Effect of the balanced carbohydrate complex Felucene on growth and development of bull calves

V N Beresnev\(^1\), H Tagirov\(^2\), O P Neverova\(^3\), N A Fedoseeva\(^4\), P S Galushina\(^3\) and S V Smirnova\(^5\)

\(^1\)Institute of Technical Support of Agriculture, branch of the Federal Scientific Agroengineering Center VIM, 38/11 Shchers str., Ryazan, Russian Federation
\(^2\)Bashkir State Agrarian University, 34 50-letiya Oktyabrya str., Ufa, Russian Federation
\(^3\)Ural State Agrarian University, 42 Karl Liebknecht str., Yekaterinburg, Russian Federation
\(^4\)Russian State Agrarian Correspondence University, 50 Shosse Entuziastov, Balashikha, Russian Federation
\(^5\)Yaroslav-the-Wise Novgorod State University, 41, ul. B. St. Petersburgskaya, Veliky Novgorod, Russian Federation

E-mail: Tagirov-57@mail.ru

Abstract. The use of balanced multicomponent supplements is highly promising. In this regard, we believe it will be relevant to use a balanced carbohydrate complex under the trade names Felucene K 2-4 and Felucene K 2-6 for agricultural animals of a specified age in accordance with the instruction for use. The inclusion of the studied supplements in the ration of young cattle in various doses made it possible to trace changes in growth and development of young Hereford breed. The experiments showed the best result demonstrated by animals of experimental group III, who received the supplement K 2-4 at a dose of 100 g and K 2-6 at a dose of 150 g per animal per day, respectively. Further research is planned to study post-slaughter indicators in order to assess the quality of meat products.

1. Introduction

One of the full-scale tasks in the agribusiness is the development of livestock and poultry farming. Provision of the population with food of animal origin is one of the priorities of the meat industry, therefore, it is extremely necessary to create, improve and produce new types of meat products [1–9]. Appropriate growth of farm animals and poultry implies adequate and balanced feeding and maintenance, therefore comprehensive measures are required to improve zootechnical norms and rules [9–15]. The experience of practical livestock breeders shows that the ration should be enriched with biologically active substances, which is consistent with the studies [16–24].

The aim of the study was to increase the production of raised Hereford sires. The study objective was to analyze the effect of a balanced carbohydrate complex on growth and development of bull calves.
2. Materials and methods

We propose to use a balanced carbohydrate complex Felucene, a powder intended for calves from 7 to 12 months (K 2-4) and from 13 to 18 months (K 2-6). The composition of the complex is protected by copyright, there is a manual for use. The purpose of our study was to scientifically substantiate and determine the norms in the conditions of a particular agricultural farm.

A set of components of the studied supplements can increase the energy nutritive value of the ration, and not only maintain the health of the skin, coat and hooves [18–26].

For this purpose, a scientific and economic experiment was performed at Berezovskaya Ferma OOO in Pervomaisky District of Tomsk region in 2018–2019. The staff of the livestock farm was actively involved in the experiment. Hereford bulls were divided into 4 groups and different doses of supplements were administered. The control group (I) of bulls received a ration without supplements, and the experimental groups (II, III and IV) received a ration with supplements, which were administered in accordance with the scheme. In the period up to one year of age, the bulls were fed the carbohydrate complex Felucene K 2-4 at a dose of 50, 100, and 150 g per animal per day, and then, until one and a half years of age, the carbohydrate complex Felucene K 2-6 at a dose of 100, 150 and 200 g, respectively.

The weight growth of the experimental animals was determined by the standard method using the scales. Linear growth was studied in accordance with approved standard zootechnical methods.

3. Results

A balanced carbohydrate complex Felucene introduced into the ration of bull calves had a favorable effect on their weight growth (figure 1).

Figure 1 shows that in the initial growth period corresponding to the age of 6 months, the live weight of bull calves of all groups ranged from 187.8 to 188.1 kg (with no correlation). Later, we observed some differences in the dynamics of the live weight of bull calves from 9 months of age to the end of the experiment – bulls from experimental groups III and IV exhibited the most intensive growth. The live weight of bull calves from the experimental group was higher than that of bull calves from the
control group and amounted to 7.8 kg and 6.9 kg at 9 months of age, respectively; 21.2 and 14.1 kg at 15 months of age; 29.3 and 21.8 kg at 18 months of age.

The data obtained were confirmed by calculation of the relative growth rate of bull calves (figure 2).

![Figure 2](image_url)

**Figure 2.** Change in the relative growth rate of calves by periods, %.

Analysis of the dynamics shows that the relative growth rate became less intense with age regardless of feeding, which is physiologically justified. At the same time, bull calves that received the considered additives exhibited a higher growth rate. Moreover, at all stages of the study, as well as over the entire period, the highest growth rate was noted for young animals from experimental group III. Over the entire one-year observation period, their relative growth rate increased by 4.3% in group I (control), by 2.13% in group II (experimental), and by 1.09% in group IV (experimental).

The animals were measured at the age of 6 and 18 months, and the change in measurements was analyzed for the given period (figure 3).
Thus, it can be noted that bull calves from the experimental groups exhibited high growth rates, whereas the maximum indicators were noted for young animals from group III. In contrast to the control, bulls from group III dominated in height at the withers by 2.51%, in height of the sacrum – by 4.38%; in breast depth – by 1.34%; in breast width – by 1.26%, in breast circumference – by 0.66%; in oblique body length – by 1.32%, in rump semicircumference – by 1.70%; in metacarpal circumference – by 1.91%.

The data obtained indicate higher rates of increase in the axial skeleton with age (table 1).

**Table 1.** Increase in the body measurements of 18-month bull calves compared to 6-month animals.

| Measurement                        | Group I | Group II | Group III | Group IV |
|------------------------------------|---------|----------|-----------|----------|
| Half girth                         | 1.25    | 1.26     | 1.27      | 1.27     |
| Sacral height                      | 1.17    | 1.18     | 1.19      | 1.19     |
| Breast depth                       | 1.35    | 1.35     | 1.36      | 1.36     |
| Metacarpal circumference           | 1.31    | 1.33     | 1.34      | 1.33     |
| Breast width behind the shoulder blades | 1.38    | 1.40     | 1.40      | 1.40     |
| Height at the withers              | 1.17    | 1.19     | 1.20      | 1.20     |
| Oblique body length                | 1.35    | 1.35     | 1.36      | 1.36     |

The most significant increase with age was noted for breast width (1.38–1.40-fold), breast width behind the shoulder blades (1.39–1.40-fold), and breast depth (1.35–1.36-fold). The values of height measurements increased to a lesser extent with age. Thus, height at the withers increased 1.17–1.20-fold with age, and height at the sacrum increased 1.17–1.19-fold.
4. Conclusion
A balanced carbohydrate complex Felucene (K 2–4 at a dose of 100 g and K 2–6 at a dose of 150 g) used in feeding of Hereford bull calves contributed to development of large animals of meat type. The use of scientifically grounded doses of feed preparations and additives increases the profitability of livestock and poultry farming, increases the production of livestock products, and provides import substitution.

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