Features of adaptation and meat qualities of Aberdeen-Angus bulls on the background of immunostimulation

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Abstract. The feasibility of using Prevention-N-E, a newly developed and tested biological product, in comparison with the previously tested PS-6 preparation in the adaptive technology of keeping specialized beef cattle of imported breeding, had been scientifically substantiated and experimentally proved. Against the background of the use of drugs in animals of the 1st and 2nd experimental groups, the incidence of the digestive and respiratory organs decreased by 1.4 and 2.3 times, the recovery time reduced by 3.36 and 4.88 days, accordingly, compared with the control (P <0.05). By the end of the growing period, the animals of the 1st and 2nd experimental groups exceeded in live weight control subjects by 6.6 and 9.2 kg, rearing by 10.4 and 14.8 kg, and fattening by 14.2 and 22.2 kg respectively. In the cuts of the carcasses of bulls of the 1st and 2nd experimental groups, there was a bigger amount of the highest grade flesh: in spin-breast – by 1.0 and 1.0 kg, in the lumbar – by 0.2 and 0.4 kg, and in the hip – by 2.3 and 4.2 kg, rather than in the control.

1. Introduction
The relevance of this study is due to the decline in recent years observed in the production of beef and veal, which does not allow to fully ensure food security [1].

On a world-wide basis increasing of meat production, especially beef, improving of its quality and reducing of costs are of great economic importance, and therefore intensification of livestock industry through introduction of advanced technologies, organization of full feeding, creation of optimal conditions for animals' welfare, breeding of the most productive breeds of young cattle are important [2].

World experience shows that meeting the demand for beef in sufficient quantity is impossible without developed specialized beef cattle breeding, whose share in the total cattle population in Europe and North America ranges from 40 to 85%. In Russia, at present, beef production is 90% based on the sale of the livestock of dairy and combined breeds [3,4].
Intensive development of beef cattle breeding is becoming a task of a national scale, which is reflected in all regulatory documents that determine the imperatives of the modern socio-economic development of our country. To solve this problem, of great necessity are scientifically based methods and mechanisms that will increase the intensity of meat production without reducing its biological value and nutritional qualities [5].

Practically in all countries of the world, in all climatic zones in beef cattle, the same breeds of cattle are used. However, when transporting animals from continent to continent, from one country to another, even if the countries are close in climatic conditions, time and efforts of specialists are needed to adapt animals [6,7]. According to the research results, animals of the Aberdeen-Angus breed showed the highest relative growth rate in the conditions of Northern Kazakhstan [8]. At the present time, the problem of searching for alternative sources of protein is urgent, since its deficiency is becoming more important at livestock and poultry enterprises in the Volgograd Region [9].

To activate the adaptogenesis of imported specialized beef cattle to the natural temperature regime of the habitat and to realize the biological potential of the organism [10], the veterinary market offers a wide range of pharmacological agents, but many of them are of chemical origin whose bioavailability is low.

The development and implementation in the production of harmless and cost-effective pharmacological agents to enhance the protective and adaptive functions of the body of beef cattle imported selection to adaptive technology and, as a consequence, the implementation of the biological potential of the body, is an urgent problem of modern veterinary science and practice [11].

Biopreparation Prevention-N-E has been developed and scientific and practical justification of its expediency for implementation of adaptive and productive potential of Aberdeen-Angus bovine due to increase of non-specific resistance of organism has been given.

The purpose of this work is the realization of adaptive potential and productive qualities of specialized Aberdeen-Angus breed beef cattle with biological preparations PS-6 and Prevention-N-E.

2. Materials and methods
The experimental part of the research work was carried out in the breeding reproducer LLC AgrofirmaMyaskom, Lyskovsky district of the Nizhny Novgorod region (Russia). The materials were processed in the LyskovoVeterinaryLaboratory (Nizhny Novgorod region, Russia) and in the Department of Morphology, Obstetrics and Therapeutics of the Higher School of Psychology and Sociology and Obstetrics (Chuvash State Agricultural Academy, Russia) from 2015 to 2019.

