ANNALES
UNIVERSITATIS MARIAE CURIE-SKŁODOWSKA
LUBLIN – POLONIA

VOL. XXVII (4) SECTIO EE 2009

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European mouflon (*Ovis orientalis musimon* Schreber, 1782) in the ecosystem of Lower Silesia

Muflon europejski (*Ovis orientalis musimon* Schreber, 1782)
w ekosystemie Dolnego Śląska

Summary. European Mouflon (*Ovis orientalis musimon* Schreber 1782) introduced at the beginning of 20th century in Lower Silesia, in the number of several heads, is now quite a large population, whose numbers are estimated at more than 1,900 animals. It inhabits the forests in Lower Silesia in different ranges of the Sudety Mountain, and here, mainly in the Sowie Mountains, Wałbrzyskie Mountains and Kaczawskie Foothills. Despite the seemingly large population, it lives in isolated subpopulations in remote areas. Isolation is due to both the „settled" lifestyle of mouflons and a fairly dense network of busy roads, not conducive to animal migrations. The natural consequence of this situation is increase of inbreeding of these groups, with easily foreseeable consequences. There are also, though rarely, problems caused by the neighbourhood flocks of sheep grazing in the summer season on meadows. The mouflon rams mated with sheep have fertile offspring and it may pose a threat to the rational breeding of domestic sheep.

Key words: mouflon, Lower Silesia

INTRODUCTION

Living in the wild in the Mediterranean area European Mouflon (*Ovis orientalis musimon* Schreber, 1782) as a result of the direct introduction live now in mountainous areas of many European countries. But first, the eighteenth-century import of mouflons from Corsica and Sardinia to the Habsburg Monarchy, resulted from plans to display the species in various zoos. Thus, in subsequent years, moulfons were exported to zoos in Germany, France and others. In the zoological garden in Wroclaw the first mouflon appeared in 1905 and it was a ram originating from Corsica [Piasecki 2005].

Imports carried out later by many European countries, such as in the nineteenth and twentieth centuries, were designed to enrich the genre of game, and also to obtain hybrids with the domestic sheep with wild game values, providing valuable hunting trophies like characteristic mouflon horns (in Polish „ślimy"). For example, in North America (Texas) the original European Mouflon was crossed with the Asian Mouflon (urial – *Ovis orientalis vignei* and argali – *Ovis ammon ammon*) and course-wool sheep breed: Blackbelly Barbados and Rambouilliet [Nowicki *et al*. 1995] creating a barbado sheep. Today the population of these sheep is over 8.500 individuals [Piegert and Uloth 2000]. At the same time, an interesting observation is the positive effect of the crossing (bastardization) of species with different number of chromosomes (mouflon 2n = 54, argali 2n = 56, urial 2n = 58), because the offspring are fertile. The phenomenon of the reduction of chromosomes, with tendency to characteristic number for mouflon, is observed.

In the original place of its occurrence mouflon was breed in nature reserves and several private manors. Thanks to the protection regulations, the regress observed in the end of the twentieth century was resolved and its abundance in Sardinia, for example, is around 1.100–1.600 animals, and in Cyprus around 1200 animals [Matschei 2002]. In contrast, the total number of clear mouflons is over 100.000 now and 90% of the population lives in the hunting grounds of Europe, mainly in the Czech Republic – 17.500, Germany – 15.600 and Hungary – 11.000 [Piasecki 2005]. The Polish population is estimated at approximately 3.000 animals and 68% of individuals is located in the Lower Silesia [Łabęcki *et al.* 2007]. The rest lives in a large dispersion in the provinces: Kujawsko-Pomorskie, Opolskie, Podkarpackie, Pomorskie, Warmińsko-Mazurskie and Wielkopolskie.

