

AGRESSIVE AND SUBMISSIVE BEHAVIOURAL ELEMENTS OF CAPTIVE WILD BOARS IN FEEDING SITUATION

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ABSTRACT – Aggressive and submissive behavioural elements of captive wild boars in feeding situation

Nowadays the interest for wild boar hunting especially achieving big and safe hunting bag is growing. It is the reason why many wild boar preserves or hunting gardens were established in the last decades. The density is determined by the interest of the maximum economic profit in most of the gardens regardless of what is optimal for the animals. The high density may cause a social stress, indicated *e.g.* by the fights, which may cause not only serious negative welfare consequences but decrease in productivity and less economic result consequently. The behaviour of wild boars in hunting gardens is poorly studied. The aim of our study was to describe and determine of the most important aggressive and submissive behavioural elements which may sign the stress level of the animals. The observations were taken in intensive wild boar gardens on feeding places at feeding times. We recorded with a video camera the animals and analyzed their behaviour with Solomon Coder. We described four aggressive (*running toward somebody, hit, chasing, bite*) and four submissive (*head lift, retreat, avoidance, escape*) behavioural elements. These elements can be ranked depending on time length and physical contact and show relation with the hierarchy order. We think that based on these elements, we can work out a guide to describe the stress level in wild boar gardens.

Keywords: wild boar, feeding situation, aggression, hierarchy, captivity

INTRODUCTION

Unfamiliar wild boars are mixed in hunting preserves to achieve high density and to satisfy huntings' requirements. During this process the game managers ignore the most important factors which might affect the behaviour of wild boars: the density and the aggressive interactions. Although many researchers agree with the crucial influence of these factors on social behaviour, but the experimental circumstances are not comparable in many times, because the variables are not defined accurately and different levels of aggression are taken into consideration.

The high density may cause many negative consequences. The individuals compete for the available sources, what can be feeding-, drinking- and bed places. The sources, which are limited in space, could create competitive situation, and this, may induce a social stress and aggression (MCGLONE, 1985; HUGHES ET AL., 1997). The availability of the resources and its distribution in the environment influence the frequency and intensity of the aggressive interactions and the spatial distribution of the animals (DONE ET AL., 1996; ESTEVEZ ET AL., 2002). The social stress and injuries lead to a reduced reproduction (MENDL ET AL., 1992), less ingestion, and a smaller bodyweight increase. The social interactions do not happen randomly within a group (DUGATKIN AND EARLEY, 2003). Domesticated species are capable in a low numbered group to identify their group mates individually and attack their

similar or lower ranked companions (FORKMAN AND HASKELL, 2004). The density and the group largeness were studied by chickens living in large groups. It was found that in larger groups where the individual identification was absent, the aggression and the stress increased (CHENG ET AL., 2003) and the chance of feeding by lower ranked individuals decreased (MCBRIDE, 1970). In many other studies opposite results were found, the aggression decreased with increasing group number (hens: HUGHES ET AL., 1997; NICOL ET AL., 1997; chicken: ESTEVEZ ET AL., 1997; pig: NIELSEN ET AL., 1995; TURNER ET AL., 2001). Different species show different kinds of fighting behaviour in spite of the evenly stable hierarchy within the group. Dwarf goats, for example, keep high level of aggression but its behaviour is more ritualized with low costs, contrary pigs fight less frequently but more seriously with higher costs (LANGBEIN AND PUPPE, 2004). However the aggressive behaviour of wild boars are poorly studied (BEUERLE, 1975; ALTMANN, 1989), the same behaviour of domestic pigs is investigated frequently (NIELSEN ET AL. 1995, ANDERSEN ET AL. 2004, PUPPE 1998).

ANDERSEN ET AL. (2004) studied with a model the aggressive behaviour of unfamiliar weaning piglets at different group sizes (6, 12, 24 piglets/group). The model predicted increasing number of fightings per individual at larger group sizes, but number of pigs out of fightings also increased significantly. They concluded that the increasing number of potential competitors it is more profitable not to fight for most of the animals. In large population the probability that a pig become a winner is low, but its benefit is relative high. So, more pigs will avoid fighting or the average number of fightings should decrease, but the intensity will increase. NIELSEN ET AL. (1995) studied the effect of increasing competition of domestic pigs at feeding places to the individual performance and behaviour with changing the number of pigs. 5, 10, 15, or 20 pigs were kept together for 29 days with one feeder. The average level of individual aggression was lower in the two larger groups on mixing day than in smaller groups. They used the following behavioural categories: aggression (bite, threat, push, knock with head, chase, and fight), displacement (mount, nose, push or bite the pig in the feeder) and mounting. The aggressive interactions were scored by unknown way but none of them were described.