The objects of research were purebred Aberdeen-Angus bulls. Three groups of bulls -analogs of 15 animals in each group were formed in a scientific experiment. Animals of all groups in the rearing period up to 210 days old were kept on suckling with mother cows in pens in the open air, and later in the rearing period up to 360 days old and in the fattening period up to 540 days old – in open areas under shelters, that is, by adaptive technology.

Hygienic conditions of keeping animals corresponded to natural temperature and humidity conditions of atmospheric air in all seasons of the year. Diets for bulls during the periods of growing up to 210 days in pens, growing up to 360 days and fattening up to 540 days in open areas under canopies on adaptive technology provided the needs of the body in energy and nutrients, mineral elements and vitamins according to the norms of feeding. On average, the diet of suckling bulls up to 7 months of age consisted of 5.3 kg of alfalfa hay and 1.5 kg of feed. The animals were fed twice a day: in the morning 60% of the normal total giving of feed and in the evening – 40% of the feed. The structure of the diet for animals in the period from 7 to 12 months included: roughage – 13%, juicy food – 46.5%, concentrated – 40.5%. In the period from 13 months to the end of fattening the diet of bulls consisted of fodder mixture, in which the share of roughage was 10.5%, juicy – 39.0% and concentrated – 50.5%. Feed was given in the amount of 4.0–4.5 kg per 1 head per day.

Animals of the 1st experimental group were injected intramuscularly with a biological preparation a PS-6 at a dose of 3 ml for 2-3 and 7-9 days of life. PS-6, a complex biological product, was an aqueous suspension containing a polysaccharide complex of yeast cells immobilized in an agar gel with the
addition of a benzimidazole derivative - (-) 2,3,5,6-tetrahydro-6-phenylimidazo [2,1-b] -thiazole hydrochloride and bactericidal drug from the group of aminoglycosides - kanamycin monosulfate - 0-3-Amino-3-deoxy-alpha-D-glucopyranosyl-(1’6)-0-[6-amino-6-deoxy-alpha-D - glucopirinazyl-[1"4)] -2-deoxy-D-streptamine (in the form of sulfate).

The 2nd experimental group of animals was exposed to Prevention-N-E, the control groups - biological preparations were not administered. The Prevention-N-E was a complex preparation, an aqueous suspension containing a saccharomyces cerevisiae polysaccharide complex immobilized in an agar gel with the addition of the benzimidazole derivative - (-) 2,3,5,6-tetrahydro-6-phenylimidazo [2,1-b] -thiazole hydrochloride and macrolide bactericidal drug - erythromycin.

Growth, morbidity and preservation, clinical and physiological status, morphological and biochemical profile of the blood, as well as non-specific resistance of the body of bulls were studied for 1, 210, 240, 360, 450, and 540th days according to generally accepted veterinary medicine methods, which are described below. After controlling slaughter, bulls were assessed for slaughter quality, and veterinary and sanitary examination of beef was carried out, for the determination of organoleptic, biochemical and spectrometric indices, which are described below.

Number of erythrocytes, concentration of hemoglobin, total number of leukocytes were determined on the PCE 90 Vet automatic veterinary hematology analyzer (Erma Inc., Japan). The status of the instrument, measurement, and plotting are displayed on a large LCD display. The device is controlled using an integrated compact keyboard. The analyzer automatically takes the blood sample, dilutes it, mixes it, lyses it, supplies it and washes it.

The total protein level and protein spectrum in serum were determined on the IDEXX VetTest 8008 biochemical analyzer (IDEXX, Russia). The VetTest analyzer offers to perform a series of steps, accompanying each of its offerings with a short audio signal, which helps the user prepare the pipette dispenser in time, insert a sample, and begin the analysis. The dispenser automatically takes the required amount of sample and then distributes it to the slide in sequence of 10 μl. As the sample passes through the slide layers, biochemical reactions occur that result in successive color changes. The VetTest analyzer optical system determines colors and their intensity. The analyzer converts the measured results into numerical measure values that are displayed on the analyzer screen and printed.

