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EFFECT OF CHLORELLA MICROALGUSTON SUSPENSION ON DAIRY PRODUCTIVITY OF SHEEP MOTHERS AND GROWTH INTENSITY OF LAMBS

Ihor Slyusarenko, Alla Kitayeva, Ruslan Susol

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For this research, 5 groups of lactating ewes of the Gypsy breed were formed with 10 heads in each, one of the groups was a control. Groups were formed by the method of analogue groups taking into account the lambs breed, age, live weight, which was 50 kg. Ewes were fed with chlorella microalgae suspension in the first 20 days of lactation, in the amount of 3; 5; 7; 9 ml per 1 kg of live weight. Growth intensity, external parameters, and hematological and biochemical composition of blood were determined in newborn lambs at the age of 20 days according to generally accepted methods. Feeding a suspension of chlorella microalgae to lactating ewes at the rate of 3, 5, 7, 9 ml per 1 kg of live weight increases milk productivity by 2.6-4.4 times and live weight of the offspring by 58.8-96.9%, compared with ewes that did not consume chlorella microalgae suspensions. With an increase in the amount of chlorella microalgae suspension in the diet of lactating ewes, the absolute increase in live weight of their offspring increases by 2.4-4.5 times. The average daily increase in live weight of lambs ranged from 199 g to 339.5 g. Increasing the amount of chlorella microalgae suspension from 3 to 9 ml per 1 kg of live weight contributed to an increase in milk productivity by 2.6-4.4 times and an increase in milk fat by 3 , 0-3.9%. Morphological and biochemical parameters were within the physiological norm. Higher milk productivity of ewes is accompanied by greater activity of blood enzymes. The best indicators of increasing milk productivity and live weight gain of offspring were obtained when ewes were fed with 9 ml of suspension of chlorella microalgae per 1 kg of live weight.

Key words: microalgae, chlorella, suspension, milk, milk productivity, live weight, growth, fat, blood.

Slyusarenko I.S, Kitayeva A.P., Susol R.L. Odessa State Agrarian University, Ukraine, 65012, Odessa, st. Panteleimonovskaya, 13, E-mail: kafedratvppt@ukr.net, slyusarenko85@ukr.net

INTRODUCTION

Providing the population with animal proteins is constantly facing the countries of the world. According to the FAO, in order to maintain the optimal functioning of the human body, it is necessary to consume 80 g of protein per day, balanced in amino acid composition, where essential amino acids should be 30 g. One of the sources of providing the population optimal vital functions of the human body with products of animal origin is sheep breeding, from which we can obtain lamb, young lamb and milk and fat. Increasing the production of these products helps to increase the competitiveness and profitability of the sheep industry, as demand for them is constantly growing.

Meat and young lamb production requires precocious animals that can use and pay for feed efficiently. The growth of newborn lambs, especially in the first days of life depends on the milk yield of their mothers and housing conditions. Therefore, the milk yield of ewes during this period is extremely important for the safety and growth of lambs. Therefore, the search for ways to increase the milk productivity of ewes is relevant.

Analysis of recent research and publications. To increase the productivity of farm animals use a variety of feed additives, the number of which is constantly growing. Among them, a significant place is occupied by feed additives from the microalgae chlorella (Bogdanov 2004, Karunsky & Voronyuk 2020). Chlorella - unicellular green algae, which contains a large number of vitamins A, B (B1, B2, B3, B6), C, PP, E, K, pantothenic and folic acids, biotin, as well as micro- and macronutrients: cobalt, magnesium , zinc, iron, calcium, phosphorus, etc .; it is rich in essential and non-essential amino acids. In terms of dry matter, chlorella contains more than 40% of complete proteins, lipids - up to 20%, carbohydrates - up to 35%, ash substances - up to 10% (Borisenko et al. 2008). Physiological and productive action of chlorella in the feeding of farm animals affects the indicators of live weight gain, resistance of animals and their reproductive function (Zolotareva 2008). However, in the literature available to us, we did not find reports of the use of microalgae chlorella in sheep feeding to increase the milk productivity of ewes and increase the live weight of lambs. Therefore, the aim of our work was to investigate the effect of chlorella microalgae suspension on lactation of ewes and the intensity of lamb growth in the early stage of postnatal ontogenesis.