The individual competing character (i.e. competitive ability, familiarity) increased the hierarchical aggression more strongly, than the ability to protect the sources (FRASER ET AL. 1995). PUPPE (1998) observed the behaviour of pigs in pairs to reveal the effect of familiarity (familiar or unfamiliar) and relatedness (unfamiliar related or unrelated) to the agonistic interactions (AI) at different pen regions (pen area and trough area). Similar aged (12 weekly ones) and weighted pigs were put together and their behaviour was recorded 3 days (daily 10 hours) after mixing. The familiar and unfamiliar pairs showed AI with similar frequency at trough area, while the unfamiliar pairs showed significantly more AI at pen area. They considered AI only with physical contact of two individuals like fight (head to head knock, head to body knock, parallel/inverse parallel pressings, biting) or displacement

The behaviour of wild boar may be different from domestic pigs (the level of aggression is not so strong possibly). We investigated wild boar sounder living in captivity. Our aim was to distinguish the aggressive and submissive behavioural elements and observe their recognition by independent observers. Then we studied the frequency of these elements depending on the rank position.

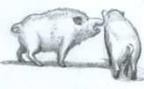
MATERIAL AND METHOD

We studied seven sows, including four wild boars and three crossbreds (Wild boar x Vietnamese pot-bellied pig). All of them have been living together for more than one year. We supposed that a stable hierarchy established among them. The examinations took place at the Horatius Animal Coordination Centre in Gödöllő. The test was made in their home pen and we reduced the daily food amount for 10 days to create a competition situation. We recorded their feeding behaviour daily for 20 minutes at the feeding-time (between 09:00h and 10:00h) with video camera positioned on a 2m high stand next to the enclosure. The sows have been used to the presence of humans, so we assume that the behaviour of them has not been influenced by the presence of the cameraman (who was also the experimenter). Each animal could be identified by its distinct physical characteristics. We set up a hierarchy among the sows based on observed wins and defeats per dyad. We analyzed the sows' behaviour with Solomon Coder. We analyzed the agreement of independent observers to the eight behaviour elements with Cohen-Kappa indices (MARTIN AND BATESON, 1993).

RESULTS

We could distinguish four aggressive and four submissive behavioural elements (*Table 1.*). In many studies bite is also used behavioural element so we applied the definition by JENSEN AND YNGVESSON (1998). Most of the studies distinguish hit depending on which body part it is directed against. We did not separate them.

Table 1. The observed behavioural elements in a feeding competition situation

Dominant	Definition	Submissive	Definition
Running toward somebody 	Fast approach towards an other sow with a closed mouth max. lasting for 2 seconds.	Head lift 	Standing in one place orienting onto the attacker with raising head and voice while contracting its body.
Bite 	One sow delivered a knock with the head against the head, neck or body of the other sow with the open mouth (Jensen and Yngvesson 1998).	Retreat 	Moving away (fast or slow) from the attacker, facing its direction. The distance of the displacement is max. 2 meter.
Chasing 	Fast approach towards an other sow with a closed or open mouth lasting for more than 2 seconds.	Avoidance 	The evasion of the other individual showing passive behaviour with changing the direction or stopping feeding.
Hit 	One sow delivered a knock with the head against the head, neck or body of the other sow with closed mouth.	Escape 	Runaway into a contrary direction of the attacker caused by any of the aggressive behaviours (see above). The distance is more than 2 meter.



Drawings: Balázs Csoma

The calculated Cohen-Kappa indices in *Table 2*.

Table 2. The calculated Cohen-Kappa indices

	Observer 1.	Observer 2.
Running toward sy	1,000	0,870
Hit	0,771	0,615
Bite	1,000	0,636
Chasing	1,000	0,636
Head lift	0,767	1,000
Retreat	0,814	1,000
Avoiding	0,611	1,000
Escape	0,847	0,619

Figure 1. shows the frequency of aggressive and submissive behavioural elements depending on the rank position.