Then, phagocytic activity of leukocytes was determined using the daily agar culture of St. aureus, lysozyme activity of blood plasma – by agar culture M. lysodeiticus, bactericidal activity of blood serum – using daily agar culture of E. coli, as well as the amount of antibodies in the serum was measured on a photoelectrocolorimeter FEK-56M (Zagorsky Optical and Mechanical Plant, Russia). Live weight and average daily gain of animals were determined by monthly weighing. Meat productivity and slaughter qualities were assessed by the results of the control slaughter of bulls (5 animals from each group) at the age of 540 days according to the standard technique. At the same time, pre-slaughter live weight, mass of hot and cooled carcass and internal raw fat, relative yield of carcass, fat, slaughter mass and slaughter yield were taken into account. After cooling for 24 hours, the right halves of the bull carcasses were weighed and boned to determine the absolute and relative content of the flesh, fat, tendons and bones, flesh output by grades, in terms of carcass. The meat index was examined as the ratio between the flesh mass of the carcass and the bone mass, that is, the amount of flesh per 1 kg of bone. Veterinary and sanitary examination of meat by organoleptic (appearance, color, texture, smell, condition of fat and tendons, degree of bleeding), cooking sample (smell, transparency, taste of broth) and biochemical parameters (pH, amino-ammonia nitrogen, formal acid reaction, reaction to peroxidase and with copper sulfate) in accordance with [12-15].

The content of heavy metals (lead, cadmium, arsenic, copper, zinc, mercury) was determined in muscle tissue using an atomic absorption spectrophotometer AA-6300 (Shimadzu, Japan). The method is to spray the test sample and atomize in a high temperature flame (furnace) followed by measuring the optical absorption level Spectral lines characteristic of atoms of determined elements. AA-6300 makes it possible to change measurement mode easily and quickly: in flame or in graphite furnace, due to automatic change of atomizer. Various options are available, ranging from manual sample dispensing to automatic sequential measurement of multiple elements using an autosampler (ASC-6100).
The economic efficiency of application of biopreparations PS-6 and Prevention-N-E for activation of protective and adaptive functions of organization of imported bulls per 1 RUB of additional costs was determined. Economic efficiency of biopreparations application was determined by formula (1):

\[ Er = \frac{Ev}{Sv}, \]  

(1)

where \( Ev \) – additional increase, RUB; \( Sv \) – costs for purchase, intramuscular injection of the preparation and sale of additional products.

Therapeutic and prophylactic efficacy of biological products was determined by monthly registration of the diseased (taking into account the diagnosis and duration of the disease) and culled animals according to the veterinary statistical reporting with the subsequent calculation of the Mellenberg coefficient using the formula (2):

\[ MC = \frac{sick\_animals\_number\times duration\_of\_disease}{number\_of\_animals\_in\_group\times experiment\_duration} \times 100 \]  

(2)

The digital material of the experiments was processed by the method of variation statistics on the reliability of the difference between the compared indicators (\( P <0.05-0.001 \)) using the Microsoft Office Excel software package.

3. Results and discussion

It was found that the double intramuscular injection of bulls PS-6 and Prevention-N-E on 2nd, 3rd, 7th, 8th, and 9th day of life in a dose of 3 ml did not affect the clinical and physiological state of the body.

During the growing period, both in the control and in the experimental groups, cases of bull diseases were identified, which are presented in Table 1.

| Indicator               | Control | Group of animals |
|-------------------------|---------|------------------|
|                         |         | 1 experimental   | 2 experimental |
| Number of animals in groups | 15     | 15              | 15             |
| Got sick                | 7       | 5               | 3              |
| Recovered               | 7       | 5               | 3              |
| Duration of disease, day | 7.23±1.26 | 3.87±1.14*     | 2.35±0.65*     |
| Morbidity, %            | 46.6    | 33.3            | 20.0           |
| Safety, %               | 100     | 100             | 100            |
| Mellenberg coefficient  | 1.61    | 0.61            | 0.22           |

From the presented tabular data, it follows that the animals of the experimental groups decreased the incidence of the digestive and respiratory organs by 1.4 and 2.3 times, the recovery time was reduced by 3.36 and 4.88 days and the Mellenberg coefficient decreased by 2.6 and 7.3 times, respectively, compared to the control (\( P <0.05 \)).