MATERIAL AND METHODS

The work was performed in Rozdilnyanske STOV, Rozdilnyanskyi District, Odessa Region. To conduct the research, 5 groups of 10 heads were formed in each lactating ewes of the Gypsy breed. One of the groups was a control. Groups were formed by the method of analogue groups taking into account the breed, age in lambs, live weight, which was 50 kg. The suspension of chlorella microalgae was fed to ewes in the amount of 3; 5; 7; 9 ml per 1 kg of live weight in the first 20 days of the lactation period, which ranged from 150 to 450 ml per head per day, respectively, from the first to the fourth experimental groups. Before the first feeding of the chlorella microalgae suspension and at the end of the experiment, the offsprings of each ewe were weighed. According to the results of weighing, the absolute and average daily gains of live weight were determined according to the method [Linnik V.S., Medvedev A. Yu., Prudnikov V.G.]. In ewes, milk productivity was calculated for the first 20 days of the lactation period according to the method (Shtompel & Vovchenko 2005) and morphological and biochemical composition of blood according to the method (Bogdanov 2004). Digital material was processed according to the method of M.O. (Plokhinsky 1969).

Research results and their discussion

Dairy productivity of ewes before weaning lambs has a direct impact on their growth and development. Lambs obtained from ewes with high milk productivity also have a high growth rate. They are viable, gain weight quickly, have good health, which contributes to high gains.

Live weight of lambs obtained from ewes of control and experimental groups ranged from 3.55 ± 0.077 kg in ewes of the 4th experimental group to 3.73 ± 0.104 kg in ewes of the 2nd experimental and control groups (Table 1).

Thus, the live weight of lambs did not differ significantly, and some deviations between groups were within the statistical error.

Table 1. Live weight of lambs at birth, kg, (n = 10)

Group	X±Sx	±δ	CV,%
Control	3,73 ± 0,083	0,249	6,6
1-experimental	3,59 ± 0,085	0,256	7,1
2-experimental	3,73 ± 0,104	0,312	8,3
3-experimental	3,70 ± 0,097	0,290	7,8
4-experimental	3,55 ± 0,077	0,232	6,5

Table 2. Body measurements of newborn lambs, cm, n = 10

Measurements	**A group of lambs**				
	Control	**1 - experimental**	**2 - experimental**	**3 - experimental**	**4- experimental**
Height at withers	37,00±0,737	35,10±0,637	34,80±0,913	37,70±0,919	37,60±0,670
Chest depth	8,60±0,281	8,30±0,316	9,40±0,421	8,50±0,235	8,50±0,392
Chest width	7,90±0,246	7,10±0,292	8,00±0,585	7,20±0,409	7,10±0,399
Chest girth	37,40±0,819	31,20±0,624	39,40±1,219	37,20±0,644	37,40±0,819
Oblique body length	30,90±0,483	32,70±1,006	30,30±0,443	35,60±1,209**	35,40±1,549*
Width in maklokah	6,40±0,421*[1 3]	5,30±0,225	6,20±0,306	5,40±0,233	6,10±0,331
Width in the buttocks	5,40±0,281*[3]	4,80±0,263	5,80±0,378	4,60±0,172	5,00±0,272
Fist circumference	5,60±0,322***[1]	3,80±0,210	6,20±0,210	6,30±0,445	5,50±0,283
Head length	9,20±0,622	8,30±0,386	8,90±0,399	8,70±0,472	9,20±0,662
Head width	6,00±0,444	6,40±0,391	6,20±0,263	5,40±0,172	6,00±0,444

*Note: * - P≥0.95; *** - P> 0.99; (probability of difference with the corresponding indicator of the control group);*** - P≥0.999; (probability of difference with the corresponding indicator of the 1st group); * [1 3] - P≥0.95; (probability of difference with the corresponding indicator of 1-3 groups)*

Newborn lambs born from ewes of all groups were well developed and had the characteristic appearance and body structure of Gypsy lambs.

