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Beef Cattle: Methods Of Management And Livestock.

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ABSTRACT

The article discusses the economic efficiency of various options for the implementation of special events from the use of management and zoo technical methods in beef cattle. Currently, scientists can enable and disable genes, as well as integrate the genes of one organism into another. The techniques and methods of genetic engineering are very diverse. The main technique used in genetic engineering is the isolation of genes from the body (cells), the manipulation of genes and their introduction into other organisms. Using these methods, it is possible to change the properties of living organisms depending on the purpose of their use, including the provision of meat products. Currently, the transition to the production of meat products from local raw materials is impossible not only because of the lack of the necessary volume, but also because of the high price for processing local meat. One of the strategic directions for the development of the meat products market is the growth in the production of high-quality consumer products. The proposed measures with good regulatory policy will be able to benefit the agricultural organization and the country to provide meat products to consumers.

Keywords: genetic engineering, beef cattle, management, efficiency.

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INTRODUCTION

The main goal of all commercial organizations is to make a profit in connection with current events in the global economy, as well as economic sanctions. In the conditions of market competition, it is difficult for organizations to find ways to make a profit, this is due to lower production costs. This leads to a decrease in product quality in most cases. Agricultural products are produced to provide the population with food, therefore a reduction in product quality is unacceptable.

The increase in the production of high-quality beef cattle products is strategically important; this problem is becoming increasingly important with the growth of the population and the satisfaction of the need for food. In this regard, the development of beef cattle attached great economic importance [8].

It is necessary to look for ways that would help organizations to get more profit while maintaining or even improving product quality. This is especially relevant in the conditions of agriculture in Russia, where most organizations are unprofitable and exist only through subsidies from the state budget [10]. Another way to increase profits is to increase production and, consequently, revenue. There are two ways to increase production: extensive and intensive. In the first variant, growth occurs due to an increase in production capacity (agricultural land, number of livestock). The second option involves the introduction of various means of scientific and technological progress. Despite the fact that the area of the territory of Russia is huge, only a small part is suitable for sowing crops. Increasing livestock is an inefficient method of increasing profits due to the high cost of maintaining it. Therefore, it is necessary to pay attention to the intensive way of increasing production volumes. One of these methods is genetic engineering.

Genetic engineering is a field of biotechnology that includes actions to rearrange genotypes. This allows manipulating the properties of organisms and creating new types of plants and animals, which are more productive, as well as increased resistance to environmental factors. This technology is common in most developed countries, and new species of plants and animals are called GMOs (genetically modified organisms).

The appearance of GMOs was due to the discovery of DNA and the creation of the first recombinant bacteria in 1973. This led to controversies in the scientific community, to the emergence of potential risks of genetic engineering. However, research in the field of genetic engineering was continued, and the creation of a product that produces human insulin was announced in 1978. In the late 1980s, a small experimental production of genetically modified plants began in Canada and the United States. The first approved projects for large-scale, commercial cultivation were launched in the mid-1990s. Since that time, the number of farmers worldwide using GMOs has increased annually.

Despite the widespread use of GMOs around the world, a ban on the cultivation and import of GMOs is in force in Russia. At the beginning of 2016, regulation in the field of genetic engineering was carried out on the basis of federal law No. 86-FZ of July 5, 1996 "On state regulation in the field of genetic engineering activity". [1] However, Federal Law No. 358-FZ “On the Amendments to Individual Legislative Acts of the Russian Federation Improving State Regulation in Genetic Engineering” entered into force on July 3, 2016 [2], which prohibited the use of GMOs in fields of activity other than scientific. The adoption of this law has become a serious restriction on the development of agriculture in Russia. Despite the widespread opinion about the dangers of GMOs, there are a large number of studies confirming the safety of using GMOs in the diet.

A statistical report entitled “Meta-analysis of the effects of genetically modified crops” [4] was published in 2014. The brief conclusions presented in the report are the following: genetic engineering technologies increase the yield by an average of 22%. Farmers income increases by 68%. The use of pesticides is reduced by 37% (these indicators are higher in the case of using crops resistant to pests than crops resistant to herbicides). These figures are averaged: the effect is much greater for developing countries than for developed ones. Based on these data, it can be concluded that the use of GMOs in agriculture will significantly increase not only the incomes of agricultural organizations (which will entail a reduction in budget expenditures on the payment of subsidies), but will allow to fully meet the needs of the population in food.

