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Zootechnical And Management Accounting Factors Of Beef Cattle: Cost Optimization.

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ABSTRACT

The production of livestock products, including beef cattle, is one of the important and difficult problems of agriculture. Beef cattle in our country has a great impact on the economy, not only of agriculture, but also of industry throughout the country. Cattle breeding is the dominant livestock industry. For example, cattle provides more than 99% of milk and about 50% of beef - the main products of agriculture. The highest efficiency of agricultural production is achieved through reliable information support for management decision-making. Any management decision made in beef cattle should be based on timely analyzed information. The most important factor in the successful production of beef cattle is the correct selection of cattle breed, the creation of a balanced and organized forage base.

Keywords: agriculture, beef cattle, management, cost, expenses.

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INTRODUCTION

Agriculture is a complex system in which the interests of economic entities of various sectors of the agro-industrial complex, trade, industry workers, investors, and consumers are intertwined. To preserve the sustainability of development, it is necessary to observe the balance of interests of all its participants. Sustainable development of agriculture is development in which the needs of the population of the country in food, the need of industry for raw materials, the need of the agricultural sector for development, competitiveness, products and commodity producers are met [7,19].

There are several specializations in cattle breeding depending on the climatic and territorial conditions of growing fodder and fodder production, the output of marketable products and the direction of operation of the farm. The main direction of cattle breeding is dairy, dairy and beef, beef. Dairy and beef, beef cattle breeding are developing in areas with large natural forage lands, including pastures. In contrast to dairy cattle breeding, meat products dominate in beef cattle breeding. For example, the proportion of cows in a herd is from 60 to 70% in dairy cattle breeding, from 45 to 50% in dairy and meat, and from 35 to 40% in meat [6].

Depending on the direction of cattle breeding and productivity, all cattle breeds are divided into specialized dairy (black-and-white, Kholmogory, Holstein, red steppe, Tagil, Yaroslavl, etc.), meat (Kalmyk, Kazakh white-headed, Hereford, Charolais, Aberdeen-Angus, Limousin, etc.) and breeds of double productivity (Bestuzhev, Simmental, Schwyz, etc.) [10].

In livestock, beef cattle is a single industry that produces high-quality products. In order to obtain quality products in beef cattle breeding, it is necessary to follow meat breeds for livestock breeding [9].

The fodder base of beef cattle is the volume, structure and quality of feed, sources of production, production system and organization of their use. Ensuring a well-organized and sustainable forage base is the main condition for the development of beef cattle, increasing its productivity and product quality. The prospects for modernization and intensification of beef cattle breeding depend on the rational organization, volume and quality of feed production. The highest level of animal feeding provides an increase in the rations of the share of the productive part of the feed, an increase in the productivity of livestock and a reduction in the cost of feed per unit of production [15].

Increasing the production of meat cattle products of high quality is strategically important. This problem does not lose its significance, but is becoming increasingly important, both with the growth of the population and with the satisfaction of the need for food. In this regard, the development of beef cattle attached great economic importance [5].

Undoubtedly, the efficiency of beef cattle, both in Russia and throughout the world, depends on breeding, veterinary and sanitary, managerial, technological, political, organizational factors and the introduction of resource-saving technologies.