Externally, newborn lambs did not differ significantly (Table 2). However, some measurements of the sexes of the body showed slight deviations. Thus, in terms of width in larvae, lambs born from ewes of the control group were superior to the lambs born from ewes of the 1st experimental group by 1.1 cm or 20.7% (P ≥ 0.95), and from ewes of the 3rd experimental group - by 1.0 cm or by 18.5% (P ≥ 0.95). The predominance of lambs obtained from ewes of the control group was also in width in the buttocks by 0.8 cm or 17.4% (P ≥ 0.95), in the circumference of the wrist - by 1.8 cm or 47.3 % (P ≥ 0.999). In terms of oblique body length, lambs obtained from ewes of the 3rd and 4th experimental groups were superior to lambs obtained from mothers of the control group by 4.7 cm or 15.2% (P ≥ 0.99) and 4, respectively. 5 cm or 14.5% (P≥0.95).

The predominance of lambs born from ewes of the control group was also by width in the buttocks by 0.8 cm or 17.4% (P ≥ 0.95), by the circumference of the metacarpal - by 1.8 cm or 47.3 % (P ≥ 0.999). In terms of oblique body length, lambs obtained from ewes of the 3rd and 4th experimental groups predominated lambs obtained from mothers of the control group by 4.7 cm or 15.2% (P ≥ 0.99) and 4, 5 cm or 14.5% (P≥0.95).

After a 20-day period of feeding lactating ewes suspensions of chlorella microalgae, the live

Table 3. Live weight of lambs 20 days of age, kg, (n = 10)

Group	X±Sx	±δ	CV,%
Control	5,25±0,067	0,201	3,8
1-experimental	7,66±0,715**	2,145	28,0
2-experimental	8,39±0,392***	1,176	14,0
3-experimental	8,73±0,249***	0,747	8,5
4-experimental	10,34±0,626***	1,878	18,2

*Note: ** - P≥0.99; *** - P≥0,999 (probability of difference with the corresponding indicator of the control group)*

Table 4. Live weight gain of lambs

Group	X±Sx	±δ	CV,%
Absolute gain, kg			
Control	1,52±0,084	0,252	16,6
1-experimental	3,98±0,718**	2,154	52,1
2-experimental	4,74±0,439***	1,317	27,8
3-experimental	5,03±0,251***	0,753	14,9
4-experimental	6,79±0,644	1,932	28,4
Average daily gain, g			
Control	76,0±4,216	12,649	16,6
1-experimental	199,0±33,754**	101,264	50,9
2-experimental	237,0±22,976***	68,928	29,1
3-experimental	251,5±12,572***	37,716	14,9
4-experimental	339,5±32,226***	96,679	28,5

Note: ** - P≥0.99; *** - P≥0,999 (probability of difference with the corresponding indicator of the control group)

weight of their offspring increased significantly compared with lambs in the control group (Table 3).

The data in table 3 show that the live weight of lambs 20 days of age born from ewes of the experimental groups is probably greater than from ewes of the control group. This excess live weight of lambs was, respectively, in groups: 1st group - 3.14 kg or 58.8% (P≥0.99), 2nd group - 3.14 kg or 58.8% (P≥0) , 99), 3rd group – 3.48 kg or 66.3% (P≥0.999), 4th group - 5.09 kg or 96.9% (P≥0.999). The lambs of the 4th experimental group had the greatest advantage in terms of live weight, their ewes were fed 9 ml of chlorella microalgae suspension per 1 kg of live weight. The coefficient of variability of live weight ranged from 3.8 to 28.0%, which indicates a slight deviation of live weight within the group of lambs and the positive effect of the suspension of chlorella microalgae on ewes, which directly affects the growth of offspring, as evidenced by live growth. (Table 4).

In terms of absolute live weight gain, lambs obtained from the mothers of the experimental groups fed the chlorella microalgae suspension were preferred. It is noted that with the increase in the amount of chlorella microalgae suspension in the diet of lactating ewes, the absolute increase in live weight of their offspring increases compared to the offspring obtained from ewes of the control group. This excess was in lambs of the 1st experimental group 2.46 kg or 2.4 times (P≥0.99), the 2nd group - 3.22 kg or 3.1 times (P≥0.999), the 3rd groups - 3.51 kg or 3.3 times (P≥0.999), the 4th group - 5.27 kg or 4.5 times (P≥0.999).

