Trends in Russian Agriculture and Rural Energy

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ABSTRACT

Economic crises and troublesome transitions from centrally planned to a market economy are the realities of present day Russia. While drastic economic reforms are under way, the problem of reorganization of agriculture and implementation of new approaches to technology and management of farming become more and more essential. These approaches require a reconsideration of management and marketing of agricultural products and the utilization of existing worldwide experience in agricultural technology and machinery. The analyses of the current situation in agriculture and rural areas are discussed along with prospects for future development.

THE SITUATION IN RUSSIAN AGRICULTURE AFTER 8 YEARS OF ECONOMIC REFORMS

Main indicators of agricultural development in the 1998 are presented in Table 1. Bioclimatic potential for crop growth is 2 – 3 times lower than in the Western Europe. The sum of effective temperatures (more than 10^0 C) in Russia is 2.0 – 2.5 x 10^3, while the optimal value is 3.0 – 4.0 x 10^3 ^{0}C. The agricultural season is 100 days in Russia compared with 140 – 150 days in the Europe. The southern part of Russia has an annual rainfall of 100 mm less than in Western Europe [1].

The development process in Russian agriculture has been severely undermined by lack of money for investment, a high inflation rate and the decline in the output of agriculture and the machinery industry.

Since 1991, the volume of agricultural production has decreased by 50% (Fig. 1 – 10) [2]. Now Russia produces wheat grain on the level of 1937, meat and milk – year 1963, wool – year 1958. For the last 7 years, the area of agricultural land was reduced by 31 million hectares, including 13 million hectares of arable land. In 1913, the area sown to flax was 1.2 million hectares and now it is 0.1 million hectares.

The use of mineral fertilizers is 10 – 15 kg/ha compared in with 300 – 400 kg/ha in Europe (Fig. 11 – 12).

The current annual production of corn in Russia is 1 million tons compared with 300 million tons in USA.

The number of cows decreased by a factor of 2 , pigs by 2.2 , and sheep by 3.3 over ten years. Russia lost 1 million cows during year the 1998 and 0.6 million cows in the year 1999.

The number of agricultural machines decreased by 50% (Fig. 13 – 14). One tractor is used for 574 hectares (3 times more than in the year 1990) and one combine is used for 260 hectares (twice the usual value). The total budget for machinery leasing during the last 5 years has been 1 billion dollars.

The agricultural sector consumes 7 million tons of diesel and 4 million tons of gasoline annually. The energy investment in Russian agriculture is 2 – 4 times greater than in the Western Europe, while the productivity of labour amounts to only 10% of the Western Europe level (table 4.5).

The service of machinery and technology stations is 2 – 2.5 times more expensive than the cost of service provided by the farmers themselves.

Russia has 270000 small new farms and 36000 joint stock farms. Small new farms having 7.2% arable land produce 2% of agricultural products. Joint stock farms (former collective farms) produce 50% of the national agricultural production.

Sixteen million families and 10 million individuals have small area private land and 22 million families have their own country houses with private land. So 75% of Russian population with private land produces 60% of the agricultural income, including 90% potatoes, 77% vegetables, 79% fruits, 66% pigs, 74% sheep, 45% milk, 46% wool, 85% honey and 31% eggs.

82% of agricultural enterprises have losses as the result of their activity. One reason of poor economical situation is price disparity. For the past 6 years, the prices for industrial goods increased by 84000 times, for energy and fuel by 15000 times (Table 6) and for agricultural products only by 1700 times.

The disparity of prices on machinery and agricultural products can be illustrated by the following figures. In 1990 the price of one ton of diesel oil was equivalent to the price of 0,6 ton of a grain and in 1996 the farmer had to sell 3.2 tons of grain in order to buy one ton of diesel oil.

The farmer has to pay 664 tons of grain in order to buy a new Russian grain combine DON – 1500.

It is known that 1 kg of grain is used to prepare 1 kg of bread. The share of the grain price in the market price of bread is 20%. The share of the milk price for farmers is less than 50% of the market milk price (Table 1). The farmer share of the market flax price is 10% (Table 3).

The production cost of beef for farmer is 27.5 % of market price, for pigs 50%.

The losses of agriculture due to the price disparity are 300 billion rubles (approx US $15 billion). This money was taken from the agricultural sector and distributed to other sectors of Russian industry.

Another reason for poor economic situation in Russian agriculture is that the state subsidy to Russian farmers is low (1%) compared with 45% subsidies (direct and indirect) in the rest of European nations [1].

The year 1999 was the first year of stabilization and revival of agricultural production. The main trends in development of Russian agriculture are as follows [3]:

- Substantial decrease of gross output of agricultural production due to soil erosion, decline of soil fertility, negligible state support, inefficient management and due to climatic change, resulting in droughts in cereal and potato-growing areas;
- Rapid increase of fuel and energy prices and direct and indirect energy expenditures;
- Imbalance between relatively low prices for agricultural products and high prices for energy and other agricultural inputs;
- Decline in agricultural profitability. Rates of production growth are behind the rates of resource consumption growth;
- The understanding of the need for urgent measures to improve the living standards of people in rural areas, to reduce the consumption of fuel and energy and to protect the environment;
- Passing of a new land code and implementation of wholesale markets, regional land banks, new tax and credit policy;
- Large scale leasing of machinery for farmers and agricultural firms;
- Development of new federal and regional systems of technologies and agricultural machinery considering the transition to market economy;
- Creation of machinery and technology stations for rendering services and effective use of agricultural techniques;
- Utilization of existing worldwide experience in agriculture technology and management including international and bilateral cooperation.

