Circular Crates for Farrowing Sows – Effects on Animal Behaviour

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Introduction

In the past the intensification of livestock husbandry led predominantly to a strongly specialized, mechanized and straw less sow husbandry in farrowing crates, aligned to productivity. In most recent time, however, more and more attention is given to the animal behaviour also during this production period. The restriction of the sow movement during the birth and nursing period is particularly performed with the aim to avoid crushing losses. However, unrestricted laying, getting up and nursing are not possible by this housing form.

Material and Methods

The aim of this study was to compare conventional farrowing crates with circular crates (Fig. 1) based on the system developed by LOU and HURNIK 1991. The conventional farrowing crate was 56 cm wide and 180 cm long. The ground plan of the circular is shown in the Fig. 2. The whole area of the conventional farrowing box was 3.85 m^2 and the circular box 5.28 m^2.

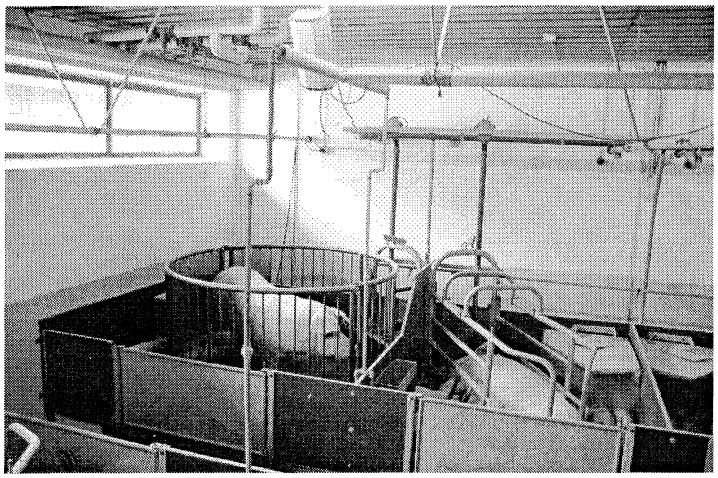

Fig. 1. Circular and conventional farrowing boxes

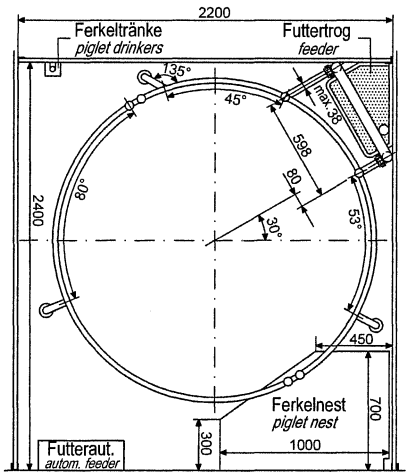

Fig. 2. Ground plan of the circular crate

18 control sows (conventional farrowing crate) and 18 tested sows (circular crate) were used for the experiment. The behaviour of the sows was recorded by video cameras during the

entire period, spent in the farrowing crate. The observed period was arranged into seven phases, three phases before the birth (the stalling of the sow in the farrowing crate, the third day after stalling and the nest building), one during the birth and three phases after the birth (nursing week 2, 3, 4). Except of the nest building phase and birth 3 two-hour blocks per day were evaluated. During the nest building phase 2 two-hour blocks and during the birth 48 hours after the birth of the first piglet were evaluated. Beside the behaviour forms "lying", "sitting", "standing" and "going" also were "rooting", "pawing" and "other" as supplementing behaviour recorded. Moreover, for the sows housed in the circular crate "place, "position", "nursing" and "angle" of sow were determined. Additionally, besides behaviour parameters also reproduction parameters were evaluated.

Results and discussion

Each change of the behaviour, of the place or of the angle was defined as changes in behaviour and from it the level of activity of the sows was derived. In both systems highest activity was observed in the phase of the nest building (Fig. 3). However, the test sows showed in the average about twice more changes in behaviour than control sows.

