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Does with antlers, i.e. intersex in roe deer (*Capreolus capreolus* L.) – description of cases

Kozy z porożem, czyli obojnactwo u saren (*Capreolus capreolus* L.) – opis przypadków

Summary. The study aimed at describing single cases of intersex occurring in roe deer in a form of secondary sexual characteristics, i.e. antlers, which is the feature immanent to males of that deer species. Four cases of roe deer females (*Cepreolus capreolus*) obtained in the Lublin province have been described. The bone growths forming pedicles and antlers have been found on frontal bones of the skulls of those roe deer females. All cases concerned older females with the carcass weight below average for that region. In the doe that developed typical antlers, these antlers were covered with velvet, i.e. the tissue characteristic of antlers in deer males during their growth. In the remaining cases, both growths and vestigial antlers were covered with typical hair coating. Evaluation of other sexual traits allowed to conclude that the studied cases should be classified as pseudohermaphroditism, i.e. alleged intersex. Despite the fact that intersex among game animals is not frequent, it should not be treated as completely exceptional, which has been confirmed by studied cases along with similar ones presented both in the Polish and other European literature references.

Key words: roe deer, antlers, hermaphrodites, Poland

INTRODUCTION

Antlers as a secondary sexual characteristics, can be found exclusively at bucks, except from reindeer (*Rangifer tarandus*), for which does also develop the antlers, although less impressive than for bucks, and this determines the dimorphism within these species. Being a specific osseous formation, it has enthralled people for a long time, particularly because it cannot be found at other groups of animals. In addition, such a great interest results from a fact that developing and falling off the antlers happens in cycles, which is closely associated with reproduction seasons at particular species, and at the same time it confirms its important roles in natural selection processes [Jaczewski 1981, Pielowski 1999].

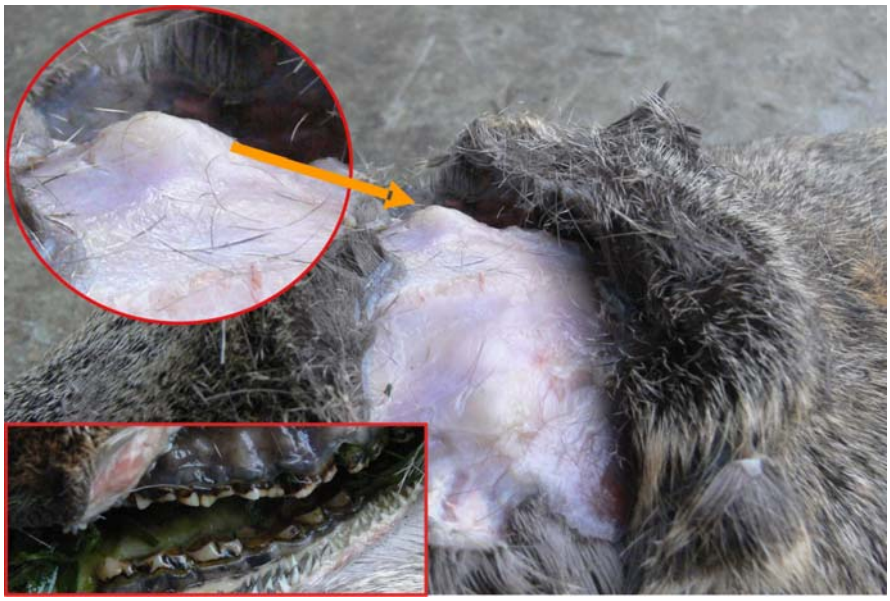
Growth and development of antlers – like any other tissue of an organism – is determined genetically and is induced due to hormones, but since it occurs exclusively at wild animals, environmental factors exert the greatest influences on growth, size, and form of antlers. Size and form of antlers are found to be the species features, although due to the fact that annual developing of the antlers proceeds under diverse environmental conditions, various deviations from commonly accepted norms can be observed [Wislocki *et al.* 1947, Jaczewski 1981, Pielowski 1999, Dziedzic and Flis 2007, Flis 2009b, 2010, 2011]. Deformations are examples of anomalous development of antlers: the reason can result from diverse environmental conditions of both biotic and abiotic character [Flis 2007]. At the same time, a biology of deer includes small number of cases of developing the antlers by does as well. These cases usually refer to the roe deer females. The phenomenon is often associated with so-called hermaphroditism, i.e. occurrence of both male and female reproductive glands at a given individual and it appears mostly at older animals [Mysterud and Østbye 1999, Flis 2009a, Pajers *et al.* 2009, Wajdzik and Kubacki 2011]. It is also worth underlining that two forms of hermaphroditism are distinguished: true and pseudo-hermaphroditism. Considering the true hermaphroditism, individuals have all genitals characteristic both for a male and female, and such cases happen extremely rarely at vertebrates. On the other hand, the pseudo-hermaphroditism is characterized by the presence of exclusively secondary and tertiary sexual traits at a given individual [Wislocki 1954, 1956, Pajers *et al.* 2009, Wajdzik and Kubacki 2011].