Many opponents of GMOs talk about the harm that brings the use of modified products, referring to studies that allegedly prove the impact of GMO use on the development of certain diseases. In particular, a

serious argument against the use of GMOs is a study conducted by French scientists in 2012 under the name "The long-term toxic effect of the herbicide Roundup and Roundup-tolerant genetically modified corn". [5] The brief conclusions of the study suggest that rats fed on GM maize were particularly susceptible to the development of cancers, premature death, and pathologies in the development of organs. However, upon closer inspection, it becomes clear that the wrong methods were used during the experiment. In particular, the method of grouping animals was chosen incorrectly. For the experiment, 200 rats were selected (100 rats of each sex); rats were divided into 10 groups. In this case, 9 out of 10 groups received GM (genetically modified) maize in different concentrations or water containing the herbicide R. Only one group was the control group. As a result of two years of observation, it was concluded that 30% of the males and 20% of the females that had tumors died prematurely in the control group, while in some groups with a diet containing GM maize, 50% of the males and 70% of the females died. It should be noted that not all groups showed excess mortality compared with the control group. Given this, it can be said that increased mortality rates in some groups compared to the control group are a statistical phenomenon, and not a consequence of the influence of GMOs. In addition, it is necessary to take into account the factor that a special type of laboratory rat - Sprague-Dawley was chosen for the experiment; this type of rat is prone to the formation of tumors. Already in the first 18 months of life, malignant tumors are formed in 45% of rats of this species. Thus, the study of the influence of GMOs on the development of cancer tumors in this type of rat is not reliable.

As noted above, the cultivation and use of GMOs is prohibited in Russia. Given the economic effectiveness of GMOs abroad, it is necessary to find out the effect of the introduction of GMOs in the Russian agriculture. To carry out such an analysis, the authors focused on a specific branch of animal husbandry - beef cattle breeding.

Most agricultural organizations that specialize in animal husbandry are engaged in dairy cattle breeding; selling meat is a secondary, often unprofitable activity for them [10]. To increase the income from the sale of meat it is necessary to improve the meat characteristics of animals. This problem can be solved with the help of genetic engineering. There are a large number of examples of successful application of genetic engineering in animal husbandry in developed countries. A perfect example for this analysis is the blue Belgian cow. To understand why this breed is unique, it is necessary to provide a brief description of it.

Work to improve the meat and dairy herds of Belgium began in the second half of the 19th century. The Bulls of the Shorthorn breed were brought from England, some meat breeds were added from France. Gradually, the local cows became increasingly larger with a fairly low planting of the body. Animals acquired a modern look in the 50s of the 20th century, when Professor Hanset blocked the gene that slows down the development of muscles and strengthened the ability to gain meat weight during the experiment on artificial insemination in Liege. Then the breed of Belgian cows was fully formed.

Table 1 shows the anthropometry of the Blue Belgian breed, depending on age.

Table 1: Anthropometry of the blue Belgian cattle

No	Age	Bulls	Cows
1	12 months	475 kg, 120 cm	370 kg, 115 cm
2	24 months	775 kg, 135 cm	500 kg, 122 cm

As can be seen from the table, animals of this breed are distinguished by very impressive sizes already at the age of 1 year. Adult bulls can reach 1300 kg.

However, when comparing the quality of meat, it can be found that according to its nutritional characteristics, the meat of the Belgian blue cow is much more valuable than meat of other breeds.

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Table 2: Nutritional value of Belgian blue meat

No	Indicators	Belgian beef	Average beef	Medium Chicken Breast
1	Moisture (g)	59,85	51,83	58,68
2	Protein (g)	17,95	15,38	17,85
3	Fat (g)	5,13	16,37	7,65
4	Cholesterol (mg)	38,47	55,30	54,42

According to the table, it is clear that the amount of protein in Belgian beef is higher, with significantly less fat and cholesterol than in meat of other breeds of cows or even chicken meat.

Summarizing the characteristics of this breed, the following advantages can be noted:

Table 3: The advantages and disadvantages of the Belgian blue breed

No	Advantages	Disadvantages
1	Increase in body weight throughout life;	Swelling of limbs with excessive weight gain
2	A high percentage of meat after slaughter	Difficult calving
3	Juicy beef diet type	The need for warm climatic conditions
4	Transfer to calves of the gene of enhanced growth	_
5	A small period of gestation	_
6	The possibility of obtaining milk	_
7	Calving at an early age	_
8	Calm nature of animals	_
9	Simple feeding scheme	_

It is necessary to determine the feasibility and possibility of using the Belgian blue breed in Russia, as well as to calculate the economic effect of its breeding.