The selective mobilization of the morphological and biochemical profiles of blood, cellular and humoral factors of nonspecific resistance of the body of bulls in the conditions of adaptive content technology in open areas has been revealed. Proven biological products have a wide range of bioeffect:

- stimulated the production of red blood cells and increased the concentration of hemoglobin in the blood of bulls, that is, improved hematopoiesis, but did not affect the production of white blood cells;
- caused physiological eosinophilia, moderate neutrophilopenia with a shift of the neutrophilic nucleus to the right and lymphocytosis;
- increased protein metabolism, mainly due to the synthesis of albumin and \( \gamma \)-globulin fractions;
- activated cellular and humoral factors of nonspecific resistance of the organism.

The dynamics of the main indicators of cellular and humoral links of nonspecific resistance of the body of bulls are shown in figures 1-4. Phagocytic activity of leukocytes in animals of the 2nd experimental group proved to be significantly higher than in control due to intramuscular injection of
biopreparation Prevention-N-E, starting from 210-day age until the end of the pre-growth period: 210-day-old bovine – by 5.2%, 240-daily – by 6.4 and 360-day – by 5.0% (P<0.05; figure 1). A more pronounced cellular response was observed against the background of PS-6 biopreparation injection in animals of the 1st test group compared to the control data at 210-, 240-, 360- and 450-day age, respectively, at 6.4%, 7.2, 5.4 and 5.0% (P<0.05).

Lysozyme activity of blood plasma of bovine of the 1st and 2nd test groups proved to be significantly higher than in control, starting from 210-day age and till the end of growth period: in 210-day animals on 2.7 and 2.3%, 240-day animals – 3.0 and 2.0, and in 360-day animals – on 3.2 and 2.6% (P < 0.05-0.01), respectively (figure 2).

It was found that bactericidal activity of blood serum of test animals as they grew older tended to increase from the beginning of the test to its end: in the control group – from 31.7 ± 1.26 to 57.0±1.30%, in the 1st test - from 31.3 ± 1.33 to 59.7±1.55%, in the 2nd test group – from 31.4 ± 1.28 to 58.1±1.22% (figure 3).

The concentration of immunoglobulins in the serum of the animals of the 1st test group (after PS-6 injection) was significantly higher by 4.5 mg/ml; 4.7; 4.3 and 2.9 mg/ml (i.e. 18.8%; 19.1; 16.5 and 10.4%) 210, 240, 360 and 450 days after the test than in the control (P < 0.05). Animals of the 2nd
experimental group (after intramuscular administration of Prevention-N-E) outperformed control peers in this indicator at 210-day age by 3.9 mg/ml (or by 16.5%) and at 240-day by 3.5 mg/ml (i.e. by 14.3%; figure 4).

Table 2. Dynamics of bull growth and development.

| Group of animals | Age, days | Live weight, kg | Average daily gain, gram | Coefficient growth |
|------------------|-----------|----------------|-------------------------|-------------------|
| Control          | 1         | 27.8±0.58      | –                       | –                 |
|                  | 210       | 202.8±2.06     | 972±13.83               | 7.23              |
|                  | 240       | 230.6±2.32     | 927±16.33               | 8.29              |
|                  | 360       | 335.6±2.62     | 875±14.56               | 12.07             |
|                  | 450       | 421.0±2.95     | 949±21.26               | 15.14             |
|                  | 540       | 497.2±3.37     | 847±18.16               | 17.88             |
| 1 experimental   | 1         | 28.0±0.63      | –                       | –                 |
|                  | 210       | 209.4±2.11     | 1008±13.45              | 7.48              |
|                  | 240       | 238.4±2.14*    | 967±18.26               | 8.51              |
|                  | 360       | 346.0±2.88*    | 897±16.77*              | 12.36             |
|                  | 450       | 433.8±3.12*    | 976±22.88               | 15.49             |
|                  | 540       | 511.4±3.44*    | 862±16.67               | 18.26             |
| 2 experimental   | 1         | 27.4±0.75      | –                       | –                 |
|                  | 210       | 212.0±2.61*    | 1026±13.56**            | 7.73              |
|                  | 240       | 242.6±3.06*    | 1020±20.00*             | 8.85              |
|                  | 360       | 350.4±3.37**   | 898±10.00**             | 12.79             |
|                  | 450       | 440.6±3.61**   | 1002±27.76              | 16.08             |
|                  | 540       | 519.4±3.87**   | 876±21.49               | 18.96             |

Notes: * P<0.05, ** P<0.01.