THE STATUS OF RURAL ENERGY

The total consumption of energy in agriculture of the Russian Federation amounts to 83 million tons of coal equivalent (tce) or to 113 million tce with the local sources wood and peat taken into account, in other words, to 10% from the total amount of energy consumed in Russia. Agricultural production consumes some 47%, while housekeeping and services consume 53% (Fig. 15).

The main components of fuel and power resources are as follows: motor fuel – 21%, solid fuel – 35%, natural gas – 30%, electric power – 11.3%, liquid stove fuel – 2.5% (Fig. 16).

Application of electric power is 51% in agricultural processes and 49% in domestic use and service (Fig. 17).

Rural electrification levels across Russia vary widely: in some regions there are densely populated communities which have a deficiency of power while in other regions the most pressing need is to electrify dispersed, isolated villages or homes.

About 70% of the Russian territory with rural population of more than 10 million people does not have a central energy supply. Forty million rural inhabitants of Russia live in the grid-connected areas. They consume annually 75 billion kWh. This is about 8.8% of the annual electric generation in the country. The electric power consumption is 6600 kWh per capita. This is about half of that in other sectors of industry.

Management inefficiency, high line losses and unreliable service characterize the utilities in many regions [4]. This poses a significant obstacle to satisfying rural power needs. Diesel generators have been widely deployed in remote areas because of their relatively low initial cost. However, these generators often operate inefficiently; the fuel itself is costly and deliveries are unreliable due to poor road conditions; the diesel generating-sets (spell out) require regular maintenance, which is often unavailable; and they produce harmful emissions. Motor fuel in remote regions of Siberia and North territories is very costly, approximately 0.5 – 0.9 US $/kg. Electric energy price is approximately 0.16 – 0.32 US $/ kWh.

With the costs of power and fuel resources drastically increasing, the application of the former power supply principles in relation to private farms in financial terms of market relations makes the activities of such farms downright unprofitable.

In connection with the poor economic situation in Russian agriculture the application of the existing world-wide experience in power supply of private farms may be regarded as most essential to utilize all the energy saving methods available, as well as to offer the Russian farmers information on all promising developments in this field.

CONCLUSIONS

1. From 1991 to 1999 Russian agriculture was in deep crisis losing 50% of gross output. As the result of drastic economic reforms the great majority of farms have been brought down to the brink of bankruptcy. The year 1999 was the first year of stabilization and revival of agricultural production.

   There are three main reasons for the crises:

   - imbalance between relatively low prices for agricultural products and high prices of machinery and energy. This is caused by unsatisfactory and undeveloped market economy, state control and poor financial management
   - insignificant government subsidy to the farmers
   - the absence of extension and consulting services

2. The expenses of energy in Russian Agriculture are 2 – 4 times greater than in the West, while the productivity of labor amounts to only 10% of the Western Europe level.
3. Russian energy losses are enormous and irrecoverable. Energy saving potential is one third of the total volume of consumed primary resources. A new agriculture and energy policy is very important for sustainable development in Russia, for improving the environment and for decreasing the dependence on food imports. New agricultural and energy technologies play a major role in the all the fields connected with sustainable development. Russia recognizes the need for mutually advantageous international cooperation in which the vast scientific technological capabilities and resource potential of Russia can be brought into play.

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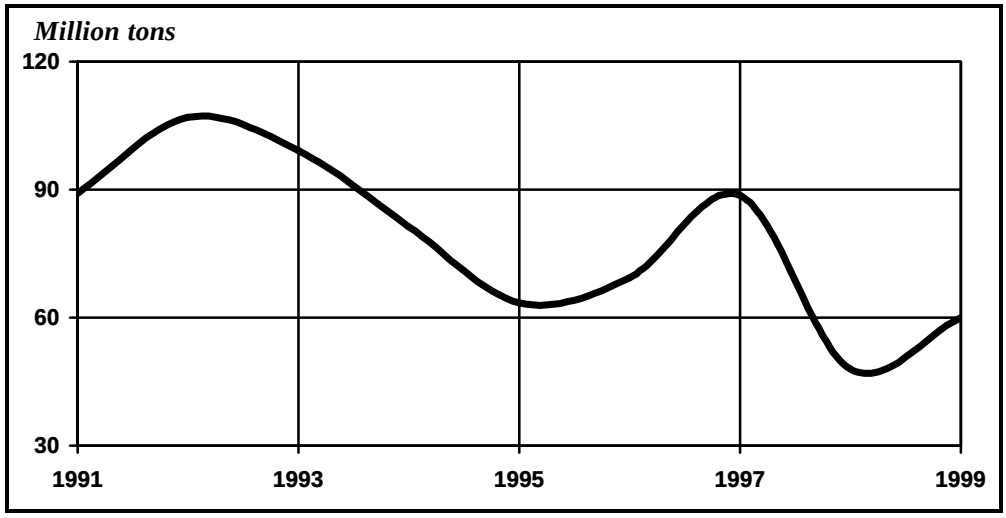

