

## ASPECTS REGARDING THE PARASITIC INFESTATION DEGREE AND BODY RESISTANCE TO PHYSICAL TRAUMA AT MOUFLON (*Ovis ammon mussimon*) FROM DOBROGEA

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**Abstract.** Taking into account that, in Romania, the mouflon is a gregarious species and it lives only into fenced areas, a disease of viral, bacterial or parasitic origin could be deadly for the entire group. The study presents the diseases that affect the mouflon from Dobrogea, which have been observed in the last 5 years, and identifies those diseases that require prophylactic treatment from the diseases that might affect the mouflon (presented by NESTEROV in 1984, 2009 and 2010). This study also aims at presenting the disorders caused by environmental conditions (soil substrate, nutriment, limited space).

**Keywords:** mouflon, wild fauna, disease, injury, Dobrogea.

**Rezumat. Aspecte privind gradul de parazitare și rezistența organismului la traume fizice la muflonul (*Ovis ammon mussimon*) din Dobrogea.** Luând în considerare faptul că muflonul este o specie gregară și care, în România, trăiește numai în spații împrejmuite, o boală de origine virală, bacteriană sau parazitată poate fi letală pentru un întreg grup. Lucrarea prezintă un tablou al bolilor observate la muflonii din Dobrogea în ultimii 5 ani și identifică dintre bolile ce pot fi întâlnite la muflon (prezentate de NESTEROV în 1984, 2009 și 2010) pe cele pentru care este necesar tratament profilactic. Prezentul studiu și-a propus să prezinte și afecțiuni care apar datorită condițiilor de mediu (substrat, hrană, spațiu limitat).

**Cuvinte cheie:** muflon, faună salbatică, boală, traumă, Dobrogea.

### INTRODUCTION

The mouflon is an allochthonous species. In the last years, the mouflon regained its importance and interest for hunting in Romania. Being a game that can be consumed, it is characterized by the lack of adipose tissue and percentages of proteins content is almost identical with that in lambs and sheep. As in Romania there are no published studies concerning the characteristics and issues of mouflon, in order to develop a suitable management it is necessary to make a study of the (specific) anatomopathological and ecological features.

Diseases never occur without a reason. They are triggered by an imbalance of the population or of the environment (PFLIEGER, 1982). Illness and mortality are significantly influenced by the climatic conditions, the quantity and the quality of the fodder, the dissemination of salt. Raptors, health agents of nature, play an important role in checking the number of the small rodents, which are very prolific and have a role in maintaining the diseases that can be transmitted from game to man (NESTEROV, 1984; 2010).

### MATERIAL AND METHODS

The personal study (January, 2008 - January, 2013) covers 5 years and is focused upon 2 effectives of mouflons: those living in semi-freedom conditions (Negureni hunting complex - 45 specimens, in 2009) and those living in captivity from the patrimony of the Museum Complex of Natural Sciences of Constanța (C. M. S. N.) 22 specimens, in 2009, which represented, at that time, the biggest nucleus of mouflons from the zoological gardens in Romania (ANTONE & UNICI, 2011; ANTONE, 2013).

In order to better understand the pathology of the mouflon, 21 dead specimens and 45 alive specimens were analysed. To highlight the possible states of parasitic infestation, faecal samples were collected from 20 specimens for laboratory tests. The samples were taken from the rectum-anus of 10 alive specimens and from different parts of the large intestine (colon, cecum, rectum) of 10 dead specimens.

Regarding the necropsy research, it should be noted that the corpses were examined in terms of the external conformation of the trunk, head, limbs and tail, in order to observe possible injuries. Those corpses were opened to study the topography and layout of the internal organs, in order to highlight some specific features of the species. Attention was mainly focused on the digestive, excretory and respiratory systems. Each internal organ was examined in detail, to identify any macroscopic anatomopathological changes, which could be attributed to the evolution of a disease. Concerning the healthiness of meat, microbiological examinations were made (total number of germs, *Escherichia coli*, *Salmonella*) on samples of muscular tissue. The samples were collected from 15 specimens, from different body parts with developed muscles.

