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Chemical composition and biological properties of cow's milk and milk fed to young calves in livestock farms in the districts of the Republic of Karakalpakstan

Senior lecturer, Nukus branch of Samarkand State University of Veterinary Medicine, Animal Husbandry and Biotechnology.

J.E.Rejepbayev, S.A.Zoytova

Annotation. The vitamins and minerals in the milk given to calves in the experiment are very important because they play a major role in their growth, development, and health. These vitamins and minerals can be found naturally in milk, and they are also sometimes given to animals as feed supplements.

Аннотация. Витамины и минеральные вещества в молоке, которое дают подопытным телятам, очень важны, поскольку они играют важную роль в обеспечении их роста, развития и здоровья. Эти витамины и минералы могут естественным образом присутствовать в молоке, а иногда их также дают животным в качестве кормовых добавок.

Annotatsiya. Tajribadagi buzoqlarga berilayotgan sut tarkibidagi vitaminlar va mineral moddalar juda muhimdir, chunki ular ularning o‘sishi, rivojlanishi va sog‘lig‘ini ta’minlashda katta rol o‘ynaydi. Bu vitaminlar va minerallar sutda tabiiy ravishda mavjud bo‘lishi mumkin, shuningdek, ular ba’zan hayvonlarga ozuqa qo‘shimchalari sifatida ham beriladi.

Key words: Cow’s milk composition, Nutrients in cow's milk, Milk proteins (casein, whey), Fat content in cow's milk, Lactose in cow's milk, Vitamins in cow's milk, Minerals in cow's milk, Fatty acids profile of milk, Milk solids content, Protein-to-fat ratio in milk

Ключевые слова: Состав коровьего молока, Питательные вещества в коровьем молоке, Молочные белки (казеин, сыворотка), Содержание жира в коровьем молоке, Лактоза в коровьем молоке, Витамины в коровьем молоке, Минералы в коровьем молоке, Профиль жирных кислот в молоке, Содержание сухих веществ в молоке, Соотношение белка и жира в молоке

Kalit so'zlar: Sigir suti tarkibi, sigir sutidagi ozuqa moddalari, sut oqsillari (kazein, zardob), sigir sutidagi yog‘ miqdori, sigir sutidagi laktoza, sigir sutidagi vitaminlar, sigir sutidagi minerallar, sutdagi yog‘ kislotalari profili, sutning qattiq moddalari, sutdagi oqsil-yog‘ nisbati.

Relevance of the topic. The impact of the unfavorable ecological environment in these regions on cattle raised on cattle farms around the world creates the basis for the development of hypovitaminosis A and D in the bodies of young calves born from them. "Vitamin D deficiency - in young animals, stunted growth and development, deformation and softening of bones (rickets), in older animals, signs of osteodystrophy such as demineralization of the last tail vertebrae, and dislocation of incisors are observed." Therefore, it is urgent to conduct scientific research aimed at selecting effective multivitamin preparations for the treatment and prevention of animal hypovitaminosis, which is one of the main problems awaiting a solution in veterinary practice, and developing the procedure and methods for their use.

Methods and materials. In order to study the chemical composition and biological properties of cow's milk fed to calves in the farms where our experiments were conducted, the chemical composition of cow's milk milked on the first, third, and seventh days after calving was examined.

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The acidity (by Turner), fat content (Gerber method), proteins (Kjeldahl method), sugar (Bertrand method), and dry matter content of cow's milk were determined.

Results and their analysis. The acidity level of colostrum according to Turner on the first day after birth was on average 25.2±1.2 (norm - 39.9 °C), on the third day - 20.5±1.3 and on the seventh day - 22.4±1.6 T. The fat content of colostrum was also on average 3.1±0.8% on the first day, 2.8±0.22 on the third day and 2.7±0.34% on the seventh day (Table 1).

The protein content of cow's milk on the first day was 10.8±1.24% (normal - 14.8%), on the third day - 6.4±1.05 and on the seventh day -3.3±0.75%. A decrease in protein content in cow's milk can negatively affect the development of immunity and reduce resistance to diseases in newborn calves. The sugar content of cow's milk on the first day was 3.1±0.17% (normal - 3.6%), on the third day - 3.0±0.5 and on the seventh day -3.2±0.26%, and the dry matter content was 16.8±1.52% (normal - 21.5%), on the third day - 9.5±0.62 and on the seventh day - 8.6±1.8%.

Table 1.

Chemical composition of cow's milk fed to calves

INDICATORS	Postpartum days		
	1- day	3- day	7- day
Acidity, ^{0}T	25,2±1,2	20,5±1,3	22,4±1,6
Oil, %	3,1±0,8	2,8±0,22	2,7±0,34
Protein, %	10,8±1,24	6,4±1,05	3,3±0,75
Milk sugar, %	3,1±0,17	3,0±0,5	3,2±0,26
Dry matter, %	16,8±1,52	9,5±0,62	8,6±1,8

These indicators show that the biological value of cow's milk from cows with metabolic diseases, geoecological conditions, and deficiencies in storage and feeding reduces the milk's biological value. As a result of cattle contracting micronutrient diseases during the calving period, the calves born from them are weak, have low vitality, are physiologically underdeveloped, hypotrophic, and are susceptible to diseases.

