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Morphometric Parameters of The Internal Organs Male and Female Scandinavian Shorthair Mink on The Northern Caucasus.

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ABSTRACT

In the farm "Lesnyye klyuchi" for mink is characterized by a bright manifestation of sexual dimorphism. It is clearly manifested as in the mass of the body, and in the mass and volume of individual organs. These differences are highly reliable. Relative indicators (the density of organs, weight in relation to the weight of the animal and the weight of the carcass without skin) do not have reliable sex differences. The mass of thymus mink does not depend on their sex, and its size is determined, apparently, by the need for the production of lymphocytes and hormones. For males, there is no significant correlation between the thymus mass and the animal mass, and the organ masses with each other have a high negative correlation. For females, the mass of immune competent organs is highly positively correlated with the weight of the animal and with each other.

Keywords: mink, morphology, internal organs, mink body weight, sexual dimorphism.

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INTRODUCTION

The American mink (Mustelavison Schreber, 1777) is a common object of fur fur farming, originates from the wild American mink. Imported for the first time in 1928, American mink were adapted and successfully bred in all regions of Russia. The American mink develops well with cellular content and undergoes morphological changes quite quickly. In the process of breeding on specialized fur farms with lifestyle changes: cellular content, high-grade feeding and consistent selection for economically useful traits, the populations of burrows underwent significant changes. During the period of cell culture in mink, all the breeding features have essentially changed: the reproductive capacity, the quality and color of the hair, the size of the body [6].

The increase in the weight of the mink body during the course of the cell cultivation proceeds many times faster than it was before with other agricultural animals. It should be noted that the increase in body weight is not only the norm of reaction to changes in feeding conditions [8], but mainly the result of the work of breeders in selecting mink for increasing the size of the trunk.

The mink is characterized by sexual dimorphism, which is expressed, in part, in the mass of the body [7]. According to O.I. Fedorovoy [3, 4] sexual dimorphism in body size (mass) in modern standard dark brown mink appears only at the age of 50 days (P> 0.999). The study of morphometric parameters in standard dark brown minks was performed by Yvonin Yu.V., Ivonina O.Yu. [12]. At present, the body weight of the standard dark brown (STK) mink has increased in comparison with the wild almost 4 times. Body length also increased significantly - 1.4 times in males and 1.3 times in females [3, 4].

The data found in the literature sources mainly refer to the study of the color form. Standard dark brown, at the same time, data on other color forms is extremely small. At the same time, studies show [5, 6], mink have a large morphological variability, including depending on the color types. Thus, breeders have the opportunity to select in this direction.

MATERIALS AND METHODS

The aim of the studies was to study in comparative aspects in female and male Scandinavian black short-haired mink (Scanblack) in the climate of the North Caucasus such morphometric indicators of internal organs as their mass, volume, density, mass in relation to the weight of the animal and the weight of the carcass of the animal without skin. The same morphometric parameters of immunocompetent organs (spleen and thymus) were also studied.

We conducted our studies in the conditions of the "Lesnyye klyuchi" farm in the Stavropol Territory. In the experiment, 40 minks (20 heads of males and females) of the Scanblack breed were used. Feeding animals and providing water was adlib. Carcases of animals at the age of 1.5 years, were obtained with planned slaughter in September. The mink had posthumously studied the mass of the animal's body, the mass of the skin, the mass and the volume of internal organs. The obtained material by morphometric parameters was biometrically processed using the Microsoft Excel 2007 statistical analysis package. To describe the magnitude of the correlation coefficient, the conventional scale proposed by C. E. Cheddock was used: the degree of correlation is less than 0.3 - weak; 0,3-0,5 - moderate; 0,5-0,7 - appreciable; 0,7-0,9 - high; more than 0.9 - very high.

RESULTS AND DISCUSSION

After studying the individual morphometric indicators, the following correlation relationships between them were revealed.

The mink is characterized by pronounced sexual dimorphism, which manifests itself in significant differences in the body weight of animals (Table 1).

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Table 1: Dimensions of the body males and females by mink "Scanblack"

Indicators	Weight of animal, g		Weight of carcass without skin, g	
	females	males	females	males
M	1114,80	2646,40*	784,80	1574,40*
m	62,71	149,45	29,12	53,37
lim	954,00-1333,00	2183,00-2996,00	684,00-853,00	1413,00-1706,00
Cv	0,11	0,11	0,07	0,07

Note: * - significant difference (p<0,001).