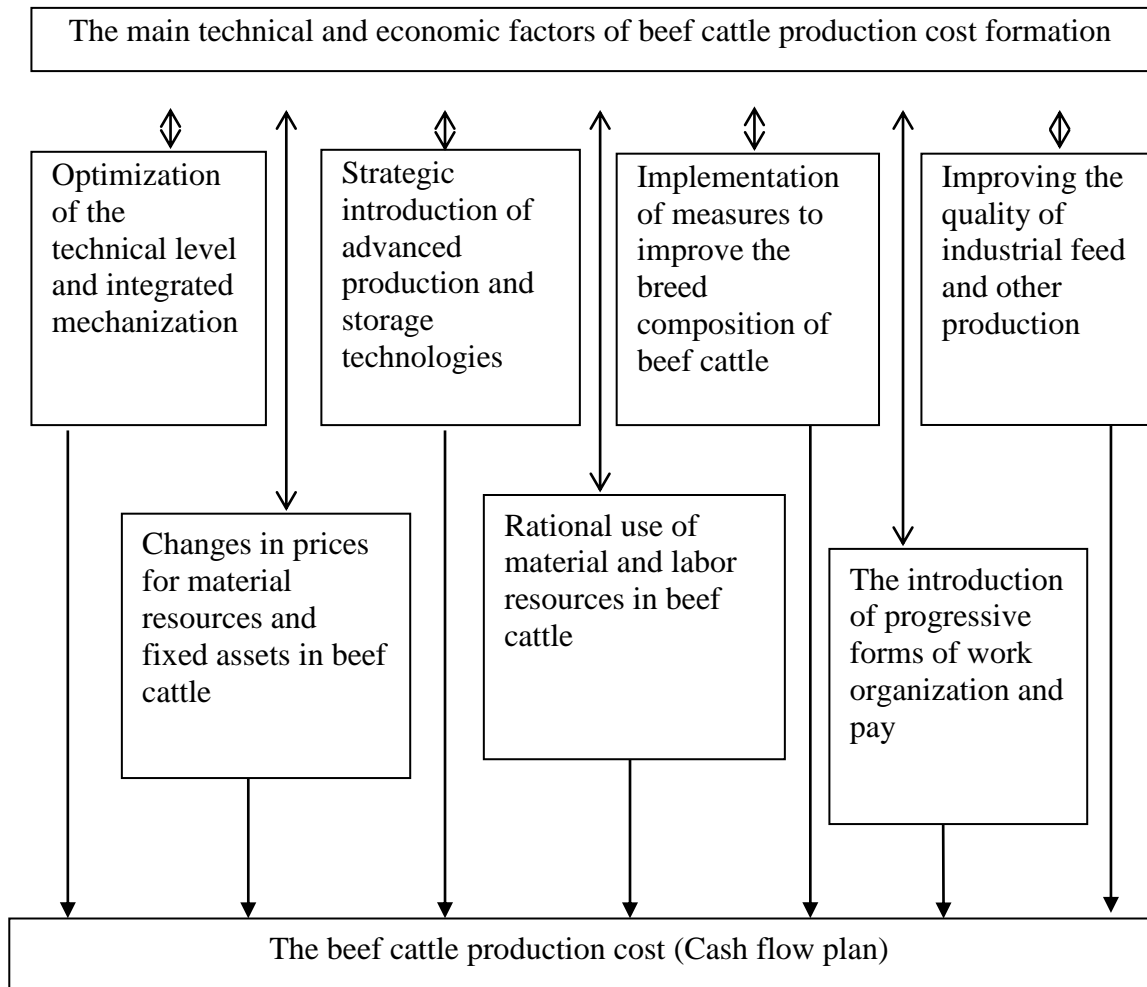


Figure 1: The impact of main technical and economic factors on the beef cattle production cost

Production processes of keeping and growing a cow can be distinguished in beef cattle:

- calf nipple housing,
- rearing a cow,
- fattening of young stock.

Beef cattle breeding needs ecological, progressive, economical technologies. For the successful development of business, beef cattle should be bred in places where there are natural pastures and hayfields.

When introducing ecological, progressive, economical technologies for the production of meat cattle breeding, it is necessary first of all to take into account the natural and economic conditions of the business, then select breeds of animals suitable for breeding, the next step is the selection of food resources. The desired effect is achieved through the use of scientifically based methods of breeding, feeding and keeping animals [16].

When feeding beef breeds, a balanced diet is necessary to achieve weight gain and growth. The necessary growth and weight gain is achieved when feeding with cereal, legumes and meadow herbs. Young animals should be kept separately, feeding them more nutritious and healthy food; resulting in rapid growth and weight gain. Beef cattle are taught gradually to the main feed; this happens within a week or about ten days. When feeding dairy cattle, it is also possible to obtain a high quality product, but the product (meat) is less juicy than that of beef cattle [11].

Stable and complete feeding of young animals by feed mixtures from four to eight months is justified, since during this period the growth rate is increased, which accordingly affects the level of meat productivity [8].

With such feeding, the average daily weight gain reaches 800-1000 grams; in addition, cheap bulky food in the form of mixtures reduces the cost of the final production of beef cattle.

From the economic point of view, beef cattle does not require large investments for the purchase of equipment and the construction of premises. We believe that the use of such technology as loose housing for beef cattle is both environmentally friendly and economically viable, with the maximum use of pasture land. When using this technology for keeping beef cattle, it is not recommended to refuse feeding, both vegetable feed and mineral additives [17, 18].

When applying loose housing for beef cattle and cost-effective ways of keeping them in open areas and light structures, insemination of cows should be carried out, as a rule, from April to July, and if necessary, stimulation of the sexual function should be used.

Seasonal calving of beef cows will come in January-April, which will provide an opportunity, absences of calves in the spring and teaching them to plant food, and in turn, cows will be given the opportunity and time to feed and prepare for winter. Obtaining offspring from each beef cow every year is the main task of beef cattle, and it is achieved by applying certain zootechnical and economic measures. Therefore, to achieve the goal, it is necessary to subject each meat cow to an obstetric and gynecological medical examination in a timely manner, this will reveal pathologies and measures will be taken in a timely manner (treatment, culling, etc.).