Milk is considered the most nutritious of all natural foods in terms of its composition. Milk contains carbohydrates, phosphatides, neutral fats, sterols, various proteins, vitamins, minerals, enzymes and water. Milk contains more than two hundred different substances, in particular about forty minerals, more than sixty fatty acids, about twenty amino acids, seventeen different vitamins, several hormones and enzymes. It is noteworthy that the proteins in milk are very easily digestible and contain amino acids that cannot be replaced by any other nutrients. Casein makes up 82% of milk and is the main protein in milk. Milk contains xanthine oxidase, alkaline phosphatase, lipase, proteinase, catalase, aldolase and other enzymes. The main carbohydrate in milk is the C12H22O11 disaccharide lactose, which makes up up to 5% of bovine milk. Bovine milk contains various lipids: triglycerides, diglycerides, and monoglycerides. Milk contains fat-soluble vitamins A, D, and E, and carotene, which is considered a provitamin. Water-soluble vitamins in milk include vitamins B1 (Thiamine), B2 (riboflavin), B3 (nicotinic acid), B6 (pyridoxine), and B12 (cyanocobalamin), and ascorbic acid. Scientists have determined that bovine milk contains almost all of the chemical elements in the periodic table of D.I. Mendeleev.

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The average chemical composition of 100 ml of bovine milk includes vitamin A - 0.025 mg, vitamin D - 0.05 mcg, vitamin E - 0.09 mg, calcium - 122 mg, phosphorus - 92 mg, total protein - 3.3 g, fat - 3.6 g, casein - 2.6 g.

The content of vitamins and minerals in cow's milk is the main indicator of vitamin and mineral metabolism in the body of calves. Therefore, in our research, in order to determine the biologically active substances in the milk given to calves during A- and D-hypovitaminosis in calves, samples of milk given to calves in livestock farms in the districts of the Republic of Karakalpakstan were taken and the vitamins and minerals in the milk were tested in the laboratory.

According to the results of laboratory testing of milk samples given to calves, the average fat content of milk in the first month of lactation of "Amir aq chashma" LLC (farm 1) in Elikkalla district was 3.48±0.64%, and in the third month of lactation it was 3.25±0.38%. The average milk fat content in cows of "Kongiratbay-Mekhri" LLC (farm 2) in Nukus district was 3.44±0.50% in the first month of lactation and 3.20±0.24% in the third month. The average milk fat content in cows of "Polvonboy avuli" LLC (farm 3) in Amudarya district was 3.6±0.38 and 3.46±0.57%, respectively. The "Fayzullaev Azizbek Lazizbek Chorva" f/x (4 farms) in the Beruniy district was 3.52±0.66 and 3.26±0.47% (norm -3.8%), respectively.

The total protein content of milk in the first farm was on average 3.3±0.2% in the first month of lactation, 2.9±0.38% in the third month, 2.9±0.31 and 2.7±0.36% in the second farm, 3.3±0.25 and 3.0±0.44% in the third farm, and 3.1±0.55 and 2.8±0.63% (normal -2.7-5.0%) in the fourth farm.

It was found that the vitamins in milk (first farm) decreased in proportion to the amount. The amount of retinol in the first month of lactation was 0.96±0.02 μg % on average, and in the third month of lactation it was 0.72±0.03 μg %. The amount of retinol in milk from cows from the second farm was 0.88±0.05 and 0.65±0.04 μg %, respectively. The amount of retinol in milk from cows from the third farm was 0.94±0.07 and 0.73±0.05 μg %, while in cows from the fourth farm this indicator was 0.98±0.07 and 0.78±0.09 % (normal -1.3-3.15 μg %).

The vitamin E (tocopherol) content in the milk of cows (farm 1) was on average 8.2±0.07 μg% in the first month of lactation and 7.5±0.06 μg% in the third month of lactation. The tocopherol content in the milk of cows from farm 2 was 8.4±0.05 and 7.3±0.04 μg%, respectively. The content in the milk of cows from farm 3 was 8.7±0.02 and 7.5±0.06 μg%, while in cows from farm 4 this indicator was 8.5±0.09 and 7.4±0.02 μg%, respectively (the norm is 8-10 μg%).

The total calcium content in cow's milk was observed to decrease to an average of 126.8±2.5 mg% in the first month of lactation in cows from the first farm, 120.4±2.3 mg% in the third month, 124.6±2.2 and 118.9±3.5 mg% in the second farm, 131.2±2.53 and 124.5±3.3 mg% in the third farm, and 128.2±2.1 mg% and 121.3±2.6 mg% in the fourth farm, respectively.

The amount of inorganic phosphorus in cows on the first farm was on average 61.2±1.5 mg% in the first month of lactation, on average 54.6±2.4 mg% in the second month, on the second farm, 57.8±2.6 and 51.3±2.7 mg%, respectively, on the third farm, 59.3±2.5 and 52.8±2.4 mg%, and on the fourth farm, 62.9±2.2 mg% and 53.7±2.2 mg%, respectively.

Conclusion

1. Vitamins and minerals in milk ensure proper growth and healthy development of calves. With the help of experiments and feed additives, more vitamins and minerals can be added to milk, which will help improve the health of calves.

2. When studying the content of vitamins and minerals in milk fed to young calves in livestock farms in the districts of the Republic of Karakalpakstan, it was found that retinol decreased by 0.42 μg%,

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tocopherol by 0.5 mg%, total protein by 2.8%, total calcium by 4.6 mg%, and inorganic phosphorus by 7.2 mg%.

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