Table 5. Body measurements of newborn 20-day-old lambs, cm (X ± Sx, n = 10)

Measurements	A group of lambs				
	Control	1-experimental	2-experimental	3-experimental	4-experimental
Height at withers	39,6±0,548	4,33±0,802**	40,9±0,531	44,0±0,667***	45,4±1,091***
Chest depth	10,1±0,331	13,2±0,539***	14,1±0,246***	14,1±0,366***	14,7±0,522***
Chest width	8,6±0,392	10,8±1,204	12,1±0,246***	12,5±0,360***	12,6±0,501
Chest girth	40,7±0,861	37,0±1,396*	43,5±1,229**	46,6±0,384***	46,9±1,717**
Oblique body length	38,5±1,501	39,1±0,367	33,3±0,386	41,2±0,344	43,7±0,903***
Width in poppy locks	6,0±0,471	6,9±0,189	7,2±0,210*	7,3±0,161*	5,7±0,274
Width in the buttocks	5,2±0,210	5,7±0,225	6,3±0,161***	7,0±0,272***	5,1±0,189
Fist circumference	6,4±0,233	6,0±0,157	6,6±0,172	6,6±0,172	6,0±0,157
Head length	9,8±0,210	10,4±0,172*	9,3±0,274	9,3±1,066	11,4±0,877
Head width	6,2±0,210	6,8±0,210	7,1±0,189**	6,4±0,172	6,2±0,262

*Note: * - P≥0.95; ** - P≥ 0.99; *** - P≥0.999; the probability of difference with the corresponding indicator of the control group*

The average daily increase in live weight of lambs obtained from ewes of experimental groups was statistically significantly higher than that of lambs obtained from ewes of the control group and was, respectively: in lambs of the 1st experimental group 123.0 g or more 2.6 times (P≥ 0.99), the 2nd group - 161 g or 3.1 times, the 3rd group - 175.5 g or 3.3 times (P≥0.999), the 4th group 263.5 g or 4, 4 times (P≥0.999).

As lamb weight increases, so do body size and appearance. Measurements of the sex of lambs of 20-day old lambs born from ewes of control and experimental groups are given in Table 5, the data of which show some of their differences. Thus, in lambs born from ewes of the control and 1st experimental groups, the difference was observed in a small number of measurements. In particular, the height at the withers of the offspring of ewes of the 1st experimental group was dominated by the offspring of the control group by 3.7 cm or 9.3% (P≥0.99), and the depth of the breast - by 3.1 cm or 30, 7% (P≥0.999), for the length of the head - by 0.6 cm or 6.1% (P≥0.95). In terms of breast circumference, lambs obtained from mothers of the 1st experimental group were inferior to peers obtained from ewes of the control group by 3.7 cm or 9.1% (P≥0.95).

Slightly greater differences in body sex measurements were observed in lambs obtained from ewes of the 2nd-4th experimental groups compared to lambs obtained from ewes of the control group. In terms of height at the withers, lambs obtained from ewes of the 3rd experimental group were dominated by lambs obtained from ewes of the control group by 4.4 cm or 11.1% (P≥0.999), and the 4th experimental group - by 5.8 cm or 14.6% (P≥0.999). A high degree of probability was also observed in terms of such measurements as depth, width and girth of the chest, width in the buttocks.

According to the depth of the breast in lambs of the 2nd and 3rd experimental groups, the advantage was 4.0 cm or 39.6% (P≥0.999), and in lambs of the 4th experimental group - 4.6 cm or 45.5% (P≥0.999). In terms of breast width, the advantage of lambs obtained from ewes of experimental groups compared to the control group was in lambs of the 2nd experimental group 3.5 cm or 40.7% (P≥0.999), 3rd group - 3.9 cm or 45 , 3% (P≥0.999), the 4th group - 4.0 cm or 46.5% (P≥0.999).

Breast girth in lambs obtained from ewes of the experimental groups was also greater than in lambs born from ewes of the control group.

