

Domestication is the process by which animals that we keep in our farms today have been genetically changed from their ancestors, which is influenced mainly by humans. Domestication has principally only been studied descriptively, but recent research has come forward with theories that must be tested in controlled and distinct experiments. In the study presented here we test the hypothesis that wild animals use a more costly behavioral strategy in comparison to domesticated animals. The premise of this hypothesis is that during domestication, humans provided animals with food and protection. This may have resulted in the gradual loss of behaviors needed in the wild situation. We suggest that the behaviors lost were the costly behavioral elements.

### **METHODS**

The model species used in this project are the wild boar versus the domesticated pig and the Red Jungle fowl versus the domesticated hen. The wild boar project was done in Wageningen (The Netherlands), while the Jungle fowl project is conducted at Tovetorp research station (Stockholm University). In our study we used The Observer 3.0 for Windows for data collection and analysis. Because the person collecting the data had to be mobile during observations, we decided to use the Psion Workabout handheld computer, a compact and robust battery-operated model. Descriptive statistics on the duration of behaviors (mean, standard deviation, maximum, minimum, etc.) were calculated with The Observer.

#### *1. Nest building behavior in pigs*

Eight domestic sows and eight crossbred sows (father wild boar, mother domesticated pig) were kept in an outdoor enclosure provided with farrowing crates, grass pasture and mud hole. All sows were induced on day 112 in order to synchronize the births of the piglets. Nest building material was provided in different kinds and shapes. Nest building observations started one hour after the induction and ended at the birth of the first piglet. Each sow was observed for 15 minutes every third hour, using one-zero sampling with a sample interval of 30 seconds. Nine different behavioral elements (lying, standing, changing position, walking, nosing, rooting, pawing, carrying, arranging) were used to categorize nest building behavior [2].

#### *2. Mother-young interactions in pigs*

Eight domestic sows and eight crossbred sows (father wild boar, mother domesticated pig) with litters were kept in an outdoor enclosure provided with farrowing crates, grass pasture and mud hole. When the piglets were eleven days old they were all able to leave the farrowing crates by themselves and to follow their sow around in the enclosure. Mother-young interactions were recorded while the observer walked with the sows in the enclosure. All sows were observed for 30 minutes each day, because we wanted to follow one single sow and her piglets for a certain time, over



a period of 8 days. In these observations we used focal sampling with a single actor and a time resolution of 0.1 second. Focus was put on the sows and their interactions with their own piglets. The behaviors were grouped in two different classes. The first class included the different behavioral states: walking, lying, nursing etc. The second class contained the interactions between sows and piglets, aggressive contacts and normal nose contacts.

### 3. Behavioral development in chicks

Five domestic hens with ten chicks each were held in separate sections in an outdoor enclosure. Five chicks were domesticated and five chicks were crossbred chicks (father Jungle fowl, mother domesticated hen). From the first week of age the chicks were observed continuously every week up to 14 weeks of age, the last observation was done when the hen was taken away. The data collection method was focal sampling with a single actor and each observation lasted 10 minutes. Focus was put on the chicks and the interactions with their mother. The behaviors were placed in one class of mutually exclusive states: walking, lying, running, etc. and to almost every behavioral element the hen was defined as a modifier.

Research topic	Nest building behavior in pigs	Mother-young interactions in pigs	Behavioral development in chicks
Subject	8 domestic sows / 8 crossbred sows	8 domestic sows / 8 crossbred sows	5 domestic hens / 5 domestic chicks / 5 crossbred chicks
Sampling method	1-0 sampling; sampling interval: 30 sec	focal sampling; time resolution: 0.1 sec	focal sampling; time resolution: 0.1 sec
Experiment duration	from induction to birth	8 days	14 weeks
Observed time	15 minutes every 3rd hour	30 minutes per day	10 minutes
Behavioral classes	1	2	1
Behavioral elements	lying, standing, changing position, walking, nosing, rooting, pawing, carrying, arranging	1: walking, lying, nursing, foraging 2: interactions between sows and piglets (aggression, naso-nasal contact)	walking, lying, running, feeding, drinking, standing, preening
Actors	multiple	single	single
Modifier	-	-	hen

### PRELIMINARY RESULTS AND DISCUSSION

There was a tendency for the crossbred sows to move around more during the nest building period and to use the material more intensively ( $p=0.06$ ) in the farrowing crate compared with the domesticated sows. There was also a tendency that crossbred sows left their piglets in the farrowing crates more often ( $p=0.058$ ) than the domesticated sows. Crossbred sows terminated more nursings ( $p<0.05$ ) compared with the domesticated sows. The data from the Jungle fowl studies have not been analyzed yet. Most studies on domestication conclude that it is the frequency and intensity of different behavior patterns that is affected by domestication [3]. This study supports previous studies but suggests that wild boar/domestic pig and Jungle fowl/domestic hen hybrids tend to use a more costly behavioral strategy than the domesticated animals and that evolutionary models and cost/benefit analysis can be successfully applied to domestication changes. The results are in accordance with other studies where a functional and adaptational approach has been used to study domestication effects, for example on aggression, schooling behavior in fish and optimal foraging behavior in pigs [1, 4] Gustafsson et al., 1998).

### REFERENCES

1. Gustafsson, M.; Jensen, P.; de Jonge, F.; Schuurman, T. (1998). Domestication effects on optimal foraging strategies in pigs. Submitted.
2. Jensen, P.; Vestergaard, K.; Algers, B. (1993). Nest building in free-ranging domestic sows. *Applied Animal Behavior Science*, **38**, 245-255.
3. Price, E.O. (1984). Behavioral aspects of animal domestication. *Quarterly Review of Biology*, **59**, 1-32.
4. Ruzzante, D.E. (1994). Domestication effects on aggressive and schooling behavior in fish. *Aquaculture*, **120**, 1-24.

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