The data of Rosstat, given in table 4, indicate that among the main types of meat produced in Russia, beef has the lowest production and export figures, but at the same time, the highest import indicator.

Table 4: Production, export and import of meat in Russia [6]

No	Indicator	Years		
		2015	2016	2017
	Meat production in Russia, million tons	8,2	8,9	9,3
	including			
1	beef	1,6	1,7	1,6
	pork	2,8	3,0	3,1
	bird	3,8	4,2	4,6
	Meat imports to Russia, million tons	2,3	1,7	1,0
	including			
2	beef	0,8	0,8	0,5
	pork	1,0	0,4	0,3
	bird	0,5	0,5	0,2
	Meat exports from Russia, million tons	0,0641	0,0635	0,0850
	including			
3	beef	0,0100	0,0015	0
	pork	0,0003	0,0004	0,0150
	bird	0,0538	0,0616	0,0700

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It can be concluded that the population's need for beef cannot be satisfied by domestic production. One of the reasons for the insufficient volume of beef production is the fact that dairy breeds occupy most of the herds of cattle in Russia (Figure 1).

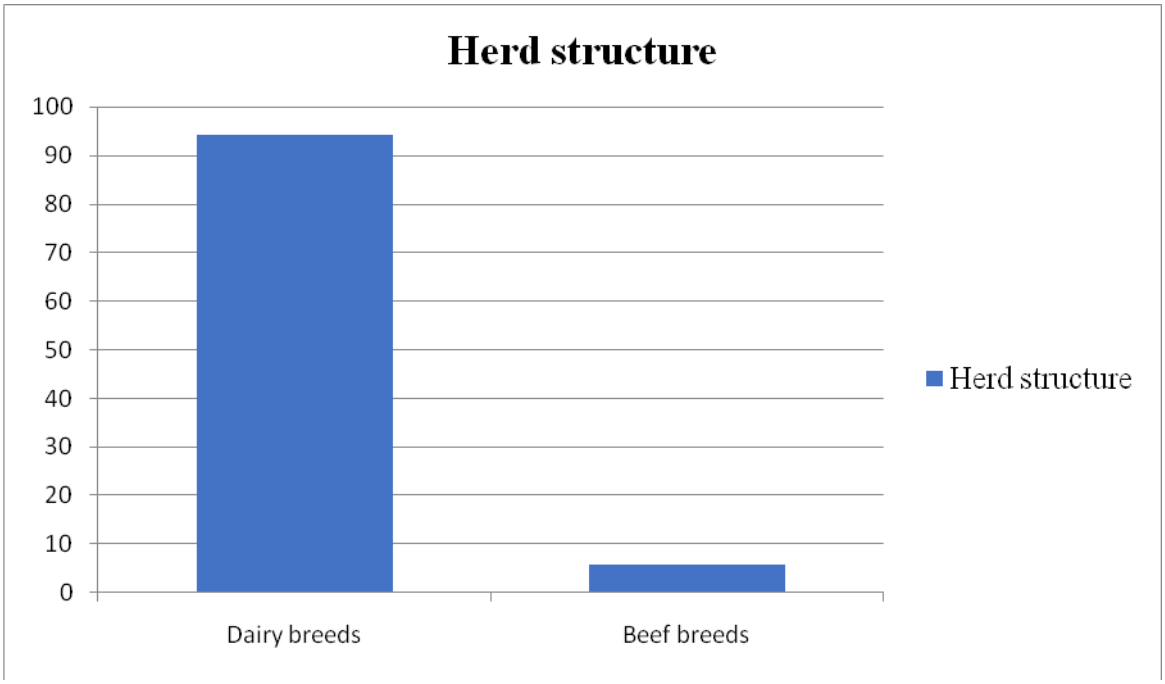

Fig 1: Ratio of dairy and beef cows in the herd structure in Russia in 2017 [7]

Such a structure of cattle herds is not able to meet the needs of the population with the necessary amount of beef. Therefore, the development of beef cattle in Russia is very promising and beneficial for agricultural enterprises.

It is important to determine how to develop this industry. As can be seen from table 3, the production of pork and poultry increased in 2017. This is due to an increase in livestock. As noted above, this method is called extensive and has very limited development limits. Therefore, attention should be paid to an intensive way to improve the meat characteristics of animals, and in particular cattle. The possibility and economic feasibility of breeding such a genetically modified animal as the Belgian blue cow is discussed further.

