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Influence of housing conditions on the appearance of cannibalism in weaning piglets

In four trial runs with a total of about 830 piglets, the influence of tail docking as well as housing conditions on the appearance of tail biting in weaners was examined. In addition the effect of counteractions in case of the appearance of cannibalism should be tested. Docking the tails was the most secure way to suppress tail biting. This was the only trial version in which no cannibalism appeared. In the conventional pens with undocked piglets, tail biting was strongly pronounced. In the trial versions with enriched pens, tail biting was reduced clearly, but could not have been suppressed completely. Counteractions in case of tail biting proved to be effective.

Keywords
Pigs, tail biting, cannibalism, tail docking, housing conditions, enrichment

Abstract
Landtechnik 68(6), 2013, pp. 389–394, 4 figures, 5 tables, 12 references

The major part of the weaning and finishing pigs in Germany are kept in housing systems with slatted floors without litter, because of procedural, hygienic and economic reasons.

These housing systems are characterized by a low-stimulus environment and few possibilities to explore or manipulate. Many publications mention the low-stimulus environment to be the primary cause for tail biting [1, 2, 3, 4, 5, 6]. The multitude of possible causes complicates the choice of specific counteractions. Tail docking is the most effective method to reduce tail biting [1, 7], but in the EU it is not allowed to be carried out routinely [8]. Nevertheless, it is the common practice in Germany and so almost all of the conventional pigs are tail-docked [3,9].

The first aim of the study was to estimate the risk of tail biting in conventional housing systems arising from leaving the tails undocked. Another aim was to find practices to prevent tail biting and stop it in case of an outbreak.

Materials and methods

Four trial runs were carried out in eight pens for weaning piglets, each with 10 m². The pens had plastic flooring, a lying area with underfloor heating, four feeding places at pulp feeding automates, three drinker nipples and one plastic ball hanging from a chain as an enrichment object. The stocking density was 0,35 m² per animal.

In the first two trial runs 50 % of the piglets were docked and the other 50 % were left undocked. The pens were left in the original constitution. Four pens were filled with docked piglets (2/3 of the tail was docked), four pens with undocked piglets.

In the next two trial runs, focus was set on the influence of the housing conditions. All animals were left undocked and four of the eight pens were equipped with enrichment objects, organic materials and one additional open-water trough. Stocking density was reduced, so that the space allowance per animal was now 0,5 m².

In all trial runs, piglets of the same litter were splitted over all eight pens so that littermates, weight and sex of the piglets were evenly distributed.

For analyzing the behavior, videos were recorded. Twice per week tail lesions and partial losses were evaluated for every individual animal. In addition the development of weight of each piglet, feed and water consumption of each pen and temperature in the stable were measured.

Before starting the trials, a scoring scheme for tail and ear lesions was developed in collaboration with other German research institutes. **Table 1** shows the scheme how lesions have been valued. In **Table 2** there are some examples for lesion-scores.

Results

Effect of non-docking

In the first two trial runs, there was a significant difference (chi-square-test $p < 0{,}001$) between the docked and the un-

docked piglets. While docked animals remained almost unharmed, nearly all undocked piglets had serious damages due to tail biting.

Tail biting always started in the second week after weaning. **Figure 1** shows the percentages of the lesion-scores of the undocked animals from both trial runs. At the beginning of the second week after weaning first injuries occurred and the action increased until the end of the third week. Within the third week, various counteractions have been taken, whereupon tail biting calmed in different durations and the wounds healed.

Figure 2 shows the percentages of lesion-scores of the docked animals. This shows that only a small proportion of the animals had little bite marks. This also occurred mainly in the second and third week after weaning.

The relative frequencies of piglets with different scores of partial losses of the tails at the end of piglet rearing period are shown in **Table 3**: The full length of the tail remained at only 6.2 % of the undocked animals. In contrast, no partial losses due to tail biting were recorded in the docked animals.

The chi-square test revealed a significant difference ($p < 0.001$) between the treatments "docked" and "undocked", when scores were classified into "no partial loss" and "partial loss > 0 %". In the class "partial loss > 0 %" the scores 1–3 had been summarized.

Effect of housing conditions

In the trial runs 3 and 4 also a significant difference between the treatments was observed (chi-square test $p < 0.001$). Strong tail biting in the conventional pens started again between the first and the second week after weaning. In contrast to the trial runs 1 and 2, countermeasures were started immediately by feeding the animals Alfalfa, whereupon the action calmed more quickly and the injuries were generally less severe (**Figure 3**).

The piglets in the enriched pens started tail biting 2–3 weeks later, and in addition, significantly fewer animals were affected. The injuries were less serious and the situation did not escalate, although no further counteractions have been taken.

