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Assessing mouflon biochemical parameters depending on genders

Introduction

The mouflon (*Ovis aries musimon* Pallas) is the only species of the genus *Ovis* L. living in the wild in Europe. They come from the islands of Sardinia and Corsica, following their likely migration from Asia Minor thousands of years ago (Bazer et al., 2012). They are not native to Slovakia. Instead, they were introduced to Slovakia from the island of Corsica (Ciuti et al., 2009). Mouflon's habitat in our geographical conditions is predominantly temperate forests (Ciberej et al., 2010). Czech and Slovak mouflon are world leaders for value, trophies, and stature amongst hunters (Hell et al., 2008; Frojtek, 2012).

Mouflon numbers are ever-growing, so it is important to extend our knowledge regarding their physiology. Biochemical markers are important factors in the body reflecting the animal's response to various stressors or negative effects of the environment (Sherwood et al., 2013; Kimáková et al., 2018). Negative biochemical balance may disrupt the body, resulting in a variety of pathological changes, physical strain, or infectious disease (Lehocký, Kuric, 2007). Biochemical markers may be a sign of disease or pathological conditions within the body noted in research in different fields (Ciberej, 2013). Our study provides the assessing of mouflon biochemical parameters depending on genders, which can be used to manage the health status of these animals.

Material and methods

The mouflon used in this research came from a game reserve in the eastern part of the Slovak Republic. Water intake from natural water sources was unrestricted and the

animals were fed hay during winter. The animals showed no signs of disease. Between 2015 and 2016, a total of 60 mouflons (*Ovis aries musimon* Pallas), n = 30 males and n = 30 females, were analysed. Blood samples were taken by a veterinarian from the jugular vein from fifteen males and fifteen females. The experimental group consisted of 4 to 5 year-old mouflons. Samples were collected in winter using blood collection tubes and heparin tubes.

The following biochemical variables were analysed: albumin – ALB, alkaline phosphatase – ALP, alanine aminotransferase – ALT, aspartate aminotransferase – AST and lactate dehydrogenase – LDH. Biochemical indicators were measured using an automatic analyser with a flexible system for consolidating routine examinations (Lehocký, Kuric, 2007). The biochemical variables were evaluated in relation to the sex of the animals in the experimental groups.

The obtained results were analysed via the statistical method of Mann-Whitney's U test using STATISTICA 12 software for comparing biochemical variables of males and females, depending on year and biochemical variables.

Results and discussion

The results of the biochemical analysis are shown in tables 1 to 4. The analysed biochemical parameters are grouped into tables according to statistical significance in the context of the years being compared and depending on sex. For the sake of comparing various biochemical variables of males and females in 2015 and 2016, we used the Mann-Whitney's U test, which is utilised in comparing two or more groups with a low number of measurements.

By comparing 2015 and 2016, we recorded similar statistically significant findings in the case of both sexes, i.e. in the case of ALB and AST parameters. The aforementioned parameters were significantly higher in 2015 compared to 2016. The average values of these parameters in the monitored years were approximately the same in the case of both sexes except AST, where these values were markedly higher in males than in females.

By comparing the individual sexes regardless of monitored years, we recorded statistically significant differences in the case of ALB, ALT, AST, and LDH parameters. All of these parameters were higher in males than in females. Lower values of ALB, ALT, and AST in females may have been caused by the fact that they were in their rutting period, during which there is a change in the values of intermediary metabolism in terms of enzyme reduction (Ciberej, 2014).

Higher values of LDH in males may have been associated with stress during handling and subsequent increased muscle activity (Krauss, Nies, 2014). When handling the animals, the males resisted more than the females, which ultimately shows in the higher values of the aforementioned parameters.

Tab. 1. Significant differences for each selected serum biochemical variable of males in the compared years of 2015 and 2016; n = 15

Male	Years												S
	2015						2016						
Variable	Mean	Median	± SD	Min	Max	Conf. int.	Mean	Median	± SD	Min	Max	Conf. int.	
ALT [IU/L]	31.98	32.63	10.84	10.12	48.74	25.99–37.96	21.44	19.40	11.68	9.70	48.14	14.97–27.90	**
AST [IU/L]	102.75	79.58	45.99	59.64	216.00	77.31–128.20	66.11	54.13	32.75	32.16	163.41	47.90–84.19	**
ALB [g/L]	11.72	11.32	2.02	9.14	14.99	10.60–12.84	9.66	9.13	2.04	6.84	14.22	8.52–10.79	**

Note: ± SD – standard deviation, Min – minimum, Max – maximum, Conf. int. – 95% confidence interval, **$p < 0.01$, ALT – alanine aminotransferase, AST – aspartate aminotransferase, ALB – albumin, S – significance

Tab. 2. Non-significant differences of each selected serum biochemical variable of males in compared years 2015 and 2016; n = 15

Male	Years												S
	2015						2016						
Variable	Mean	Median	± SD	Min	Max	Conf. int.	Mean	Median	± SD	Min	Max	Conf. int.	
ALP [IU/L]	37.90	35.33	13.65	16.7	60.40	30.36–45.45	26.65	20.36	16.11	4.79	49.10	17.66–35.51	NS
LDH [IU/L]	496.80	456.00	138.00	325	720	420.4–573.2	494.7	419	188.6	287	816	390.3–599.2	NS

Note: ± SD – standard deviation, Min – minimum, Max – maximum, Conf. int. – 95% confidence interval, NS – not significant, ALP – alkaline phosphatase, LDH – lactate dehydrogenase, S – significance

Tab. 3. Significant differences for each selected serum biochemical variable of females in the compared years of 2015 and 2016; n = 15