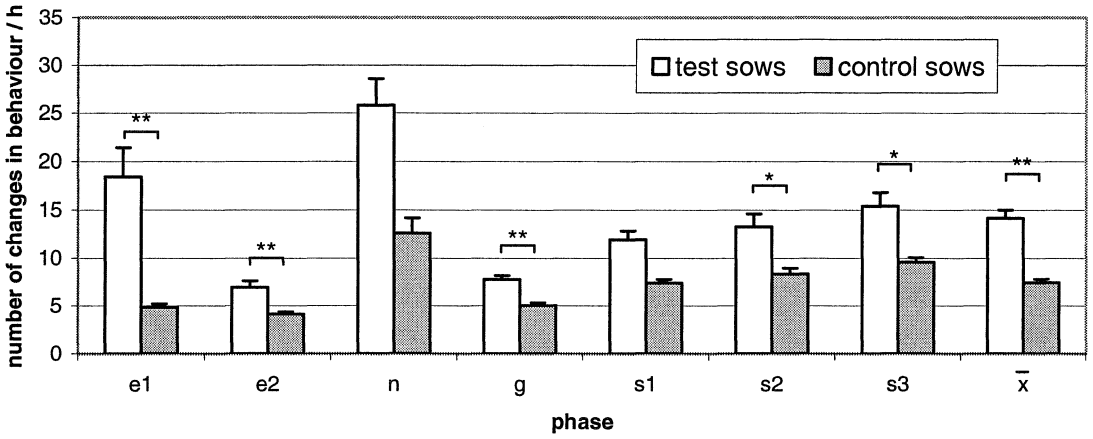

Fig. 3: Number (n) of changes in behaviour
(e1-e2 = stalling in (week 1 and 2), n = nest building, g = birth phase, s2–s4 = nursing (week 2-4); x = mean value of all sows over all phases).
Data are presented as mean ± SEM.

Despite the similar proportion of activity and resting periods in both systems (Fig. 4), substantial differences were observed in the duration of the individual behaviour characteristic. Consider all behaviour patterns (lying, sitting, standing and going) it becomes clear, how much time the sows spent lying. The majority of the time, similarly in both group

(86.0 % test sows, resp. 87.8 % control sows), spent the sows just lying (Fig. 4), reaching the maximum in the birth phase and decreasing continuously with increasing weeks of nursing. However, the test sows spent more time standing than controls. In contrast, the control sows sat and lay on the belly longer than the sows housed in the circular crates. However, the highest degree of the activity, the going, which was possible only for test sows, took only 1.1 % of the time.

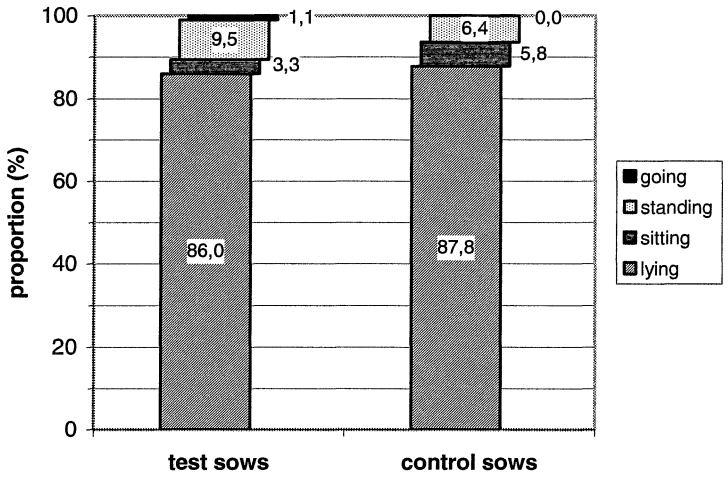

Fig. 4. Proportion of behaviour form lying, sitting, standing and going by test and control sows.

Concerning supplementing behaviour (rooting, pawing, nursing and other supplementing behaviours) the test sows rooted more (9.3 % vs. 7.2 % in control sows) and also pawed more (0,1 % vs. 0.0 % in control sows). This shows, that test sows performed more adequate behaviour typical for sows than controls. Significant differences were observed also by nursing. The test sows nursed their piglets longer (they nursed 8.23 minutes) than the control sows, which nursed their piglets 6.59 minutes per hour. In contrast, the control sows showed more other supplementing behaviour (82.5 % vs. 78.6 % in test sows). These supplementing behaviour were mostly observed when sows were lying, therefore so high proportion per hour in both group and higher proportion in control sows, which cannot move and performed less species adequate behaviour.

The sows showed different behaviour after the birth of the first piglet (Tab. 1). Also during this time can be clearly recognized that the percentage of sitting and lying sows on the belly was higher in the control group than in the test group. On the other hand, the test sows used

the possibility to move and to turn around. Thereby more than 50 % of the test sows contacted their piglets.

Tab. 1: Proportion of sows (in %) showing noted behaviour after birth of piglet

	n	lying on belly	sitting	standing	going	angle 90°	angle 180°	contact to piglet
test sows	15	46.7	40	73.3	73.3	26.7	46.7	53.3
control sows	13	84.6	92.3	61.5				

A clear decrease of the activity was observed between the birth of the first piglet and later born piglets without influence of group (Fig. 5). Increased activity was observed mainly after the birth of the first piglet. While after the birth of the first piglet the number of changes in behaviour was around 15 after the birth of the second piglet it was only around half. Afterwards activity of the sow until the birth of the last piglet was very low. Activity of the sows increased again after the end of farrowing. Therefore the fixation of sows during the farrowing is not really necessary.