The coproparasitological examination was based on the method LCSVD Olteanu identification of eggs and cysts of parasites by flotation and sedimentation.

## RESULTS AND DISCUSSIONS

In 12 analysed cases of of dead specimens (specimens from C. M. S. N), it resulted that pulmonary congestion prevails, followed by hypothermia.

Following coproparasitological examination of 20 faecal samples from live and dead specimens, there were identified infestations with *Eimeria* sp. and *Trichostrongylus* sp. (Table 1).

Coccidiosis is a parasitic enteritis caused by 11 species of coccidia of the genus *Eimeria* that affects all categories of sheep breeds, especially the youth (DULCEANU & TERINTE, 1994). Each species that parasitizes is localized in a certain intestinal segment. At sheep breeds, coccidiosis is clinically characterized by diarrheal stools mixed with blood, dehydration and weakness.

Table 1. Parasites identified in samples.

No.	SAMPLE IDENTIFICATION	IDENTIFIED PARASITES	
		<i>Trichocephalus ovis</i>	<i>Eimeria</i> spp.
1	Sample 1	-	+
2	Sample 2	-	+
3	Sample 3	+	++
4	Sample 4	-	+
5	Sample 5	+	++
6	Sample 6	-	-
7	Sample 7	-	+
8	Sample 8	+	++
9	Sample 9	-	-
10	Sample 10	-	+
11	Sample 11	-	+
12	Sample 12	-	+
13	Sample 13	+	++
14	Sample 14	-	+
15	Sample 15	+	++
16	Sample 16	-	+
17	Sample 17	-	+
18	Sample 18	+	++
19	Sample 19	+	++
20	Sample 20	-	+

**Legend:** + - weak infection  
 ++ - medium infection  
 +++ - strong infection

Synergism should be taken into consideration if 2 or 3 species of coccidia occur simultaneously, which causes severe disorders compared to those produce by each species. Mixed infections last longer.

In case of the infections with *Eimeria* sp. and *Trichostrongylus* sp., the nematode presence has no influence on the growth of lambs or the elimination of oocysts.

Of 20 faecal samples examined, 2 samples have been found free of parasitic infestation. It is worth mentioning that the 2 samples came from females aged 2-3 years, fact which is contrary to the literature. Medium infection with *Eimeria* sp. has always been associated with *Trichocephalus ovis* weak infection.

Infections clinically manifested with dysentery forms were observed in spring, after the rainy season and were due to the consumption of water from puddles. A single specimen, a male, required medication.

From 21 lung samples analysed to evaluate the sanitation of specimens, only 1 sample showed weak injuries due to the infection with *Muelleris capillaris* (nematoda) (MUELLER, 1889). The mouflon lung injuries caused by *M. capillaris* were identified by different types of grey stains with varying dimensions – extended, diffuse and/or nodular (Fig. 1.). In our case, the size of stains was less than 5 mm on the lung surface and, in addition, there were observed small hard nodules with a diameter of 1-5 mm under the lung pleura and within the left lobe of the mouflon lung (Fig.1. b). Those nodules were quite similar to the granulomas described by Beresford-Jones (1967), found in sheep infected with *M. capillaris*. McFadyean (1894) (cit. by BERESFORD-JONES, 1967) describes those nodules as pseudo-tuberculi.