Fig.1 Gross output of a grain

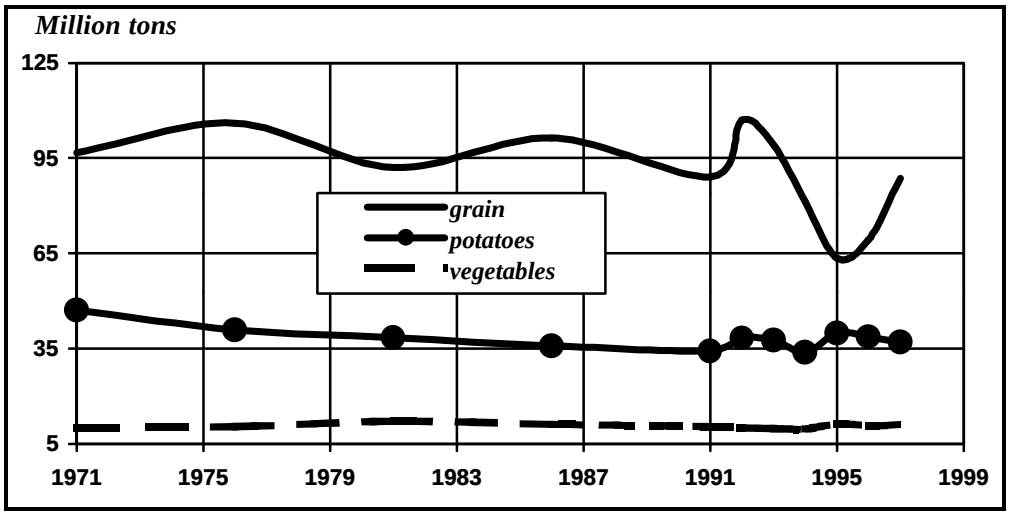

Fig.2 Gross output of crop production

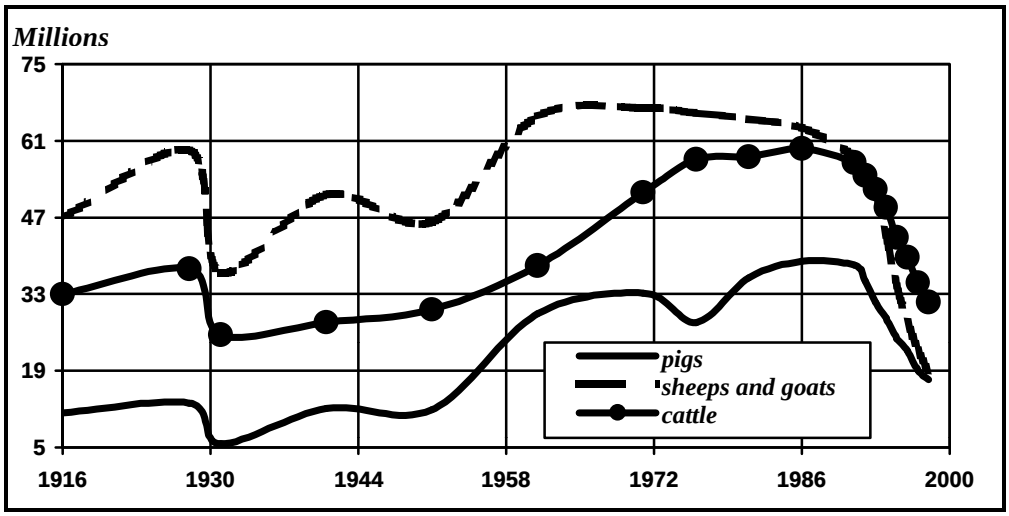

Fig.3 Cattle stock

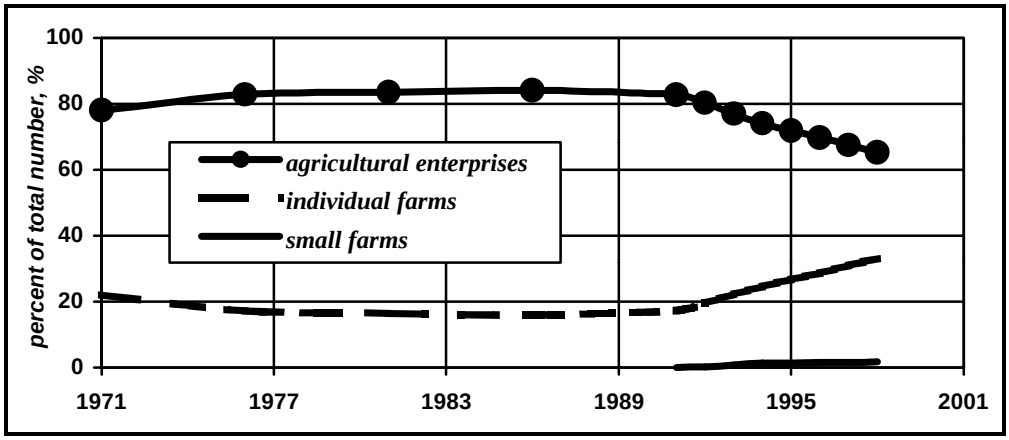

Fig.4 Structure of cattle stock