Interbreeding can be considered an economically justified and less costly breeding technique that will allow forming a herd of beef cattle in a short time. With multi-breed crossing, it is possible to pick up both meat and dairy breeds; the main condition is to get young animals with high growth energy. In addition, young animals should have the ability to adapt to the local climate and livestock system.

The young animals obtained from this selection are usually carriers of certain genes, which they inherited from their various pedigree parents (heterosis), with high viability and growth energy.

Preventive work and measures in places of keeping animals for improving resistance are an equally important measure. The main and necessary event is to conduct disinfection and disinfestation in places where beef cattle are kept and in the area of their location.

During the year, the costs of beef cattle, as a rule, are reflected separately for each accounting group of animals (Figure 2).

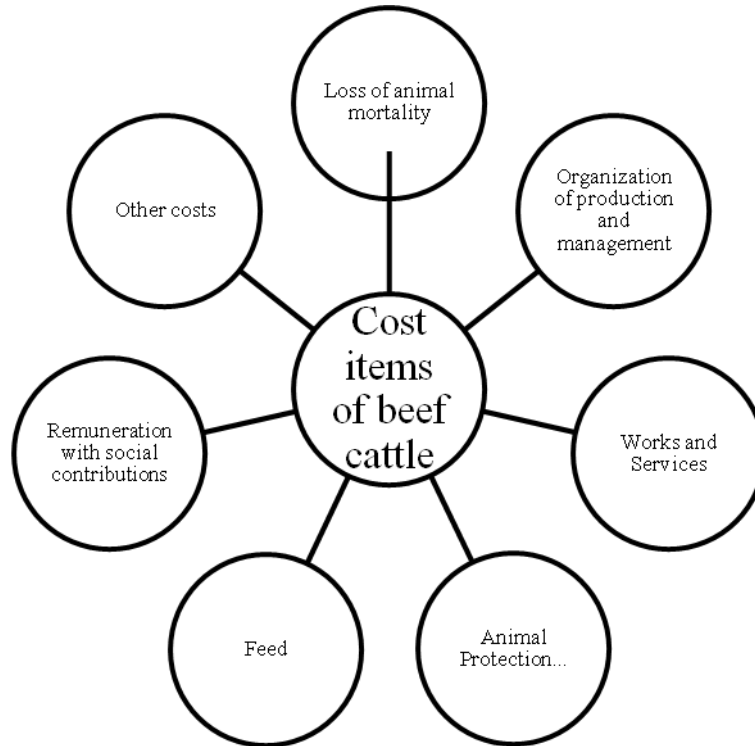


Figure 2: Cost items of beef cattle

Costs incurred in beef cattle are recorded in documents drawn up in the prescribed manner (checklists, invoices, expenditures for materials, medicines, etc.), accumulative and consolidated registers (work and cost accounting logs; production reports; personal accounts for the relevant groups).

Calculating the cost of production of beef cattle is a time-consuming process, therefore the objects of cost accounting should be analyzed (table 1).

Table 1: The objects of cost accounting and calculation of the cost of production of beef cattle

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	Centner Head Centner
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	Centner Centner

By-products for each accounting group of animals include manure, wool-shedding, raw hair.

Volumes of calculating the cost of production of beef cattle are determined by whether the animals are in the main herd or are on growing and fattening.

The calculation of the cost of production should be consistent (Figure 3).

