

**Anna Sytchevnik<sup>1</sup>**  
Chair of Organization  
Economic Faculty  
Grodno State Agricultural University  
Grodno, Byelorussia

## **The innovation resources of enterprises in the dairy sector in Belarus**

**Abstract.** The modern stage of development of Byelorussian economy demands search of new solutions to old problems, especially with respect to agriculture. Despite of external well-being and measures taken for development of agriculture, the majority of enterprises can not effectively go on with production on their own. In many branches of production the state subsidies are granted. Various sorts of state grants. If to consider structure of profit of the agricultural organizations its greater part represents a. In article are considered problems of innovative development of agriculture of Belarus, in particular the enterprises of dairy sector.

**Keywords:** innovations, dairy sector, agriculture

### **Introduction**

Innovative activity is basing on the development of a scientific idea which often originates from practice and leads to change of scientific paradigms. Medvedeva [2007] ascertains that this change has no feedback with economy and scientific and technical progress, but nevertheless there is a change in technology. All innovations can be classified into different degrees of influence on various spheres of the social and economic life of a society: basic innovations and secondary innovations (or pseudo-innovations). The cyclically repeated periods of preference or counteraction to innovations are observed in history. Paradoxically the great demand for basic innovations is observed during the periods of economic recession, since owing to this factor it is possible to overcome the developed crisis situation. Secondary innovations are in demand during the economic growth periods. At this time technologies and workers with high qualification are necessary to the enterprises. Introduction of innovations would demand from them additional expenses. This fact counteracts basic changes in techniques and technology.

A national program of innovative development of the country for 2007-2010 is created in Belarus. According to this program a national innovative system should be constructed in the country. This system will allow generating, distributing and using knowledge to be embodied in new products, technologies, services. 61 new products and 177 technologies will be introduced in agriculture and processing of agricultural production. All this will demand a use of significant resources which many enterprises of agriculture have not enough of. For this reason creation of investment base (especially attraction of foreign investments) is required not only monetary in kind, but also in the form of imports of technologies, including management. The leading role in solving these problems is allocated to the state. Serious problems face the enterprises in dairy sector in Belarus today. They increase even more within the limits of the accepted Program of innovative

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<sup>1</sup> MSc, e-mail: annvlad@rambler.ru

development of the country. Who should develop innovative technologies? How to train the personnel in working with new machines and the equipment? How to define a correct strategy of development of the enterprise, its specialization? Where to take financial assets for all it? These and other questions arise with creation of a strategy of development in each agricultural enterprise. We shall try to find answers to these questions. We already considered structure of dairy sector in earlier works and marked, that all structural elements of the agricultural subcomplex are interconnected and interdependent. For this reason we shall consider the relevant conditions for each of its elements.

### **State of the agricultural science**

According to the Ministry of Agriculture nearly 25 million US dollar has been directed to financing of the branch science for the last three years. [Пысак 2007]. Actually it is not such a lot, as it seems at first sight. The material base of scientific institutes is becoming outdated in many respects. In the field of agriculture a whole network of scientific institutes is engaged in the scientific research. There are 4 centres of science extension service, 11 scientific research institutes, 2 skilled stations and besides research is done in the higher educational institutions (2 universities and 2 academies). The university science is represented by 100 doctors and more than 700 candidates of sciences. Every year scientists of agricultural high schools create about 100 scientific and technical new products (plant varieties, veterinary preparations, breeds of animals, machine and equipment specifications, scientific and methodical recommendations). In all agricultural high schools a professional training in the highest scientific qualifications is conducted in more than 30 specialities. Annual reception of more than 150 people for doctoral and postgraduate studies takes place in the agricultural high schools under various forms of training (daytime and correspondence).

But, as many scientists notice it, the scientific support for innovative development is not sufficient in Belarus. First of all it is caused by a low number of researchers. There is an outflow of young researchers from the scientific field of employment. The number of the scientific researchers is reduced annually by 3 %. The principal cause is a low level of salaries, and especially low in the sphere of agricultural science. Therefore many scientists and teachers from high schools migrate abroad and remain there to live and work (nearly 70 people annually).

Some research organizations are transformed into research-and-production units. Thus there is a reorientation of these establishments from the release of scientific and new technological products to the socially significant, but not high technology products. Scientific research practically is not done. Many scientists do not share the governmental optimism about fast and successful formation of the national innovative system. Growth in numbers of graduates from universities has had no systematic character. There are not enough experts with high education in natural science instead of production education. There is a need of about 7000 experts in the field of innovative management who are lacking in the country.

