

Litterless Housing Systems in the Farrowing Area - II

Ethological and Pathological Criteria as well as Biological Performances

Three keeping variants (conventional farrowing crate, opening crate, activity pen) for nursing sows were compared. In the first presentation the project was described, and results from recording the animal house climate and assessing the pen soiling were reported about. In this paper selected pathological and ethological criteria and biological performances are presented.

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Keywords

Keeping system, sow keeping, farrowing pens, animal behaviour

Literature

Literature references can be called up under LT 03501 via internet <http://www.landwirtschaftsverlag.com/landtech/local/literatur.htm>.

In the experiment presented here, three housing systems (conventional farrowing crate, opening crate, activity pen) for nursing sows were compared. Aspects such as animal welfare, economy and ecology were of main interest. Additionally the effects of a restricted straw supply, enabling nest building behaviour in litterless housing systems, were studied. In this contribution the results of a classification of sows and piglets as far as injuries and further skin alterations (calluses, swollen spots, ulcers), the biological performance as well as selected ethological criteria are presented.

Animals, Materials and Methods

Housing Technique and Straw Supply

The experiment, which this article is based on, was carried out in four farrowing compartments each housing six litterless pens. The set-up can be described as follows:

Compartment 1, A₁, conventional farrowing crate. The sow was fixed from the day of stalling-in until the day of stalling-out.

Compartment 2, A₂, largely identical to A₁. However, after the castration of the piglets (on round about the 10th day of their lives), the crate was opened.

Compartment 3, A₃, activity pen. It was possible to fix the sow temporarily.

Compartment 4, A₄, similar to A₃. However, it was impossible to fix the sow.

The main experimental period was divided into two trial periods. No straw was used in trial period V_I. In V_{II}, the sows were offered straw for a limited period of time in order to allow them to exhibit nest building behaviour.

Since the possibility of fixing a sow temporarily was not used in A₃ during the entire trial period, compartments A₃ and A₄ did not differ with regard to the housing system and are summarised as activity pens in the following. A slight difference existed in the form of straw supply in the second period of the trial. A detailed description of the set-up is given in the first contribution.

Pathological Criteria

The classification suggested by Ekesbo [1] was used for sows and piglets. Injuries (scratches, abrasions and wounds) as well as further alterations of the integument (calluses, swollen spots and ulcers) were examined. The sows were classified on the day of stalling-in and again on the day of stalling-out, whereas the piglets were classified only once on the day of weaning. Additionally the nutritive state of the sows, lameness and the soiling degree of sows and piglets were recorded. The soiling degree of the sows was not registered at stalling-in, because they were washed before entering the farrowing compartment.

Ethological Criteria

Investigation of ethological criteria was realised with the aid of video recordings. The behaviour of the mother animals was recorded from the day of stalling-in until weaning of the piglets after a suckling period of round about three weeks. The time lapse modus allowed 72 hours to be reduced to 180 recorded minutes.

The first four days post partum were used to evaluate the lying down behaviour. The behaviour of the mother animals was observed and additionally the behaviour of the piglets were registered following the method of [2].

Direct observation was preferred to register when there was any abnormal behaviour at all. Per suckling period one continuous two-hour observation sometime between the fourth and the sixth day post partum was carried through. Frequency and duration of the following behavioural disorders were registered: bar biting, vacuum chewing, foam chewing, grinding with teeth and excessive water consumption. The latter comprised excessive consumption of water as well as manipulation of the drinker. Only if one behaviour enumerated was exhibited longer than one minute, it was recorded to be abnormal.

Biological Performance

Parameters such as the number of live-born and of still-born piglets, the number of weaned piglets were used to evaluate biological performance of the sows. Rearing losses (noting date, piglet weight and reason) as well as the birth weight and the weaning weight of the piglets were also taken into account.

Results and Discussion

Pathological Parameters

Soiling of the rear quarter and the mammary gland may cause urogenital infections and has to be judged negatively from the hygienic point of view [3]. As to the sows, total soiling and the soiled parts of the body differed noticeably between the compartments. The number of sows classified to be "clean" in the conventional farrowing crate was 11.7%, remarkably lower than in the two other housing systems. While more than 50% of the mother animals were classified to be "clean" in the opening crate stand and the activity pen, more than 80% of the sows were classified to be soiled at the rear quarter in the conventional farrowing crate. When evaluating the soiling of the piglets no differences due to the housing system were stated.

Lameness was seldomly noticed in sows and piglets alike. The number of mother animals with slightly disabled gait amounted to 6.5%, 6.3%, 9.2% and 2.3% in the compartments A₁, A₂, A₃ and A₄.

