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Circular Crates for Farrowing Sows

Analysis of Animal Behaviour and Work Management

While keeping breeding sows in the farrowing compartment, crushed piglet losses can be reduced by restricting movement in the crate. As this study of comparative housing systems (conventional farrowing crates and circular crates) for farrowing sows showed, crushed piglet losses occurred almost exclusively in circular crates. These losses were observed only during the first 48 hours after birth. Therefore, sow fixation is sensible and justified during this period. For the rest of the time, sows used the movement area in circular crates for normal species behaviour and hence they should not be restrained during this time.

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Keywords

Breeding sows, farrowing crates, locomotion crate, animal behaviour, labour time requirement

The restriction of the sow movement during the birth and nursing phase by farrowing crates is particularly performed with aim to avoid crushing losses. However, unrestricted laying, getting up and nursing are with this housing form not possible. The results of large number of investigations and comparisons of conventional farrowing crates with crates allowing movement are a clear reference that the existing system must be improved.

Fig. 1: Circular crate with piglet nest and sow before farrowing

Material and method

The present investigations were based on housing system developed by [2] so-called „circular crate“. This was tested in modified form in the research station Thalhausen of TU-Munich (*Fig. 1 and 2*). In four farrowing compartments altogether six test crates with the dimensions 2.2 • 2.4 m beside six crates with conventional crate conditions were installed. The round construction of the test crates divides the farrowing crates into the area used by the sow and the area used by the piglets. It consists of two parts, whereby the fixed front part is bolted with the attachment for the old conventional with an opening to further used feeding trough. The rear part is pin-jointed with the front part, so that this can be opened for housing or the removing of the sow. The floor consists of slatted cast iron, covered 75% with a rubber mat. The complete construction withstood the high demand during all batches.

In six batches the behaviour of the sows was recorded on a fixed day by six video cameras. From the entire stay of the sow in the farrowing stable six phases with 2 to 3 two-hour blocks were evaluated in each case and also the birth phase (until 48 hours after birth of the first piglet). Beside the behaviour forms „lying“, „sitting“, „standing“ and „going“ were as supplementing behaviour „rooting“, „pawing“, „nursing“ and „other“ recorded. Additionally, for the sows housed in the circular crate „place“, „position“ and „angles“ of each sow were determined.

Results and discussion

Animal behaviour

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 concluded. The sows in the circular crate (test sows) had in the average about twice more changes in behaviour than sows housed in the conventional farrowing crate (control sows) (*Fig. 3*). In particular the phase of stalling the sow in the crate and the phase of the nest building (six hours before the birth) are noticeable.

The resting behaviour, which in both groups took approx. 87 % of the time, reached the maximum in the birth phase and decreased with the increasing weeks of nursing continuously. Control sows stood more, rooted longer and used the offered area to turn around. In contrast, the control sows sat in all phases longer and the proportion of lying on the belly of the total lying time was

Table 1: Proportion of sows (in %) showing noted behaviour after birth of a piglet

	n	lying on belly	sitting	standig	going	angle 90°	angle 135°	angle 180°	contact to piglet
Tested sows	15	46.7	40	73.3	73.3	26.7	13.3	46.7	53.3
Control sows	13	84.6	92.3	61.5					