Table 1

Scoring scheme for tail lesions and partial losses

Schwanzverletzungen/*Tail lesions*		**Teilverluste/*Partial losses***	
0	keine Verletzung erkennbar *no lesion visible*	0	kein Teilverlust *no partial loss*
1	Kratzer, leichte Bissspuren *scratches, slight bite marks*	1	bis zu 1/3 Teilverlust *up to 1/3 partial loss*
2	kleinflächige Verletzungen *small-area lesions*	2	bis zu 2/3 Teilverlust *up to 2/3 partial loss*
3	großflächige Verletzungen *large-area lesions*	3	mehr als 2/3 Teilverlust[1)] *more than 2/3 partial loss*

[1)] Bei kupierten Tieren ist ein Teilverlust immer Note 3/*for docked animals a partial loss is always score 3*.

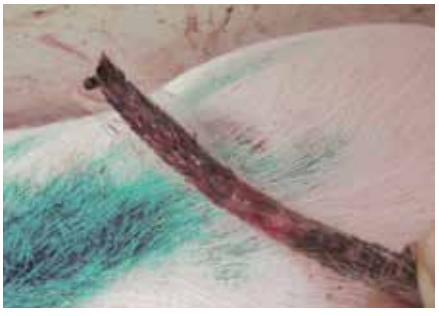
Table 2

Picture-examples for the scoring scheme for tail lesions and partial losses

Verletzung/*Tail lesion:* 0
Teilverlust/*Partial loss:* 0

Verletzung/*Tail lesion:* 1
Teilverlust/*Partial loss:* 0

Verletzung/*Tail lesion:* 2
Teilverlust/*Partial loss:* 2

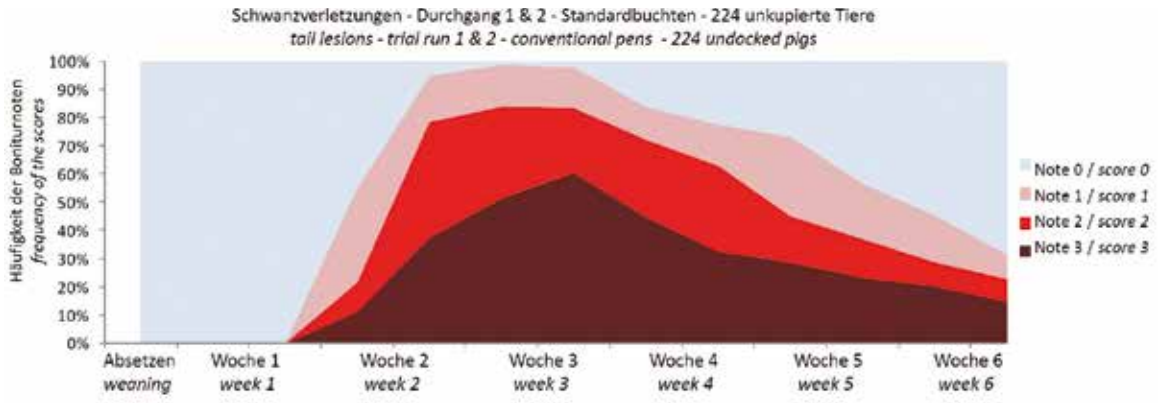


Verletzung/*Tail lesion*: 3
Teilverlust/*Partial loss*: 0

Verletzung/*Tail lesion:* 2
Teilverlust/*Partial loss:* 1

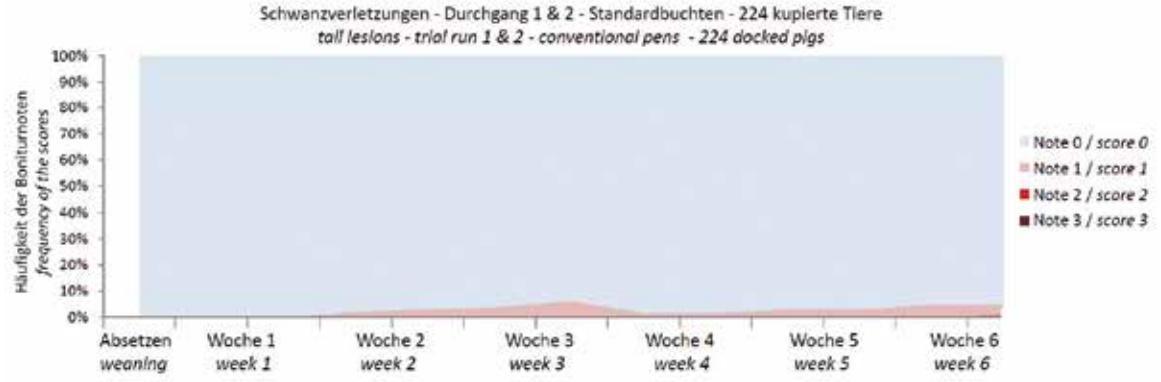
Verletzung/*Tail lesion:* 3
Teilverlust/*Partial loss:* 3