MATERIAL AND METHODS

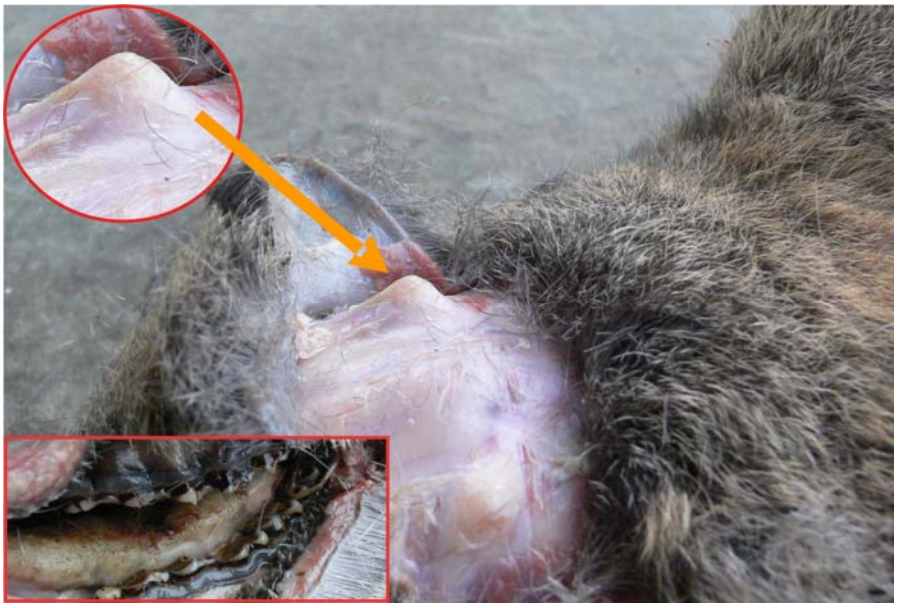
Material for study comprised of 4 roe deer's skulls obtained in hunting circles localized in Lublin province. The organoleptic evaluation of the skulls revealed the symptoms of developing the antlers. The does were obtained under diverse environmental conditions during years 2008–2011. Organoleptic assessment along with the evaluation of photos of described cases was performed. In a case of doe obtained in 2011, the X-ray of the skull with antlers was additionally made to determine the anatomical structure of the case. In all cases, the animal's age was estimated on a base of organoleptic method including characteristic changes of molars and premolars, which is commonly used in hunting practice [Przybylski 2008]. Moreover, data on animal's carcass weight were collected.

RESULTS

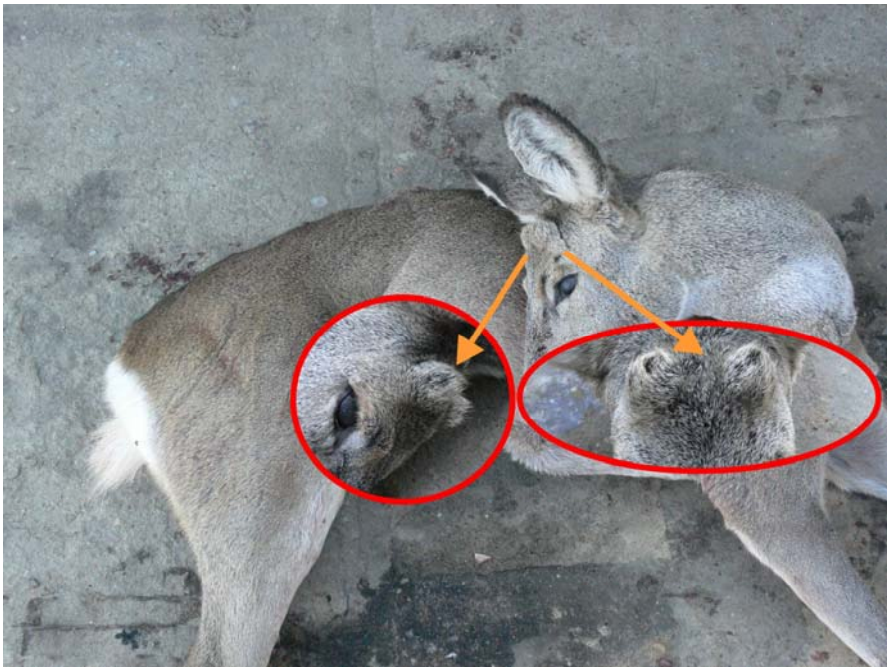
First of analyzed doe's skulls was characterized by the presence of small growths on frontal bones. They were prominent under the hair cover, which was associated with occurrence of vestigial pedicles, on which antlers at roe deer bucks grow annually. To illustrate this case, some part of hair coating along with the skin was removed and measurement of the growths revealed their height for about 10 mm (Phot. 1). At the same time, surface appearance of the growths showed that they were uniform bone tissue in combination with frontal bones of the skull. The doe's age, evaluated on a base of characteristic changes of molars and premolars, was 8 years. The carcass weight, i.e. body weight without inner organs that were removed during slaughter, amounted to 16 kg.