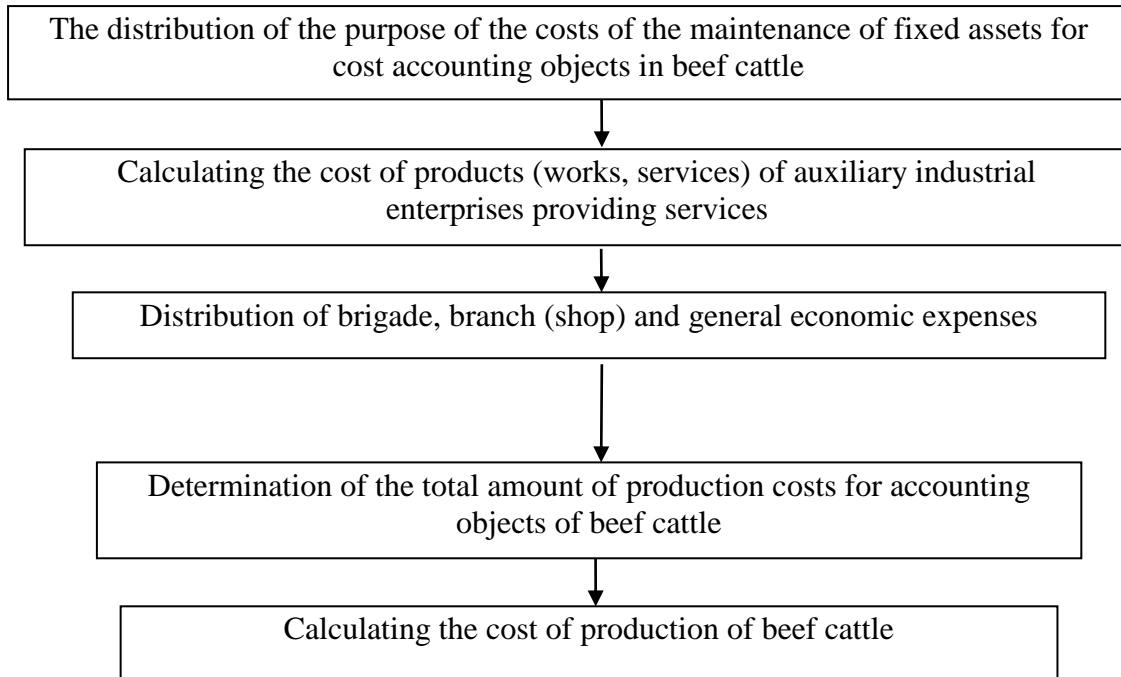


Figure 3: The sequence of calculation of the production cost of beef cattle

Cost estimates are subject to the main, related and by-products of beef cattle.

One head of offspring in beef cattle is estimated on the basis of the live weight of the calf at birth and the actual cost of 1 quintal of the live weight of weaned calves under the age of eight months last year. Consider the procedure for calculating the cost of production of beef cattle (figure 4).

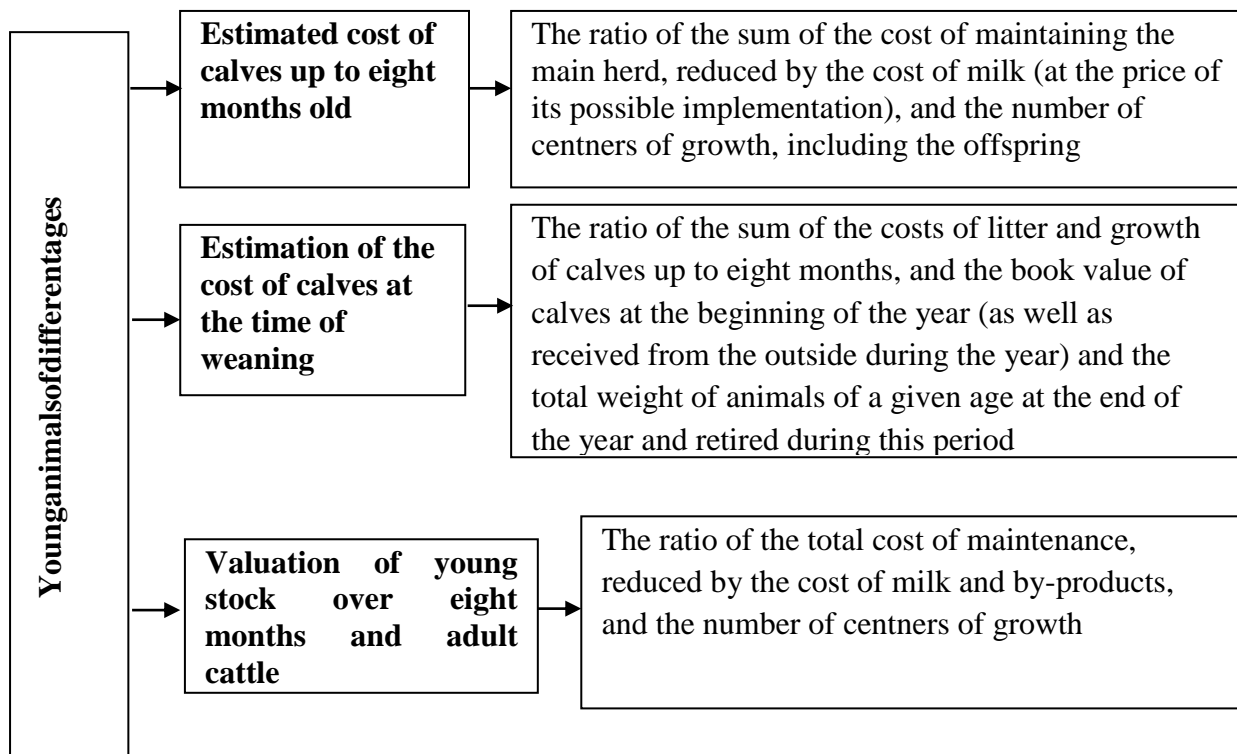


Figure 4: The procedure for calculating the cost of 1 quintal increase in live weight

We present information for calculating the cost of production of beef cattle and calculation (table 2).