There are two options for the introduction of the Belgian blue breed in Russian agriculture:

1) Purchase and breeding of purebred cows of this breed;
2) Purchase of Belgian blue breed seed for crossing with breeds bred in Russia.

In the first variant, it is necessary to take into account that this breed of cows is characterized by a low content of fat in the body, therefore the conditions for its maintenance should be quite comfortable. This problem can be solved by building well-heated barns or breeding this breed in the southern regions of the country. In addition, purebred cows of this breed are distinguished by such an anatomical feature as the narrowness of the hip bones. This feature leads to difficult calving. As the practice of breeding this breed in Europe shows, approximately 50% of calving is done using a cesarean section. Taking into account all these features, the breeding of a purebred breed in Russian conditions seems to be rather laborious and requires quite high qualification and additional time costs for livestock workers.

The second option seems to be more realistic in the conditions of Russian agriculture. As studies and examples of such interbreeding crossings abroad show, such crossbreeding will increase the muscle mass of cows by 7-10%, and in some cases, will also increase the dairy characteristics of cows.

To calculate the economic effect of the second option, it is necessary to determine the cost items. First, it is necessary to take into account the cost of purchasing seed from abroad. As the market survey shows, the average price for a single dose of seed is 10-15 €. This equals 635.4-953.1 rubles at the rate at the time of writing. Secondly, the cost of shipping seed from abroad. These costs vary greatly depending on the supplier and on average amount to 200-300 € per delivery. Thus, it is more profitable to order large quantities of goods (from 100 pieces). Third, the additional costs of labor and social contributions to veterinarians. If the level of farm workers does not allow to carry out work on the crossing and breeding of animals with high quality, it is necessary to involve outside highly qualified specialists.

Since the crossing of the Belgian blue and black-and-white breed has never been done, it is rather difficult to evaluate the result of such crossbreeding. To calculate the economic effect, it is necessary to make the assumption that the meat characteristics (live weight of cattle) of a new breed of cows will be improved to the same extent as when crossing the Belgian blue with other breeds, i.e. by 7-10%. In addition, it is necessary to assume that dairy characteristics will remain at the same level.

Table 5: Objects of economic evaluation of beef cattle products [9]

No	Accounting groups of animals	Objects of calculating the cost of production	Calculation units
1	The main herd of beef cattle (cows, bulls and calves up to 8 months)	Milk Offspring Weight gain	Center Head Center
2	Animals on growing and fattening (heifers and bulls of all ages older than 8 months, cows, bulls and oxen culled from the main herd)	Weight gain Live weight	Center Center Center

The calculation of economic efficiency will be as follows (table 6).

Table 6: The economic effect of the proposed activities

No	Formula	Calculation
1	The cost of seed + shipping + payment of the work of specialists -*additional costs per 100 heads*.	79425 rubles + 15885 rubles + 25000 rubles = 120 310 rubles – *additional costs per 100 heads*.
As practice shows, the output of meat of black-and-white breed of cows averages 60%. At dairy enterprises, bulls are sold for slaughter when they reach a weight of about 400 kg. Sale of cows for slaughter is carried out only when culling animals. The average weight is 600 kg. The average weight for the calculation is 500 kg. The meat yield from one head of black and motley cow breed:		
2	Live weight *meat yield percentage	500 kg * 60% = 300 kg
The increase in muscle mass for 1 head of black-and-white breed of cows:		
3	Meat yield from 1 head of black-and-white breed * percentage of muscle mass gain as a result of crossing	300 kg * 10% = 330 kg
4	The increase in muscle mass as a result of crossing one head * number of heads - *an additional meat yield per 100 heads.*	30 kg * 100 heads = 3000 kg - *additional meat yield per 100 heads.*
Considering that the average purchase price of 1 kg of meat by processing plants amounts to 200 rubles, then the additional income received as a result of crossing will be equal to		
5	_	3000 kg * 200 rubles = 600 000 - *additional income per 100 heads.*
The resulting economic effect (profit) from the crossing of the black-and-white and Belgian blue breeds is equal to:		
6	_	600 000 rub. - 120 310 rub. = 479 690 rubles. - *additional profit per 100 heads.*
The profitability of additionally obtained products:		

7	Profit from the sale of additional products / cost of additional products	(479,690 rubles / 120 310 rubles) * 100% = 399%
This figure suggests that 3.99 rubles of profit accounted for one ruble spent on production.		

