Scientific Papers. Series D. Animal Science. Vol. LXV, No. 1, 2022
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN Online 2393-2260; ISSN-L 2285-5750

THE INFLUENCE OF HYPODYNAMICS ON SOME PARTICULARITIES INTERIOR OF SHEEP KARAKUL

Ion BUZU

Institute of Zoology of Academy of Sciences of Moldova (ASM),
1 Academiei Street, MD 2028, Chișinău, Republic of Moldova

Corresponding author email: ionbuzua@gmail.com

Abstract

The aim of this research was to identify the impact of hypodynamics on the particularities of the interior of Karakul sheep, raised in different conditions of maintenance. The research was conducted on three similar batches of Karakul sheep, 150 heads in each batch. They were raised in different conditions, from the age of 3 months to 32 months. During the winter (December-March), the sheep from all batches were traditionally kept in stables in paddocks and fed with a mixture of chopped fodder, according to the zootechnical norms. During the summer (April-November), the sheep from Batch I (control) were kept grazing with daily movement at a distance of up to 10-15 km. The experimental Batch II sheep were maintained in the summer at the stable with daily active walking at a distance of 2-3 km. The sheep from Batch III were maintained throughout the experiment, at the stable under hypodynamic conditions. Sheep from batches II and III during the summer were fed green mangers, according to the zootechnical norms. It was found that in sheep in Batches III and II, the degree of oxygen saturation of arterial blood was significantly lower, compared to that of sheep in Batch I, by 7.4 and 2.8% (t_d = 5, 81 and 2.89; P <0.001 and P <0.01). At the same time, in sheep in Batches III and II, the degree of oxygen saturation of venous blood was significantly higher, compared to that of sheep in control Batch I, with 64.6 and 29.2% (t_d = 5.52 and 2.35; P <0.001 and P <0.05). In Batches III and II sheep, the level of oxygen utilization by body tissues was significantly lower compared to that of Batch I sheep, respectively by 40.1 and 17.4% (t_d = 7.43 and 3.06; P <0.001 and P <0.01). Sheep in Batch III significantly outnumbered their contemporaries in Batch I by 1.04 kg or 41.1% (t_d = 9.15; P <0.001) of gross internal fat deposited in the body after slaughter, by 1.80 kg or 7.5% (t_d = 2.61; P <0.05), after cutting yield, by 3.17 or 6.6% (t_d = 2.82; P <0.05) and after mass of the omasum, with 28 g or 29.2% (t_d = 5.65; P <0.01). At the same time, the sheep from Batches II and III, yielded significantly to the contemporaries from Batch I, after the development of internal organs, such as: liver, heart, lungs, kidneys, stomach, rumen, abomination and small intestine, by 14.4-37.9% (P <0.05 - 0.01). In the Batch III sheep, there was an obvious tendency to decrease, compared to the control Batch, the quality of the furskins, expressed by the weight of the furskins of Sort I, by 12.9% (t_d = 1.88; P <0.1).

Key words*: blood, furskin Karakul, hypodynamics, internal organs, oxygen, sheep.*

INTRODUCTION

In the Republic of Moldova, sheep of all races, including the Karakul race, are traditionally maintained in the winter (December - March) - in the stable, and in the summer (April - November) - in the pasture.

At the same time, in connection with the intensification of agriculture, the widening of arable land and the reduction of natural pastures, some farm managers are addressing the problem of maintenance sheep in paddy fields and feeding them in mangers with mixtures of shredded fodder - summer.

Stable sheep maintenance system is well known in developed countries for the intensive rearing of young sheep for fattening the meat.

Thus, according to information from France (Le Hen, 1983), an analysis was made of 500 households in which four systems of maintenance and rearing of young sheep were practiced: 1 - grazing; 2 - grazing with the mothers and final fattening at the stable; 3 - increase in stabling during lactation and subsequent fattening during grazing; 4 - at the stable. It was found that the highest production yield was obtained by the rational combination of maintenance of the sheep during the period of lactation at the stable with that of grazing at fattening.