It was established that by the end of the growing period, the 210-day bulls of the 1st and 2nd experimental groups exceeded the live weight of control peers by 6.6 and 9.2 kg, respectively, of growing (360 days) by 10.4 and 14.8 kg and fattening (540 days) – by 14.2 and 22.2 kg (P <0.05-0.01) (Table 2). A similar pattern occurred in the nature of changes in average daily growth and growth rate of animals of comparable groups. Consequently, the intramuscular administration of biologicals stimulates their growth and development (Table 2).

Table 3. Indicators of the control slaughter of bulls.

| Indicator                                | Group of animals | Control | 1 experimental | 2 experimental |
|------------------------------------------|------------------|---------|----------------|----------------|
| Live weight for the removal of fattening, kg |                  | 497.2±3.37 | 511.4±3.44*    | 519.4±3.87**   |
| Pre-slaughter live weight, kg            |                  | 483.4±3.56 | 498.8±3.95*    | 505.4±4.13**   |
| The steam mass carcass, kg               |                  | 269.8±1.93 | 279.4±2.16*    | 289.4±2.38***  |
| Carcass output, %                       |                  | 55.8     | 56.0           | 57.3           |
| Weight of internal fat, kg               |                  | 6.5±0.25 | 7.1±0.33       | 7.0±0.25       |
| Internal fat yield, %                    |                  | 1.34     | 1.42           | 1.38           |
| Slaughter weight, kg                     |                  | 287.1±2.06 | 301.2±2.66**  | 308.8±2.66***  |
| Slaughter yield, %                      |                  | 59.4     | 60.4           | 61.1           |

Notes: * P<0.05, ** P<0.01, *** P<0.001.

The results of the bovine slaughter studies are shown in Table 3. The results of the control slaughter showed that the bulls of the 1st (498.8 ± 3.95 kg) and the 2nd (505.4 ± 4.13 kg) experimental groups were superior to the peers of the control group (483.4 ± 3.56 kg) by pre-slaughter body weight by 15.4 kg or by 3.2% (P <0.05) and by 22.0 kg, i.e. by 4.5% (P <0.01; table 3). It was established that the mass of the steam carcass of bulls grown on the background of intramuscular injection of PS-6, with further
rearing and fattening in open areas under sheds, exceeded the same values in the control by 9.6 kg or 3.5% (P <0.05), and with the use of a biological product Prevention-N-E - by 19.6 kg, i.e. by 7.3% (P <0.001). At the same time, the bulls of the 1st and 2nd experimental groups outperformed their peers in control by 1.0 and 1.7% (Table 3).

As a result of deboning of the carcasses, it was found that in the absolute yield of the muscular tissue of the carcasses of bulls of the 1st and 2nd experimental groups exceeded the peers of the control group by 8.0 and 15.6 kg (P <0.05-0.01), fat yield - by 0.9 and 0.7 kg (P >0.05) (Table 4). The yield of tendons in the section of the experimental groups of gobies revealed no definite pattern, and it varied in an insignificant range – from 8.9 ± 0.17 to 9.3 ± 0.17 kg. The absolute yield of bones from animal carcasses of the 1st and 2nd experimental groups was higher by 1.3 and 2.4 kg (P >0.05), respectively than in the control group. However, bone yield, expressed as a percentage relative to the mass of the carcass, in the bulls of the experimental groups, on the contrary, was lower by 0.13 and 0.27%, respectively. The pulp yield per 100 kg of pre-slaughter weight of bulls in the 1st experimental group was 43.06±0.24 kg, i.e. it was more by 0.28 kg (P >0.05), and in the 2nd experimental group – 44.04±0.29 kg, i.e. it was more by 1.26 kg (P <0.01) than in the control group – 42.78±0.12 kg. The fleshing index of the bulls of the 2nd experimental group was 4.74, which is more than in the control and 1st experimental groups by 0.09 and 0.05.