The weight of males is 2.37 times the mass of females. The weight of carcass of males without skin is more than the same indicator of females 2.01 times.

Thymus is the organ of lymphopoiesis, it ripens and differentiates T-lymphocytes. The spleen is not a vital organ, but it also causes lymphopoiesis, antibodies are produced. The studied indicators are given in Table 2.

Table 2: The morphometric parameters of immune organs male and female mink " Scanblack"

Indicators		Thymus				Spleen			
		Mass, g	Volume, cm^3	% of animal mass	% of carcass	Mass, g	Volume, cm^3	% of animal mass	% of carcass
Females	M	0,80	1,00	0,07	0,10	4,82	4,20	0,43	0,61
	m	0,10	0,00	0,01	0,01	0,71	0,73	0,05	0,08
	lim	0,60-1,20	1,00-1,00	0,06-0,09	0,09-0,14	3,38-7,40	3,00-7,00	0,32-0,56	0,44-0,87
	Cv	0,26	0,00	0,14	0,20	0,29	0,35	0,21	0,25
Males	M	1,03	1,60	0,04*	0,07	8,75*	7,80*	0,33*	0,55
	m	0,08	0,24	0,00	0,01	1,18	1,02	0,04	0,07
	lim	0,74-1,22	1,00-2,00	0,03-0,06	0,05-0,09	4,70-11,78	4,00-10,00	0,22-0,48	0,33-0,79
	Cv	0,16	0,31	0,22	0,18	0,27	0,26	0,27	0,27

Note: * - significant difference (p<0,05).

Thymus or thymus gland is a small organ. Its absolute mass varies in the range of 0.6-1.22 g. In females the average mass is 0.80 ± 0.10 g, in males 1.03 ± 0.08 g, but these differences are not reliable. The differences in the mass of the thymus with respect to the weight of the animal are reliable: in females this index is 1.79 times higher.

Another picture we see when studying the size of the spleen. Its mass and volume in males are significantly higher than in females (in 1.82 and 1.86 times, respectively), and the relative mass is 1.3 times lower.

We also studied correlations of the thymus and spleen masses with respect to the weight of the animal and to each other (Table 3).

Table 3: Correlations of some traits in males and females of mink

	Weight of animal / mass of spleen	Weight of animal / weight of thymus	Spleen weight / thymus weight
Females	0,764	0,934	0,823
Males	0,482	0,062	-0,794

There is an interesting regularity. In female burrows, the masses of organs are highly positively correlated with the mass of the animal and with each other. In males there is no appreciable correlation

between the thymus mass and the animal mass, and the organ masses with each other have a high negative correlation.

Some morphometric parameters of the kidneys of the burrows are given in Table 4.

Table 4: Morphometric parameters kidneys of mink

Indicators		Weight of carcass without skin, g	Weight of animal, g	Mass of left kidney, g	Mass of right kidney, g	Both kidneys		
						mass, g	% of animal mass	% of carcass
Females	M	784,80	1114,80	3,91	3,97	7,88	0,72	1,01
	m	29,12	62,71	0,19	0,21	0,40	0,06	0,07
	lim	684,00-853,00	954,00-1333,00	3,38-4,30	3,42-4,40	6,80-8,70	0,60-0,91	0,87-1,27
	Cv	0,07	0,11	0,10	0,10	0,10	0,16	0,14
Males	M	1574,40*	2646,40*	8,37*	8,14*	16,51*	0,63	1,05
	m	53,37	149,45	0,76	0,61	1,33	0,04	0,07
	lim	1413,00-1706,00	2183,00-2996,00	7,00-11,22	6,70-10,40	14,20-21,62	0,49-0,75	0,86-1,31
	Cv	0,07	0,11	0,18	0,15	0,16	0,13	0,14

Note: * - significant difference (p≤0,005)

In mink, sexual dimorphism is very noticeable in body size: males are heavier than females 2.4 times. Along with the mass of the body, the mass of internal organs also changes.

Kidneys perform the function of urination to regulate the chemical homeostasis of the body. The weight of both kidneys in males is significantly higher than in females, the ratio of the mass of female kidneys to the mass of the kidneys of males is 47.7%. When determining the relative mass of the kidneys to the body weight, it can be noted that the difference is not reliable: the kidneys are 0.49-0.91% of the animal's weight or 0.86-1.31% of the body weight of the carcass without skin in both males and females.