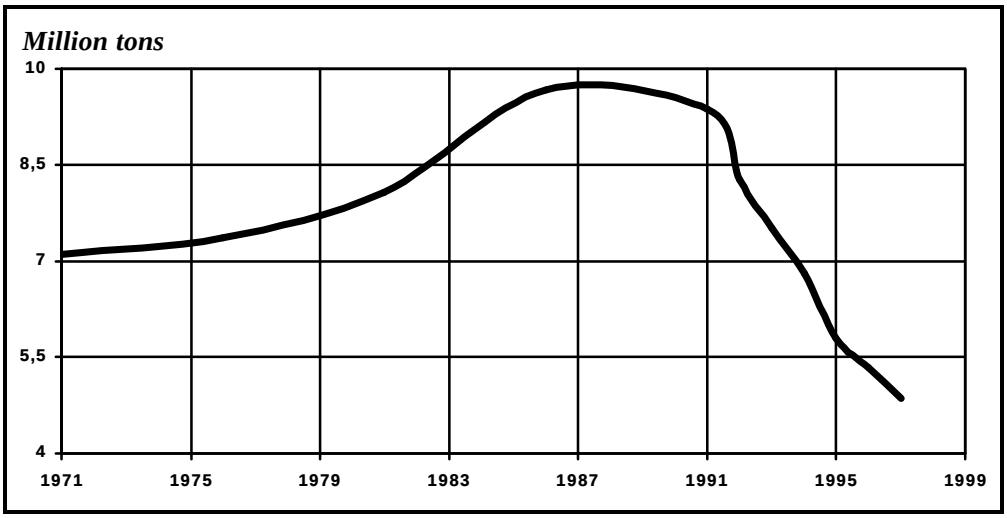

Fig.5 Meat production (slaughter weight)

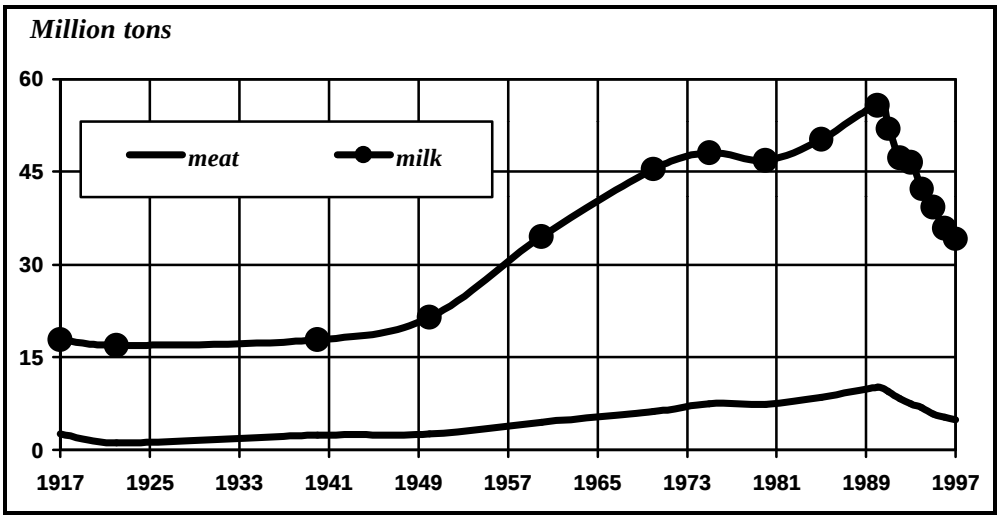

Fig.6 Meat and milk production

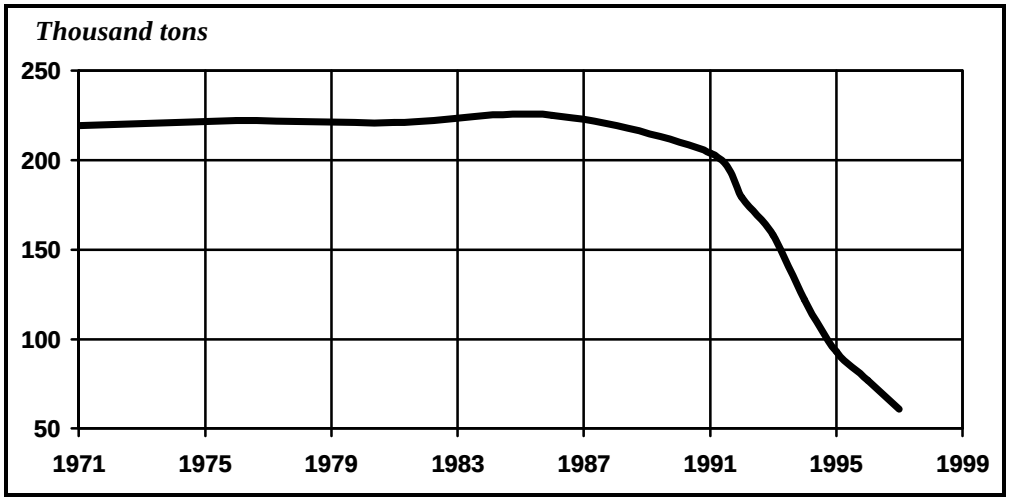

Fig.7 Wool production (physical weight)