Table 2: Calculating the production cost of beef cattle

No	Indicator	Unit of Measurement / Calculation
Information for calculation		
1	Livestock stock in live weight at the end of the year	3640 centners
2	Converted to an adult herd of livestock - in live weight	680 centners
3	Sales	1000 centners
4	Off spring accepted for accounting	240 centners
5	Translated from the main herd and put up for fattening	340 centners
6	Live weight of livestock residue at the beginning of the year	3030 centners
	Received by-products (manure) at the standard price of 90 rubles per 1 ton	1350 tons
7	The cost of keeping young cattle meat direction over 8 months amounted to	3 223 800 rub.
Cost calculation		
8	Total increase in body weight for the reporting year	1710 c
9	Exclusion of the cost of manure from the total value of costs when calculating the cost of 1 kg of growth	$(3640 + 680 + 1000 - 3030 - 240 - 340)$.
10	The actual costs of the main production of beef cattle (increment)	121500 rub.
11	The calculation of the cost of 1 kg of growth	$(1350 \text{ t} * 90 \text{ rub} / \text{t})$.

The output of by-products depends on the technology of keeping animals in beef cattle: milk, manure, wool-shedding, raw hair.

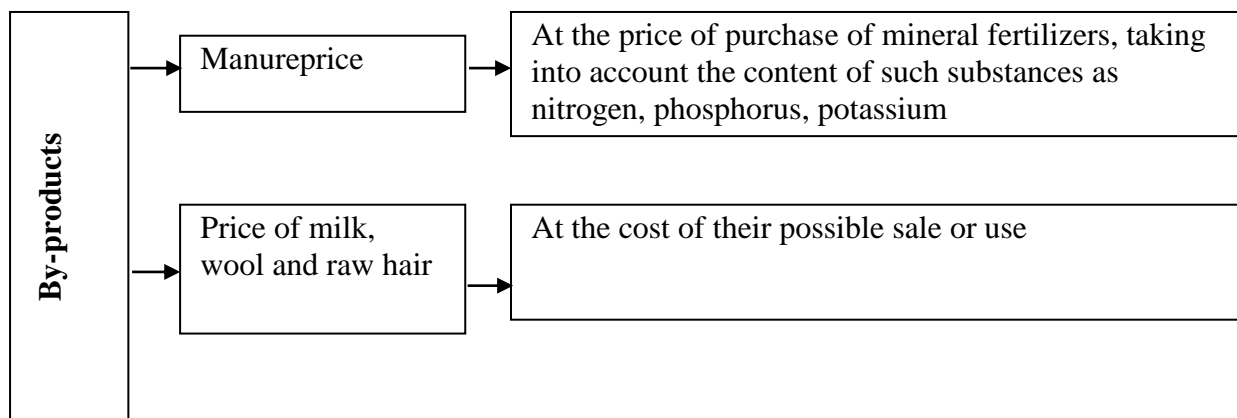


Figure 5: Assessment of by-products of beef cattle

Agricultural organizations can estimate the manure also on the basis of the standard (estimated) costs for its cleaning in specific conditions and the cost of litter.

To increase the mass of beef cattle, improve the slaughter yield of the product, the quality of the final product, reduce the cost of beef cattle breeding, the last stage of production is fattening.

Fattening at the last stage occurs with the use of high-energy feeds; fattening livestock should be stopped at the age of eighteen to twenty months, since after this age the weight of animals grows slowly. In the period from 18 to 20 months, the average daily increase in the use of high-energy feeds ranges from 900 to 1000 g, and the live weight of beef cattle reaches more than 400 kg.

Beef cattle should be fattened with both green and succulent fodder, as well as silage and agricultural waste.

However, you should take into account the nutritional value of about 50-70%, of which in the diet:

- coarse feed 12-15%;
- concentrated 10-25%.

In addition, for beef cattle feed, salt not less than 40-95 g per day, tricalcium phosphate about 40-75 g, bone meal, precipitate and chalk are needed.

At the last stage of feeding beef cattle, feed in the diet of animals is balanced, normal feed is reduced by ten, or even twenty percent, and the rate of high-energy feed and hay is increased. In the diet of beef cattle for balanced feeding, feed additives are also added, and feed mixtures that contain: grass meal, feed tremors, hybrid and premixes. Feeding beef cattle per day is carried out two to four times at a strictly scheduled time. At the final stage of feeding, it is better to use a tethered system for keeping beef cattle, since weight gain is faster.