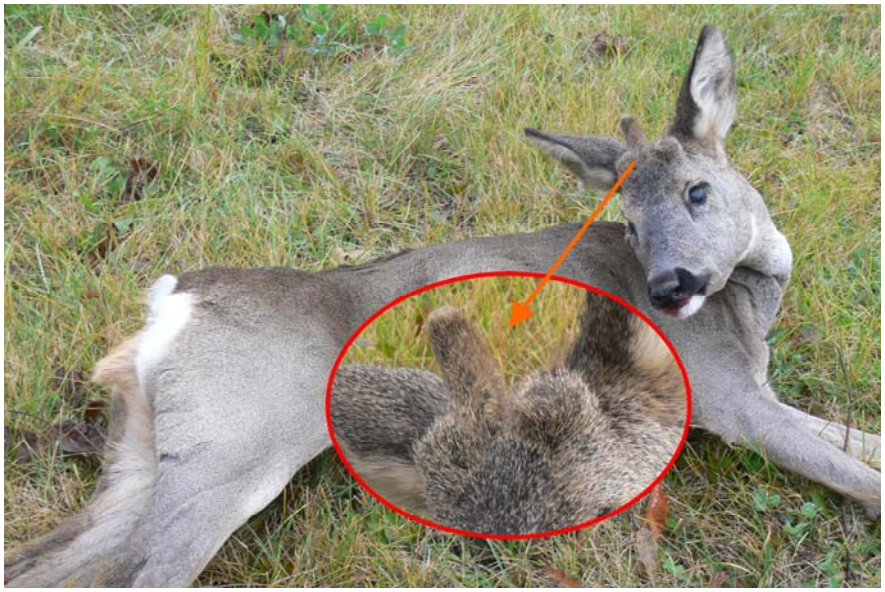
Phot. 1. Skull of 8-year-old doe with small pedicles visible just under the skin
Fot. 1. Czerep ośmioletniej kozy z niewielkimi możdżeniami nieznacznie widocznymi pod skórą



Phot. 2. Skull of 7-year-old doe with pedicles situated under the skin, while visible in morphological structure
Fot. 2. Czerep siedmioletniej kozy z możdżeniami znajdującymi się pod skórą, lecz widocznymi w budowie morfologicznej



Phot. 3. Ten-year-old doe with visible pedicles and vestigial antlers
Fot. 3. Dziesięcioletnia koza z widocznymi możdżeniami i śladowym porożem



Phot. 4. Nine-year-doe with developed antlers with velvet
Fot. 4. Dziewięcioletnia koza z wykształconym porożem w scypule

Phot. 5. Radiological picture of doe's skull with visible internal structure of antlers
Fot. 5. Obraz radiologiczny czerepu kozy z widoczną budową wewnętrzną poroża

Another case comprised of the skull of a doe from Pulawy surroundings. That roe deer female, as similar as in previously described case, also had small growths on frontal side of its skull (Phot. 2). These growths were slightly higher than in previous case at their average height of 17 mm. The animal's age was assessed for 7 years, while carcass weight for 14 kg. The next year, a doe with pedicles and additional small antlers developed on frontal bones of the skull, completely covered with skin and hair coating, was obtained in one of the hunting circles of Lublin province (Phot. 3). However, hair coating on antlers was different from the velvet, i.e. typical tissues that covers antlers of deer males during its growing, instead it was common hair cover characteristic for this wild animal species. Such specific vestigial antlers were of about 40 mm high, the doe's age was evaluated for 10 years, and carcass weight for 16 kg.

