pens of 3.5 m^2 did not progress after week 2, thus older piglets showed infantile fighting. Furthermore, at an age of about 10 weeks — 2 weeks after all the pigs had been transferred to straw pens of 8.7 m^2 — they still showed abnormal agonistic behaviour in experimental encounters with unknown pigs (Lammers & Schouten, 1985). From this we conclude that for the development of normal agonistic behaviour in group-housed pigs it is very important that the pens in which piglets are reared are large enough, presumably larger than 3.5 m^2. Of course, the pens in which adult pigs are housed must also have a minimum size in order to allow the performance of normal agonistic interaction. On this latter aspect only preliminary data exist (Petherick, 1983).

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Effects of pen size during rearing on later agonistic behaviour[1] in piglets

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Abstract The agonistic behaviour during experimental social encounters between 2 unfamiliar pigs was studied in pigs ca. 10 weeks old reared in pens of 3.5 m^2 or 6.7

[1] Agonistic behaviour is all the behaviour between agression and flight.

m^2. Results showed that the pigs reared in 3.5 m^2 pens which became dominant in the experimental social encounters performed more abnormal agonistic behaviour than reared pigs reared in 6.7 m^2 pens.
Key-words: agonistic behaviour, rearing condition, pig, piglet, pen size.

Introduction. The development of agonistic behaviour of piglets reared in pens of 3.5 m^2 has been shown to be quite different from piglets reared in pens of 6.7 m^2 or 28 m^2 (Lammers & Schouten, 1985). The piglets reared in the smallest pen did not develop threat behaviour and directed more head knocks to the hindpart of the body of other piglets. The present study examines whether these pigs reared in 3.5 m^2 pens perform normal agonistic behaviour at an older age (10 weeks). This was investigated by comparing the agonistic behaviour in experimental social encounters of these pigs with that of pigs reared in 6.7 m^2 pens.

Material and methods. Four litters (7-8 piglets per litter) were housed from day 53 to day 57 in pens of 8.7 m^2. Before that, 2 litters lived in pens of 3.5 m^2 and 2 litters in pens of 6.7 m^2, all with tethered sows. All pens had straw bedding. The litters were weaned between day 36 and day 38. Between day 58 and day 81 the agonistic behaviour of these pigs was tested by confronting two unfamiliar pigs with each other for 20 minutes in a pen of 6.7 m^2.

Each dyad was tested on 3 successive days. Most pigs from the four litters were used in two different dyads. In total 30 dyads were tested: 10 × 2 pigs which were reared in a pen of 6.7 m^2, 10 × 2 pigs which were reared in a pen of 3.5 m^2, and 10 × 2 pigs of which one was reared in a pen of 6.7 m^2 and one in a pen of 3.5 m^2. The behaviour of the pigs was recorded on video and registered afterwards with a 40-channel event recorder.

Results and discussion. In 29 out of 30 dyads a clear dominance relationship was established. The behaviour of the pigs which became dominant in the experimental social encounters was strongly influenced by the pen size in which these pigs were reared. Although the total number of head knocks given did not differ, dominant pigs reared in 3.5 m^2 pens placed relatively more head knocks on the hindquarters of their opponents than dominant pigs reared in 6.7 m^2 pens (23.3 % and 2.4 % respectively).

Compared to the opponents of the dominant pigs reared in a 6.7 m^2 pen, the opponents of the dominant pigs reared in a 3.5 m^2 pen moved away for a longer period (1.3 s and 1.0 s respectively per bout of moving away), stood for a longer period with the front legs against the wall of the pen (123 s and 30 s per 20 min respectively) and jumped more often against the wall of the pen (2.4 and 0.4 times respectively per 20 min). From this we concluded that in the experimental social encounters submissive pigs were more afraid of a dominant pig reared in a pen of 3.5 m^2 than of a dominant pig reared in a pen of 6.7 m^2, probably because the former gave more head knocks on the hindquarters. We think that head knocks given on the hindquarters can be considered as abnormal because of the receiver's reaction with screaming and escape attempts.

Also during the first eight weeks piglets reared in pens of 3.5 m^2 placed a higher proportion of their head knocks on the hindquarters (Lammers & Schouten, 1985). It is likely that the higher proportion of head knocks given on the hindquarters by the pigs reared in 3.5 m^2 pens in the experimental social encounters is a carry-over effect of growing up in these small pens.

The effect of pen size on the behaviour of the submissive pigs in the experimental social encounters was not clear because of the overruling effect of the dominant pigs on the behaviour of the submissive pigs. Two pigs (one reared in a pen of 3.5 m^2 and one in a pen of 6.7 m^2) were extremely aggressive in the experimental social encounters and were therefore not included in the above analyses. These pigs gave up to 3 times more head knocks than the other dominant pigs, and the one reared in a pen of 6.7 m^2 placed also a large proportion of the head knocks on the hindquarters (up to 54 %). The opponents of these two pigs reacted very panicky with a lot of screaming and jumping against the wall of the pen (up to 29 times per 20 min). The cause of the extreme aggressiveness of these pigs is still unclear. Probably other factors than rearing played a role. The results of this study show that pigs reared in very small pens are more likely to perform abnormal agonistic behaviour in social encounters. This supports the idea that for successful grouping of pigs, the conditions under which the pigs are reared are important (Lammers & Schouten, 1985).

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