It should be noted that the quality of meat and meat obtained from slaughter and processing can significantly change under the influence of various factors that can be combined into certain groups (Figure 6).

The main product derived from meat breeds is meat. Slaughter of meat breeds should be carried out at the age of:

- bulls- 8-10 months;
- heifers - 14-15 months.

It is important to understand that beef cattle at this time reaches an optimal weight, therefore, with timely slaughter, both meat and economic indicators significantly increase.

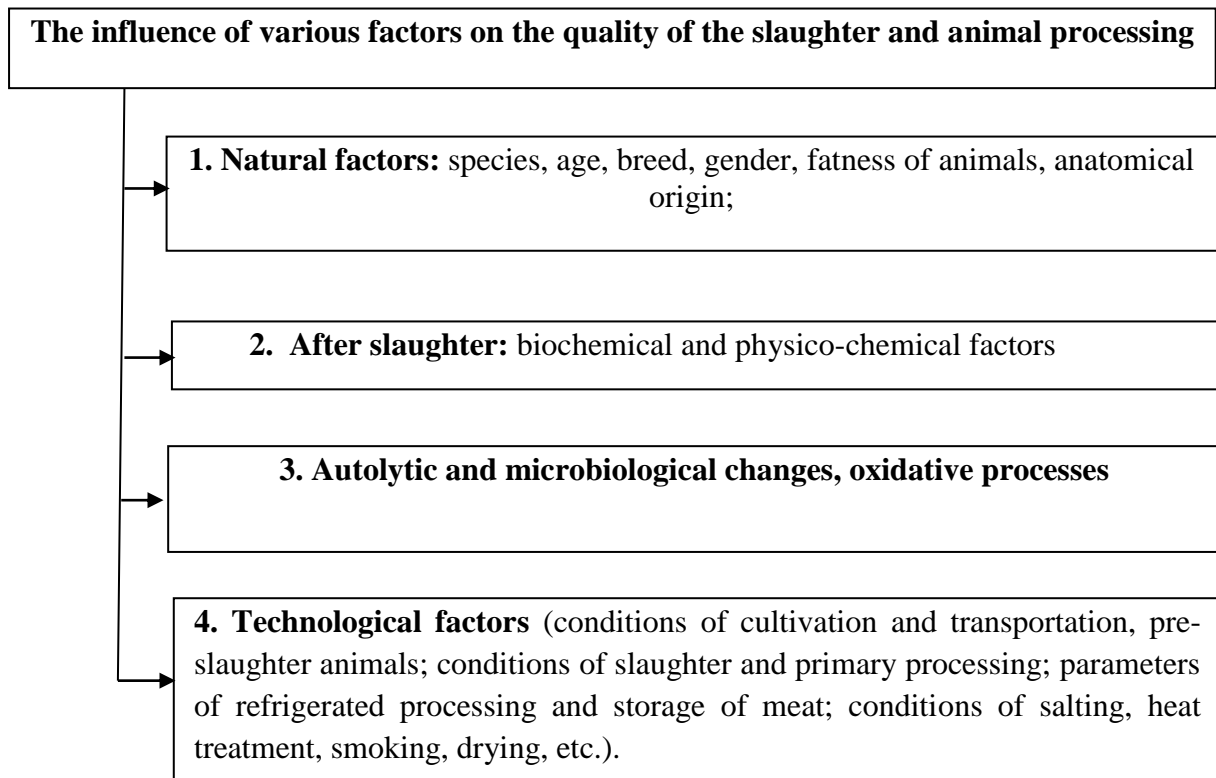


Figure 6: Effect of various factors during slaughter and processing

The quality of meat and its characteristics are related to the properties and the quantitative ratio of the tissues in the meat, which, in turn, depend on natural factors. The influence of these factors on meat quality is interrelated.

In agricultural production, the quality of beef cattle products is one of the indicators of the effectiveness of the management system, characterizing the level of realization of its functions. Therefore, it is advisable to use the results of continuous and systematic analysis using zootechnical methods of product quality, when making management decisions.

To a certain extent, the quality of the final product can serve as an indicator of the intensity of production: when recalculating products into conventional units that level the product heterogeneity, the products of below-average quality will be taken into account using reduction factors. Thus, the products of beef cattle breeding of "problematic" quality (DFD: dark, firm and dry) converted into meat raw materials, due to their chemical composition, have limited application in meat processing, which means a relatively low selling price [12, 13].

