

Jais, Christina; Oppermann, Peter; Schwanfelder Josef and Ebert, Jana

Rubber mats in the lying area of pregnant sows – 1. Experimental design and length of claws

During a two year lasting study the floor in the lying area in a pen for 30-40 pregnant sows was fitted with rubber mats, while in an identically designed control pen, the lying area was equipped with slatted concrete floor with round holes. The activity area of both pens consisted of slatted concrete floor. To evaluate the effect of rubber mats on the sows, claws and joints were judged regularly. Sows entered in the study with their second pregnancy and stayed, depending on their lifetime and their time of entering, up to five pregnancies in the study. For the analysis of claw length and growth the data of 341 pregnancies of 137 sows could be used. For none of the two criteria a difference between experimental and control pen could be identified, that would indicate a reduced abrasion of claws caused by rubber mats in the lying area.

Keywords

Rubber mats, slatted floor, pregnant sows, claws

Abstract

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In the stables of the Bavarian State Research Centre for Agriculture at the Centre for Pig Husbandry at Schwarzenau, during a two year lasting study the floor of a pen for 30–40 sows was equipped with rubber mats (**Figure 1**). Totally the area of the six lying zones was 36.4 m². In the same building an identically designed pen, of which the lying zones were fitted with slatted (round holes) concrete floor, served as control unit (**Figure 2**). Pen design with automatic individual feeding stalls, lying zones, activity areas and an open air area is shown in **Figure 3**. As regarding durability and cleanness the mats were already described [1].

Aim of the study and methods

Additionally to the durability of the rubber mats the effects on the sows should be evaluated in a long term study. Sows were introduced to the experimental pens during the early days of their second pregnancy and stayed in the study for up to five pregnancies, depending on their lifetime and on their time of entering into the study.

Because the long term effect of the type of floor in the lying area should be tested, sows that had been introduced into to pen with rubber mats in their first experimental pregnancy, were also kept on rubber mats during each of the fol-

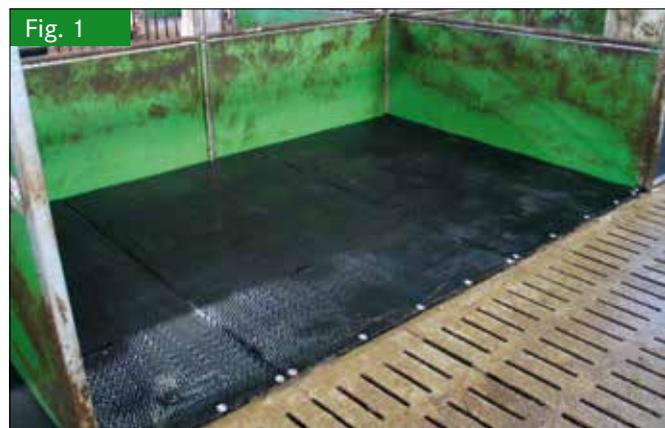
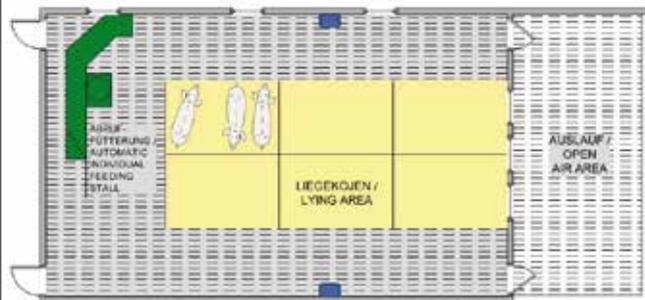


Fig. 1
Lying area with rubber mats in the experimental pen (Foto: LfL)



Fig. 2
Lying area with elements of concrete floor with holes in the control pen (Foto: LfL)

Fig. 3



Design of experimental and control pen

Fig. 4



Measuring the claw's length (Foto: LfL)

lowing pregnancies. Similarly, sows of the control group were always introduced into the pen with slatted floor. At the end of the fourth week of pregnancy sows were brought to the group pens directly from the gestating unit, where they were kept in individual stalls. Experimental and control pens were populated always at the same time with an almost equal number of sows.

Collection of data

The effects of the rubber mats on the sows' claw and leg health took centre stage of the study. Therefore at several times of the production cycle claws, joints and motion of the sows were judged.

Length of claws

Length of the left and the right outer claw (front lip of the claw) of the hind legs was measured once in each production cycle in the farrowing unit using a sliding calliper (Figure 4).

Alterations of the claws

Status of the claws of the hind legs was judged at three times:

- In the individual stalls of the gestating unit, few days before moving the sows to the group pens of the unit for pregnant sows.
- In the unit for pregnant sows, approximately one week after their introduction into the group pens, when hierarchically fights had already ceased.
- In the farrowing unit, one week after farrowing.