Fig. 1



Tail lesions of undocked weaners in conventional pens (trial run 1 and 2)

Fig. 2



Tail lesions of docked weaners in conventional pens (trial run 1 and 2)

Table 3

Proportion of piglets with different tail losses (trial run 1 and 2)

Behandlung/*Treatment*	**Note 0/*Score 0***	**Note 1/*Score 1***	**Note 2/*Score 2***	**Note 3/*Score 3***
Kupiert[1)]/Docked[1)]	100 %	-	-	0,0 %
Unkupiert/Undocked	6,2 %	38,6 %	19,5 %	35,7 %

[1)] Kupierte Tiere konnten nur die Noten 0 (kein Teilverlust) oder 3 (> 2/3 Teilverlust) erhalten/*docked animals could only get score 0 (no partial loss) or score 3 (> 2/3 partial loss).*

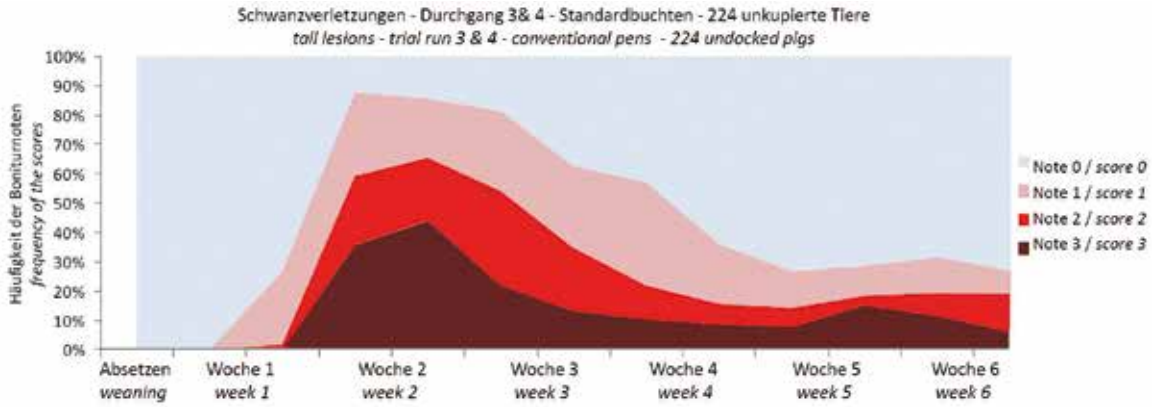
The relative frequencies of piglets with different scores of partial losses of the tails at the end of piglet rearing period are shown in **Table 4**: the animals in the enriched pens had significantly fewer partial losses than in the conventional pens. The chi-square test also revealed a significant difference ($p < 0.001$) between the treatments in classes "no partial loss" and "partial loss > 0 %".

Effect of counteractions

In the trial runs 1 and 2 counteractions had been taken about one week after the beginning of strong tail biting (several animals with clearly visible injuries with at least score 2). Therefore, about 500 grams of straw per pen were thrown into the lying area twice a day.

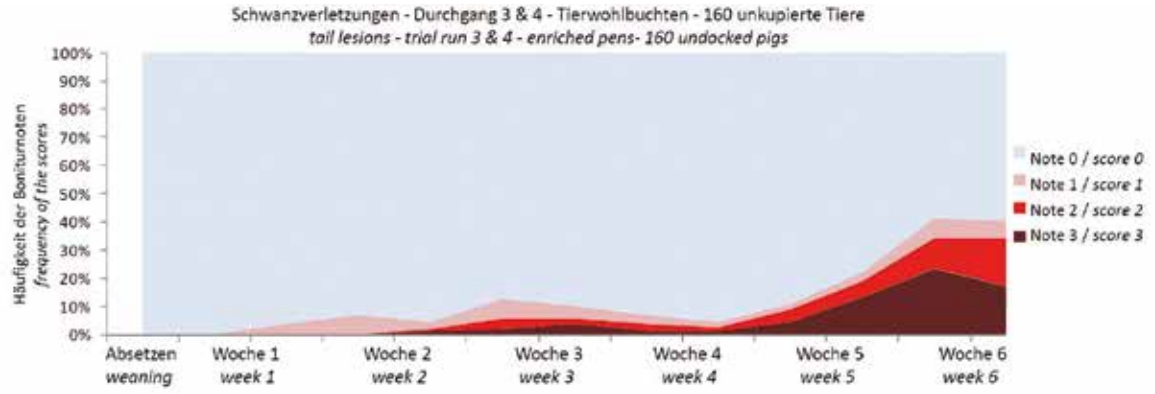
In contrast, in the trial runs 3 and 4, immediately at the onset of strong tail biting it was started to feed 500 grams of Alfalfa per pen twice a day. From the video recording, tail-biting activities were determined before and after taking the counteraction. **Table 5** shows the absolute frequencies of tail biting in 24 hours ("event-sampling"). It was distinguished between soft tail biting (without pain expression of the bitten animal) and severe tail biting (with pain expression of the bitten animal). Already within the first day after the counteraction, a reduction of tail biting in all four groups was clearly visible and with one