Table 6. Dairy productivity of ewes for the first 20 days of lactation, kg, (n = 10)

Group	X±Sx	±δ	CV, %
Control	7,6±0,135	0,405	5,3
1-experimental	19,9±0,381***	1,143	5,7
2-experimental	23,7±0,453***	1,360	5,7
3-experimental	25,2±0,292***	0,872	3,5
4-experimental	33,9±0,531***	1,592	4,7

*Note: *** - P≥0.999 (probability of difference with the corresponding indicator).*

Table 7. The composition of ewes of ewes with the use of a suspension of chlorella microalgae, X ± Sx, (n = 10)

Indicators	A group of ewes				
	Control	**1-experimental**	**2-experimental**	**3-experimental**	**4-experimental**
Fat,%	5,32±0,765	6,22±1,005	6,44±0,830	6,87±0,575	7,41±0,310*
White,%	3,32±0,070	3,10±0,055**	3,22±0,015**	3,31±0,650	3,45±0,020**
Lactose,%	5,29±0,105	4,95±0,083*	5,14±0,045	5,28±0,105	5,48±0,300
SPM,%	9,17±0,195	8,57±0,155*	8,95±0,085	9,16±0,190	9,54±0,050
Density	1,03±1,095	1,03±0,200	1,03±0,200	1,03±0,855	1,03±0,450

*Note: * - P≥0.95 (probability of difference compared to the corresponding indicator of the control group.*

This advantage was in the offspring of ewes of the 2nd experimental group 2.8 cm or 6.8% (P≥0.99), 3rd group - 5.9 cm or 14.5% (P≥0.999), 4- group - 6.2 cm or 15.2% (P≥0.999). Lambs obtained from ewes of the 4th experimental group had an advantage over lambs the probability of difference with the corresponding indicator of the control group obtained from ewes of the control group, by an oblique body length of 5.2 cm or 13.5% (P≥0.99).

The width in the buttocks was dominated by lambs of the 2nd and 3rd experimental groups of their peers, obtained from ewes of the control group, respectively, 1.1 cm or 21.1% (P≥0.999) and 1.8 cm or 34, 6% (P≥0.999). Head width in lambs obtained from ewes of the control group by 0.9 cm or 14.5% (P≥0.99).Therefore, the use of a biological additive of chlorella microalgae suspension in the diet of ewes promotes more intensive growth of lambs obtained from them.
The growth rate of newborn lambs depends on the presence of milk in the mother, as up to 20 days of age they can not digest food other than milk. Therefore, their live weight, growth rate and viability depend on the quantity and quality of breast milk. The more ewes produce highly nutritious milk, the more it will receive lamb, which contributes to better physiological condition and supply of nutrients, vitamins, trace elements and other biologically active substances of the growing body of lambs, which accelerates the intensity of their growth.

Dairy productivity of ewes when feeding a suspension of chlorella microalgae in the first 20 days of lactation is shown in Table 6.

The obtained data show that the ewes of the experimental groups, which received a suspension of chlorella microalgae in the diet, had higher milk productivity. With its increase in the diet of lactating ewes, they increased the quantitative production of milk. The largest amount of milk per head had ewes of the 4th experimental group, which is 4.4 times more than the ewes of the control group. Ewes from other experimental groups also had higher milk productivity compared to peers in the control group. The advantage in milk productivity of ewes of experimental groups over control was, respectively: 1st group - 12.3 kg or 2.6 times, 2nd group - 16.1 kg or 3.1 times, 3rd group - 17, 6 kg or 3.3 times, the 4th group - 26.3 kg or 4.4 times. Milk contains all the nutrients necessary for the growth of a young body in a concentrated and easily digestible form. Its value is that it contains a large amount of protein, has a high caloric content of milk fat, a large number of fat-soluble vitamins, high easy digestibility of carbohydrates, the presence of minerals, especially calcium.

The composition of milk depends on many factors, including such as environmental conditions, including feeding and keeping. The composition of ewes' milk when feeding a suspension of chlorella microalgae has some differences (Table 7).