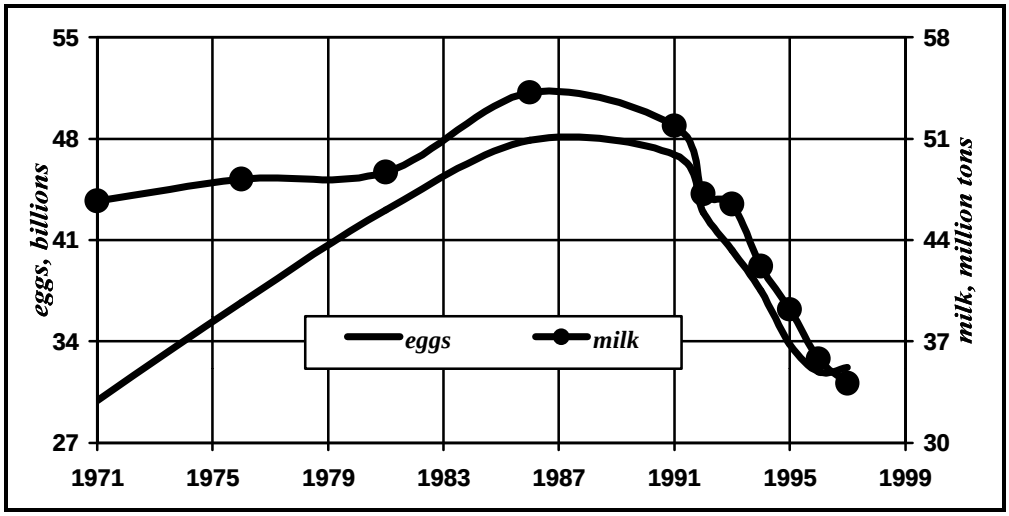

Fig.8 Production of main products of animal husbandry

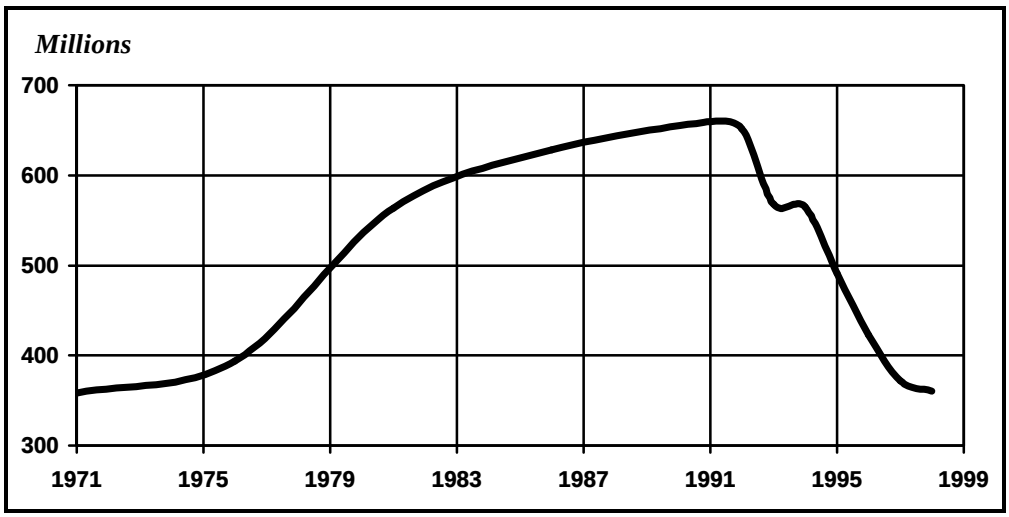

Fig.9 Fowl numbers

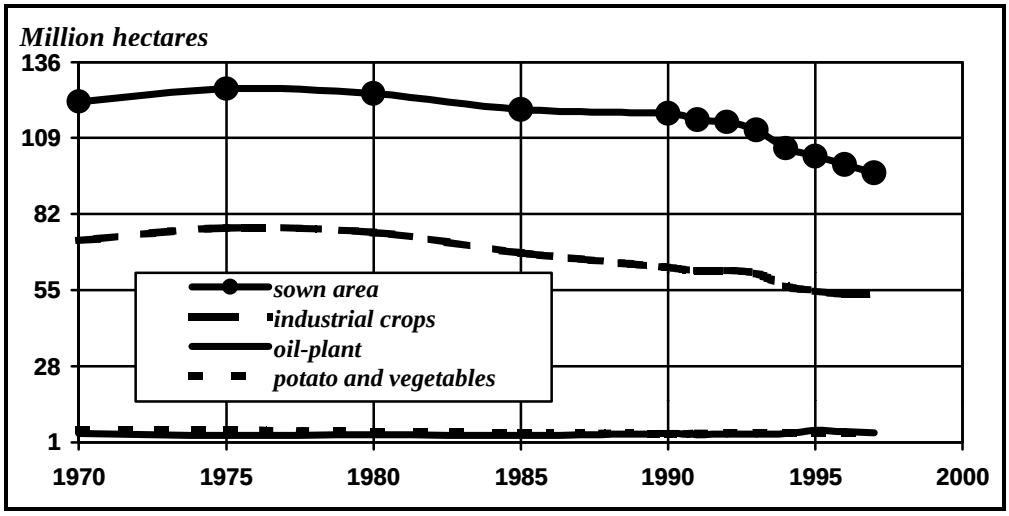

Fig.10 Area sown to crops