All aforesaid allows for a conclusion, that innovations existing abroad will be demanded in the near future in Belarus. Also the already invented technologies will have to be improved (secondary innovations).

## Condition of technical and technological base in the enterprises

Academician M. Severnev considers that the organization of any production begins with technology, and economy begins with production [Севернев 2007]. The economy will be in stagnant if nothing is changed in technology. It is difficult to disagree with it. The bulk of agricultural enterprises use traditional ‘know-how’ in milk production. However, the life has already proved their inefficiency. Those win who constantly improve their products.

For a long time it has been noticed that in Belarus favourable conditions for development of dairy cattle breeding are prevailing. The genetic potential of dairy cattle stays at a level of 7000-7500 kg of milk per cow and year. But it is used only on 43 %. The average annual productivity was 4019 kg in the past year. The factors determining dairy productivity are feeding in 70 %, breed in 20 %, conditions of maintenance in 10 %. It is necessary to feed cows with the high-grade balanced forages. However, it is not given due attention in the agricultural enterprises. As show data in table 1, annual actual charge of forages in Belarus exceeded a normative level. In what has it resulted? We have lost 12.14 dollars on 1 ton of milk in 2005. We shall get a number of 45300.2 thousand USD if we count losses for the whole volume of production. It is one of the reasons of low competitiveness of the dairy sector.

Table 1. The analysis of the expense of forage for production of 1 ton of milk

Parameter	Year				
	2001	2002	2003	2004	2005
Actual expense of forages, MJ	17.08	16.81	16.58	15.89	15.63
Standard allowance of forages, MJ	15.21	14.98	14.74	13.69	13.10
Excessive expense of forages, MJ	1.87	1.83	1.84	2.20	2.53
Cost of the excessive expense, US dollars	8.99	8.80	8.85	10.58	12.14

Source: [Гусаков and Бельский 2007] and own calculations

Excessive expenditure of forages occurs usually because of an imbalance of diet and forage poor quality. How to achieve improvement of this situation? Nowadays an effective ‘know-how’ of forages exists. For example, it is the technology of drying corn grain of the raised humidity, of using biological preservatives for storage silos, it is the technology of preparation and distribution of fodder mixes. Such technologies are in use in many agricultural enterprises. It has allowed to achieve good results and to raise efficiency in the use of forages.

Other problem of milk production is bad work on reproduction of herd. Now we receive 88-94 fertilized for 100 cows. Elimination of fruitless cows is low. Therefore regular work is required on their revealing and removal from herd. One of revolutionary innovations is the ultrasonic scanner for early diagnostics of pregnancy.

One more problem is the organization of process of milking. Usually cows are being milked in milk line by means of portable buckets. This process is very labour consuming. Milk has poor quality (a high degree of impurity). Innovation is milking parlours with a fast turnover of cows milked dry. The standard level of automation allows one person to milk dry 76-80 cows per hour. The sanitary rules are observed and the dairyman carries out labour operations without a pressure.

There is also a sharp problem of the input of power resources now. Among the accessible innovations there are changes in design of protecting structures which allow for adjusting the microclimate parameters in premises without additional expenses of thermal energy. There are possibilities of reduction in the expense of electric power on illumination with use of photo-electric converters and light-emitting diode fixtures.

The average duration of use of equipment and technologies is 20-30 years. More than half of them were developed in the days of Soviet Union. Relative share of the amortized capital exceeds 80 % of the initial cost of machines and equipment. Consumption of durable resources lasts twice longer than in the economically developed countries for this reason. The scientific and technical centres for grain harvesting and forage harvesting techniques on the basis of 'Gomselmash' factory and for production of tractors on the basis of 'Minsk tractor factory' are created for the purpose of scientific support for the process of production.

Production should be improved constantly. It is necessary to introduce intensive technologies, productive equipment and techniques. The 'Byelorussian agri-industrial week' takes place annually in Belarus. This exhibition gives access to all existing technologies in agricultural production and technical innovations. They are offered by Byelorussian and foreign firms. The exhibition 'Belagro' was held for 17 time in 2007. In the exhibition it was possible to see all new that is created in the world. Exhibitors from Austria, Hungary, Germany, Spain, France and Poland took part in it. It was possible to track logically the technological chain: cultivation and agricultural technique, animal husbandry, food processing, packing and storage of food stuffs. Visitors to the exhibition have come to conclusion during exchange of opinions that they were surprised by many technological innovations and techniques. They would search opportunities for introduction of novelties in production in the future.