Intensification of production is a continuous process, which involves the continuous management of factors and activities that affect productivity and income. The support of this process is the selection of a scientifically based classification of costs in agriculture. In the economic literature in relation to improving the effectiveness of cost control, they are classified according to various criteria in planning and accounting, but few experts mention the costs of improving product quality.

Since the ultimate goal of rational consumption of resources in the production process is to maximize profits by improving the characteristics of the products, there is an objective need to allocate the cost of product quality to account for losses and control their reduction, as well as the assessment of reserves. The scope of budgeting and cost control of the quality of production can cover the limits of cost accounting for groups of basic and organizational and management costs. In our opinion, it is advisable to allocate the actual cost of quality in the framework of cost classification. However, it would be unlawful to allocate them in a separate category based on the attitude to the production process. With this approach, in particular, it will be difficult to compare the costs incurred by the economic entity (basic and organizational-managerial) with the result.

The cost of quality is the difference between the actual cost of a product or service and its possible (reduced) cost, determined if there are no cases of poor quality services, refusal to order products or inconsistencies in their production [4,14]. In this regard, we propose the allocation in the group accounting costs for the quality of production on the basis of the expediency of resource consumption in the production process.

When using the proposed approach, the monitoring of the cost-effectiveness of quality can be carried out on the basis of the volume of the product received, its quality according to plan and fact.

To assess the level of quality of the final product in meat processing, the method of assessing the quality by units of the useful product is used. The method is based on a comparison of the content of basic nutrients and the energy value of meat and meat products (C_{PRODi}) with the calculated weighted average norms of the physiological needs of the human body (H_i) [1, 3].

Taking into account the current level of development of zootechnics and the developed methods for predicting the quality of beef during livestock, as well as classical methods for evaluating samples of meat and beef mince in cattle, we suggest using this method to assess the quality of beef cattle production [2]. As applied to the industry's costing objects - the increase in live weight and live weight of livestock - we consider it expedient to use the method of calculating the coefficient of product quality as a food product. The basis of this method is in the different chemical composition of normal and problem meat-beef (Table 3).

Table 3:Chemical composition of meat (per 100 g) *

Quality level	Proteins, g	Fat, g	Mineral substances mg				Vitamins, mg			Energy value, kcal
			Ca	P	Mg	Fe	B ₁	B ₂	PP	
Average	15	27,2	8	165	24	1,1	0,87	0,13	2,2	305
Below the average	11,4	41,7	8	114	19	1,3	0,59	0,12	2,5	421
Above the average	13,7	35,2	7	145	18	1,15	0,925	0,13	2,165	372
Consumption rate per day	75	83	800	1200	400	10	1,5	2	20	2500

*The data is based on the data provided in special reference tables developed in collaboration with the Institute of Nutrition of the Russian Academy of Medical Sciences.

The coefficient (K_{PROD}), reflecting the quality level of beef or its predictive value, is calculated by summing the relative values obtained by dividing the content of a particular substance in meat by the daily rate of its consumption:

$$K_{PROD} = \frac{C_1}{H_1} + \frac{C_2}{H_2} + \dots + \frac{C_i}{H_i}$$

where C_1, C_2, C_i – the content of basic nutrients and the energy value of meat of a specific quality level
 H_1, H_2, H_i – weighted average norms of the physiological needs of the human body in basic nutrients and kilocalories.

To determine the volume of output in terms of units of a useful product, the quality factor for each type of beef is multiplied by its quantity in physical terms. The obtained values take into account the unequal nutritional value of normal and problematic meat and, therefore, are most suitable for comparison, analysis of the performance of departments and use in management accounting as a whole.

In particular, the value of the necessary quality costs can be found as the difference between the potential yield of meat of normal quality (chemical composition, taken as the norm) in units of useful product and the actual output of meat in quality below average; multiplied by the unit cost of a useful product at the actual cost level. In this case, the cost of a unit of a useful product is found by dividing the actual cost of production by the actual number of units of the useful product (table 4).

Table 4: Evaluation of the cost of quality in the fattening of one head of beef cattle in terms of cost expediency

Quality level	Quality factor K_{prod}	Live weight, kg	The number of units of useful product	Production cost, rub.	The cost of 1 unit of useful product, rub. (5) / (4)	Reduced cost of production, rub.(4)*(6) μ	Change the number of units of useful product	Quality costs, rub.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Normal	1,72	400	689	26287	38	-	0	0
Belowtheaverage	1,68	400	673	26287	39	25699	-15	589

As can be seen, at a cost of 65.7 rubles per 1kg of live weight of beef cattle (average in the industry), the required unit quality costs for beef below the average quality level will be 1 ruble per each unit of useful product (the difference between the cost of 1 unit of useful product is below average and normal quality). A potential increase in output for units of a useful product will require a cost of quality for 589 rubles. (38 rubles*15 units of useful product). Similarly, it is possible to calculate the necessary cost of quality for products of normal quality, compared with products of higher than average quality.

