

Для цитирования: Харлова Е.В., Шаганова Е.С. Применение нетрадиционных добавок в кормлении коров // Grand Altai Research & Education — Выпуск 1 (26)'2026 (DOI: 10.25712/ASTU.2410-485X.2026.01) — EDN: <https://elibrary.ru/KUWFWK>

УДК 636.22/28.084.13

РИНЦ AuthorID:

Харлова Е.В. 1112279; Шаганова Е.С. 523007

SPIN: Харлова Е.В. 3219-7744

ПРИМЕНЕНИЕ НЕТРАДИЦИОННЫХ ДОБАВОК В КОРМЛЕНИИ КОРОВ

Е.В. Харлова¹, Е.С. Шаганова¹

¹ Алтайский государственный аграрный университет, Барнаул, Россия

E-mail: Lenochka_1506@mail.ru; stepanenlena@yandex.ru

Аннотация. Облепиховый жмых — ценное высокоэнергетическое сырье — получают из жома облепихи после выжимки сока и масла. Целью исследований было изучение эффективности использования облепихового жмыха в кормлении коров в период раздоя. Были сформированы 2 группы животных — контрольная и опытная. Опытная группа дополнительно к основному рациону получала облепиховый жмых (0,15 кг на голову). Под влиянием кормления облепиховым жмыхом молочная продуктивность коров увеличилась. За период исследований от опытных животных было получено на 3,5% молока больше, чем от коров контрольной группы. Благоприятно сказывается скармливание облепихового жмыха на содержание жира и белка в молоке.

Ключевые слова: кормление, КРС, облепиховый жмых, молочная продуктивность, качество молока, содержание жира, содержание белка

For citation: Kharlova E.V., Shaganova E.S. Use of non-traditional additives in cow feeding // Grand Altai Research & Education — Issue 1 (26)'2026 (DOI: 10.25712/ASTU.2410-485X.2026.01) — EDN: <https://elibrary.ru/KUWFWK>

USE OF NON-TRADITIONAL ADDITIVES IN COW FEEDING

E.V. Kharlova¹, E.S. Shaganova¹

¹ Altai State Agrarian University, Barnaul, Russia

E-mail: Lenochka_1506@mail.ru; stepanenlena@yandex.ru

Abstract. Sea buckthorn cake is a valuable high-energy raw material obtained from sea buckthorn pulp after extracting juice and oil. The purpose of the study was to investigate the effectiveness of using sea buckthorn cake in feeding cows during the milking period. Two groups of animals were formed: a control group and an experimental group. The experimental group received sea buckthorn cake (0.15 kg per head) in addition to their regular diet. The milk production of the cows increased as a result of feeding sea buckthorn cake. During the study period, the experimental animals produced 3.5% more milk than the control group. Feeding sea buckthorn cake had a positive effect on the fat and protein content in milk.

Keywords: Feeding, cattle, sea buckthorn cake, milk production, milk quality, fat content, protein content

Introduction

The main objective of feeding farm animals is to ensure the realization of genetically determined productivity, improve the quality of products while reducing their cost. The effectiveness of feeding is influenced by a wide range of factors, such as the nutritional value of the diet, the quality of feed, the preparation of feed for feeding, the origin of the animals, their age and productivity level, health status, heredity, technological loads, etc.

Literature review

The systematic use of natural and artificial products, as well as secondary raw materials, in animal diets should help to normalize the animal's microecological status, providing a regulatory effect on the animal's physiological functions, biochemical reactions, and psychological behavior.

Functional feed, which, in addition to its direct role as a source of nutrients, also improves the health and well-being of the animal, includes dietary fiber, oligosaccharides, amino acids, vitamins, bifidobacteria, and other lactic acid bacteria, minerals, herbal remedies, antioxidants, etc.

Easily digestible sugars play an important role in the nutrition of cattle. On the one hand, they provide energy for the animals, and on the other hand, as a nutrient medium, they contribute to the positive microecological status of the rumen microflora, which uses them in the synthesis of bacterial protein and volatile fatty acids [1].