Weis Kassel (1983), in the FRG, performed experiments on two batches of sheep maintenance on meadows grown in plots (with additional feeding of concentrates) and in the stable. For weaning, 123 and 137 lambs were

raised for every 100 sheeps. The cost of feed for the production of 1 kg of meat amounted to 1.94 and 1.77 marks, respectively.

Such experiences of raising young sheep in various conditions of maintenance both year-round at the stable and mixed - during the winter at the stable, and in the summer at grazing, were also carried out by Ожигов et al (1982), Алексиев (1982), Конурбаев (1982). They concluded that sheep raised both year-round and mixed (stable in winter and grazing in summer), with good nutrition, achieve a fairly good development, without essential differences in productive performance and development of internal organs.

At the same time, information on special experiences of maintenance of Karakul sheep all year round in stable conditions for a long period of several years is not known in the profile literature. However, taking into account the fact that classical researchers in the Karakul race (Иванов, 1964; Кошевой, 1975; Дъячков, 1980; Аверьянов et al, 1968; Taftă et al, 1997) states that the conditions of maintenance and nutrition can influence the quality of the furskins obtained from newborn lambs, then the issue addressed requires further study.

We believe that one of the main factors that can influence the organism of sheep in stable conditions is hypodynamics, expressed by limiting physical movement in the paddock. We assume that the presence of sheep in the conditions of hypodynamics at the stable can have an impact on physiological processes, the development of internal tissues and organs. So, it is about some changes or adaptations of the inner particularities, of the organism metabolism, such as the catabolic and anabolic processes.

Some researchers (Onmaz et al., 2009; Celi, 2010; Varghese et al., 2017; Izer et al., 2020) state that the catabolic and anabolic processes of metabolism in the organism can be monitored by the level of saturation with oxygen from the arterial blood compared to the venous one.

Genes (2021) states that lack of exercise (hypodynamics) causes a lack of sufficient oxygen in the blood, which can be transported to the cells of tissues and organs, which leads to decreased immunity of the organism and decreased resistance to various weather conditions.

Jordán M.J. (2020) considers that sheep grazing improves their enzymatic antioxidant defense during the stressful period of lamb weaning and also the antioxidant status of sheep plasma in both physiological stages: lactation and after weaning the lamb.

According to Hohimer et al (1984), the oxygen content in the arterial blood in goats, after running in a special trainer, increases, compared to the state of rest, by 12.8 - 14.6%. At the same time, there is a certain increase in the hemoglobin content in the blood from 9.7 to 10.7%.

In the research of Lotgering et al. (1983), it found that, after physical load (running), oxygen consumption in sheep increased from 5.8 to 32.1 ml/min/kg, while increasing the value of the difference in oxygen content in the arterial blood and venous from 3.9 to 8.0 ml/L, and the oxygen content in the venous blood suddenly decreased from 70 to 26%.

Фазульзянов (1979), in repeated experiments, showed that the long-term stabilization of fine wool sheep leads to their overweight fattening and impaired reproductive rates.

Considering that special research on the long-term growth of Karakul sheep in hypodynamic (in stable) conditions for several years is missing in the profile literature, it is particularly relevant to elucidate the influence of this maintenance system on the organism of sheep.

In this context, the aim of this scientific paper was to identify the impact of hypodynamics on the particularities of the interior of Karakul sheep, raised in different conditions of maintenance.

MATERIALS AND METHODS

The research was conducted on three similar batches of Karakul sheep, 150 heads in each batch. They were raised in different conditions, from the age of 3 months to 32 months.

During the winter (December - March), sheep from all batches were traditionally maintenance in stables in paddocks and fed with a mixture of shredded fodder (hay, hay, silage, straw) and 0.3 kg of granulated concentrate (whole grain plant), distributed in mangers, according to the zootechnical norms.