Table 4. Morphological composition of carcasses of bulls.

| Indicator                        | Group of animals                  |
|----------------------------------|-----------------------------------|
|                                  | Control 1 experimental 2 experimental |
| Chilled carcass weight, kg       | 260.2±2.27 269.8±2.35** 278.6±3.23** |
| The mass of the pulp, kg         | 206.8±2.35 214.8±2.33* 222.4±3.11** |
| The yield of pulp, %             | 79.48 79.61 79.82                  |
| including the weight of fat by weight of pulp, kg | 15.4±0.58 16.3±0.31 16.1±0.29 |
| Fat yield, %                     | 5.92 6.04 5.78                     |
| Tendon weight, kg                | 8.9±0.17 9.2±0.12 9.3±0.17         |
| The yield of tendons, %          | 3.42 3.41 3.34                     |
| Bone weight, kg                  | 44.5±0.75 45.8±0.66 46.9±0.74      |
| Bone yield, %                    | 17.10 16.97 16.83                  |
| Pulp yield per 100 kg of pre-slaughter live weight | 42.78±0.12 43.06±0.24 44.04±0.29** |
| Fleshing index                   | 4.65±0.15 4.69±0.11 4.74±0.08      |

Notes: * P<0.05, ** P<0.01.

Table 5. Weight and yield of cuts from carcasses of bulls.

| Indicator                        | Group of animals                  |
|----------------------------------|-----------------------------------|
|                                  | Control 1 experimental 2 experimental |
| Carcass weight, kg               | 260.2±2.27 269.8±2.35* 278.6±3.23** |
| including the cut:               |                                   |
| cervical, kg (%)                 | 29.1±0.15 (11.2) 27.2±0.23 (10.1) 26.5±0.24 (9.5) |
| humero-scapular, kg (%)          | 48.7±0.21 (18.7) 47.2±0.12 (17.5) 46.7±0.22 (17.1) |
| spinal chest, kg (%)             | 74.9±0.72 (28.8) 82.9±0.54 (30.7)*** 86.4±0.62 (31.0)*** |
| lumbar, kg (%)                   | 33.3±0.40 (12.8) 35.1±0.37 (13.0) 36.5±0.60 (13.1)*** |
| hip, kg (%)                      | 74.2±0.59 (28.5) 77.4±0.62 (28.7)*** 81.6±0.71 (29.3)*** |

Notes: * P<0.05, ** P<0.01, *** P<0.001.
Table 6. Morphological composition of carcasses of bulls.

| Indicator                          | Group of animals          |
|------------------------------------|---------------------------|
|                                    | Control                  | 1 experimental | 2 experimental |
| The mass of the pulp, kg           | 206.8±2.35               | 214.8±2.33*    | 222.4±3.11**   |
| The mass of the pulp of the highest grade, kg | 49.0±0.77                | 52.2±0.63*     | 54.7±0.65***   |
| The yield of the pulp of the highest grade, % | 23.7                     | 24.3           | 24.6           |
| The mass of the pulp of the first grade, kg | 107.3±1.40               | 112.1±1.17*    | 117.4±1.53**   |
| The yield of the pulp of the first grade, % | 51.9                     | 52.2           | 52.8           |
| The mass of the pulp of the second grade, kg | 50.5±0.53                | 50.5±0.59      | 50.3±0.60      |
| Second-grade pulp yield, %         | 24.4                      | 23.5           | 22.6           |

Notes: * P<0.05, ** P<0.01, *** P<0.001.

It was established that bull carcasses of the 1st and 2nd experimental groups had an advantage in terms of the mass of the most valuable cuts: spin-breast - by 8.0 and 11.5 kg, lumbar - by 1.8 and 3.2 kg, hip - by 3.2 and 7.4 kg (P <0.01-0.001), respectively, than in the control. The yield of these cuts from the carcasses of bulls of the 1st and 2nd experimental groups was higher by 1.9 and 2.2%, by 0.2 and 0.3%, by 0.2 and 0.8%, respectively than in control (Table 5).

From the table 5 it follows that the highest content of the highest grade pulp was characterized by bulls carcasses of the 1st (52.2 ± 0.63 kg) and 2nd (54.7 ± 0.65 kg) experimental groups, respectively, by 3.2 and 5.7 kg compared with the control (49.0 ± 0.77 kg; P <0.05-0.001). The yield of high-grade pulp was higher in animals of the experimental groups by 0.6 and 0.9% (Table 6).