The current deficit of easily digestible sugars in the rations of cattle in the country's farms is 35-40% [2]. This disrupts the activity of the microflora and reduces the digestibility and absorption of other nutrients in the diet, which not only hinders the realization of the genetic potential for productivity but also affects the overall health of the animals. Contrary to popular belief, this deficit persists even during the summer. Even in the early vegetative phase, the green mass of sown cereal or legume crops on natural pastures does not satisfy the rations of cows in terms of easily digestible carbohydrates by up to 50% [3]. The main sources of easily digestible sugars in farms are root crops (mainly sugar beet) and processed products, as well as hydrolyzed sugars. In the first case, this is not always cost-effective due to the low sugar content of root crops and the short shelf life of molasses, and in the second case, the waste products of the pulp and paper industry are not always safe or non-toxic for animals.

Favorable conditions for the development of the foregut microflora and, as a result, improved amino acid and LPC synthesis and vitamin nutrition are provided by a favorable sugar-protein ratio in the rations of ruminants [4]. Therefore, the search for cost-effective sources of easily digestible sugars that would not only enrich the diet and optimize the sugar-protein ratio, but also have a positive effect on the overall health of the animal over a long period remains relevant.

Therefore, the search for cost-effective sources of easily digestible sugars remains relevant, as they not only enrich the diet and optimize the sugar-to-protein ratio, but also have a positive impact on the overall health of the animal over a long period. Another area of improvement in the functional feeding of dairy and beef cattle is the provision of all necessary nutrients by introducing additional feed additives into the diets, which not only enhance the nutritional value of the feed mixture but also positively affect the functioning of the digestive tract. In farm rations, the deficiency of energy and certain nutrients (macro- and micronutrients) can be up to 20-50% of the required amount. One of the ways to normalize the rations of cattle is to use new products of secondary processing of berry crops, such as sea buckthorn and rosehip

cakes, which are a good source of energy and vitamins (A, D, E) and minerals: calcium, potassium, iron, and copper, which are higher than in other concentrated feed.

In this regard, the use of natural sources of vitamins, such as vitamin-rich herbal flour, coniferous flour, sea buckthorn cake and meal, and others, is promising [5].

In Altai, sea buckthorn holds a special place among fruit and berry crops. As the production of pharmacopoeial sea buckthorn products increases, the amount of industrial waste (meal) reaches up to 90 tons per year. Sea buckthorn meal is a residue that is formed after extracting sea buckthorn oil from dry sea buckthorn pulp and consists of partially crushed seeds and fruit shells. Sea buckthorn meal is a good source of energy, vitamins (A, D, E), and minerals such as calcium, potassium, iron, and copper, which are higher than in other concentrated feed. The meal contains a lot of crude protein, fiber, ash, carbohydrates, and carotene.

Sea buckthorn cake is a valuable high-energy raw material, produced from sea buckthorn pomace after squeezing the juice and oil. It is a brownish-yellowish powder, greasy to the touch, with a characteristic sea buckthorn smell. The cake contains a lot of crude protein, fiber, ash, carbohydrates, and carotene.

Sea buckthorn cake has high antioxidant and detoxifying properties for heavy metals (mercury, cadmium, lead, etc.). Sea buckthorn cake is rich in carotene, B vitamins, especially nicotinic and folic acids, and contains organic acids (up to 4.2 in total): malic, tartaric, oxalic, and succinic acids. The latter has an active physiological effect in preventing toxic effects on the body. In terms of chemical composition and nutritional value, sea buckthorn cake is similar to oilseed cake (except for its protein content), and it surpasses vitamin grass flour in these parameters, and is significantly richer in vitamins and other biologically active substances [6].

Materials and methods. The aim of the study was to investigate the effect of sea buckthorn meal on the milk yield, milk quality and reproductive function of the Black-and-White cows.

To achieve the set goal, a scientific-economic experiment was conducted. The scheme of the experiment is presented in Table 1.

Table 1. Scheme of experience

Group	Number of heads	Feeding conditions
Control	15	Main diet (MD)
Experimental	15	MD + 0.15 kg of sea buckthorn cake

To carry out scientific and economic experience on the basis of LLC Semenovod in the Altai Territory of the Biysk region, two groups of black-and-white cows were formed using the analog method — a control and an experimental one with 15 heads each. The differences between the experimental groups were as follows: the control group received a basic ration consisting of fire hay (4kg), grain and bean haylage (15kg), corn silage (15kg), beet pulp (10kg), and a grain mixture (4kg). The animals in the experimental group were additionally given sea buckthorn meal at a rate of 150 g per head.

