

## Fragmenta Theriologica

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THE ROLE OF ANTLERS IN ESTABLISHMENT OF THE RED DEER  
HERD HIERARCHY

## ROLA POROŻA W USTALANIU HIERARCHII STADNEJ JELENIA SZLACHETNEGO

Changes in the herd hierarchy of red deer *Cervus elaphus* Linnaeus, 1758 were observed in an enclosure. Two males with normal cyclic changes of antlers and two castrates, with antlers always in velvet, were observed nearly one year. In winter the antlers of castrates underwent frequent frostbitten, necrosis and partial loss above the point of freezing. As a result, the animals in the observed group changed the mass of their antlers relatively to each other. The observations indicate that the size of antlers is important factor in the establishment of herd hierarchy.

Most authors regard antlers as an impressive organ (Hediger, 1946; Bubenik, 1966; Lincoln *et al.*, 1970) important in the process of establishment of herd hierarchy.

The present observations were aimed at the explanation of the importance of cyclic changes in the antlers of red deer (*Cervus elaphus* L.) in the establishment of herd hierarchy.

The investigations on this subject were carried out from November 1968 to July 1969 in the Experimental Department of the Institute of Genetics and Animal Breeding PAN at Popielno (52°43' N 21°36' E). The experimental herd consisted of 5 individuals which were kept in a fenced pen 20×50 m. The herd included: one female, three male half-brothers aged 3 years from one father, and a two-year-old male. Among the three brothers, one had normal antlers (stag A). The other two were castrated (C and D), their antlers were permanently in velvet during the whole period of observation. The two-year-old male was named B.

During the winter, the antlers of the castrateds were repeatedly frostbitten. This was followed by necrosis and subsequent sequestration and casting off of the frostbitten parts. As a result, depending on individual susceptibility of the castrates to cold, they had on their heads permanently in velvet but changing in size. Moreover the normal cycles of males A and B caused often changes in the ratio of antlers size among all deer in this enclosure.

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Simultaneously observations were made on the changes in the hierarchy between these animals. The hierarchy was established at the feeding trough after supplying food. The dominating animal drove away other males and stayed alone at the feeding trough. Simultaneously, the hierarchy was estimated by an alternative method after causing a state of great confusion in the herd when a man entered the pen. In this case the animals assembled in one corner of the pen and the dominating male drove away the other individuals who occupied a lower position in the herd hierarchy. The results of both methods of estimation of herd hierarchy were identical. The female present in the herd during the whole period of observation, never took part in the fighting for social position.

#### RESULTS

Before the period of great frosts in the winter of 1968/1969 the herd hierarchy was as follows: *A, D, C, B*. On December 15, 1968 castrate *D* lost the major part of his right antler due to frostbite. On his head remained the burr with approximately 3 cm of beam, as well as brow tine and also the whole left antler (permanently in velvet). Subsequently after only a few hours castrate *D* became subordinated to *C*, other hierarchy positions remaining unchanged.

On February 3, 1969 castrate *C* got frostbitten and lost part of his left antler above the tray tine. As most of this antler remained on his head, the order of hierarchy remained unaltered: *A, C, D, B*.

On February 9, 1969 due to frostbite *D* lost the major part of his left antler, symmetrical to the right one lost on December 15. This resulted in the fall of castrate *D* to the bottom of the hierarchy. After the loss of the left antler in deer *D*, a demonstration of strength occurred between him and deer *B*. The encounter took place at the feeding trough, a few minutes after the person supplying the food had left the pen. The two animals stayed for a while opposite each other, then they simultaneously reared up on their hind legs, and finally castrate *D* retreated without fight. Castrate *D* weighed approximately 130 kg, while deer *B* weighed ca 70 kg but having hard antlers took his place at the feeding trough.

On March 8, 1969 the dominating stag *A*, frightened by a man, killed himself by hitting his head against the fence. The hierarchy was then established in the following order: *C, B, D*. This state persisted until May 12, when deer *B* cast his antlers. This immediately caused his fall to the bottom of the hierarchy. The new antlers of deer *B* began to grow quickly, while the antlers of the castrates did not show big changes after the winter losses. By the end of May the antlers of stag *B* reached a size similar to that of castrate *D*. However, changes in the hierarchy occurred only in the second half of June when the antlers of deer *B* were two times bigger than those of *D*, despite the fact that earlier male *B* had made several attempts to recover his position. Hence in the second part of June the hierarchy was the following: *C, B, D*.

Observations were stopped in the first decade of July on account of the sudden death of the dominating castrate *C*. At that time the size of the antlers of deer *B* exceeded the size of antlers of the dominating castrate *C*. It should be added here that stag *A* had treated young male



*B* and castrate *C* and *D* in a different way. *B* was very often beaten and driven away while the domination of *A* over castrate *C* and *D* was shown only at the feeding trough. The demonstration of position over castrates was mild and limited to a threatening stance at the trough.

#### DISCUSSION AND CONCLUSIONS

The conclusions from the present observations are in agreement with those of Lincoln *et al.* (1970) that herd hierarchy depends on the stage and size of the antlers. On the other hand, observations presented above do not confirm the opinion expressed by Lincoln *et al.* (1970) that males with hard antlers always dominate over those with antlers in velvet.

The hierarchy among deer was also investigated by Hediger (1946) who ascribed to the antlers the function of an impressive organ. This statement is in agreement with the present paper. Hediger held the opinion that the male who lost his dominating position by shedding his antlers will try to recover in accordance with the growth of new antlers. The results obtained in the present work indicate that the deer who casts his antlers falls to the bottom of the hierarchy and can not return to his previous position if the loss of antlers is permanent. This suggests that permanent loss of antlers caused permanent changes in the hierarchy and confirms the assumption of Bubenik (1966) that herd hierarchy is formed during the growth of antlers and depends on the actual mass of the growing antlers.

The present observations indicate that the size of the antlers is important factor for the establishment of herd hierarchy. The slow changes as during the period of antler growth cause the social changes probably with a delay.

#### REFERENCES

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#### ATAVISTIC PATTERNS IN UPPER MOLAR OF THE PINE MARTEN

#### ATAWISTYCZNE WZORCE GÓRNEGO TRZONOWCA U KUNY LESNEJ

Two cases of an atavistic pattern in the first upper molar of the pine marten, *Martes martes* (Linnaeus, 1758), were found when the collection of carnivores in the Zoological Museum of Moscow University was examined. These cases are very interesting because they provide precise information on the evolution of the pine marten's molars.