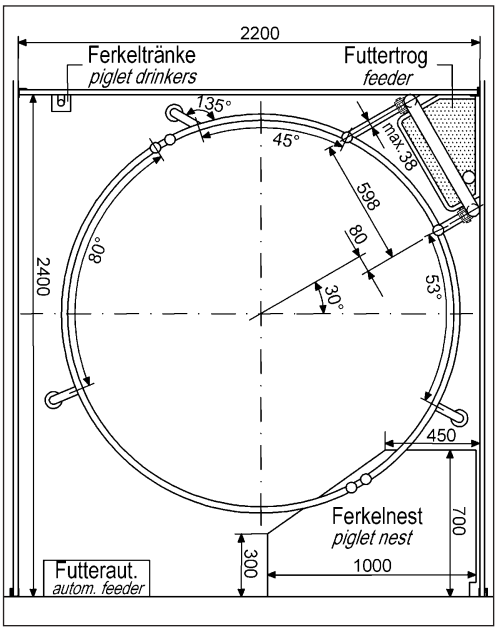

Fig. 2: Groundplan of the circular crate

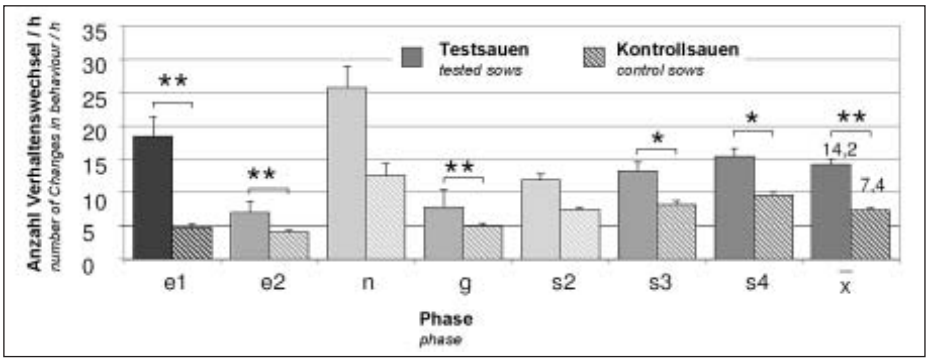

Figure 3: Number of changes in behaviour during the phases in the farrowing compartment

significantly higher than for the sows housed in the circular crates.

The animals in the circular crates were preferentially on the mat, rooted longer and pawed more. For nursing significant differences could be observed between the groups in the first three life weeks. The test sows nursed their piglets on average 8.23 minutes, compared to the control sows, which nursed on the average 6.59 minutes per hour.

The sows showed different behaviour between the birth of the first and the last piglet (*Table 1*). Also during this time it can be clearly recognized that for the control sows in the conventional farrowing crates the proportion of sitting and lying on the belly was higher. Contrary, the test sows used the possibility to move and to turn around. Thereby more than 50 % of the test sows contacted their piglets.

Reproduction parameter

The number of weaned piglets after litter adjustment did not differ with 9.6 piglets in the circular crate and with 9.9 piglets in the conventional farrowing crates between both systems.

However, significant differences were determined by crushing losses. While in the conventional farrowing crates only 0.5 % of the piglets were crushed, for the test sows in the circular crates it was altogether 16 piglets (7.9 %). This corresponds to the results of other investigations obtained in movement crates [4]. It is remarkable that all crushing took place within 48 hours after the birth of the last piglet [3] and no losses occurred by laying down of the sow. All observed crushing happened by changing the position of 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 laying. Very tight construction of the conventional farrowing crate impaired and slowed down the movements of 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 of 4.3 hours were the births in the circular farrowing crate around 0.6 hours shorter than in the conventional farrowing crate.

Work management

The video-recordings were used for the detection of the working time in both systems. Only those activities were included into the comparison, where differences between the systems were expected. The results of the labour input for the specific work steps are shown in *Table 2*. Significant differences between the systems were observed only for the manure removal. An enlargement of the portion of perforated surface can reduce this. The total labour time requirement was calculated from the characteristics in *Table 2*. The stalling in and out of the crates of the animals and also 30 times manure removal were taken as a basis for the assessment. Per sow and day this results in 1.13 Wmin[1]) for the circular crate and 0.69 Wmin for the conventional farrowing crate. This means an additional requirement of approximately 0.5 Wh [2]) per sow and year for the circular crate.

Conclusions

Compared with the conventional farrowing crates, the circular crates offer the sows the possibility to perform a further spectrum of adequate behaviours. The sows use the opportunity to turn around, to have 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 circular farrowing box did not differ from conventional farrowing box substantially. If it could be possible to reduce the piglet losses, e.g. by temporal adjustment of the sow in the critical 48 hours after the birth of the piglets, the circular farrowing crate is an alternative to conventional farrowing crate.

[1]) Wmin = working minutes;
[2]) Wh = working hours.

Literature

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Table 1: Labour time requirement of specific work steps

	labour time requirement [sec]				Signifikanz
	tested sows	SE	control sows	SE	
stalling in one sow	29.60	3.36	23.11	2.20	
mucking out one sow	45.00	3.09	21.44	2.21	p< 0.001
catching one piglet	9.39	0.78	8.39	0.98	
stalling out one sow	13.72	1.14	17.00	1.51	
stalling out one piglet	33.44	4.79	26.39	3.59	