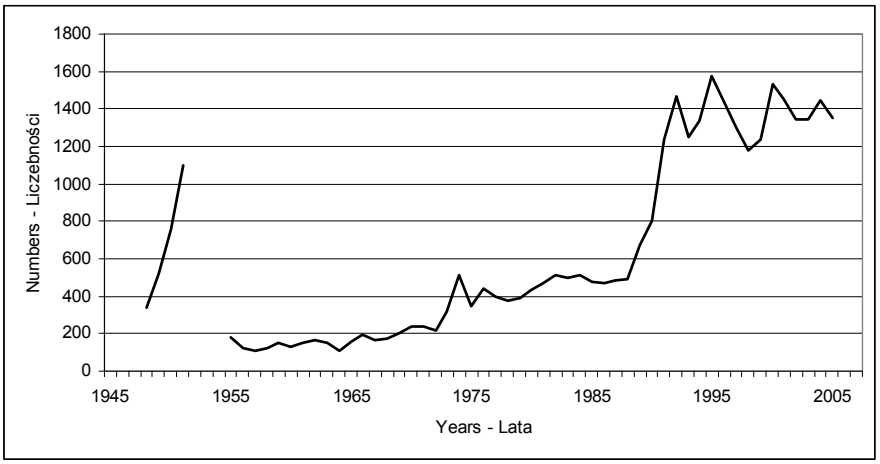
In the Lower Silesia the first mouflons appeared in the early twentieth century in the estates of great land-holders. In 1902, Count von Seidlitz-Sandreczki brought, from the Slovak hunting ground Nagy-Appony, 5 mouflons (2 rams and 3 ewes) to his place in the Sowie Mountains in the region of Bielawa [Szczepkowski 1951]. Those mouflons were kept in pens and after the multiplication they were released to nature in the year 1929 [Schmidt 1935]. Also the other landowners followed him. In the years 1912–1913 to the property of Schaffgotsch in the vicinity of Jagniątków (Karkonosze Mountains) a few mouflons were brought, which were released into a hunting ground in 1921. In 1913 the Prince von Pless to the 20-acre enclosure (Wałbrzych Mountains) bought a few mouflons, which were got to the hunting ground in 1914. In the period 1928–1929, around the massif of Śnieżnik Kłodzki, 9 mouflons were brought, which flock, to the year 1937, increased to 250 animals [Uloth 1976, Maciejewski 1988]. All imports came mainly from the Slovak and Hungarian hunting grounds [Uloth 1976]. Another transport to the property of Schaffgotsch, this time directly from Corsica, had a place in the year 1935.

CURRENT SITUATION

After the II World War in 1945 about 500 mouflons lived in Karkonosze Mountains, and around 600 animals in the Kłodzko Valley. Poaching, and also lack of human care particularly during the snowiest winters caused that by the year 1948 only 339 mouflons survived, but is also possible that some animals moved into the Czech part of Sudety, finding better living conditions there. High risk for herds of mouflons were also packs of loitering dogs. How big threat to mouflons, especially for females with lambs, are loitering dogs Schmid informed as early as 1935, describing the wild dogs hunted on mou-

flons It was not until the early 50. of twentieth century, thanks to the started fight against poaching and loitering dogs, as well as thanks to the feeding wildlife in winter, the number of mouflons population began to increase rapidly and soon exceeded 1.000 individuals. Unfortunately, in subsequent years, the number of mouflons collapsed again, and their number in 1957 decreased to 110 animals. Renewed and continued growth in their number is observed from 1965 to the present day. On 15th March 2004 in the Lower Silesia there were 1.447 wild living mouflons, including 806 rams and 641 ewes. In 2007, the total number of mouflons in the Lower Silesia slightly decreased and amounted to 1.324 individuals.

The mouflon population in the Lower Silesia in the postwar period is summarized in Fig. 1 on the basis of data collected by Szczepkowski [1951] for the years 1945–1950, the Regional Directorate of State Forests in Wroclaw, for the period 1955–2003 [Łabęcki 2003], and the publication of Łabęcki *et al*. [2007] for the year 2007.