Mutual relation between milk producers and processing enterprises in the dairy sector is full of problems. Considering this situation, some research was done in 2006 about the expediency of creation of economic groups which should be engaged in the production of milk, in its industrial processing, finishing of ready dairy products and delivering up to consumers. Dairy subcomplex is a multilevel system. That system demands a complex resolution of problems. Therefore we should recognize validity of offer of creation of a Center of Agricultural Economy in the National Academy of Science of Belarus. The offer means creation of a uniform coordination centre of the vertically-integrated formation under the control of the Centre of Agricultural Economy, the Ministry of Agriculture and Food and the Central Administrative Board of National Bank. As a matter of fact three centres should be created in this framework:

1. centre of development of raw material zones (agricultural enterprises)
2. centre of development of production (processing of milk)
3. centre of development of distribution (trade).

Such approach will allow carrying out a uniform policy in all structural elements of the subcomplex of agriculture and alimentation. All occurring changes will have complex character. The project of such formation is developed for the Minsk region. However we think that it is expedient to develop them for the other regions of Belarus.

## Personnel maintenance

In the last years an outflow of manpower occurs in the agricultural sector. The basic reason is the level of salaries considerably lower in this branch than in all others. The wages in agriculture exceed only by half the minimal consumer budget. It is necessary to mean, that each worker has a family, children.

Table 2. Data about change of the nominal added monthly average wages of workers on branches of economy

Branch	Monthly average wages of workers, January-April 2007		Parity of monthly average salary and the minimal consumer budget, April 2007, %
	thousand roubles	USD	
All employers	640.5	298.4	240.6
Industry	712.3	331.4	264.2
Agriculture	378.0	176.1	151.3
Forestry	611.7	285.0	235.1
Transportation	743.3	346.3	286.6
Trade	523.5	243.9	199.4
Education	522.5	243.4	193.1
Science	837.2	390.0	315.1
State administration	980.4	456.7	380.2

Source: Ministry of Labour and Social Protection of Byelorussia, own calculations

Nevertheless, superfluous employment is observed in agriculture. According to the statistical reports there are no seasonal workers in the agricultural enterprises. But the working day is reduced in winter time. In this way the overly employment becomes visible.

First of all managers and experts are necessary to solve problems of innovative development of agricultural enterprises. Unfortunately, the spirit of entrepreneurship, this most valuable quality, has been put out of their heads in the last years. Now all production is subordinated to the will of regional leaders. Enterprises are deprived of initiative. Out of 60 thousand managers and experts only 36 % have higher education. There are enterprises which are headed by people who are not having special agricultural education. Turnover of staff reaches 11 % annually at this level. Educational establishments let out more than 8000 specialists of various qualifications annually. But not all of them start to work as specialists (about 60 %). The principal cause for that are low salaries and absence of normal life conditions. The tendency of reduction in employee numbers is especially visible in agriculture. It is characteristic for the world agriculture and it forces to search for innovative solutions because the population should be provided with foodstuffs. On the other hand, the low level of working motivation leads to search for new decisions before there is nobody left in agriculture.

According to a long-term plan for 2006-2010, 127 postgraduate students and 15 doctoral students will be accepted for direction of agricultural production and in processing animal products industries.

## Finances of enterprises

The gross output has increased by 25 %; exports of agricultural products have grown twice in comparison with 2000. In total 7 unprofitable agricultural enterprises made 0.4 % of their aggregate number in 2006. The unprofitable enterprises are not present in the dairy industry. However not all so is good as it may seem. The tendency of growth of creditor debts is persisting. The sum profits is less than pending debts more than 18 times. The situation could look still worse if there was no state support for agriculture. As Minister of Agriculture has stated, more than 400 million roubles (about 200 thousand USD) go to the enterprises as a kind of stimulation for production of milk and a beef (and more likely for covering of mismanagement) in the form of extra charges to procurement prices. 15 % of the enterprises sell milk at a loss even with governmental grants. The loss ratio on production of milk was -0.8 % without taking into account extra charges. Profitability reached 13.4 % with extra charges. The extra charge to procurement prices of milk have been cancelled recently. What results will it bring we shall see in statistics.