The following characteristics were taken. The rating was based on a scheme developed by the Dutch network of farmers for group housing [2], complemented by taking also the lateral abrasions of the claw horn. Four marks were described for each characteristic and assigned subjectively (Figure 5).

Balls

- 1 = no abnormality detected
- 2 = moderate proliferations
- 3 = formation of fractures
- 4 = proliferations and marked fractures

Injuries of the claw horn

- 1 = no abnormality detected
- 2 = slight injuries of the supporting frame, small fractures
- 3 = moderate injuries of the supporting frame, bigger fractures
- 4 = extreme fractures, partly detachment of the claw horn

Lateral abrasions of the claw horn

- 1 = no abnormality detected
- 2 = slight abrasions of the claw horn
- 3 = moderate, extensive abrasions of the claw horn
- 4 = moderate, extensive abrasions of the claw horn, up to the complete destruction of the claw horn

Injuries of the skin above the claw

- 1 = no abnormality detected
- 2 = slight injuries of the skin
- 3 = profound injuries of the skin
- 4 = profound injuries of the skin, up to extreme inflammations

Length of inner and outer claw

- 1 = no abnormality detected, equal
- 2 = slightly irregular, up to approx. 15 mm of difference
- 3 = much too long, up to approx. 30 mm of difference (sabre-like)
- 4 = extremely long, more than 30 mm of difference

Length of dewclaws

- 1 = no abnormality detected, length up to the beginning of the claw horn
- 2 = slightly too long, up to approx. 15 mm
- 3 = much too long, more than 15 mm
- 4 = dewclaw torn off

Alterations of the joints

Rating of fetlock and ankle of the right and the left hind leg was carried out together with the rating of the claws. Four marks had been defined in the following way:

- 1 = no abnormality detected
- 2 = hairless areas, redness
- 3 = slight swelling
- 4 = swelling, inflammation, bursae

Motion and weight

Fig. 5



Rating scheme for claws based on [2] (Fotos: LfL)

Rating of the sows' motion took place when moving them from the gestation to the pregnant unit, in the pregnant unit after ten days of introduction (at the same time with the rating of the claws) and when moving the sows from the pregnant to the farrowing unit using four marks:

- 1 = motion with no abnormality detected
- 2 = motion slightly affected (stiff walk, slight lameness)
- 3 = motion highly affected (moderate lameness, clumsy walk)
- 4 = motion extremely affected (severe lameness).

Sows were weighed individually each time when moving them from one unit to another.

Results

Length and growth of claws

For analysing the claw length only data from the 2.–6. pregnancy of the sows (according to their 1.–5. pregnancy in the study) were used. Totally data from 341 pregnancies and 137 sows could be used. 34 sows completed only one pregnancy in the study, 43 sows completed two pregnancies, 23 sows three pregnancies, 33 sows four pregnancies and 4 sows five pregnancies.

Table 1 shows the measured length of claws at the beginning and at the end of the pregnancy as well as growth of claws during pregnancy. Data of all pregnancies are shown sorted by the age of the sows (expressed by number of pregnancy). The parameter "length of claw at the beginning" was taken at the end of the previous pregnancy.

Table 2 and **Table 3** show the results of those sows that completed at least four pregnancies in the study. As thus the

same identical sows appear in each pregnancy, growth of claws can be determined for a period of up to four pregnancies.

Analysis of data was carried out by means of analysis of variance considering floor type as factor and length of claws at the beginning as co-variable.

The claw length rises with the age of the sows (**Table 1** and **2**). Within a period of four pregnancies length of claws rose about 6-7 mm (**Table 3**).

As regarding the parameters length and growth of claws there occurred no significant differences between the animals of the experimental pen and those of the control pen that would indicate a reduced abrasion of claw length caused by rubber mats in the lying area of the experimental pen. Fitting the lying area with rubber mats therefore led to no reduced abrasion of claw length when compared to a pen with lying areas equipped with concrete floor. The remaining part of slatted concrete floor in the activity area (approx. 80 m²) was obviously sufficient for abrasion of the claw length.

Conclusions

The use of rubber mats in the lying area of sows combined with concrete floor in the activity area does not lead to reduced abrasion of the claw length.