As can be seen from the calculations, the economic effect of crossing a black-and-white breed of cows with a Belgian blue breed obtained using genetic engineering is obvious.

The results show that the use of genetic engineering in agriculture will ensure the needs of the population in Russia, but also increase the export of agricultural products. However, there is a ban on the cultivation of GMOs in Russia, so this path of agricultural development is currently not available.

The study of the cost of feed and premix is one of the managerial and zoo technical management methods associated with the production of beef cattle. After examining the cost structure in organizations, the following items of material costs were identified, occupying the largest share in the cost of production:

- feed (green, juicy, coarse, concentrated, vitamin and mineral supplements);
- veterinary drugs;
- spare parts for agricultural machinery, repair and maintenance work related to maintaining the optimal state of the organization's tractor and tractor fleet.

As a rule, the need for the above materials is met with the help of third-party specialized organizations. However, the prices for such products are often inflated, and the quality does not always correspond to such a price. Therefore, the leadership faces the question of the organization of its own auxiliary production. Each cost item separately is further considered to analyze the possibility of creating such industries [11,12].

Many producers have agricultural land, which is used for growing various cereals, leguminous plants and other crops. As practice shows, the production of crop products, in particular hay and straw, for their own needs is economically justified. Calculation of the cost of hay and straw in a number of organizations showed that the cost of these products during production inside the organization is on average two times lower than the cost in the market.

Table 7: Comparison of costs for hay and straw

Name of feed	The cost of production in the organization, rubles per kg	Average price on the market, rubles per kg
Hay	2	3,5-4
Straw	1	2-3
On the basis of these data, it can be assumed that own production of other forage crops will also be economically profitable.		

However, production requires not only providing juicy, rough and green fodder. These feeds largely cover the need for such vital elements as protein, fats, carbohydrates, fiber and a number of mineral substances (calcium, phosphorus) [13]. But the productivity of cows is largely influenced by vitamins (A, D3, E and others) and minerals, the concentration of which in the feed is insufficient or absent (magnesium, iron, copper, zinc, etc.). For the production of such additives requires more complex technology than for the production of hay or straw. It requires certain equipment and accuracy in calculating the concentration of vitamins and minerals. However, with proper qualifications of workers, the organization of such production can bring the necessary economic effect.

Table 8: Comparing the cost of premixes

Premix name	The cost of production in the organization, rubles per kg	Average price on the market, rubles per kg
Minvit 7	31	39
Minvit 5-2	70	90
According to the presented data, it can be concluded that, as in the case of roughage, the production of premixes in an organization is on average 20-25% cheaper than when purchasing these premixes from third-party organizations. However, as noted above, strict adherence to production technology and the availability of highly qualified personnel are necessary.		

The costs of veterinary drugs are discussed below. The production of veterinary drugs requires a license, expensive equipment and highly qualified specialists and experience in this industry. Given the complexity of the production of veterinary drugs, it is rational to talk about the organization of such production only for large agricultural producers or even for a group of such producers. Currently, few organizations involved in the production of veterinary drugs. There are a number of companies engaged in the resale of such products. Such conditions are conducive to higher prices for medicines. Creating own production will significantly reduce the cost of veterinary drugs. However, as noted above, the organization of such production is quite a laborious process. The economic effect will be obvious with the necessary conditions. The calculation of the cost of a number of drugs has shown that in-house production can save organizations from 30 to 50% of the cost of purchased medicines.

The third cost item that is covered in this article is spare parts for agricultural machinery, repair and maintenance work related to maintaining the optimal state of the organization's tractor and tractor fleet. The production of agricultural products in general requires a large amount of equipment and machinery. Agricultural organizations cannot independently produce all necessary spare parts, but at the same time, repair and maintenance work can be carried out in the organization without the involvement of third-party companies. Many organizations already have in their structure repair shops in which the current repair of equipment is carried out. Such workshops can significantly save on repair work and, most importantly, allow you to ensure the efficiency of such work, which plays a large role in the conditions of seasonality of agriculture.

Considered the cost of production of beef cattle are decisive in calculating the cost of production. As can be seen from the above examples, the costs of each of these items can be optimized, which will lead to a decrease in cost and, consequently, to an improvement in the financial condition of the organization and profit.

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