The liver performs a large number of different physiological functions, its role in the body can not be overemphasized. Morphometric parameters of liver of mink are given in Table 5.

Table 5: Morphometric parameters the liver of mink

Indicators	Females				Males			
	Mass, g	Volume, cm^3	% of animal mass	% of carcass	Mass, g	Volume, cm^3	% of animal mass	% of carcass
M	49,38	46,40	4,44	6,29	97,61*	84,80*	3,73	6,22
m	2,45	2,04	0,10	0,16	4,74	5,68	0,24	0,30
lim	41,40-56,50	42,00-54,00	4,24-4,79	5,77-6,62	87,60-113,53	70,00-102,00	3,02-4,22	5,31-6,91
Cv	0,10	0,09	0,04	0,05	0,10	0,13	0,13	0,10

Note: * - significant difference (p≤0,001)

For mink males, the mass and volume of the liver is significantly higher than in females, and exceeds the similar indices of females in 1.98 and 1.83 times, respectively. The relative mass of organs in females exceeds this in males (4.44 and 3.73%, respectively), but these differences are not reliable.

Morphometric parameters of the thoracic cavity organs were also studied (Tables 6, 7).

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Table 6: The morphometric parameters of mink lung

Indicators		Mass, g	Volume, cm^3	Density, g / cm^3	% of animal mass	% of carcass
Females	M	16,40	18,60	0,90	1,48	2,09
	m	0,56	1,47	0,06	0,07	0,05
	lim	14,30-7,53	15,00-2,00	0,78-1,09	1,25-1,68	1,95-2,26
	Cv	0,07	0,16	0,12	0,10	0,05
Males	M	33,55*	35,20*	0,96	1,29	2,14
	m	2,05	2,50	0,01	0,11	0,15
	lim	29,10-9,27	30,00-2,00	0,93-1,00	1,00-1,61	1,76-2,63
	Cv	0,12	0,14	0,03	0,17	0,14

Note: * - significant difference (p≤0,005)

The weight and volume of males are also significantly higher than those of females: in 2.05 and 1.89 times, respectively. In addition to these indicators, lung density and relative mass were also determined. These indicators did not have reliable sex differences. The density of the lungs averaged 0.9 g / cm^3 in females and 0.96 in males. The weight of the lungs with respect to the mass of the animal differed appreciably: 1.48% in females and 1.29% in males. However, these differences were also not reliable.

Table 7: Morphometric parameters the heart of mink

Indicators		Mass, g	Volume, cm^3	Density, g / cm^3	% of animal mass	% of carcass
Females	M	7,65	7,25	1,08	0,68	0,98
	m	0,58	0,95	0,08	0,06	0,08
	lim	6,50-9,21	6,00-10,00	0,92-1,30	0,59-0,81	0,78-1,18
	Cv	0,13	0,23	0,13	0,15	0,15
Males	M	15,67*	15,00*	1,10	0,60	1,00
	m	1,08	1,61	0,13	0,05	0,07
	lim	12,44-18,20	10,00-20,00	0,62-1,39	0,51-0,79	0,83-1,22
	Cv	0,14	0,21	0,24	0,17	0,15

Note: * - significant difference (p≤0,05)

When determining the morphometric parameters of the heart, the same pattern was observed as with other organs. The weight and volume of the organ in males were significantly higher (2.05 and 2.07 times, respectively), while the relative values did not differ significantly depending on sex.

We also studied some correlations in morphometric indices. Thus, the heart and lungs are in the chest cavity, which has a limited volume. Therefore, it was interesting to see whether the parameters of mass and volume of lungs and heart correlate with each other (Table 8).

Table 8: Correlation of the mass and volume thoracic cavity organs of the mink

	Heart mass / lung mass	Heart volume / lung volume
Females	0,050	-0,725
Males	-0,913	0,124

In these indicators an interesting regularity is observed. While the masses of the heart and lungs do not have a significant correlation between themselves, their volumes have a high negative correlation. Conversely, in males the masses of these organs show a very high negative correlation at a weak - between their volumes.

CONCLUSION

On the basis of the studies carried out, it can be concluded that sexual dimorphism in minks is clearly manifested in both the body mass and in the mass and volume of individual organs. These differences are

highly reliable. Relative indicators (the density of organs, weight in relation to the weight of the animal and the weight of the carcass without skin) do not have reliable sex differences. The mass of the thymus does not depend on the sex of the mink, and its size is determined, apparently, by the need for the production of lymphocytes and hormones.

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