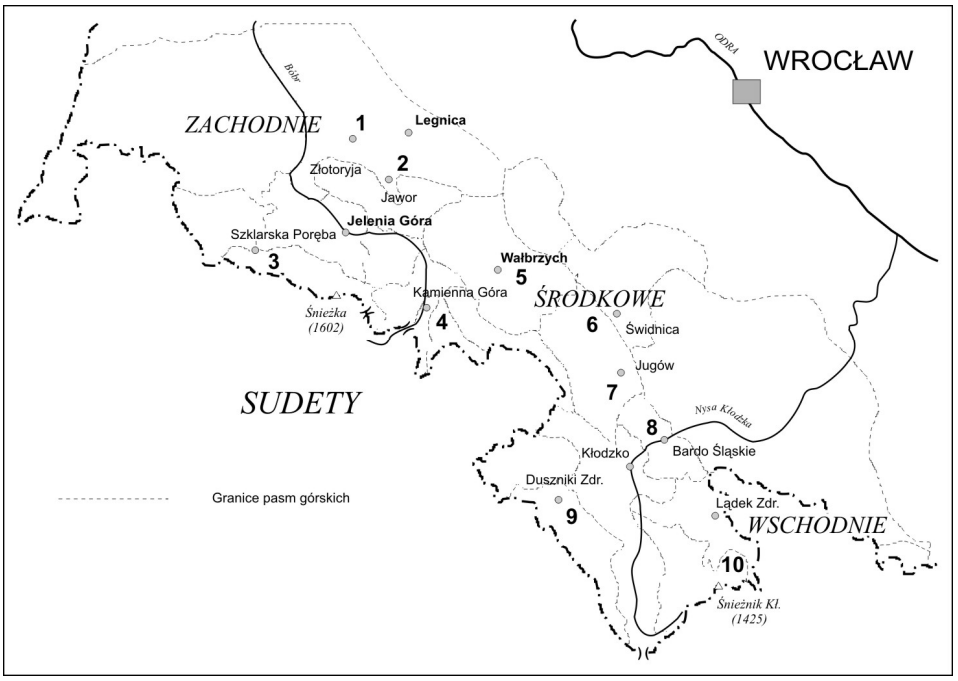


1945 – 1100 indiv. – szt.
1946, 1947, 1952, 1954, 1954 – lack of data – brak danych,
1955, 1961 – estimated value [Maciejewski 1988] – wartość szacunkowa [Maciejewski 1988]
2004 – oral report from L. Łabęcki from Regional Directorate of State Forests in Wroclaw – informacja ustna L. Łabęckiego z Regionalnej Dyrekcji Lasów Państwowych we Wrocławiu)

Fig. 1. Changes in mouflon population in Lower Silesia in the years 1945–2007
Rys. 1. Zmiany stanu pogłowia muflonów na Dolnym Śląsku w latach 1945–2007

Currently in the Lower Silesia there are several isolated sub-populations, which often occur in remote mountain ranges. These populations are not integrated, what probably is a result of „settled" lifestyle of mouflons, in terms of sufficient feed, a large urbanization of mountain regions in the Lower Silesia, and also the network of busy roads and other obstacles, detering animals of the crossing. The main areas of occurrence of mouflon in the Lower Silesia is presented in Fig. 2.

Settled lifestyle of mouflons, among others is confirmed by telemetric observations conducted in 2006 by Frąckowiak *et al*. [2007]. We know, however, that in the summer mouflons live in the family groups, called „gajna", consisting of females and young males. In autumn, these family groups merge into larger herds called in Polish „kierdel". Older males live in the „bachelor" groups or alone. With the beginning of the reproductive season males join to flocks, in which they are by the spring.



Kaczawskie Foothills – Pogórze Kaczawskie (1. Złotoryja, 2. Jawor), Karkonosze Mountains – Karkonosze (3. Szklarska Poręba), Kamienne Mountains – Góry Kamienne (4. Kamienna Góra), Wałbrzyskie Mountains – Góry Wałbrzyskie (5. Wałbrzych), Sowie Mountains – Góry Sowie (6. Świdnica, 7. Jugów, 8. Bardo Śląskie), Bystrzyckie Mountains – Góry Bystrzyckie (9. Duszniki Zdrój), Massif of Śnieżnik – Masyw Śnieżnika (10. Lądek Zdrój)

Fig. 2. Subpopulations of mouflons (according to forest inspectorates) in Lower Silesia
Rys. 2. Subpopulacje muflona (nadleśnictwami) na Dolnym Śląsku

The mainstays of mouflon are overflow mountain forests at an altitude from 300 to 1.000 m above sea level, covered with mixed trees with a rich undergrowth. The main feed is grass and herbs, also leaves, young branches of trees and shrubs, bark. Mouflon is not a strong competitor to native game, because of its better-developed proventriculuses which allow to use harder palatable feed, even ligneous.

OWN OBSERVATIONS

For the best density of animals in the habitat is considered maximum 6 animals/100 ha [Dręboszak 1988], although the German breeders suggest that with the very intense feeding the maximum may be 11–12 animals/100 ha [Gärtner 1999]. Confronting the number of listed above subpopulations of mouflon with the surface of habitat in different forest inspectorates (Tab. 1) it can be concluded that at least in the one forest inspectorate: The Forest Inspectorate Wałbrzych, mouflon density in 2003 exceeded the maximum 6 animals/100 ha. In other forest inspectorates the density slightly exceeded the maximum – The Forest Inspectorates: Jugów and Bardo Śląskie, in the other was far less than the maximum.

Table 1. The surface of the main habitats in comparison with the number of mouflon sub-populations in Lower Silesia in 2003
Tabela 1. Powierzchnia głównych siedlisk w zestawieniu z liczebnością subpopulacji muflona na Dolnym Śląsku w 2003 r.