Female	Years												S
	2015						2016						
Variable	Mean	Median	± SD	Min	Max	Conf. int.	Mean	Median	± SD	Min	Max	Conf. int.	
AST [IU/L]	64.37	59.64	16.05	41.20	94.60	55.45–73.23	48.20	43.35	15.81	26.20	75.81	39.40–56.89	**
ALB [g/L]	10.87	9.42	3.09	7.94	17.00	9.16–12.57	8.99	7.77	3.93	4.73	17.13	6.81–11.17	*

Note: ± SD – standard deviation, Min – minimum, Max – maximum, Conf. int. – 95% confidence interval, *p < 0.05, **p < 0.01, AST – aspartate aminotransferase, ALB – albumin, S – significance

Tab. 4. Non-significant differences for each selected serum biochemical variable of females in the compared years of 2015 and 2016; n = 15

Female	Years												S
	2015						2016						
Variable	Mean	Median	± SD	Min	Max	Conf. int.	Mean	Median	± SD	Min	Max	Conf. int.	
ALP [IU/L]	27.37	25.15	7.31	16.7	43.1	23.29–31.38	25.69	23.35	13.77	5.99	43.71	18.02–33.23	NS
ALT [IU/L]	17.90	18.20	7.49	7.01	27.3	13.77–22.04	16.17	15.93	9.16	5.87	39.34	11.08–21.20	NS
LDH [IU/L]	380.47	365	129.80	221	610	308.6–452.4	374.8	303	170.0	163	714	280.7–469.0	NS

Note: ± SD – standard deviation, Min – minimum, Max – maximum, Conf. int. – 95% confidence interval, NS – not significant, ALP – alkaline phosphatase, ALT – alanine aminotransferase, LDH – lactate dehydrogenase, S – significance

Conclusion

The dynamics of the observed selected biochemical variables indicates their importance when maintaining homeostasis in animals. In our research, we investigated the biochemical status of mouflons of both sexes as the current physiological status for this type of wild game. Based on our monitoring of the biochemical status of mouflon, we recorded significant differences between sexes in the case of ALB, ALT, AST, and LDH parameters. All of these parameters in our study were higher in males than in females.

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References

Bazer, F.W., Spencer, T.E., Thatcher, W.W. (2012). Growth and development of the ovine conceptus. *Journal of Animal Science*, *90(1)*, 159–170. DOI: 10.2527/jas.2011-4180

Ciuti, S., Pipia, A., Grignolio, S., Ghiandai, F., Apollonio, M. (2009). Space use, habitat selection and activity patterns of female Sardinian mouflon (*Ovis orientalis musimon*) during the lambing season. *European Journal of Wildlife Research*, *55(6)*, 589–595. DOI: 10.1007/s10344-009-0279-y

Ciberej, J., Lazar, P., Halász, J. (2010). *Game caring and diseases*. Zvolen: Technical University, p. 108–222.

Hell, P., Slamečka, J., Gašparík, J. (2008). *Fallow deer and mouflon in Slovakia*. Bratislava: PaPress.

Frojtek, P. (2012). *Mouflon from south Moravia, history, management and trophy*. Modrý Kameň, p. 18–26.

Sherwood, L., Klandorf, H., Yancey, P. (2013). *Animal Physiology. From Genes to Organisms.* Belmont, USA: CA Brooks/Cole Cengage Learning.

Kimáková, T., Kuzmová, L., Nevolná, Z., Bencko, V. (2018) Fish and fish products as risk factors of mercury exposure. *Annals of agricultural and environmental medicine, 25(3),* 488–493. DOI: 0.26444/aaem/84934

Lehocký, M., Kuric, P. (2007). *Management in huntings and breeding of wild game*. Zvolen: National Forest Centre.

Ciberej, J. (2013). *Hunters zoology and biology*. Zvolen: Technical University.

Ciberej, J. (2014). Indents and teeth. *Hunting and fishing*, *66*, 8–11.

Krauss, J.G., Nies, D.H. (2014). *Ecological Biochemistry, Environmental and Interspecies Interactions*. USA: Wiley-Blackwell.

Abstract

The aim of our study was to evaluate the selected biochemical parameters of mouflon depending on gender. Thirty mouflons of both sexes with the same approximate age in the winter season were used for research. Blood samples for biochemical analysis were taken from *vena jugularis* for determination of selected biochemical parameter. Biochemical indicators were measured using the standard automatic analyser. The results of statistical testing of selected biochemical parameters in the experimental group of animals confirmed differences between the genders and at the selected biochemical parameters.

Key words: biochemical status, female, male, laboratory analyses, mouflon

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Ocena parametrów biochemicznych muflona w zależności od płci

Streszczenie

Celem badań była ocena wybranych parametrów biochemicznych u muflona, zależnych od płci. W sezonie zimowym, do badań wykorzystano trzydzieści muflonów obu płci, o przybliżonym wieku. Próbki krwi do analizy biochemicznej pobrano z *vena jugularis*, w celu określenia wybranego parametru biochemicznego. Wskaźniki biochemiczne mierzono za pomocą standardowego automatycznego analizatora. Wyniki badań statystycznych wybranych parametrów biochemicznych w grupie zwierząt doświadczalnych potwierdziły różnice między płciami i wybranymi parametrami biochemicznymi.

Słowa kluczowe: status biochemiczny, samica, samiec, analizy laboratoryjne, muflon

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She currently works as an educator in the fields of ecology and environment. In her field of scientific work, she is focusing on monitoring the biochemical, haematological, and immunochemical conditions of animals, including interspecies breeding and the sex differences of animals. Her work focuses on problem-solving animal hygiene due to the strategically necessary improvement of food security and production.

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