According to the content of the studied components of the milk of experimental ewes, it meets the requirements for the milk of gypsy sheep. However, in some respects it had some differences. Thus, the milk of ewes of the control group, which did not receive a suspension of chlorella microalgae, had a lower fat content compared to the milk of ewes of the experimental groups. Therefore, the suspension of chlorella microalgae contributed to the increase in fat content of ewes' milk by the following number of fat units: 1st experimental group - by 0.9 or 16.9% (P 20.95), 2nd experimental group - by 1.12 or by 21% ($P \leq 0.95$), the 3rd experimental group - by 1.55 or 29.1% ($P \leq 0.95$), the 4th experimental group - by 2.09 or 39.3 % ($P \geq 0.95$).

The protein content in the milk of ewes of the 1st and 2nd experimental groups is lower than in the control group, respectively, by 0.22% or 6.6% relative ($P \geq 0.99$) and 0.1% or 3, 0% relative ($P \geq 0.99$). In the milk of ewes of the 4th experimental group there was more protein by 0.13% or 3.9% relative ($P \geq 0.99$).

According to the content of lactose and dry skimmed milk residue (SPM) in milk, their content in the milk of ewes of the 1st experimental group was lower by 0.34% or 6.4% relative ($P \geq 0.95$) and by 0.6% or 6.6% relative ($P \geq 0.95$, respectively). In the milk of ewes of 2-4 experimental groups, the content of these components of milk tended to increase gradually. The milk of ewes of the 4th experimental group contained more lactose compared to the milk of ewes of the control group by 0.19% or 3.6% relative ($P \leq 0.95$). This variability in the milk content of ewes is due to their adaptation to the feeding of chlorella microalgae suspension in the diet. The reaction of animals of the 1st experimental group to this impurity indicates a decrease in the content of nutrients in milk, except fat, due to insufficient impurities in the diet and insufficient time to adapt to it.

With increasing dose of impurities in the diet of lactating ewes 2-4 experimental groups increased the content of nutrients in milk. The highest indicators for all studied components of milk were animals of the 4th experimental group, which received 450 ml of suspension of microalgae chlorella per head per day or 9 ml per 1 kg of live weight.

An important indicator of the physiological state of the animal's body are the indicators of blood, which when fed in different amounts of suspension of chlorella microalgae had some differences (Table 8).

The morphological composition of the blood of ewes of the experimental groups had some differences compared with the ewes of the control group. Thus, the content of erythrocytes in the blood of ewes of the control and 4th experimental groups was within normal limits, and ewes of 1-3rd experimental groups had a smaller number of erythrocytes compared to ewes of the control group and less than the lower limit of normal. The blood of ewes of the experimental groups had fewer erythrocytes compared to ewes of the control group, respectively: 1st experimental group by 4.04.1012 / l or 56.0% ($P \geq 0.999$), 2nd experimental group - by 3.94.10 12 / l or by 54.6% ($P \geq 0.999$), the 3rd experimental group - by 3.98.1012 / l ($P \geq 0.999$).

The ewes of the control and all experimental groups had a hemoglobin content within the physiological norm, which ranged from 92.4 g/l in ewes of the 1st experimental group to

Table 8. Morphological parameters of ewes' blood after administration of the suspensionchlorella microalgae, X ± Sx, (n = 10)

Group	Erythrocytes, 1012 / l	Hemoglobin, g / l	Leukocytes, 109 / l
Norm	7,0 – 12,0	70 – 110	6,0 – 14,0
Control	7,22±0,270***	96,8±3,040	18,00±2,650**
1-experimental	3,18±0,105	92,4±1,435	7,14±0,385
2-experimental	53,28±0,215***	96,0±0,565	7,22±0,500
3-experimental	53,24±0,200***	101,2±5,275	7,88±0,970
4-experimental	7,75±0,420	103,8±3,395	18,12±5,950

*Note: ** - P≥0.99; *** - P≥0,999 (probability of difference with the corresponding indicator of the control group)*

Table 9. Biochemical parameters of ewes' blood after consumption of chlorella microalgae suspension, (X ± Sx, n = 5)