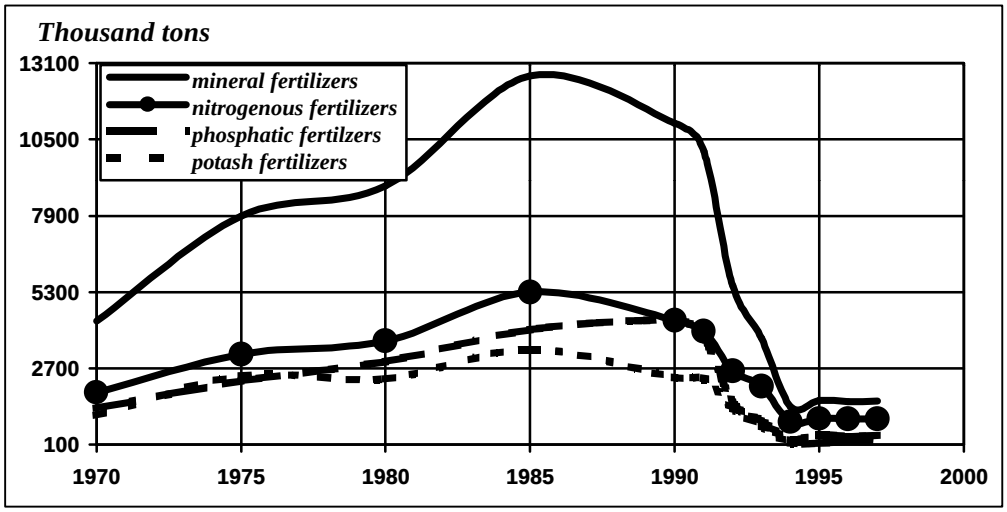

Fig.11 Sale of mineral fertilizers to the agricultural enterprises

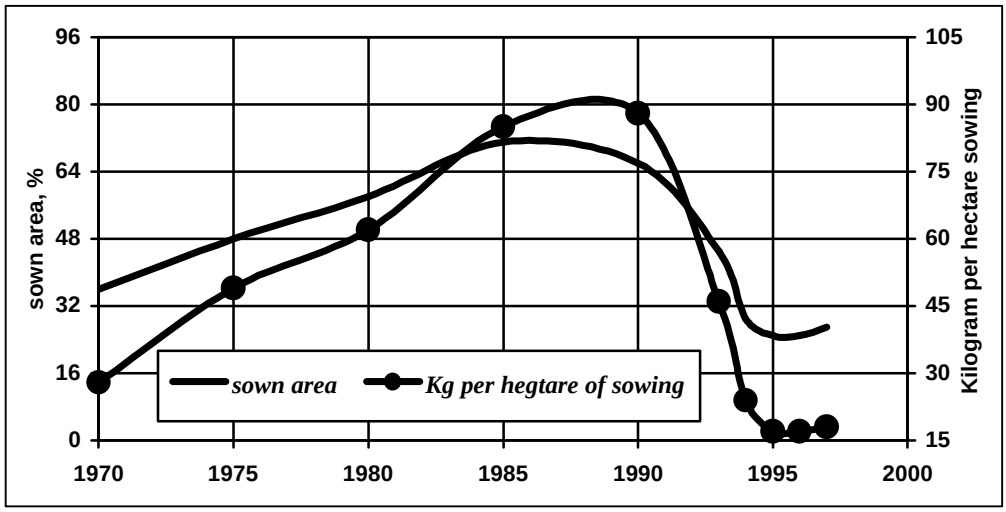

Fig.12 The use of mineral fertilizers

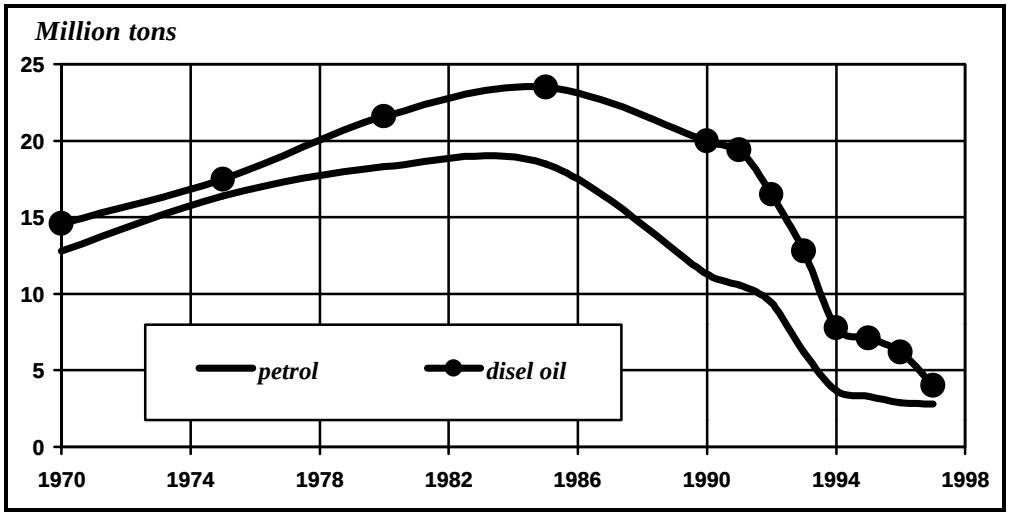