During the summer (April-November), the sheep from Batch I, which served as a witness,

were maintenance grazing with daily commute (round trip) at a distance of up to 10-15 km.
The experimental Batch II sheep were maintenance in the summer at the stable with daily active walking (active walking) at a distance of 2-3 km.
The sheep from Batch III, during the whole period of the experiment, were maintained and permanently raised at the paddock in conditions of hypodynamics.
Sheep from batches II and III during the summer were fed on mangers with green mass of mown fodder plants (mixture of grasses and legumes, peas + oats, ryegrass, alfalfa, asparagus, etc.), according to the zootechnical norms.
In order to elucidate the particularities of the development of the interior in sheep, the following were researched:
* the degree of oxygen saturation of arterial and venous blood, as well as the level of oxygen utilization by organism tissues;
* the degree of development of some internal organs of the sheep;
* the quality of Karakul furskins obtained from newborn lambs.
The degree of oxygen saturation of the blood was determined by the cuvette method on the combined Oxyhemometer model 057. To determine the level of oxygen consumption by the organism tissues, at the age of 32 months, arterial blood samples were taken and venous from 20 representative sheep from each of the 3 experimental batches.
Arterial blood samples were taken in a syringe coupled with a rubber hose with a puncture needle from the abdominal aorta, by inserting it into the last intervertebra to the lower level of the spinal cord, at an angle of 45°, according to the method of Воронин (2015).
Venous blood samples were taken from the jugular vein by the traditional method. The collected blood was immediately placed under vaseline oil to prevent it from coming into contact with atmospheric oxygen.
Prior to the determination of oxygen saturation, the blood under the oil was previously diluted 1 to 1 in a special solution of 0.3 g of sodium salicylate ($C_7H_5O_3Na$) and 2.0 g of sodium chloride (NaCl) to 100 ml of distilled water. The blood sample was placed in the cuvette and placed in the device. The device's oxygen saturation read on the screen. The difference between the degrees of oxygen saturation of arterial and venous blood was the level of oxygen utilization by the organism tissues.
In order to research the development of the internal organs and the particularities of the deposition of the raw internal fat, at the age of 32 months, the control slaughter of 3 representative sheep from each of the three experimental batches was performed. In slaughtered sheep were studied: carcass mass, raw internal fat, slaughter yield, mass of internal organs (liver, heart, lungs, kidneys, stomach, rumen, omasum, abomasum and small intestine).
The qualities of the furskins were assessed according to the methods of the Union Institute for Scientific Research for Karakulture (Дъячков et al., 1963), as well as according to the provisions of ГОСТ (1984) in force for purrace Karakul furskins.
The data obtained as a result of the research were statistically processed with the help of the computer software "STATISTICS - 12" and their certainty was assessed, according to the biometric variational statistics, according to the methods of Плохинский (1989).

RESULTS AND DISCUSSIONS

It is known that the main function of the respiratory system is to remove carbon dioxide (CO_2) from the systemic venous blood that reaches the lungs and to add oxygen (O_2) to the arterial blood. Gaseous exchange in the respiratory system refers to the diffusion of oxygen and carbon dioxide into the lungs and peripheral tissues. Thus, in the arterial and venous blood is found oxygen and carbon dioxide, the amount of which varies depending on the physiological state of the animal (Chiuțu, 2012).
Раушенбах (1976) shows that the general level of oxidative processes in the organism depends on the percentage of oxygen utilization in the inspired air. In this way, the animals have a certain reaction to adapt to changing environmental conditions.
The results of our research have shown that sheep maintenance conditions have significantly influenced the physiological processes of metabolism in the organism, in particular, the function of blood respiration, confirmed by the variability in the degree of oxygen saturation of

arterial and venous blood, and the level of use of oxygen by the tissues of the organism (Table 1).