References

- [1] Jais, C.; Oppermann, P. (2012): Einsatz von Gummimatten bei tragenden Sauen - Haltbarkeit und Sauberhaltung. Landtechnik 67(4), S. 291-294
- [2] Arden, M. (2006): SUS-Aktion: Machen Sie den Klauen-Check! SUS 6, S. 34-36

Table 1

Length of claws (mean \pm standard deviation) at the beginning and at the end of pregnancy as well as growth of claws during pregnancy according to age of sows (expressed as number of pregnancy)

Trächtigkeit Pregnancies	Merkmal Characteristic	Gummimatten Rubber mats	Beton Concrete floor	Signifikanz Significance
2	Anzahl Sauen/number of sows	46	48	
	Klauenlänge am Anfang/claw length at the start [mm]	44.4 \pm 2.3	45.1 \pm 3.3	n. s.
	Klauenlänge am Ende/claw length at the end [mm]	46.6 \pm 2.9	47.9 \pm 3.5	n. s.
	Klauenwachstum/growth of claws [mm]	2.2 \pm 3.0	2.8 \pm 2.9	n. s.
3	Anzahl Sauen/number of sows	43	45	
	Klauenlänge am Anfang/claw length at the start [mm]	45.6 \pm 3.3	47.2 \pm 3.5	n. s.
	Klauenlänge am Ende/claw length at the end [mm]	47.3 \pm 2.6	48.6 \pm 3.1	n. s.
	Klauenwachstum/growth of claws [mm]	1.7 \pm 3.3	1.4 \pm 3.2	n. s.
4	Anzahl Sauen/number of sows	38	30	
	Klauenlänge am Anfang/claw length at the start [mm]	47.5 \pm 2.4	48.2 \pm 3.2	n. s.
	Klauenlänge am Ende/claw length at the end [mm]	49.8 \pm 4.8	50.8 \pm 4.8	n. s.
	Klauenwachstum/growth of claws [mm]	2.3 \pm 4.6	2.5 \pm 3.8	n. s.
5	Anzahl Sauen/number of sows	34	25	
	Klauenlänge am Anfang/claw length at the start [mm]	49.6 \pm 4.8	50.1 \pm 5.0	n. s.
	Klauenlänge am Ende/claw length at the end [mm]	51.1 \pm 5.7	51.0 \pm 4.5	n. s.
	Klauenwachstum/growth of claws [mm]	1.5 \pm 3.3	0.9 \pm 2.5	n. s.
6	Anzahl Sauen/number of sows	15	16	
	Klauenlänge am Anfang/claw length at the start [mm]	49.2 \pm 4.7	49.0 \pm 4.8	n. s.
	Klauenlänge am Ende/claw length at the end [mm]	51.3 \pm 5.9	49.8 \pm 5.1	n. s.
	Klauenwachstum/growth of claws [mm]	2.1 \pm 3.4	0.8 \pm 3.4	n. s.

¹⁾ n. s. = nicht signifikant/nonsignificant.

Table 2

Length of claws (mean \pm standard deviation) of sows with at least four pregnancies during the study from the beginning of the study (1. farrowing) to the end of the fourth pregnancy during the study (5. farrowing)

Anzahl der Abferkelungen Number of farrowings	Gummimatten Rubber mats (16 Sauen/Sows)	Betonboden Concrete floor (12 Sauen/Sows)	Signifikanz Significance
1 (vor Versuchsbeginn)	44.7 \pm 2.0 mm	45.4 \pm 4.5 mm	n. s.
2	46.4 \pm 3.2 mm	47.7 \pm 3.8 mm	n. s.
3	46.4 \pm 2.3 mm	48.9 \pm 4.0 mm	p < 5 %
4	50.0 \pm 3.1 mm	51.2 \pm 5.1 mm	n. s.
5	50.9 \pm 3.7 mm	52.2 \pm 4.8 mm	n. s.

Table 3

Growth of claws (mean \pm standard deviation) of sows with at least four pregnancies during the study from the first to the fourth pregnancy during the study

Trächtigkeit Pregnancy	Gummimatten Rubber mats (16 Sauen/Sows)	Betonboden Concrete floor (12 Sauen/Sows)	Signifikanz Significance
2	1.7 \pm 3.4 mm	2.3 \pm 3.7 mm	n. s.
3	0.0 \pm 3.0 mm	1.2 \pm 3.6 mm	n. s.
4	3.6 \pm 2.9 mm	2.3 \pm 3.9 mm	n. s.
5	0.9 \pm 3.8 mm	1.0 \pm 2.5 mm	n. s.
2-5	6.2 \pm 3.9 mm	6.8 \pm 3.7 mm	n. s.

Authors

Peter Oppermann und Dr. Christina Jais work in the team "Pig Husbandry" at the Institute for Agricultural Engineering and Animal Husbandry of the Bavarian State Research Centre for Agriculture in Grub, Josef

Schwanfelder at the Centre for Pig Husbandry at Schwarzenau. Jana Ebert dealt with the topic during a practical course. Prof.-Dürrwächter-Platz 2, D-85586 Poing/Grub; e-mail: christina.jais@LfL.bayern.de