Indicators	**Norm**	**Norm Group of ewes**				
		Control	**1-experimental**	**2-experimental**	**3-experimental**	**4-experimental**
ALT, od / l	15-78	87,40±9,700	92,00±8,450	112,20±5,570	88,20±7,600	123,40±11,850
AST, od / l	49-123	14,20±0,750	17,8±3,860	14,20±1,550	13,00±0,600	16,40±1,822
Total protein, g / l	59-78	63,80±2,800	65,40±2,550	61,80±1,772	62,40±0,750	61,20±2,300
Albumin, g / l	27-37	31,40±0,950	34,80±2,050	33,80±2,200	32,80±0,365	32,10±4,000
Globulin, g / l	32-50	32,40±2,900	30,60±3,050	28,00±0,900	29,62±2,100	29,20±5,850
Potassium, mmol / l	4,3-6,3	4,60±0,105	5,10±0,150	4,70±0,225	4,62±0,205	5,03±0,130
Sodium, mmol / l	142-160	138,60±0,600	140,20±0,530	138,90±1,390	138,20±0,625	139,70±0,705
Calcium, mmld / l	2,3-2,9	2,21±0,150	2,50±0,060	2,51±0,070	2,46±0,040	2,23±0,120
Magnesium, mmol / l	0,8-1,1	1,05±0,040	1,36±0,165	1,20±0,080	1,48±0,060	139,70±0,705
Phosphorus, mmol / l	1,3-2,4	1,13±0,200	1,30±0,115	0,94±0,110	1,11±0,150	1,44±0,190

103.8 g/l in ewes of the 4th experimental group. But there was some group difference. Thus, the highest content of hemoglobin had ewes of the 4th experimental group. According to this indicator, they predominated ewes of the control group by 7.0 g / l or 7.2%, the 1st experimental group - by 11.4 g / l or 12.3% (P≥0.95), 2nd experimental group - by 7.8 g / l or 8.1% (P≤0.95), the 3rd experimental group - by 2.6 g / l or 2.5% (P≤0, 95).

And since hemoglobin carries oxygen in the body of animals, its increased content indicates the growth of redox processes, which encourages increased metabolism, growth energy and such vital processes as appetite, natural resistance, milk production and others.

The content of leukocytes in the blood of ewes of the 1st-3rd experimental groups was within normal limits and ranged from 7.14.109 /l in ewes of the 1st experimental group to 7.88 9 / l in ewes of the 3rd experimental group. In the blood of ewes of the control and 4th experimental groups

Table 10. Leukocyte formula of ewes after suspension chlorella microalgae, (X ± Sx), (n = 5)

Indicators	**Norm**	**Norm Group of ewes**				
		Control	**1-experimental**	**2-experimental**	**3-experimental**	**4-experimental**
Neutrophils:	3-6	1,00±0,555	2,60±0,500	3,6±0,240**	2,80±0,485*	2,20±0,730
Stick core,%	35-45	48,00±5,800	31,60±2,000*	36,80±3,595	44,00±1,920	50,20±9,550
Segmental,%	4-12	2,80±0,600	2,60±1,205	5,60±1,600	3,00±0,445	3,80±0,370
Eosinophils,%	2-5	3,40±1,650	3,20±0,580	4,60±1,210	4,20±1,315	6,80±2,285
Monocytes,%	40-50	44,4±6,500	60,60±3,735	49,40±4,665	46,00±2,500	39,40±5,500
Lymphocytes,%	0-10	1,0	1,60±0,240	2,0	2,0	1,0
ESR, mm / year	70-500	236,20±18,600	312,60±8,555	312,20±13,055	335,40±4,725	301,40±15,080

*Note: * - P≥0.95; ** - P≥0.99; the difference in probability with the recovery of the control group*

there was more than the norm of leukocytes by 4.0.10 9 / l or 28.5% and 4.12.109 l or 29.4%, respectively (P≤0.95).

Since the deviations in the number of uniform elements in the blood of experimental ewes did not fluctuate sharply and were within the physiological norm, and their difference between the groups had no statistically significant difference, except for comparison with ewes of the control and 4th experimental groups, it is possible to state the normal state and the course of physiological processes without any deviations from the norm and milk production.

