

## **EFFECT OF GROUP ON AGONISTIC BEHAVIOUR OF WEANED PIGS**

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### **Introduction**

Despite the predisposition of pigs to interspecies aggression, conditioned upon increased excitability, their social behaviour is behaviourally consolidated by creating a social hierarchy (Hvozdiák, 1997). The mixing of unfamiliar pigs after weaning is a common practice in pig production. Whatever the weight and age of the piglet, weaning is a stress and the younger and smaller a piglet, the greater is the stress (Rushen et al., 1994; Novák et al., 2002).

Weaning is achieved in most units by removing the piglets from the sow and mixing them often with piglets from different litters, into groups of piglets with similar weight. Mixing leads to conflict behaviour, which can result in wounds and even death in hot weather (McGlone et al., 1981). Meese and Ewbank (1973) found that the dominant pig was identifiable to an observation within 30-60 min, and that dominance order was established within 48 h. The stressor associated with mixing may cause physiological changes such as higher plasma cortisol concentrations in non-littermale pigs re-grouped at weaning and 2 weeks after weaning (Blecha et al., 1985).

Graves et al. (1978) found that mixing pigs from litters had little effect on growth rate. Blackshaw (1985) found that growth rate was depressed between 6 and 28 days after weaning; the most common period being 7 days.

This study showed that agonistic behaviour was greatly increased in both mixed groups compared with littermales. There were no long-term effects of mixing on performance.

### **Material and methods**

Agonistic behaviour involved conflict situations between animals and was recorded for 1,5 h immediately after mixing which occurred in the morning (Period 1). The second period of observation (Period 2, 4-5 h later) was over 1 h 5 days later. Changes in frequency and type of agonistic behaviour over the 5 days could then be studied. The 5 days observation period was considered to be sufficient as the literature indicated a dramatic fall in agonistic

activity over the first hour after mixing, and establishment of the dominance hierarchy after 48 h (Meese and Ewbank, 1973).

## Results

In all of these 8 analysis a litter-grouping  $\times$  period interaction was found. Using estimates of standard errors from these analysis, and the natural logarithm of frequencies, t-tests were used to compare the 9 litter-groupings  $\times$  observation periods for each behaviour and contact / non contact grouping. The raw data are given in Table II and the re-transformed means, showing all significant differences ( $p < 0.05$ ) are presented in Table III and IV.

Overall the first observation period recorded significantly more agonistic behaviours than the latter two observations periods (Table III).

The agonistic behaviours were then considered as either contact (head-thrusting, biting, and pushing) or non-contact (chasing, threat and displacement) behaviour. Regardless of group structure, the frequency of contact behaviours during the first observation was significantly greater than in the second and third observation periods (Table III). The number of non-contact behaviours recorded during Period 1 was also significantly greater than in Period 2 and 3. The number of contact behaviours in each period also differs significantly from the non-contact behaviours during the same period (Table III).

Period 1 contact and non-contact behaviours were compared with those of Period 2 and 3. Contact behaviours were least frequent in Group 4 $\times$ 3 during Periods 1 and 2, but the frequency did not fall further in Period 3. The frequency of non-contact behaviours was relatively low in all periods, although group 3 $\times$ 4 had a higher frequency than the other two groups in Period 1.

In all groups, head thrusting and biting were greater Period 1 than during Periods 2 and 3. Pushing behaviour had decreased significantly by Period 3 (Table IV). The non-contact behaviours tended to decrease over time, but in group 4 $\times$ 3 there was no significant change over time in chasing behaviour.

The first observation period (Period 1) is the most important for hierarchy establishment, so the behaviours of each group structure during period 1 were analysed. The percentage of contact behaviours over the total interactions during Period 1 was as follows: Group 6 $\times$ 2, 85%; Group 4 $\times$ 3, 76%.

Group 4×3 had significantly less head-thrusts than group 6×2 or 3×4; group 6×2 or 3×4; biting was significantly greater in group 3×4 than in group 6×2 and 4×3; group 6×2 had significantly more pushing behaviour than groups 4×3 and 3×4.

In the non-contact behaviours during Period 1, Groups 6×2 and 4×3 were significantly lower than Group 3×4 in chasing and threat behaviour, but there were no differences between the groups in displacement behaviours. For the total 3.5 h of observation over the 5-day period, Group 4×3 had 1416 observed agonistic behaviours compared with 1798 and 2015, respectively, in Groups 6×2 and 3×4.

Table II. Number of behaviours per hour at each time period (1,2,3) for 3 replicates of each group structure: 6 pigs from 2 litters (6×2); 4 pigs from 3 litters (4×3); 3 pigs from 4 litters (3×4). HT=head thrusting; B=biting; P=pushing; C=chasing; T=threat; D=displacement

Behaviours	Group structure								
	6×2 Period			4×3 Period			3×4 Period		
	1	2	3	1	2	3	1	2	3
Contact									
H	298	143	59	206	86	134	297	126	36
B	290	205	17	283	78	22	506	102	8
P	61	35	6	23	15	14	22	9	11
Non-contact									
C	39	30	2	31	11	15	98	18	2
T	67	49	42	79	14	78	118	64	19
D	15	54	9	7	5	14	22	15	24

Table III. Behaviours frequency per hour ( re-transformed means of natural logarithmus) during each of the three periods of observation \*