Fig.13 Sale of petroleum to the agricultural enterprises

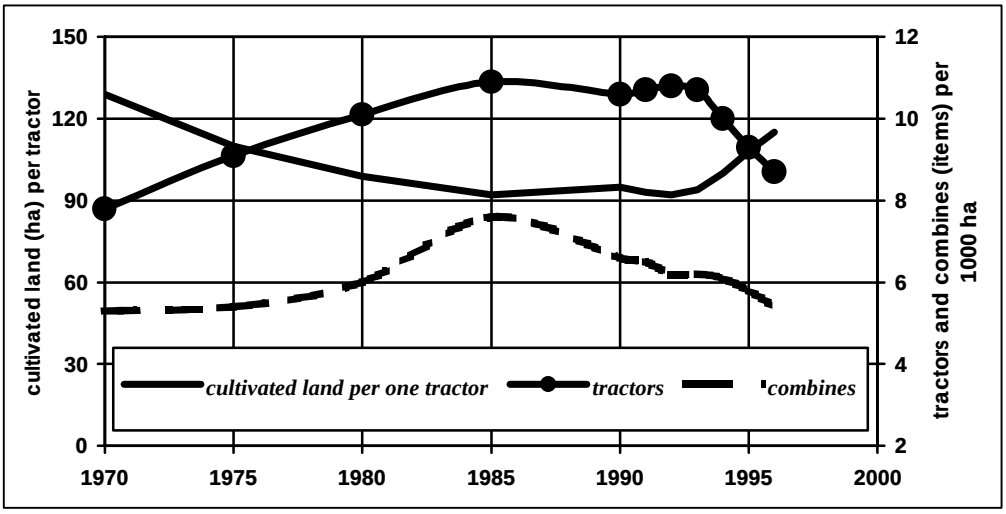

Fig.14 Provision of agricultural enterprises with tractors and combines

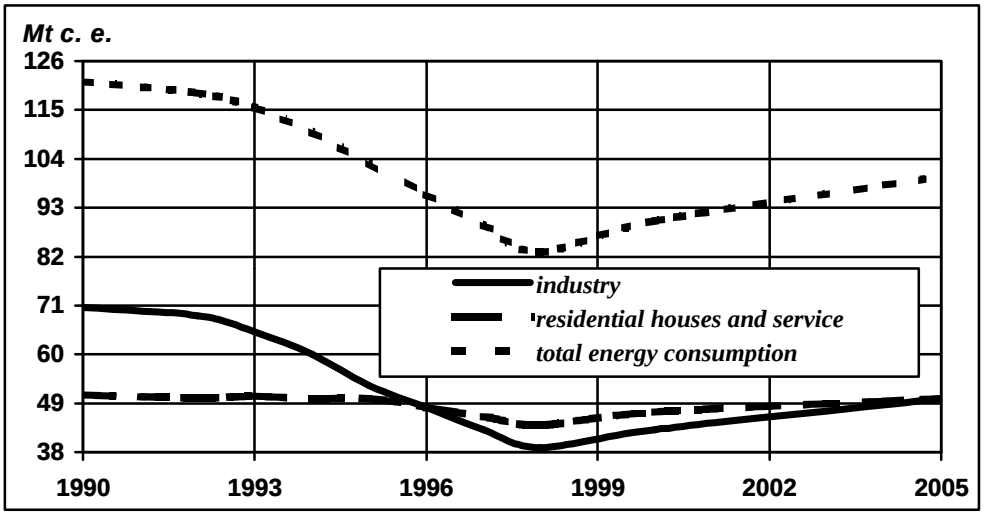

Fig.15 Energy consumption in Russian agriculture.