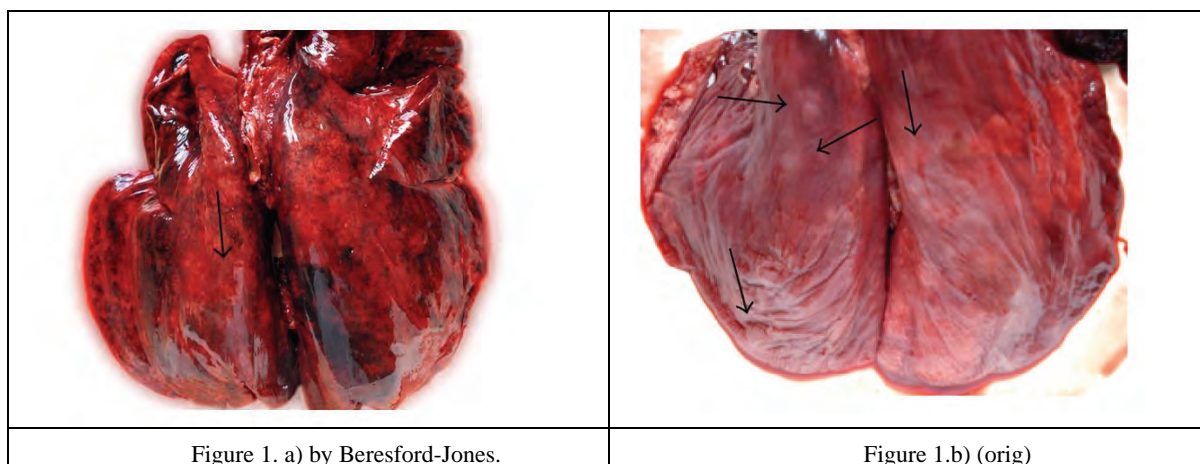


Figure 1. Mouflon lungs infected with *Protostrongylids* (a) by Beresford-Jones. (b) Mouflon lungs infected with *Protostrongylids*.

In accordance with the subjective adopted criteria, the abnormalities of the mouflon lung were classified.

From possible diet-related diseases, only one case was found during the study - avitaminosis, male lamb, in 2010 (Fig. 2.) (The mother was 2 years old, at first birth). Avitaminosis is a disease caused by insufficiency or lack of one or more vitamins. It is manifested by excessive hair fall, leaving bare patches of dry skin. The most affected areas are the head and the joints of the limbs. It was associated with dysfunctions of growth and dry skin.



Figure 2. a) Mouflon lamb with signs of avitaminosis - head area. Figure 2. b) Mouflon lamb with signs of avitaminosis - limb joints.

Figure 2. Infections to a mouflon lamb (orig.).

The treatment consisted in disinfecting the affected areas by dabbing with methylene blue and administration of vitamins. Vitamins were injected (subcutaneously), in five consecutive days. The dose of vitamins has been: 5ml of calcium gluconate, 1 ampoule of B12, 5ml of B1-B6 and 5ml of vitamin C.

Mechanical injuries which may occur:

- Crush wound or contusion; it is caused by a hit with a hard object, which has a smooth or irregular surface; this type of wound is relatively common during the rut, at males, as a result of fights, when the horns collide with the rump or the abdomen of the opponent;
- Dislocation and torn tissue caused by certain types of predators; this type of wound has not been observed because there are no predators;
- Cut wound: it is caused by sharp instruments; blood loss following a cut wound is variable and is directly influenced by the calibre of blood vessels (from light to severe bleeding). Just 2 cases of cut wounds were registered, caused by wire threads protruding from fence - some mouflon have been put into a small enclosure (1ha) from Negureni. The wounds were produced at the head; both specimens were males, 3-4 years old. No medical intervention was necessary, because the wounds were superficial, without significant loss of blood;

- Closed fractures are bone lesions characterized by interrupting the continuity of a bone upon mechanical factors interference. The fracture was accompanied by soft tissue injuries of the musculoskeletal system. Such closed fracture was observed in the case of an aged ram (12 years), who was pushed into the shelter wall by the side, kicked by another young male (6-7 years). The impact effect was the fracture of 2 ribs on the right flank with lung perforation, diaphragm rupture and internal bleeding - death occurred in 10-12 minutes after impact;

- Comminuted fracture; it is a fracture with displacement of bone ends, which pierces and injures the surrounding soft tissues, including the skin. This type of open fracture has been studied in case of a ram (1.5 years). The ram was brought to C. M. S. N. from the hunting complex Mereni / Covasna. According to the rules, he was kept in a quarantine area for a period of 21 days. Being a wild animal and accustomed to open spaces, in an attempt to escape, went through a window with grille and fractured its right leg. He was found near the quarantine area, in a state of lethargy and was transported to a specialized veterinarian (Fig. 3.a). He had a rupture of the femur in two places, with bone chips that have pierced the muscles and skin. By operation, the bone was fixed with a rod attached to the round ends (lateral condyle) of the femoral bone.