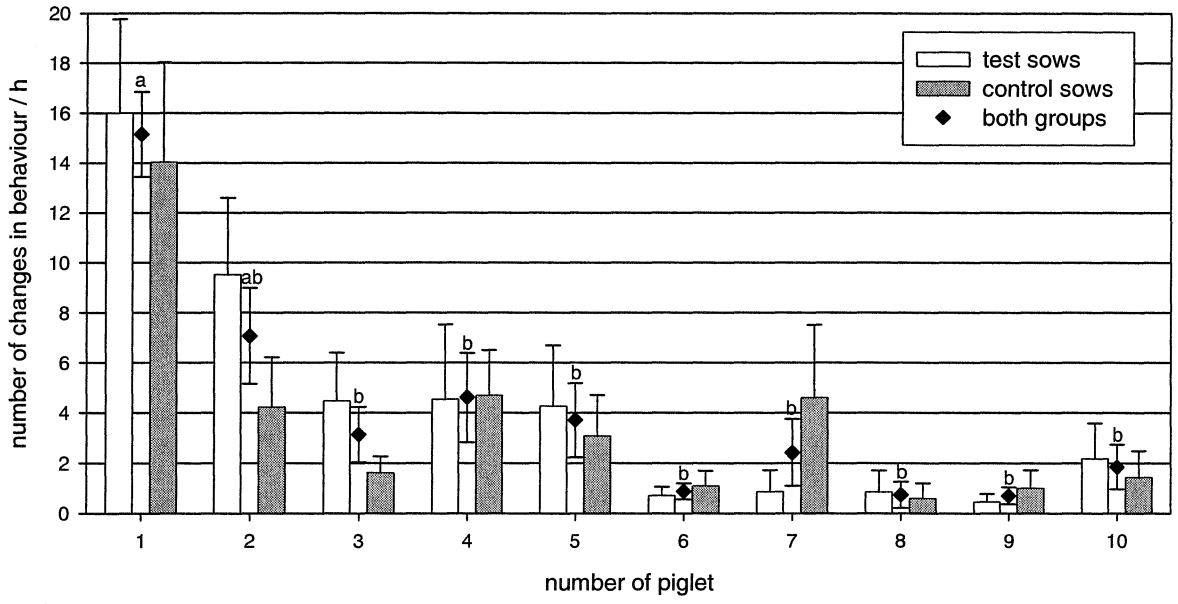

Fig. 5. Number of changes in behaviour during the birth.

Data are presented as mean ± SEM.

In addition, the position of the sow to the grid and to the eight directions were recorded in the circular crate. A clear preference of the sows to take a position without contact to the grid was observed. The angle changes and the turns of 180° correlated closely and they reflected also the number of behaviour changes.

Reproduction parameter

The number of born (11,22 in test sows and 11,72 in control sows) and weaned piglets after litter adjustment (9,61 in test sows and 9,94 in control sows) did not differ between systems. However, significant differences were determined by crushing losses. Higher crushing losses (0,89 piglet/sow) were observed in the test sows than in control sows (0,06 piglet/sow). The majority of these losses happened between 18.00 and 8.00 o'clock. In all observed cases they occurred while the sow turned from belly to the side or the other way round. This corresponds to the results of other investigations obtained in movement crates (Waldmann, 1995). It is remarkable that all crushing took place within 48 hours after the birth of the last piglet (Marchant et al., 2000) and no loss occurred by lying down of the sow. All observed crushing happened by changing of position in lying. In 86 % of the cases the sow lying on the belly turned on the side and they did not notice thereby the piglets sleeping at their back. The piglets could not save themselves, since they were surprised in the sleep and they were crushed. The remaining 14 % occurred during nursing by the turning of the lying sow from the side position to the belly, i.e. by the interruption of the nursing. The piglet came under the sow udder and could not free itself, not even with vehement movement.

This knowledge contradicts with the need of anti-crush bars for a circular crate. The sows lie preferentially in the middle of the circular crate without leaning against dividers when lying. Very tight construction of the conventional farrowing crate impaired and slowed down the movements by the position change of the lying sow so much that the piglets could escape from the danger zone in time.

The birth duration ranged in both systems within the intervals indicated in the literature. With the duration of the birth for 4.3 hours were the births in the circular farrowing crate around 0.6 hours shorter than in the conventional farrowing crate.

Conclusion

Compared with the conventional farrowing crate, the circular crate offers to sows the possibility to perform a further spectrum of adequate behaviour. The sows use the

opportunity to turn around, to have a contact with its piglets, to choose the direction of sight and to lay without restriction.

These differences could be observed, although the area of whole farrowing box did not differ from conventional farrowing box substantially. If it would be possible to reduce the piglet losses, e.g. by temporal adjustment of the sows in the critical 48 hours after birth of the piglets, the circular farrowing crate is an alternative to the conventional farrowing crate.

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