The composition and properties of young cattle nutrition enriched with the additive “Tanrem”

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Abstract. Feeding that provides animals with good health, high productivity and good product quality at the lowest feed cost is considered complete. For this goal, it is necessary to balance the diet of animals for all nutrients, because even the work of breeders does not guarantee high productivity from animals without a complete diet. The lack of energy in the diet affects all vital functions of the animal’s body, which caused the need to enrich the diet with energy-carbohydrate feed. This fact determined the relevance of our work. With the help of a computer program, it became possible in a short time to analyze the diet with the inclusion of the studied additive in three different dosages, to assess its structure, nutritional value and to carry out a zoo analysis. The ration was made up for stall and pasture keeping of young cattle of LLC “Agro-Alliance”, divided into 15 animals in a group. The main fodder was procured in the same farm. The calculation showed that in the experimental groups the ration was as close as possible to the standard values, which indicates the prospects of using the studied type of feed in feeding young animals.

1. Introduction

The question of the quality of feed and the technology of their feeding remains relevant for many decades. At the same time, the lack of a balanced diet acts as a brake on the development of the industry in many regions of the country [1–4].

Balanced feeding is able to provide the body with all the necessary substances, accelerating the metabolism of animals. A deficiency or excess of certain components leads to metabolic disorders, up to deaths. In this regard, it becomes relevant to use various additives, both domestic and foreign manufacturers, which are presented on the market in a large assortment. Their use allows to improve the
digestibility of feed, and, consequently, to influence the increase in the productive qualities of livestock [5–8].

The aim of the research was to increase the productivity of young cattle. The task of this study was to determine the actual nutritional value of feed used in the diets of young animals, analyze the diets for compliance with their requirements, calculate the daily amount of energy-carbohydrate feed “Tanrem” to balance the diet in terms of sugar and energy for subsequent study of its effect on animal productivity.

2. Materials and research methods

Energy-carbohydrate feed is produced in the Russian Federation (Balashikha, Moscow region) under the trade name “Tanrem”. The composition of the feed is represented by easily fermentable carbohydrates, vegetable fat, vegetable protein.

Sugars serve as a source of energy, have an impact on digestive processes and the degree of utilization of nutrients. Easily fermentable carbohydrates are necessary for the body to synthesize microbial protein [9].

Vegetable fat in the supplement is a source of fat-soluble vitamins and energy, which is spent on heating the body, animal growth and milk synthesis. It is part of the protoplasm of cells and participates in metabolic processes [10].

Protein supplements are of plant origin and are important for the growth of meat and milk production. In addition, without their participation, the cellular and tissue growth of organism is impossible [11].

Increasing the profitability of cattle and poultry husbandry requires researchers to introduce new technologies for keeping and feeding farm animals [12, 13] and poultry [14–20].

In order to start the scientific and economic experiment, the selection of feed for the diet and its balancing in the software complex for young cattle were made. The feed was procured at LLC “Agro-Alliance” of Chishminsky district of the Republic of Bashkortostan, where the experiment was organized.

For the experiment, the animals were divided into 4 groups of 15 animals in each, control and experimental according to the principle of analogues. The latter in the composition of the diet as an experiment introduced different doses of the studied additive (250, 500 and 700 g per animal per day).

3. Research results

The beginning of the experiment fell on the stall keeping, where the young animals were kept for the period from 6 months to 12 months. During this period, the diet of young animals consisted of coarse, juicy, and concentrated feed (table 1).

| Table 1. The composition of the diets of young animals per 1 animal, kg. |
|------------------|-----------------|-----------------|
| Indicator        | Young growth, months |
|                  | 6               | 9               | 12              |
| Stall period     |                 |                 |
| Alfalfa Hay      | 1               | 1.5             | 1.5             |
| Alfalfa haylage  | 3               | 5               | 5               |
| Barley straw     | -               | -               | -               |
| Corn silo        | 3.5             | 3.5             | 6               |
| Barley           | 0.4             | 0.4             | 0.4             |
| Oats             | 0.6             | 0.5             | 0.5             |
| Peas             | 0.2             | 0.1             | 0.2             |
| Table salt, g / kg | 0.015          | 0.02            | 0.025           |
| Monosodium phosphate feed, g / kg | 0.06 | 0.085 | 0.085 |
| Premix P60-1     | -               | -               | -               |
| Additive “Tanrem” I (control) / II / III / IV | - / 0.25 / 0.50 / | - / 0.25 / | - / 0.25 / 0.50 / |
|                  | 0.75            | 0.50 / 0.75     | 0.75            |
| Grazing period   |                 |                 |                 |
Grass bean-bean mixture  21
Barley  0.55
Oats  0.5
Peas  0.1
Table salt, g / kg  0.03
Monosodium phosphate feed, g / kg  0.06
Additive “Tanrem” I (control) / II / III / IV  0.0 / 0.25 / 0.5 / 0.75

As it can be seen from the table, in the winter period the young stock ration consisted of alfalfa hay, alfalfa haylage, corn silage, barley, oats, peas, table salt, monosodium phosphate feed, additives “Tanrem”, and in the pasture period - cereal and legumes, barley, oats, peas, fodder molasses, table salt, fodder monosodium phosphate and Tanrem additives.