Table 1. Degree of oxygen saturation of arterial and venous blood in experimental sheep

Batch	N	M ± m, %	The difference compared to Batch I		t_d
			d	%	
Arterial blood					
Batch I	20	97.02 ± 0.44	-	-	-
Batch II	20	94.30 ± 0.83	-2.72	2.8	2.89**
Batch III	20	89.87 ± 1.15	-7.15	7.4	5.81***
Venous blood					
Batch I	20	30.35 ± 3.14	-	-	-
Batch II	20	39.22 ± 2.09	+8.87	29.2	2.35*
Batch III	20	49.95 ± 1.66	+19.60	64.6	5.52***
Arterio-venous difference					
Batch I	20	66.67 ± 3.16	-	-	-
Batch II	20	55.07 ± 2.08	-11.60	17.4	3.06**
Batch III	20	39.92 ± 1.72	-26.75	40.1	7.43***

*Remark: * P < 0,05; ** P < 0,01; *** P < 0,001.*

It was found that the degree of oxygen saturation of the arterial blood varied on average from 89.87% in sheep in Batch III to 97.02% in sheep in Batch I. The arterial blood of the sheep from Batch I, which were traditionally maintained during the summer (April-November) when grazing at a distance of 10-15 km, was more saturated with oxygen, compared to the blood of sheep from batches II and III, which were maintained during this period at the stable, respectively, with 2.72 and 7.15 units or 2.8 and 7.4% (t_d = 2.89 and 5.81; P <0.01 and P <0.001).
The level of residual oxygen in venous blood varied on average from 30.35% in Batch I sheep to 49.95% in Batch III sheep. It was found that the level of residual oxygen in the venous blood of the sheep in Batch I, which were traditionally maintained during the summer grazing at an essential distance, was, on the contrary, lower compared to the blood of the sheep in the batches II and III, which were maintained during this period at the stable, respectively, with 8.87 and 19.6 units or 29.2 and 64.6% (t_d = 2.35 and 5.52; P <0.05 and P <0.001).
The arterio-venous difference in the degree of oxygen saturation of the blood varied on average from 39.92% in sheep in Batch III, to 66.67% in sheep in Batch I.
Judging by the arterio-venous difference in blood saturation with oxygen, it was found that the level of oxygen utilization by the organism tissues in Batch I sheep, which were traditionally maintained, during the summer grazed at an essential distance, was higher than that of the sheep in batches II and III, which were maintained during this period at the stable, respectively, by 11.60 and 26.75 units or 17.4 and 40.1% (t_d = 3.06 and 7.43; P <0.01 and P <0.001).
The results obtained by us regarding the degree of oxygen saturation of arterial and venous blood, as well as the level of oxygen utilization by the organism tissues, are consistent with the conclusions drawn by Сидоров (1975), Раушенбах (1976), Lotgering et al. (1983), Hohimer et al. (1984).
These data allow us to consider that, as a result of active walks, the organism of sheep maintained for grazing adapts to certain conditions of physical activity and produces a significant increase in oxygen consumption. The degree of dissociation of oxygen and its diffusion into tissue cells occurs at a faster rate. Oxygen is used more intensively for metabolic processes. Therefore, the catabolic processes of metabolism prevail in the organism of these sheep.
At the same time, the conditions of hypodynamics, in which the sheep from batches II and III were maintained, caused a decrease in the oxygen saturation of the arterial blood and the rate of its use by the organism tissues. The degree of dissociation of oxygen and its diffusion into tissue cells occurs at a slower rate. Anabolic processes of metabolism prevail in the organism of sheep maintained in stable conditions under hypodynamics.
Some researchers also tell us about the influence of sheep maintenance systems on some interior features.
According to Яшунин et al. (1980), sheep increased in stable conditions, exceeded their contemporaries increased in grazing, by carcass mass by 37.8-44.4%, lean meat mass by 52.7 - 61.6% and slaughter yield by 6.2-8.6%.
In the experiments of Султанов (1979), young ewes bred at stable had advantages, compared to those bred at grazing, at the index of carcass mass, by 43.0 - 81.4%, at the cutting yield, by 4.8-12.2% and the yield of lean meat, with 3.2-7.9%.
Our data, obtained as a result of the control slaughter of the representative sheep from the researched batches, showed that the conditions of physical activity at grazing and

hypodynamics at stables had a different influence on the development of their internal tissues and organs (Table 2).