As a result of the trimming, it was established that the cervical cut along the seventh vertebra inclusively consists mainly of the pulp of the first and second grades. Bulls of the 1st and 2nd experimental groups were inferior to control peers by weight of the first-grade pulp by 0.7 and 0.8 kg, second grade – by 0.7 and 0.9 kg, respectively (P>0.05).

As a result of the varietal separation of the shoulder-cut cuts of bull-calves carcasses, it was found that the intergroup differences were insignificant (P> 0.05). The highest mass of top-grade pulp was in the shoulder cuts of the bulls of the 2nd experimental group and amounted to 5.5 ± 0.12 kg, i.e. it turned out to be higher than that in animals of the control and 1st experimental groups by 0.1 and 0.4 kg, respectively.

The highest content of the highest grade pulp was characterized by spin-breast cuts of bull-calves of the 1st (9.5 ± 0.17 kg) and 2nd (9.5 ± 0.14 kg) experimental groups, which is 1.0 kg higher than in control (8.5 ± 0.21 kg; P <0.01). At the same time, in the experimental groups, the yield of the highest grade pulp was more by 0.1 and 0.3%. The first-grade pulp content in spin-breast cuts of bull-calves of the 1st and 2nd experimental groups was 3.2 and 2.5 kg more, the pulp yield was 0.3 and 0.1% compared to the control (P <0.001).

The highest-grade pulp was the highest in lumbar cuts of bull-calf carcasses of the 2nd experimental group – 4.7 ± 0.19 kg, which is 0.4 and 0.2 kg more, respectively, than in the control and 1st experimental groups. At the same time, the highest grade pulp exceeded the gobies of the 1st experimental group of the peers of the control and 2nd experimental groups, respectively, by 0.3 and 0.1%. In terms of the content of the first-grade pulp, bulls of the 1st and 2nd experimental groups were superior to their peers in the control group by 0.8 (P> 0.05) and 1.6 kg (P <0.05). The yield of the pulp of the first grade in the lumbar cuts of the bulls of the experimental groups was almost the same and amounted to 65.4%, 65.4% and 65.3% in the control, 1st, and 2nd experimental groups, respectively.

The amount of the highest grade pulp in the hip bullhead cuts of the 1st (33.1±0.49 kg) and 2nd (35.0 ± 0.53 kg) experimental groups was 2.3 and 4.2 kg more than in the control (30.8±0.38 kg). At the same time, the output of the highest grade pulp in the control group was 49.9%, in the 1st test group - 50.6% and in the 2nd test group – 48.7%. In terms of pulp content of the first grade, bulls of the 1st (27.5 ± 0.46 kg) and 2nd (32.0 ± 0.58 kg) experimental groups also exceeded their peers in control (25.0 ± 0.29 kg) by 2.5 and 7.0 kg. And the yield of first-grade pulp was higher in the experimental groups by 1.5 and 4.0%, rather than in the control.
Thus, the highest content of the flesh of the highest grade was characterized by carcasses and cuts, especially lumbar and hip, bulls of the 1st and 2nd experimental groups grown on the background of intramuscular injection of biologics in conditions of adaptation to the natural temperature and humidity regime of atmospheric air.

4. Conclusion
Biological preparation of Prevention-N-E is developed based on polysaccharide complex of Saccharomyces cerevisiae cells and bactericidal preparation of macrolide group, and scheme of its application in meat cattle breeding in adaptive technology of bull keeping.

For activation of an adaptogenz of the specialized meat cattle of import selection to conditions of adaptive technology of cultivation, growing and sagination on the open areas, and Aberdeen - the Angus breed we recommend realization of boresource potential of meat qualities of bull-calves. Intramuscular injection of biopreparations PS-6 and Prevention-N-E twice on the 2nd-3rd and 7th days of life in a dose of 3 ml.

Biopreparations activate protective-adaptation functions of organism to pressing of ecological-technological factors of habitat and contribute to realization of biological resource potential of bovine meat qualities due to selective mobilization of morphological and biochemical profiles of blood, cellular and humoral factors of non-specific resistance.

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