4                | 62.1                                      |