Table 2. Level of slaughterhouse and development indices of internal organs of sheep of 32 months

Batches	N	M ± m	The difference compared to Batch I		t_d
			d	%	
Housing mass, kg					
Batch I	3	21.60 ± 0.49	-	-	-
Batch II	3	22.23 ± 0.23	+0.63	2.9	1.16
Batch III	3	22.37 ± 0.38	+0.77	3.6	1.24
Raw internal fat, kg					
Batch I	3	2.53 ± 0.10	-	-	-
Batch II	3	3.33 ± 0.57	+0.80	31.6	1.39
Batch III	3	3.57 ± 0.04	+1.04	41.1	9.15***
Cutting mass, kg					
Batch I	3	24.13 ± 0.57	-	-	-
Batch II	3	25.57 ± 0.76	+1.44	6.0	1.51
Batch III	3	25.93 ± 0.39	+1.80	7.5	2.61*
Cutting yield, %					
Batch I	3	48.23 ± 1.05	-	-	-
Batch II	3	50.83 ± 1.31	+2.60	5.4	1.55
Batch III	3	51.40 ± 0.40	+3.17	6.6	2.82*
Liver, g					
Batch I	3	724 ± 25	-	-	-
Batch II	3	539 ± 10	-185	25.6	6.83**
Batch III	3	594 ± 19	-130	18.0	4.11**
Heart, g					
Batch I	3	160 ± 5.4	-	-	-
Batch II	3	134 ± 1.7	-26	16.3	4.67**
Batch III	3	137 ± 5.4	-23	14.4	3.01*
Lungs, g					
Batch I	3	629 ± 30	-	-	-
Batch II	3	514 ± 21	-115	18.3	3.10*
Batch III	3	488 ± 36	-141	22.4	2.98*
Kidneys, g					
Batch I	3	117.6 ± 3.3	-	-	-
Batch II	3	93.3 ± 7.4	-24.3	20.7	2.99*
Batch III	3	98.6 ± 2.6	-19.0	16.2	4.45**
Stomach, kg					
Batch I	3	1.49 ± 0.02	-	-	-
Batch II	3	1.18 ± 0.05	-0.31	20.8	5.52**
Batch III	3	1.25 ± 0.03	-0.24	16.1	6.15**
Rumen g					
Batch I	3	983 ± 24	-	-	-
Batch II	3	752 ± 51	-231	23.5	4.08*
Batch III	3	785 ± 18	-198	20.1	6.60**
Omasum, g					
Batch I	3	96 ± 3	-	-	-
Batch II	3	115 ± 4	+19	19.8	3.89*
Batch III	3	124 ± 4	+28	29.2	5.65**
Abomasum, g					
Batch I	3	244 ± 27	-	-	-
Batch II	3	183 ± 18	-61	25.0	1.83
Batch III	3	196 ± 18	-48	19.7	1.47
Small intestine, kg					
Batch I	3	1.03 ± 0.13	-	-	-
Batch II	3	0.65 ± 0.04	-0.38	36.9	2.70*
Batch III	3	0.64 ± 0.03	-0.39	37.9	2.86*

It has been found that the maintenance of sheep in Batch III in the stable under hypodynamic conditions, without active exercise for a long period (from birth to 32 months), leads to excessive development of tissues, slaughter indices and parts of the stomach, and, at the same time, to the decrease of the level of development of some internal organs.

Thus, the sheep in Batch III, which were permanently maintenance in the stable under hypodynamic conditions, significantly outperformed their contemporaries in Batch I (control), which were maintenance in the winter during the stable and during the summer - during grazing. after the amount of crude internal fat by 1.04 kg or 41.1% (t_d = 9.15; P <0.001), after cutting mass by 1.80 kg or 7.5% (t_d = 2.61; P <0.05), after cutting yield, by 3.17 or 6.6% (t_d = 2.82; P <0.05) and mass of omasum, by 28 g or 29.2% (t_d = 5.65; P <0.01).

In the Batch II sheep, which were maintenance for the whole period also in the stable, especially since, in the summer, they had an active daily walk at a distance of 2-3 km without grazing, only a trend was observed. weaker than the contemporaries in Batch I, according to the amount of raw internal fat, mass and yield at cutting.