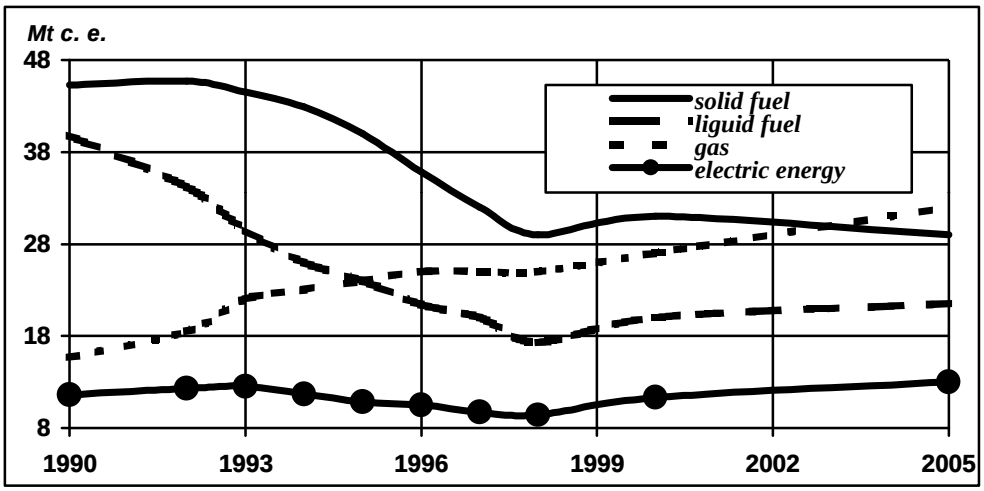

Fig.16 Energy consumption in Russian agriculture

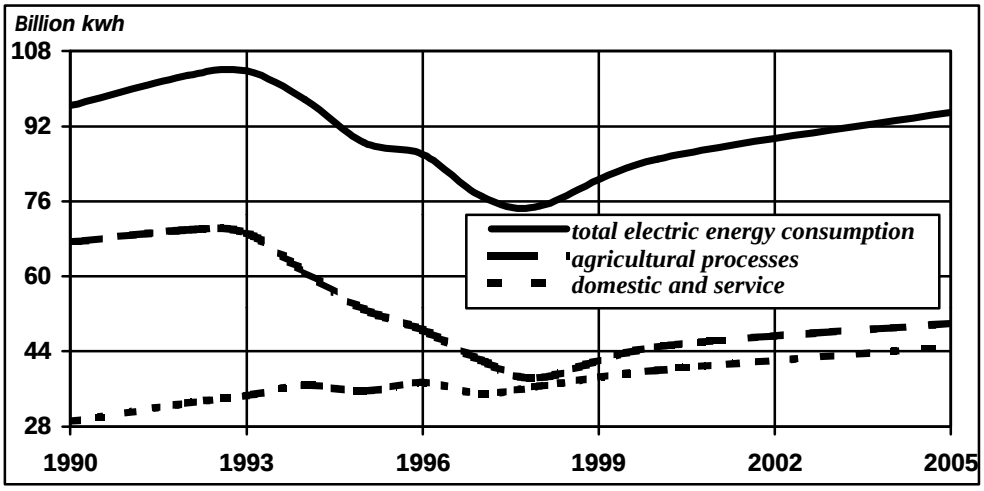

Fig.17 Rural Electrification in Russia

Table 1. Agriculture of Russia

I	*Macroeconomic standings of agriculture - in the year 1999:*		
	Share of agriculture on GNP of country	6.7 %	
	Share of agricultural population	27 %	
	Total number of workers in agriculture	10000×10^{3}	
	Agricultural population	39500×10^{3}	
II	Main indicators of agriculture development - in the year 1999		
	Total area of country	1707540×10^{3} ha	
	agricultural land	195200×10^{3} ha	
	Forest area	768293×10^{3} ha	
			Income
	Total number of farms	313800	100 %
	individual and family farm	16400	60 %
	agricultural land, 10^{3} ha	10,5	
	small new farms	270200	2 %
	agricultural land, 10^{3} ha	12,9	
	collective farms over 100 ha	27200	38 %
	agricultural land, 10^{3} ha	163,5	

Table 2. Milk Production Cost

Labour	17,5 %
Feed	43,2 %
Fuel and energy	20 %
Overhead	12,5 %
Other	6,7 %
TOTAL	100 %

Table 3. The Flax Market Price Structure

Raw material	10 %
Primary flax treatment factory	15 %
Textile factory	40 %
Trade	35 %
TOTAL	100 %

Table 4. Energy expenses in agricultural production, MWh/t

ITEM	RUSSIA		USA	
	direct	indirect	direct	indirect
PORK	55	26	18	10
MILK	8,8	2,9	3,3	2,1
EGGS 1000 pieces	2,8	1,4	0,95	0,55
WHEAT GRAIN (4,5 t/hectare)	3,47	0,92	1,8	0,52

Table 5. The productivity of labor in agricultural production, person hour/100 kg

ITEM	RUSSIA	USA
MILK	8,5	0,4
BEEF	58	2,2
PORK	33	0,8
MEET OF POULTRY	1,5	0,22
EGGS, person hour/1000 pieces	2,8	1,2
WHEAT GRAIN	0,9	0,26
SUGAR BEAT	0,75	0,11

Table 6. Fuel and Energy Prices in Russia

ITEM	1991	1992	1993	1994	1995	1997	1999
Electric energy, $/kWh:							
residential housing	0,001	0,001	0,003	0,005	0,03	0,04	0,012
industry	0,001	0,005	0,018	0,03	0,067	0,08	0,02
Motor diesel fuel, $/1	0,003	0,031	0,074	0,146	0,3	0,3	0,2
Gasoline $/1	0,01	0,038	0,097	0,178	0,39	0,4	0,3