Forest inspectorate Nadleśnictwo	Surface of forest habitat Powierzchnia siedlisk leśnych (ha)	Number of mouflons Liczba muflonów	Denisity of animals per 100 ha Obsada zwierząt na 100 ha
Złotoryja	4940.92	30	0.6
Jawor	6432.70	243	3.8
Szklarska Poręba	1183.19	18	1.5
Kamienna Góra	1431.27	17	1.2
Wałbrzych	3102.92	306	9.9
Świdnica	6595.80	274	4.2
Jugów	1569.64	104	6.6
Bardo Śląskie	4352.28	276	6.3
Duszniki Zdrój	1351.11	24	1.8
Lądek Zdrój	1512.23	41	2.7

The territorial isolation of moufflon subpopulation has probably also the negative effects resulting from the crossing individuals in close relationship. The possible inbred causes homozigosity of number of the unfavorable genes, which weaken in effect the viability of animals, even with the lethal effects. Such situation was observed, inter alia, in subpopulation of mouflon living in the Sowie Mountains, where occured a feature of incorrectly twisted horns of males, which should be includeed to lethal feature. Spiral twist of horns, instead of twisting outside, is twisting inside, sticking, after 3–4 years of life, into the animal skull. According to Nowakowski [2003] this is the result of an inbred, which can only counteract by increasing heterozygosity through import of new individuals. It may be recalled that the indicated subpopulation was created at the beginning of the twentieth century as a result of import of 5 individuals. However, it can be thought that introduction of 177 new, unrelated individuals, done in 2006 [Pieśniarski *et al*. 2007], prevent the consolidation of this feature. Also important is planned shooting (selection) of rams with the observed deformation of the horns.

The interesting conclusions arise from the observation of mouflons reproduction. Like by the other sheep, the mating season is associated with the shortening day, and usually falls in autumn. Pregnancy lasts from 147 to 160 days and females lamb in the spring. It appears, however, that because of the differences in climate the European mouflons start reproduction earlier than Asian mouflons. Similar differences are observed among European mouflons. After Briederman [1992] in Germany mouflons are born at the end of March and in April. In Poland, according to Godlewski [2002] lambings fall in April and May.

Mouflon males do not have socalled the physiological infertility and male are able to fertilize the female throughout the year. The first ovulation in females may occur even in the year of birth, and the condition of its occurrence, indicated by the Santiago-Moreno, and Burnet [2000], is achieving a weight equal to 82% of body weight of adult sheep, ie, 23.8 kg. This weight is achieved by the young females at about 248 days of life. Although in Poland young females start the reproduction after the second year of life. The young rams start the reproduction in a similar age.

It is observed, however, that staying in „bechelor" groups young rams may came to the pastures in the vicinity of forests and fertilize the domestic sheep ewes. This phenomenon was observed, inter alia, in the Sowie Mountains (own observations), where the concentration of mouflons is the highest. It has to be stressed that for the male the fence of more than 1-meter height is not a barrier. Born bastards were white and in the first days after birth, difficult to distinguish from pure-bred lambs. Only the next days showed the slower growth and development of bastards, which allows to eliminate them from the flock. It should be noted, however, that the domestic sheep reproduction maintained under such conditions can negatively influence on the desired effects of breeding. At the same time, an uncontrolled migration of domestic sheep, fertilized by mouflons may be a cause of bastardization of mouflon population, with the incomparable loss in breeding – this time among mouflons.

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Streszczenie. Introdukowany na początku XX w. na terenie Dolnego Śląska w liczbie kilkunastu sztuk muflon europejski (*Ovis orientalis musimon* Schreber 1782) stanowi dziś dość sporą populację, której liczebność ocenia się na przeszło 1900 sztuk. Miejscem jego występowania są lasy w różnych pasmach Sudetów, a przede wszystkim w Górach Sowich i Górach Wałbrzyskich oraz na Pogórzu Kaczawskim. Populacja ta, mimo zdawałoby się sumarycznie dużej liczebności, żyje w odległych terytorialnie, izolowanych subpopulacjach. Izolacja ta wynika zarówno z „osiadłego" trybu życia muflonów, jak i urbanizacji terenu oraz innych przeszkód terenowych niesprzyjających migracjom zwierząt. Naturalnym skutkiem staje się zatem wzrost spokrewnienia wewnątrz subpopulacji, z łatwymi do przewidzenia konsekwencjami. Odnotowuje się także, choć sporadycznie, problemy wynikające z sąsiedztwa stad owiec hodowlanych, wypasanych w sezonie letnim na pastwiskach podgórskich. Są nimi dzikie kojarzenia tryków muflona z owcami hodowlanymi, które z racji płodnego potomstwa mogą stanowić zagrożenie dla racjonalnej hodowli owiec i muflonów.

Słowa kluczowe: muflon, Dolny Śląsk