Sheep from the experimental Batch II significantly exceeded their contemporaries from the control Batch I after the omasum meal, by 19g or 19.8% (t_d = 3.89; P <0.05).

At the same time, the sheep from groups II and III, which were maintenance in the stable under hypodynamic conditions, yielded significantly to the contemporaries from the control group, which were kept during the summer grazing, after the development of the liver, respectively, with 185 g and 130 g or 25 g, 6 and 18.0% (t_d = 6.83 and 4.11; P <0.01), after heart development, with 26 and 23 g or 16.3 and 14.4% (t_d = 4.67 and 3.01; P <0.01 and P <0.05), after lung development, with 115 and 141 g or 18.3 and 22.4% (t_d = 3, 10 and 2.98; P <0.05), after kidney development, with 24.3 and 19.0 g or 20.7 and 16.2% (t_d = 2.99 and 4.45; P <0.05 and P <0.01), after stomach development, with 0.31 and 0.24 kg or 20.8 and 16.1% (t_d = 5.52 and 6.15; P <0.01), after development rumen, with 231 and 198 g or 23.5 and 20.1% (t_d = 4.08 and 6.60; P <0.05 and P <0.01) and small intestine, with 0.38 and 0.39 kg or 36.9 and

37.9%, also having a lower tendency to develop abomasum.

In the context of the above findings, it is particularly important for the Karakul race to elucidate the impact of the maintenance system in the conditions of hypodynamics on the furskin qualities of newborn lambs.

The results of the research showed that the essential differences between the furskin qualities of the lambs of the newborn lambs of the sheep in the control batch, maintenance during the summer grazing and the lambs born of the sheep of the Batch II, maintenance during the summer period in the stable with walking active, practically, does not to ascertain (Table 3).

Table 3. Furskin qualities obtained from lambs newborns in the experimental batches

Batches	N	M ± m	The difference compared to Batch I		t_d
			d	%	
Furskin share of Sort I, %					
Batch I	80	88.7 ± 3.6	-	-	-
Batch II	76	85.5 ± 4.1	-3.2	3.6	0.59
Batch III	75	77.3 ± 4.9	-11.4	12.9	1.88
Furskin share valuable jacket group, %					
Batch I	80	62.5 ± 5.4	-	-	-
Batch II	76	61.8 ± 5.6	-0.7	1.1	0.09
Batch III	75	52.0 ± 5.8	-10.5	16.8	1.25
Furskin share of Sort II, %					
Batch I	80	11.3 ± 3.6	-	-	-
Batch II	76	10.5 ± 3.5	-0.8	7.1	0.16
Batch III	75	16.0 ± 4.3	+4.7	41.6	0.84

At the same time, there was an obvious trend of decreasing the share of Sort I furskins in the furskins of newborn lambs from ewes in Batch III, which were permanently maintained at the stable until the age of 32 months, compared to the furskins of new-born lambs from ewes of the control batch, which were maintained during the summer grazing, with 12.9% (t_d = 1.88; P < 0.1). There is also a weaker trend of decreasing the share of valuable furskins in the Jacket Group and increasing the share of less valuable furskins from Sort II, obtained from the lambs from Batch III, whose mothers were permanently maintained at the stable.

Generalizing the results of the research, we can conclude that the more intensive use of oxygen by the tissues of the organism of sheep maintenance grazing results in a higher level of catabolic processes, which contributed to the greater development of internal organs and, at the same time, decreased deposition in the organism of raw internal fat. At the same time, the hypodynamics in the conditions of sheep maintenance at the stable, leads to a decrease in the level of oxygen utilization by the organism tissues, to the weaker development of some internal organs and, at the same time, to the accentuation of the process of deposition of raw internal fat.

Therefore, the maintenance conditions of the sheep (at the stable or grazing) cause a clear influence on the interior of the organism as a whole, including certain organs and tissues in particular.