The leukocyte formula of ewes in the control and experimental groups did not have significant deviations both from the norm and between groups (Table 9). The most significant difference was observed in the number of rod-shaped neutrophils in ewes of the control group, which is 2.0% less than the lower limit of normal. In terms of the number of rod-shaped neutrophils, ewes of the 2nd experimental group were dominated by ewes of the control group by 2.6% (P≥0.99), and ewes of the 3rd experimental group - by 1.8% (P≥0.95). In terms of the number of segmental neutrophils, ewes of the 1st-3rd experimental groups were inferior to ewes of the control group from 4.0 to 16.4%. However, the difference was statistically significant only in ewes of the 1st experimental group, which amounted to 16.4% (P≥0.95). Ewes of the control and experimental groups had some fluctuations in the biochemical composition of the blood (Table 10). Thus, analyzing the enzymatic composition of ewes' blood at the end of feeding chlorella microalgae suspension, it should be noted that the activity of ALT and AST increases with increasing milk productivity, which is associated with the amount of feeding chlorella microalgae suspension per 1 kg of body weight. The activity of these enzymes depends on the age, breed and housing conditions of the animals. ALT activity increases by 0.8-36.0 mmol / l or from 0.9 to 41.2%.

AST activity was wavy in nature. In ewes of the 1st experimental group its activity was the highest and amounted to 17.8 ± 3.860 IU / l, which is 3.6 IU / l more than in ewes of the control group, but this excess was improbable. With an increase in the amount of chlorella microalgae suspension in the diet of lactating ewes, the activity of AST decreased in animals of the 2nd and 3rd experimental groups by 3.6 units / l or 20.2% and 4.8 units / l or 27%, respectively but also not likely.

In the ewes of the 4th experimental group, the activity of AST increased compared with the ewes of the control group by 2.2 units / l or 15.5%, but was less than in the ewes of the 1st experimental group by 1.4 units / l or by 7.9% (P ≤ 0.95).

The amount of total protein, albumin and globulins in the blood of ewes of the control and experimental groups varied slightly depending on the amount of introduction into the diet of a suspension of chlorella microalgae. Higher content of total protein had ewes of the 1st experimental group with the least amount of suspension of microalgae in the diet and was 65.40 ± 2.550 g / l, which is higher compared to ewes of the control group by 1.6 g / ll or 2.5%. With an increase in the amount of chlorella microalgae suspension in the diet of experimental groups of ewes, no significant changes in the amount of total protein were found. The amount of albumin in ewes of the experimental groups was within normal limits, but the ewes of the 1st experimental group compared to the ewes of other experimental groups had a greater amount, respectively: 2nd group - 1.0 g / l or 2.9%, 3 Group 4 - by 2.0 g / l or 6.1%, Group 4 - by 2.7 g / l or 8.4%.

The content of globulin in the blood of ewes of experimental groups also decreased with increasing amount in the diet of suckling ewes suspension of chlorella microalgae from 30.6 g / l in ewes of the 1st experimental group to 29.20 g / l in ewes of the 4th experimental group.

Metabolic and energy stress affects the functional state of animals, especially lactating. The obtained data confirm that higher milk productivity of ewes is accompanied by higher activity of blood enzymes. Ewes of the 4th experimental group had the highest indicators of ALT and rather high indicators of protein metabolism and the highest milk productivity. Thus, the intensity of metabolism in lactating ewes is closely related to milk productivity, which is facilitated by the introduction into the diet of a suspension of chlorella microalgae.

CONCLUSIONS

1. Suspension of chlorella microalgae increases the intensity of metabolism in the body of lactating ewes, which contributes to greater milk production and growth rate of lambs.

2. Feeding lactating ewes suspension of microalgae chlorella in the first 20 days of lactation at the rate of 3; 5; 7; 9 ml per 1 kg of live weight increases the live weight of the offspring compared to the control group, respectively: 1st and 2nd experimental groups - by 58.8%, 3rd experimental group - by 66.3%, 4th experimental group - by 96.9% ($P \geq 0.999$).

3. Compared milk productivity, ewes which are fed with suspension of chlorella microalgae outperformed ewes that did not receive this supplement, from 12.3 to 26.3 kg or in 2.6 to 4.4 times ($P \geq 0.999$).

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