Behavior category	observation period		
	1	2	3
ALL behaviors	108.7 <sup>a</sup>	49.9 <sup>b</sup>	27.4 <sup>c</sup>
Contact	219.8 <sup>a</sup>	88.2 <sup>b</sup>	33.5 <sup>c</sup>
Non-contact	54.2 <sup>a</sup>	28.2 <sup>b</sup>	22.3 <sup>c</sup>

\*significant differences (p<0.05) between observation periods denoted by different litters

Table IV. Behaviour frequency per hour (re-transform of natural logarithms) in litter groups during each of the three periods of observation\*

Behaviour category	Group structure								
	6×2 Period			4×3 Period			3×4 Period		
	1	2	3	1	2	3	1	2	3
Contact	216.3	127.7	27.3	168.3	59.4	56.3	273.4	78.3	18.4
Non-contact	41.0	42.0	17.1	41.3	94.1	36.0	78.7	31.3	15.7
Head-thrust	99.1	48.3	19.3	69.3	29.7	44.4	99.3	41.7	11.7
Biting	96.4	69.0	5.3	98.3	28.1	7.1	168.3	32.7	11.8
Poshing	20.0	12.3	1.8	7.3	4.8	4.3	72.3	3.0	3.3
Chasing	13.0	6.8	0.4	10.0	3.4	4.7	32.3	5.7	0.8
Threat	22.1	16.4	13.7	27.0	39.0	21.0	39.3	21.0	6.3
Displacement	5.0	18.1	3.1	2.0	4.3	4.4	7.1	4.7	7.7

\*significant differences (p<0.05) denoted by different litters within each behavior category

Analysis of deviance showed that for all groups there were no significant differences in the contribution of particular litters in each treatment to the formation of the hierarchy over the 5-day period.

## Discussion

The most vigorous interactions occur in the first 1.5 h after mixing overall the group 4×3 replicates had less contact agonistic interactions than the other two structure. Groups 6×2 and 4×3 showed less chasing and threat interactions than Group 3×4 and all groups were similar in displacement behaviours.

Both contact and non-contact behaviours decreased over the observation periods. When the contact behaviours were individually considered, it was found that head-thrusting and biting decreased in all groups, but pushing remained the same in Groups 4×3 and 3×4. It can be argued that pushing does not cause physical injury, but in Groups 4×3 and 3×4 the probability of meeting strange animal (0.74 and 0.83, respectively) was much higher than in Group 6×2 (0.56).

It could be suggested that more contact behaviours might be needed to maintain pigs in their position in the hierarchy.

The work on poultry by (Lander and Craing, 1980; Falis et al., 2004; Jacková, 2000; Skalická et al., 2000) showed that the frequency of agonistic acts is generally reduced between pairs of individuals when they are close to a third individual who is socially dominant to both of them. This principle may also operate with pigs.

Mixing pigs from three litters at weaning resulted in less agonistic behaviour than mixing pigs from two or four litters.

## References

1. Blecha, F., Pollman, S., Nicholas, D.A.: immunologic reactions of pigs regrouped at or near weaning. *Am.J.Vet.Res.*, 46, 1934-1937, 1985
2. Falis, M., Beňová, K., Toropila, M., Sesztáková, E., Legáth, J.: Changes in the activity of selected adaptive enzymes in chicken liver after single gamma irradiation, *Bull. Vet. Inst. Pulawy*, 48, 2004 503-506.
3. Graves, H.B., Graves, K.L., Sherritt, G.W.: Social behaviour and growth of pigs following mixing during the growing-finishing period. *Appl. Anim. Ethol.*, 4, 169-180, 1978.
4. Hvozdič, A.: Ethological study of social behaviour of pigs after negative experience in early ontogenesis. *Folia Veterinaria* 41, 3-4, 131-134, 1997
5. Jacková, A., Siklenka, P.: Vplyv NOx-látok na mlieko v regione oceliarní. IX.medzin. sympozium O ekologii vo vybraných aglomeráciach Jelšavy-Lubenika a stredného Spiša. 2000, 99-102.
6. McGlone, J.J., Kelly, K.W., Gaskins, C.T.: Lithium and porcine aggression. *J.Anim. Sci.*, 51, 447-455, 1981
7. Meese, G.B., Ewbank, R.: The establishment and nature of the dominance hierarchy in the domestic pig. *Anim. Behav.*, 21, 326-334, 1973
8. Novák, P., Kubiček, K., Odehnal, J., Beňová, K., Zabloudil, F.: Tvorba prostředí chovu a řešení problému vlivu chovu zvířat na životní prostředí v České republice. Zborník referátov, VÚŽV Nitra, 2002, 45-59.
9. Skalická, M., Makoová, Z., Koréneková, B.: Vplyv humátu sodného na koncentraciu kadmia u hydiny, *Hygiene Alimentorum XXI*, 1.-3, 6. 2000, Štrbské Pleso, 179-181.
10. Rushen, J., Passille, A.M., Ladwig, G.J., Foxcroft, G.: Effects of stress on maternal behaviour in pigs. *Proceedings-28 th International Congress of the ISAE, Foulum, Denmark*, 35, 1994
11. Ylander, D.M., Craig, J.V.: Inhibition of agonistic acts between domestic hens by a dominant third party. *Appl. Anim. Ethol.*, 6, 63-69, 1980.