Doe with antlers was obtained in one of the hunting circles in Lublin province in 2011, as well (Phot. 4). Antlers were improperly developed on the left side of the skull and it was in a form of small growth on a pedicle covered by hair coating. On the right side, developed antlers of about 80 mm covered by typical tissue present at roe deer males during the growth – velvet. In order to determine the anatomical structure of the antlers, it was X-rayed (Phot. 5). The radiological image unveiled that typical pedicles, on which the antlers developed, were present both on the left and right side of the frontal bones of the skull. Small, about 5 mm high bone growth, that was also observed during organoleptic determination, occurred on the left side of pedicle, whereas fully developed antlers built from bone tissue was present on the right pedicle. In addition, typical growth callus (wreath) related in morphological structure of deer male's antlers to as "rose", was found on a border between the antlers and pedicle. That part of antlers developed only on a half of pedicle width on internal side of the skull, while only growth forming the rose occurred on the other side. Both sides were divided by a small yet well-defined fissure. Age of that doe was assessed for 9 years, while its carcass weight amounted to 17 kg.

In all studied cases, due to a fact that material was dissected, there was no possibility to make a complex evaluation of reproductive organs. However, phenotypic elements associated with secondary sexual characteristics, except at pedicles and antlers, gave evidence that no symptoms of male reproductive organs could be found, thus examined animals had properly developed reproductive glands typical for females. Such cases are said to be pseudo-hermaphroditic. Although, because the does were obtained by means of selective hunting and had not any progeny, it may also prove that disturbances of sexual cycle could occur on them, which can be directly attributed to hormonal malfunctions and intersex presence.

DISCUSSION

In a view of presented data, it can be concluded that not all secondary sexual characteristics, including pedicles and developed antlers, are features associated with a sex, because they can occur in different forms also at deer females [Wislocki 1954, Wislocki 1956, Mysterud and Østbye 1999, Flis 2009a, Pajers *et al.* 2009, Wajdzik and Kubacki 2011]. At the same time, these specific anomalies referred to older animals in all studied cases, which can confirm that it was a consequence of subsequent pregnancy events, often twin ones, in the wild animal species, and associated hormonal disturbances manifesting as secondary sexual characteristics appearance in a form of pedicles and vestigial antlers, which are typical for males of the species. Furthermore, environmental conditions seem to have some influence that can be observed also in bucks as various modifications of the processes of antlers growth and development [Kjellander *et al.* 2006, Toïgo *et al.* 2006, Dziedzic and Flis 2007, Flis 2010, 2011]. The animal's carcass weight was below average for that species females in Lublin province [Dziedzic and Flis 2007, Flis 2009b, Flis 2010, 2011].

Despite of the fact that intersex is not frequently found among wild deer animals, it should not be counted as completely exceptional phenomenon, which was confirmed by above described cases, as well as examples presented both in Polish and foreign litera-

ture references [Wislocki 1954, Wislocki 1956, Mysterud and Østbye 1999, Flis 2009a, Pajers *et al.* 2009, Wajdzik and Kubacki 2011].

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Streszczenie. Celem badań było opisanie pojedynczych przypadków obojnactwa u saren w postaci obecności drugorzędowej cechy płciowej, jaką jest występowanie poroża, którą przypisuje się samcom tego gatunku. Opisano cztery pojedyncze przypadki samic sarny (*Cepreolus capreolus*) pozyskane na Lubelszczyźnie, u których na kościach czołowych czaszki stwierdzono występowanie narośli kostnych w postaci możdżeni oraz poroży. Wszystkie przy-

padki dotyczyły samic starszych, o masie tuszy poniżej przeciętnej dla tego regionu. Jedna z kóz wykształciła typowe poroże, które pokryte było scypułem, czyli typową tkanką okrywającą poroże podczas wzrostu u samców jeleniowatych. W pozostałych przypadkach zarówno narośle, jak i śladowe poroża okryte były typową powłokową okrywą włosową. Ocena innych cech płciowych pozwoliła na wnioskowanie, iż przypadki te określić należy jako pseudohermafrodytyzm, czyli obojnactwo rzekome. Pomimo iż obojnactwo wśród zwierząt łownych nie jest zjawiskiem częstym, nie należy go zaliczać do przypadków zupełnie wyjątkowych, czego potwierdzeniem są opisane przypadki, jak również podobne przypadki prezentowane w piśmiennictwie zarówno w Polsce, jak i w niektórych krajach europejskich.

Slowa kluczowe: sarna, poroże, hermafrodytyzm, Polska