The dairy industry in the country functions effectively enough. Dairy products are exported. But the analysis of data shows that the profitability of cream exports is negative (-29.4 %). Its sale is also unprofitable in the home market (-6.7 %). It is profitable to export casein, cheeses, dry skimmed milk and cottage cheese. Sale of these products is profitable at home market too. Competitiveness of dairy products has grown owing to modernization of dairy factories and introduction of systems of a quality management in production.

The enterprises of dairy sector will require the state support in the future. The reason is that they have not enough own financial resources.

## Investments

Already for a long time it has been noticed that there is a close interrelation between the growth of investments and the growth of gross domestic product. Investments in agriculture in 2005 grew 9.5 times since 2001.

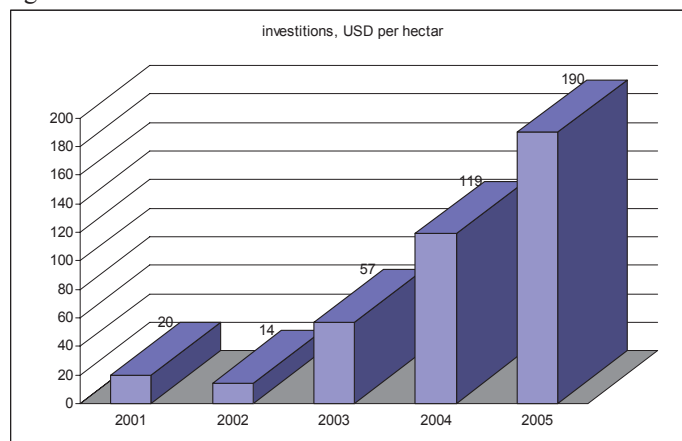


Figure 1. Investments in agriculture, USD per hectare

The structure of long-term investments in agriculture has undergone changes too. Possession of own means by the organizations caused that they began to borrow at a smaller relative density, 31.2 % of the investment worth. The fund of accumulation and fund of reproduction of non-material actives are not used as a sources of finance for investments. The greatest share in financing in 2005 belongs to the budgetary funds (34.4 %) and to the bank credits (30.1 %). 1.4 billion USD was received from the state budget and other appropriate funds in 2005. These means have been used on various purposes. 425 million USD was used in financing of capital investments. A significant part (11.3 %) has also been used on covering the losses of the agricultural organizations. 0.2 billion roubles (95 thousand USD) have been used in financing the scientific research works from budgetary grants in 2005. Therefore it is difficult to speak about an innovative development in the agricultural sector.

## **Innovations in the world agriculture**

In 2006 the International Bank of Reconstruction and Development has published a brochure 'Enhancing Agricultural Innovation: How to Go Beyond the Strengthening of Research Systems'. The existing approaches to innovative development in agriculture are discussed in this edition in detail. The system of innovative development is a certain association of the organizations, the enterprises and people which in common create knowledge and technology, rules and mechanisms by means of which they cooperate. The central role in innovative systems is allocated not only to the science, but also all other actors involved in system. It extends out of the limits of scientific research in order to capture all the factors that allow for using of new and existing knowledge in new and useful ways. Now the innovation is considered in the social and economic sense is not as simple as opening and the invention.

Pomareda and Hartwich [2006] conceive innovations as new knowledge and technologies in agricultural production, food-processing industry and marketing. As a result of such innovations farmers, manufacturers and dealers become more competitive, produce or sell better products of high quality and receive greater profit. Kaczmarek [2006] points out that in the economically developed countries a greater value is allocated to management of knowledge. In Germany the network of organizations supporting inventors is created. Germany spends for scientific research and development about 75 billion euro annually. In the context of our research of innovative system in Belarus we should note that we are at an initial stage of its creation. The concept of national innovative system should be expanded. As a criterion of efficiency of functioning of innovative system the competitiveness of all national economy and its separate elements should be taken. World experience has shown that investments into innovations pay back for themselves. Therefore a further growth of investments in creation and functioning of innovative system of Belarus is necessary.

## **Conclusions**

The logic of agricultural development demands a perfection of whole production in Belarus (and in dairy sector in particular). It is possible to attain only with being guided by innovation. It concerns an innovative development of science, techniques and 'know-how',

qualified personnel maintenance in science and production, growth of financial investments and their efficiency.

The agricultural enterprises have not enough financial resources for financing scientific research. Therefore in Belarus a steady demand for innovative solutions already existing abroad will be observed in the near future.

Creation of an integrated formation (including all organizations of the dairy subcomplex) is necessary for the steady innovative development of enterprises in the dairy sector.

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