In all three housing systems more than 70% of the sows did not have any injuries. Most of the injuries were due to wounds. The parts of the body affected were the shoulder (65.6%), the pelvis (11.5%) and the nape of the neck (10.9%). In the conventional farrowing crates the number of sows with injuries was the highest, it amounted to 28.6%. Compared to 15.8% and 16.3% in the activity pens.

Piglets were mostly injured near the carpal joint and the hock. 75% of the weaned piglets had injuries on the forelimb. While 2.6% of the weaned piglets in the conventional farrowing crates had abrasions on forelimbs and hind limbs, the corresponding value was 0% in the two remaining housing systems. By non-parametric analysis of variance it was proved that the housing system had a significant influence on the injuries.

A percentage of 11.5% of the weaned sows had skin alterations (calluses, swollen spots and ulcers). 1.3% having calluses and 9.9% with ulcers. The parts of the body affected were the shoulder blade (44.5%), the carpal joint (15.8%), the elbow joint (9.5%) and the nape of the neck (6.3%). The percentage of piglets with skin alterations amounted to 4.7%. None of the three housing systems was disproportionately responsible. This was corroborated by statistical analysis. This made it clear that the influence of the housing system on the skin alterations registered was not significant. Hence, aspects of litterless housing systems will have to be discussed.

Lying Down Behaviour and Biological Performance of the Mother Animals

In his contribution [4] emphasises that forming of piglet groups is a primary condition for the unhindered lying down of the sows. In the present investigation forming of groups preceded the lying downs in more than 90% of the observations. The percentage amounted to 91.3% in the conventional farrowing crate, 90.2% in the opening crate as well as 96.2% and 98.2% in the activity pens.

Quite often the sows firstly knelt down before lying down on their belly or on their side. This behaviour was interpreted by [2] as a protective measure against crushing. He observed that there was no danger for the piglets to die from crushing if the sows lied down on their bellies directly after kneeling.

The number of lying downs with the mother animal kneeling first before lying down was highest in the activity pens.

The differences due to the housing system were remarkable as to the rearing losses. In the conventional farrowing crate the losses amounted to 17.9%, in the opening crate 19.6% and in the activity pens 26.9% as well as 25.8%. [5] reported moving reasons for the rearing losses. They stated that more piglets are crushed in activity pens, whereas more piglets die of a lack of vitality in conventional farrowing crates. These findings could not be corroborated in the present study. Independently of the housing system the main reason for piglet mortality was crushing.

A birth weight of 1.6 to 1.8 kg is optimal according to [6]. In the present trial the average birth weight in all three housing systems was 1.7 kg (Table 1). Differences became obvious in weaning weights and daily gains of the piglets.

Behavioural Disorders

Vacuum chewing was the abnormal behaviour mostly registered in all three housing systems. The percentage amounted to 87.2, 77.3, 87.4 and 80.4% in the compartments A₁, A₂, A₃ and A₄. [7] found that oral behavioural disorders were reduced when straw was supplied. In the present investigation differences were small between the trial periods as far as the duration of abnormal behaviour is concerned. During the trial period V_{II} with straw supply, foam chewing and manipulation of the drinkers were exhibited longer than in V_I without straw supply. However, a significant influence of straw supply could only be proved for the manipulation of the drinkers.

Conclusion

The present investigation shows that the increased mobility of the mother animals has positive effects on the lying down behaviour. On the one hand, the percentage of lying downs with the sow lying its rear quarter down opposite to the grouped piglets was considerably higher in the activity pens. On the other hand, piglet mortality from crushing occurred more often in activity pens than in conventional farrowing crates or opening crates. However, this aspect has to be seen in context with the generally high rearing losses on the experimental farm.

		Compartment			
		A1	A2	A3	A4
Birth weight [kg]	LSM	1,7	1,7	1,7	1,7
	SE	0,0	0,0	0,0	0,0
Weaning weight[kg]	LSM	6,5 ^{ab}	6,3 ^b	7,1 ^a	6,7 ^{ab}
	SE	0,3	0,2	0,2	0,2
Weight gain [kg]	LSM	4,8 ^{ab}	4,6 ^b	5,4 ^a	5,0 ^{ab}
	SE	0,2	0,2	0,2	0,2
Daily weight gain [g d ⁻¹]	LSM	213,1	217,9	228,6	234,4
	SE	10,3	9,4	9,5	9,6

Table 1: Birth weight, weaning weight, weight gain and daily gain of the piglets in the different keeping variants (V_I and V_{II})

V_I, trial period I, no straw supply; V_{II}, trial period II, straw supply, in order to allow nest building behaviour; A₁, compartment 1, conventional farrowing crate; A₂, compartment 2, farrowing crate to open; A₃ and A₄, compartment 3 and 4, activity pens; LSM, least squares means; SE, standard error.

Means of the same line with the same superscript do not differ significantly at p < 0.05; no superscript: statistical model or influence of the effect is non-significant at p < 0.05.