Sea buckthorn cake has a high nutritional value — 1.3 feed units, is rich in digestible protein — 179.6g/kg, contains a significant amount of fat and sugar — respectively, 202.1 and 37.1g/kg, with a low content of crude fiber — 20%. Since sea buckthorn cake contains the seeds and shells of sea buckthorn berries, it is very rich in phosphorus, the content of which in 1 kg reaches 44.23g. In terms of micronutrient content, it also surpasses other feed rations, with an iron content of 330.2mg, a copper content of 98.11mg, a zinc content of 40.82mg, and a manganese content of 37.9mg. Sea buckthorn cake is an excellent source of carotene, with a content of 110mg per kilogram.

Research results. Animal productivity and health depend largely on feeding. A lack of nutrients in the diet, such as fats, carbohydrates, minerals, and vitamins, disrupts normal life functions and causes various diseases, reducing the breeding value of animals and the quality and quantity of their products. The results of the experiment using sea buckthorn cake are presented in Table 2.

Table 2. Indicators of milk productivity in first-calf cows

Indicator	Control	Experimental
Milk yield for 100 days of lactation, kg	2369±68,0	2451±83,7
Fat content, %	3,59±0,03	3,76±0,04
Protein content, %	2,80±0,02	2,94±0,02
Milk fat, kg	85,1±2,61	92,1±4,00
Milk protein, kg	66,3±2,31	72,1±2,46

Under the influence of feeding sea buckthorn cake, the milk productivity of cows increased. The data indicate that the inclusion of sea buckthorn cake in the diet contributed to the formation of higher milk productivity. During the study period, the experimental animals produced 3.5% more milk than the control group. The milk fat content increased by 0.17%, and the milk protein content increased by 0.14%.

All processes in the female body that are directly or indirectly related to reproduction are closely dependent on environmental factors, especially the feeding system. Inadequate feeding during the late stages of gestation and after calving (before insemination) has a particularly negative impact on the reproductive function of cows and heifers.

Table 3 — Reproductive Function of Cows

Indicator	Control group	Experimental group
Number of animals, heads	14	14
Service period, days	113,0±7,09	90,1±8,36
Number of calves, heads	12	13
Number of calves per 100 cows, heads	86	93

The service period is the main indicator of a cow's fertility and the efficiency of herd reproduction. With a high level of herd reproduction, the interval from calving to successful insemination (service period) should not exceed 80 days, and more than 85% of cows should be inseminated within the first 60 days after calving.

During the study period, the average service period for cows in the control group was 113.0 days (Table 1), the service period of the experimental group was shorter by 22.9 days and amounted to 90.1 days.

12 calves were obtained from the control group of first-calf cows, and 13 calves were obtained from the experimental group, resulting in a calf yield of 86% and 93%, respectively.

Conclusion. Under the influence of feeding sea buckthorn cake, the milk productivity of cows increased. The data indicate that the inclusion of sea buckthorn cake in the diet contributed to the formation of higher milk productivity. Thus, during the study period, the experimental animals produced 3.5% more milk than the control group. The fat content in milk increased by 0.17%, and the protein content increased by 0.14%. Thus, to increase the milk yield of cows and improve the quality of milk, it is recommended to use sea buckthorn cake at a rate of 150g per head.

References

- [1] Gorshkov, V.V. Development of scientific foundations for functional feeding of cattle using agricultural and secondary raw materials subjected to complex technological processing / V.V. Gorshkov // Vestnik AGAU. 2017. No. 9. Pp. 125-129.
- [2] Aksenov V.V. Processing of rye and wheat grain into fodder carbohydrate additives and their use in the diets of lactating cows // Vestnik KrasGAU. 2007. No. 1. Pp. 184-186.
- [3] Soloshenko V.A., Zagitov Kh.V. Sugar in the diets of Siberian cows // Achievements of Science and Technology in the Agro-Industrial Complex. 2009. No. 12. Pp. 29-30.
- [4] Zaitsev S.Yu., Konopatov Yu.V. Animal Biochemistry. Fundamental and Clinical Aspects. St.Petersburg: Lan, 2004. Pp. 128-162.
- [5] Golomolzin V.D. Using the Prolonged Action of the Carotene Drug Kuksavit β to Improve the Reproductive Capacity of Cows // Agrarian Bulletin of the Urals. 2010. No. 2 (68). Pp. 71-72.
- [6] Torikov, V. E. Medicinal Value of Vegetable, Fruit, Berry, Field Plants, and Wild Plants: A Monograph. Bryansk: Bryansk State Agricultural Academy, 2013. 292 p.