Before the start of the experiment, the composition and nutritional value of the farm feed used in the diets were studied. The results of the zootechnical analysis showed that the composition and nutritional value of feed used in the diets of young animals are close to the average reference data (table 2).

| Nutrition Indicators        | Group |     |     |     | I (control) | II | III | IV |
|----------------------------|-------|-----|-----|-----|-------------|----|-----|-----|
|                            |       | stall| grazing | stall| grazing | stall| grazing | stall| grazing |
| Pure lactation energy, MJ   |       | 32.6| 34.7  | 30.6| 33.7  | 29.4| 32.4  | 29.4| 31.7   |
| ECE                        |       | 5.59| 5.84  | 5.67| 6.07  | 5.86| 6.24  | 6.26| 6.54   |
| O.E. MJ                    |       | 55.9| 58.4  | 56.7| 60.7  | 58.6| 62.4  | 62.6| 65.4   |
| Dry matter, g              |       | 5946| 5556.5| 5687| 5425  | 5513| 5208  | 5513| 5121   |
| Crude protein, g           |       | 890.7| 895.5 | 879.0| 911.0 | 889.0| 912.2 | 925.3| 935.4  |
| Breakable protein, g       |       | 702.7| 751.7 | 663.1| 734.2 | 641.0| 704.8 | 641.0| 693.7  |
| Non-digestible protein, g  |       | 188.4| 143.6 | 180.1| 140.4 | 176.0| 134.8 | 176.0| 132.7  |
| Digestible protein, g      |       | 551.3| 602.8 | 513.1| 587.8 | 494.1| 564.8 | 494.1| 555.2  |
| Lysine                     |       | 41.7| 46.0  | 39.4| 45.2  | 38.5| 43.3  | 38.5| 42.9   |
| Methionine, g              |       | 29.2| 22.3  | 28.2| 21.9  | 27.6| 20.0  | 27.6| 20.8   |
| Tryptophan, g              |       | 10.4| 8.1   | 9.8 | 7.8   | 9.6 | 5.9   | 9.6 | 5.3    |
| Sugar, g                   |       | 198.0| 614.3 | 256.0| 679.1 | 319.5| 718.6 | 387.0| 784.0  |
| Starch, g                  |       | 558.0| 513.5 | 482.0| 499.0 | 451.5| 556.5 | 509.0| 570.0  |
| Crude Fat, g               |       | 199.8| 240.2 | 222.4| 266.7 | 246.9| 286.7 | 276.9| 313.9  |
| Crude fiber, g             |       | 1535.8| 1204.4| 1517.7| 1196.6| 1505.0| 1142.6| 1505.0| 1156.2 |
| Table salt, g              |       | 30.3| 32.1  | 30.3| 32.1  | 30.3| 32.1  | 30.3| 32.1   |
| Calcium g                  |       | 66.3| 53.7  | 65.8| 53.6  | 65.7| 51.1  | 65.7| 51.0   |
| Phosphorus, g              |       | 36.4| 26.6  | 35.3| 26.1  | 34.6| 25.7  | 34.6| 25.4   |
| Magnesium g                |       | 14.7| 10.4  | 14.3| 10.0  | 14.0| 9.6   | 14.0| 9.5    |
| Potassium g                |       | 88.1| 90.6  | 86.1| 89.8  | 85.0| 85.8  | 85.0| 85.3   |
| Sulfur, g                  |       | 10.9| 11.3  | 10.8| 11.2  | 10.6| 10.7  | 10.6| 10.7   |
| Iron mg                    |       | 1530.5| 1496.6| 1520.4| 1494.5| 1516.3| 1424.5| 1516.3| 1422.4 |
| Copper mg                  |       | 44.1| 121.3 | 42.1| 120.1 | 40.8| 114.7 | 40.8| 114.1  |
| Zinc mg                    |       | 141.1| 346.2 | 133.1| 341.8 | 127.7| 326.8 | 127.7| 324.2  |

Table 2. Nutrient content in stall ration.
The use of the Tanrem supplement promotes an increase in sugar in the diet during all periods of observation. With its deficiency in the diet of ruminants, it leads to a lack of readily available energy for the cicatricial microflora, that is why it sharply reduces its digestive and synthetic processes, negatively affects the digestibility of feed nutrients, especially protein and fiber. At the same time, it is important not only to maintain an optimal level of sugars and starch in the diet, but also the ratio of sugar to digestible protein, which affects the absorption of nutrients in the diet. It should be noted that the summer diet has a higher content of metabolic energy, crude protein, crude fat, but less dry matter and crude fiber. The diet of the young was additionally subjected to zoo analysis (table 3).