Figure 3. a) - Mouflon with open fracture (orig.).

Figure 3. b) - Mouflon with operated fracture (orig.).

Figure 3. Mouflon with right hind fractured.

After the surgery, when anaesthesia went off, it was introduced into the enclosure, with other specimens (Fig. 3.b) and it adapted fast to the group. The affected foot was held off the ground about a month, after that it started to support on it. After six months, the foot was effectively used only in emergency or when it was forced to run with the group. Locomotor differences are hardly noticeable after one year, even for those who know the case.

Table 2: Types of injuries.

Wound type	Description	No. of specimens	Age (years)	Sex	Cause	Effect
Crush wound	Concussion by hitting	6	3-7	M	Fight/rut	Healing in 1-2 weeks
Torn wound	No such case	-	-	-	-	-
Cutting wound	Cutting caused by protruding wire	2	3-4	M	Escaping	Healing in 2-4 days
Closed fracture	Fracture of ribs, lung perforation, diaphragm rupture, internal bleeding	1	12	m	Fight	Death in 10-12 min.
Comminuted fracture	Femoral bone, open fracture	1	2	m	Escaping	Healing, after surgery 1 year

Analyzing all cases of mechanical trauma, it may be observed that all cases were due to the struggle for reproduction or fight for survival / defense. All 10 cases of mechanical trauma were registered at males (Table 2.). Those 10 specimens fall into three age classes: juvenile (1 specimen), adult (8 specimens), senescence (1 specimen).

During the study, 3 problems due to environmental conditions have been highlighted.

One problem mentioned by many works (COTTA et al., 2001; UNICI et al., 2009) is the excessive growth of the hoof and hoof deformation at the mouflon that live on other type of soil than the rocky one or with rock at surface.



Figure 4. Female with grown and deformed hooves. (orig.).

At Negureni, because the substrate of the soil is rough in many areas, it was not registered an excessive growth of the hoof (Fig. 4.) At the specimens from C. M. S. N., it was registered a higher growing trend in case of the old females. There were no cases of excessive nail growth for the specimens of up to 3 years. In hunting complexes, the mouflon with an excessive nail growth are captured, the hooves are trimmed and they are proposed for selection.

The mouflon has a low resistance to moisture. The rainfalls, during spring or summer, when lambs are small, cause most deaths. The lung congestion is a pulmonary alveoli inflammation and is often associated with pleura contribution. It resembles pneumonia, because it is caused by the same microbial agent - pneumococcus. The mouflon does not seek shelter in case of rain, but only in case of downpour, storms or heavy snowfalls.

Hypothermia may occur, because the mouflon does not make shelters. They seek shelter under branches of trees or shrubs or at the base of the cliffs. The risk of hypothermia is very high when the temperatures decrease below  $-10^{\circ}\text{C}$  for a longer time and the organism is weak. In this case lambs may die.

## CONCLUSIONS

The mouflon analysed effectively have had as the starting core a small number of specimens and thus the actual specimens are characterized by genetic abnormalities due to the inbreeding.

In springtime, non-specific enteritis may occur, due to the change of feed and, in some cases, stress. The assessment of health and hygiene is mandatory for the mouflon specimens living in semi-freedom conditions.

The mouflon has remarkable capacity of recovery/healing in case of physical and mechanical trauma. Resilience of specimens that suffered serious injuries (fractures of limbs) is remarkable.

A summary of lesions/injuries of different biological units and systems reveals some macroscopic changes that can be presented in future studies/works of wild ruminant species pathology.

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