Thus, the calculation of quality costs based on the feasibility of resource consumption in the production process based on the quality assessment method for useful product units will allow optimal assessment of the efficiency of livestock units and the agricultural organization as a whole based on identifying and reducing losses, as well as estimating reserves.

REFERENCES

- [1] Federal law of 02.01.2000 N 29-FZ "On the quality and safety of food."
- [2] State Program for the Development of Agriculture and Regulation of Agricultural Products, Raw Materials and Food Markets for 2013-2020. Decree of the Government of the Russian Federation of June 14, 2012- No. 717.
- [3] Market profiles - brief reviews of the agricultural sectors of Russia: meat market. Available at: <http://www.ikar.ru/meat/profile.html> (accessed 18.01.2017).
- [4] Balukova M.V. Evaluation of meat productivity. The materials of the author's seminar of John C. Schottmiller on the topic "Economy of Quality. Analysis of the cost of quality ". Available at: <http://www.classs.ru/stati/menejment1/zatratu.html>.
- [5] Gogaev O.K., Ostaev G.Y., Khosiev B.N. Optimization of Evaluation of Beef Cattle Products. Animal Husbandry of the South of Russia. 2018. No. 1 (27). Pp. 31-33.
- [6] Gogaev O.K., Ostaev G.Y., Khosiev B.N. Some features of the application of management and zootechnical methods in beef cattle breeding. Scientific Review: Theory and Practice. 2018. No. 1. P. 79-89.
- [7] Ostaev G.Ya., Khosiev B.N., Kallagova A.Kh. Management accounting in agriculture: Methods for making optimal (key) decisions. Gorsky State Agrarian University. Vladikavkaz, 2018. -480 p.
- [8] Ostaev G.Y. Economic efficiency of application of management and zootechnical methods in beef cattle breeding. Development of the methodology of modern economics and management Materials of the I Interdisciplinary All-Russian Scientific Practical Conference. 2017. p. 269-275.
- [9] Ostaev G.Y., Kontsevaya S.M., Kontsevoy G.R. Methodical approaches to conducting internal control over costs in beef cattle breeding. International Accounting. 2016. No. 9 (399). Pp. 30-49.
- [10] Ostaev G.Y., Khosiev B.N., Kontsevaya S.M. Express control of calculating the cost of production in beef cattle. Accounting in agriculture. 2016. No. 6. P. 60-70.
- [11] Ostaev G.Y., Methodical features of cost accounting in beef cattle breeding. Actual problems of modern science. 2016. No 1 (6). Pp. 58-68.
- [12] Smolentseva E.V. Problems of development of the pig industry in the context of the sanction policy. Successes of modern science. 2016. V. 1. No 6. Pp. 94-96.
- [13] Tikhonova N. A method for predicting the quality of beef // Dairy and beef cattle. - 2011. - № 3. - p. 27 - 28.
- [14] Skurikhina I.M., Volgareva M.N. The chemical composition of food: Book 1: Reference tables of the content of basic nutrients and energy value of food. Moscow, Agropromizdat, 1987. 224 p.
- [15] Khosiev B.N., Ostaev G.Y. Some aspects of the internal control of the registration of animals on growing and fattening. Accounting in agriculture. 2017. No. 2. P. 44-59.
- [16] Khosiev B.N., Ostaev G.Y., Kontsevoy G.R. The cost of the production of pig production: Problems of internal control. Accounting in agriculture. 2018. No 9. Pp. 64-77.
- [17] Gogaev O.K., Ostaev G.Y., Khosiev B.N. Storage, Accounting and Development of Meat in Large Cattle: Investment Project. Bioscience. 2018. T. 68. No. 12-2. P. 1292-1305.
- [18] Ostaev G.Y., Khosiev B.N., Gogaev O.K., Mukhina I.A., Kondratyev D.V., Markovina E.V. Beef Cattle: Methods Of Management And Livestock. Research Journal of Pharmaceutical, Biological and Chemical Sciences 2018 No. 9 (6). Pp. 1678-1686.
- [19] Ostaev G.Y., Khosiev B.N., Gogaev O.K., Dzodziewa F.N., Gezikhonov R.A. The Methodology of Investing in Business Projects of Agricultural Dairy Enterprises. Journal of International Business Studies. 2018. T. 49. No. 9-2. Pp. 1631-1648.