CONCLUSIONS

The degree of oxygen saturation of the arterial blood in Batch III sheep, permanently maintained at the stable under hypodynamic conditions, as well as in Batch II sheep, maintained at the stable with daily active walking during the summer, was significantly lower compared with that of the control sheep in the first batch, maintained during the summer grazing period, by 7.4 and 2.8%, respectively (t_d = 5.81 and 2.89; P <0.001 and P <0.01).

At the same time, the degree of oxygen saturation of the venous blood in the sheep in Batch III, permanently maintained at the stable in hypodynamic conditions, as well as in the sheep in Batch II, maintained in the stable with daily active walking during the summer, on the contrary, was significant. higher compared to the control sheep in the first batch, maintained during the summer grazing, respectively, by 64.6 and 29.2% (t_d = 5.52 and 2.35; P <0.001 and P <0.05).

The level of oxygen utilization by the tissues of the organism, defined by the arterio-venous difference in the degree of oxygen saturation of the blood in Batch III sheep, permanently maintained at the stable under hypodynamic conditions, as well as in the Batch II sheep, maintained at the stable with daily active walking during the summer, was significantly lower than that of the sheep in the control Batch I, maintained during the summer grazing, respectively, by 40.1 and 17.4% (t_d = 7.43 and 3.06; P <0.001 and P <0.01).

Sheep in Batch III, which were permanently maintained at the stable under hypodynamic

conditions, significantly outperformed their contemporaries in Batch I (control), which were maintained during the summer grazing, according to the amount of crude internal fat, by 1.04 kg or 41.1% (t_d = 9.15; P <0.001), after cutting mass, by 1.80 kg or 7.5% (t_d = 2.61; P <0.05), after yield at cut, by 3.17 or 6.6% (t_d = 2.82; P <0.05) and omasum mass, by 28 g or 29.2% (t_d = 5.65; P <0.01).

At the same time, the sheep from batches II and III, which were kept in the stable under hypodynamic conditions, yielded significantly to the contemporaries from the control group, which were maintained during the summer grazing, after the development of a series of internal organs, such as: liver, heart, lungs, kidneys, stomach, rumen, abomasum and small intestine, with 14.4 - 37.9% (P <0.05 - 0.01).

In Batch III sheep, which were permanently maintained at the stable under hypodynamic conditions, there was an obvious tendency to decrease the quality of the furskins obtained from newborn lambs, expressed by the share of the furskins of Sort I, compared to the furskins from Batch control, obtained from lambs maintained in summer grazing, by 12.9% (t_d = 1.88; P <0.1).

REFERENCES

Celi, P. (2010). The role of oxidative stress in small ruminants health and production. Small Ruminants. *R. Bras. Zootec*., 39 (suppl), https://doi.org/10.1590/S1516-35982010001300038

Chiuțu, L. (2012). Respiratory physiology - Gaseous exchanges. https://atimures.ro/wp-content/uploads/2012/09. CEEA, 38 p.

Genes, C. (2017). Ozone. https://meps.ro/ro/ads/5889ec1b25a36/Sali-sport% 26fun/-ozonoterapie-MedOzon-Timisoara.

Hohimer, R.A., Bissonnette, I.M., Metcalfe, I.M., & Kean, T.A. (1984). Effect of exercise on uterine blood flow in the pregnant Pygmy goat. *Amer. J. Physiol.*, 2, 207-212.

Izer, J., Mattern, E., Ellwanger, J., Wilson, R. (2020). Comparison of invasive and non-invasive blood pressure measurements in anesthetized female Dorset cross-bred lambs (Ovis aries). *Res Vet Sci*., 132, 257-261. doi: 10.1016/j.rvsc.2020.07.004. PMID: 32688102

Jordán, M.J., Martínez-Conesa, C., Bañón, S., Otal, J., Quílez, M., García-Aledo, I., Romero-Espinar, P., & Sánchez-Gómez, P. (2020). The Combined Effect of Mediterranean Shrubland Pasture and the Dietary Administration of Sage By-Products on the Antioxidant Status of Segureña Ewes and Lambs. *J. Antioxidants, 9*(10), 938.

Le Hen, A. (1983). Notre marge de progres est encore importante. *J. Patre*, 309, 7-11.