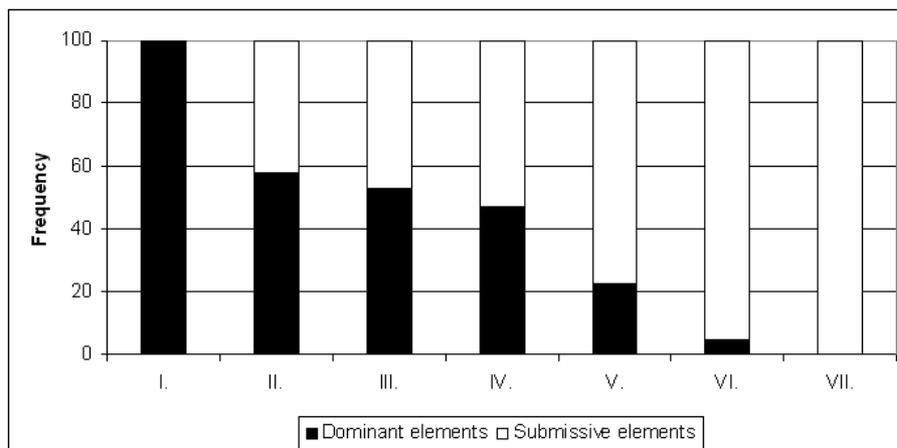


Figure 1. The frequency of aggressive behavioural elements of the seven sows

DISCUSSION

One of the biggest gregarious animals is the domestic pig and its ancestor, the wild boar, there is many studies on aggressive interactions with domestic pigs (i.e. NIELSEN ET AL. 1995; TURNER ET AL. 2001; PUPPE, 1998) but these studies have different variables and experimental circumstances. Most of the studies investigate the behaviour of unfamiliar pigs after mixing, in this case the aggression is more overt and stronger. Investigation of a group with stable hierarchy is more difficult, because the aggression is lower and not so overt. That's why sometimes it is difficult to compare these results and to draw a generally conclusion. Moreover it is difficult to apply these methods for studying wild boars. Compare previous studies (i.e. NIELSEN ET AL., 1995; ANDERSEN ET AL., 2004, TURNER ET

AL., 2001) we concluded that it is necessary to define the examined behavioural elements as accurate as possible. It is still under discussion that when observing agonistic interactions we should consider only the overt agonistic behaviour, like the fight, bite, and displacement with physical contact or other elements also, like threat and gestures of fears (LEHNER, 1996). LANGBEIN AND PUPPE (2004) think that we should focus only to the overt interactions, because they deliver clear and unambiguous results between various observers. Furthermore they claimed to be sure in an outcome of an agonistic interaction we should consider not only the aggressive interactions but also the submissive elements show by the receiver. Tuchscherer et al. (1998) defined submissive patterns (any signs of displacement, turning the body or the head away from the other individual and any kind of escaping) but many studies do not consider submissive behaviour (i.e. NIELSEN ET AL., 1995; ANDERSEN ET AL., 2004). SAEBEL (2007) described retreat (“ausweichen”) as passive aggressive behaviour. In our study we distinguish four aggressive and four submissive behaviour elements, seven of them have not been used before only *bite* (i.e. JENSEN AND YNGVESSON, 1998). Our observed elements can be ranked based on physical contact (supposedly higher aggression) like hit, bite and on time length (running toward sy, chasing). Some of the submissive elements are answers to an initiated aggression (head lift, retreat, escape), which might express the level of submission (the more the displacement is, the higher flight is), avoiding is expressed without any aggression. We are planning further investigations to specify these levels and to find a relation between the aggressive and submissive elements.

The high Cohen Kappa indices show (0.60 to 0.80=good agreement; 0.80 to 1.00=very good agreement), that the behavioural elements are recognisable. According to LANGBEIN AND PUPPE (2004) behavioural elements, which do not show overt aggression (there is not any physical contact), are less definable and recognisable. However our results show that the observers are able to recognize the less overt behavioural elements after short practice if detailed description of behavioural elements is provided for them.

Taking these behavioural elements into consideration the hierarchy might be established accurate, it is possible to decide precisely which animal wins and loses in a fight. It is necessary to use the less overt agonistic and submissive behavioural elements to establish the hierarchy in groups living together for a long time. Moreover we suppose that with these elements we could observe the changing in the rank or the level of the aggression. This could help to estimate interferences in wild boar preserves, for example changing in the group composition after huntings or putting new individuals inside the group and to investigate these effects on production.

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