Fig. 3



Tail lesions of undocked weaners in conventional pens (trial run 3 and 4)

Fig. 4



Tail lesions of undocked weaners in enriched pens (trial run 3 and 4)

Table 4

Proportion of piglets with different tail losses (trial run 3 and 4)

Behandlung ***Treatment***	**Note 0** ***Score 0***	**Note 1** ***Score 1***	**Note 2** ***Score 2***	**Note 3** ***Score 3***
Standard *Conventional*	29,3 %	57,7 %	9,3 %	3,7 %
Tierwohl *Enriched*	76,6 %	19,0 %	4,4 %	0,0 %

exception always significant (**Table 5**). The differences between the frequencies of tail-biting activities before and after the start of the counteraction have been tested using the chi-square test.

Discussion

In all four trial runs strong tail biting occurred in the undocked animals. Noticeable was the good repeatability of the test results. Tail biting in the conventional pens, always started in the 2nd week after weaning. In the enriched pens a significant temporary shift of 2–3 weeks and a less severe form of tail biting activities were recorded. In all trial runs the behavior disorder was always clearly identified as the reason for the injuries, previous necroses of the tails [10] were never observed.

The counteractions always led to an improvement of the situation. In some cases, however, the provision of manipulable material was not sufficient, and in addition, a biting pig had to be identified and removed from the pen. This observation is consistent with a study of Zonderland [11]. Also reports from countries, where the shortening of the tails is already prohibited, confirm this [12].

In these experiments a complete suppression of tail biting could be only achieved by tail-docking. In all variants with undocked animals, tail biting occurred. Even in the enriched pens individual animals were severely affected. This confirms the outstanding effect of tail docking against tail biting, as well as it is formulated in the EFSA report [1] and in a study by McGlone et al. [7].

Conclusions

The results show that a sudden stop of tail-docking is not possible, without increasing the risk for the occurrence of tail biting dramatically. Even a significant reduction of the stocking density and an enrichment of the housing conditions including

Table 5

Absolute frequencies of tail biting activities in 4 undocked groups in conventional pens 3 days before and after starting the counteraction

Durchgang *Trial run*	**Gruppe** *Group*	**Beißen** *Biting*	**Tag -3** *Day -3*	**Tag -2** *Day -2*	**Tag -1** *Day -1*	**Tag 0** *Day 0*	**Tag +1** *Day +1*	**Tag +2** *Day +2*	**Tag +3** *Day +3*	**Signifikanz** *Significance*
2[1)]	1	leicht *light*	585	798	828	Start der Gegenmaßnahme *starting the counteraction*	480	174	219	< 0,0001
		stark *strong*	45	42	45		48	51	48	0,9572
2[1)]	2	leicht *light*	1 146	1 170	1 686		564	552	450	< 0,0001
		stark *strong*	366	186	210		54	57	45	< 0,0001
3[2)]	3	leicht *light*	72	189	705		186	213	51	< 0,0001
		stark *strong*	0	12	174		12	33	0	< 0,0001
3[2)]	4	leicht *light*	102	225	396		147	66	30	< 0,0001
		stark *strong*	0	39	333		33	0	0	< 0,0001

[1)] Gegenmaßnahme 1 Woche nach ersten Verletzungen 2. Grades: 2 x täglich Stroh/*Counteraction 1 week after the first lesions with score 2: straw semi-daily*.
[2)] Gegenmaßnahme sofort bei ersten Verletzungen 2. Grades: 2 x täglich Luzernehäcksel/*Conteraction instantly with the first lesions with score 2: chopped lucerne semidaily*.

organic materials, could not sufficiently reduce the behavioral disorder. There is a considerable need for further research to find ways to reduce the risk of tail biting in undocked pigs.

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