**Table 3.** Zooanalysis of the diet.

| Indicator | Group | Stall | Grazing | Stall | Grazing | Stall | Grazing | Stall | Grazing |
|-----------|-------|-------|---------|-------|---------|-------|---------|-------|---------|
| Calcium: Phosphorus | I (control) | 1.8 | 2.0 | 1.9 | 2.1 | 1.9 | 2.0 | 1.9 | 2.0 |
| Sugar: Protein | | 0.4 | 1.0 | 0.5 | 1.2 | 0.6 | 1.3 | 0.8 | 1.4 |
| Digestible Protein: Non-digestible Protein | | 3.7 | 5.2 | 3.7 | 5.2 | 3.2 | 5.2 | 3.6 | 5.2 |
| The content of crude protein in dry matter,% | | 15 | 16.1 | 15.5 | 16.8 | 16.1 | 17.5 | 16.8 | 18.3 |
| The content of crude fiber in dry matter,% | | 25.8 | 21.7 | 26.7 | 22.1 | 27.3 | 21.9 | 27.3 | 22.2 |
| The content of crude fat in dry matter,% | | 3.4 | 4.3 | 3.9 | 4.9 | 4.5 | 5.5 | 5.0 | 6.1 |
| The starch content in dry matter,% | | 9.4 | 9.2 | 8.5 | 9.2 | 8.2 | 10.7 | 9.2 | 11.1 |
| The sugar content in dry matter,% | | 3.3 | 11.1 | 4.5 | 12.5 | 5.8 | 13.8 | 7.0 | 15.3 |
| The amount of ECE per 1 kg of dry matter | | 0.9 | 1.1 | 1.0 | 1.1 | 1.1 | 1.2 | 1.1 | 1.3 |
| The digestible protein content in 1 kg of dry matter, g | | 98.6 | 103.2 | 90.5 | 96.8 | 84.3 | 90.5 | 78.9 | 84.9 |
| The carotene content in 1 kg of dry matter, mg | | 61.1 | 181.5 | 63.8 | 185.9 | 65.8 | 184.4 | 65.8 | 187.6 |
| The content of vitamin D₃ in 1 kg of dry matter, IU | | 291.8 | 18.9 | 305.1 | 19.4 | 314.7 | 19.2 | 314.7 | 19.5 |
| The content of vitamin E in 1 kg of dry matter, mg | | 104.9 | 191.1 | 108.5 | 195.6 | 111.7 | 194.1 | 111.7 | 197.3 |
| The nitrogen balance in the rumen, g | | 17.66 | 18.36 | 15.41 | 16.97 | 14.04 | 14.69 | 12.55 | 13.08 |
| Absorbed protein, g | | 780.3 | 780.75 | 782.7 | 804.96 | 801.26 | 820.39 | 846.89 | 853.63 |
| Microbial protein, g | | 591.9 | 637.15 | 602.6 | 664.56 | 625.26 | 685.59 | 670.89 | 720.93 |
Comparative analysis indicates an increase in the sugar-protein ratio in the diet of young animals in the experimental groups during all periods of keeping. A similar pattern was established for the content of crude protein in dry matter, crude fiber, crude fat and sugar in dry matter.

The structure of the diet of young stall and pasture housing was also analyzed (table 4).

### Table 4. The structure of the diet of young animals, %.

| Feed        | Age | Group                          |
|-------------|-----|-------------------------------|
|             |     | I (control) | II | III | IV |
| Stall period|     |             |    |     |    |
| Rude        | 6   | 48.1        | 45.24 | 41.39 | 38.93 |
|             | 9   | 62.32       | 57.63 | 55.74 | 51.95 |
|             | 12  | 54.74       | 53.97 | 52.22 | 48.88 |
| Juicy       | 6   | 20.51       | 19.29 | 17.65 | 16.6  |
|             | 9   | 16.50       | 15.25 | 14.75 | 13.75 |
|             | 12  | 24.69       | 24.34 | 23.55 | 22.04 |
| Concentrated| 6   | 31.39       | 25.95 | 23.75 | 20.08 |
|             | 9   | 21.18       | 19.59 | 15.12 | 14.09 |
|             | 12  | 20.57       | 14.64 | 10.75 | 10.06 |
| Grazing period| |           |     |     |    |
| Juicy       | 12  | 79.11       | 76.11 | 70.51 | 67.28 |
| Concentrated| 12  | 20.89       | 17.30 | 16.83 | 14.53 |

The data in table 4 shows that both in the pasture and in the stall period of keeping with the use of the additive “Tanrem” in the structure of the diet of young animals, a decrease in the proportion of succulent feed is noticeable.

### 4. Conclusion

Thus, a comparative analysis of the diets of young animals for stall and pasture keeping with their enrichment with energy-carbohydrate feed indicates the ability of the feed set of the diet to provide the body with additional energy for growth, development and high productivity. In addition, the additive provides the attractiveness of the staple feed due to its pleasant taste and aroma, inducing appetite and better palatability. Due to the fact that the energy-carbohydrate feed is rich in structural fibers, this has a beneficial effect on rumen motility. Therefore, to improve the diets of young animals, we recommend to include the supplement “Tanrem” in the amount of 500 g per 1 head per day both in winter and summer periods of keeping animals. This contributes to the improvement of carbohydrate and energy metabolism, presumably, an increase in the productivity of young animals and a decrease in feed costs per unit of production.

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