Lotgering, F.K., Gilbert, R.D., & Longo, L.D. (1983). Exercise responses in pregnant sheep: oxygen consumtion, uterine blood flow, and blood volume. *J. Appl. Phisiol., Respir. Environ. and Exercise Physiol., 55*(3), 834-841.

Onmaz, A.C., Gunes, V., Atalan, G., & Gelfert, C.C. (2009). Comparison of arterial and venous blood gas values in sheep before and during isoflurane anaesthesia. *Revue de Médecine Vétérinaire*, *160*(7), 356-361

Varghese, J., Potter, L.C., La Fountain, R., Pan, X., Raman Subha, V., Rizwan, A., & Simonetti Orlando, P. (2017). CMR-based blood oximetry via multi-parametric estimation using multiple T2 measurements. *Journal of Cardiovascular Magnetic Resonance*, 19, 09, 88.

Weiss Kassel, I. (1983). Produktionstechnic und Wirtschaftlichkeit. *J. Dentsche Schafzucht*, 75, 26, 524-528.

Taftă, V., Vintilă, I., Zamfirescu, S. (1997). Production, breeding and reproduction of sheep. Bucharest, RO: Ceres Publishing House.

Аверьянов, И.Я., Ибрагимов, И.М. (1968). Качество каракуля в связи с условиями пастбищного крмления маток в суягный период. Биология кожи и волосяного покрова животных. *Тезисы докладов МОИП*, Москва, 68-69.

Алексиев, И.А. (1982). Продуктивность молодняка при различных системах выращивания. *Овцеводство*, 4, 25-26.

Воронин, И.И. (2015). Пункция брюшной аорты у овец. https://topuch.ru/prakticheskoe-zanyatie-metodi-novokajnovoj-terapii/index5.html.

ГОСТ на каракуль чистопородный невыделанный, (1984). Изд. Гостстандарт, Москва.

Дъячков, И.Н., Закиров, М.Д., Письменная, Р.Т. (1963). Методика изучения качества каракуля. Труды ВНИИ Каракулеводства. т. 13. Самаруанд, с. 175-189.

Дъячков, И.Н. (1980). Племенное дело в каракульском овцеводстве. Изд. *«Фан», Ташкент*, 163 с.

Иванов, М.Ф. (1964). Каракульские овцы. Полное собрание сочинений, том 4. Москва, Изд. *«Колос»,* 380-398.

Конурбаев, У.Ч. (1982). Продуктивные качества потомства от овцематок, выращенных при различных режимах содержания. Дис. канд. с.-х. наук. *Ставрополь*, 110 с.

Кошевой, М.А. (1975). Селекция и условия разведения каракульских овец. Ташкент, изд. *«Фан»,* 247 с.

Ожигов, Л.М., Селеменева, Р.М. (1982). Выращивание ярок на механизированных площадках. Овцеводство, 5, 22-23.

Плохинский, Н.А., (1989). *Руководство по биометрии для зоотехников*. Изд. «Колос», Москва, 256 с.

Раушенбах, Ю.О. (1976). Специфика адаптивной реакции крупного рогатого скота на низкую температуру среды. В кн.: Тепло и холодоустойчивость домашних животных. Изд. «Наука». *Новосибирск*, 168-179.

Сидоров, В.Т. (1975). Некоторые показатели окислительно-восстановительных процессов у телят голландской и черно-пестрой пород. В кн.: Зоотехническая наука Белоруссии. Изд. «Урожай». Минск, 16, 48-53.

Султанов, М.Т. (1979). Выращивание ярок для воспроизводства при разных возрастах отбивки в условиях промышленной технологии. Автореф. дис. канд. с.-х. наук. Ставрополь, 24 с.

Фазульзянов, А.Х. (1979). Ранняя случка ярок. Степные просторы. *Саратов*, 4, 36-37.

Яшунин, В.Г., Никушев, Ж.Н. (1980). Сроки отбивки и системы содержания ягнят в условиях промышленной технологии. Ж. *Овцеводство*, 1, 31-33.