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Comprehensive Assessment of Innovative Pig Fattening Methods in a Field Study

Experiment Design and Ethological Assessment Concept

A one year field study in four innovative pig fattening systems, each in five stables, is being carried out. The goal was a comprehensive cost-benefit analysis, focused on ethological issues. In the following, direct animal observation with the scan-sampling method and video support, as well as the integument assessment is introduced. Based on preliminary results, the ethological assessment concept allows for a differentiation of the individual systems.

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Keywords

Pig-fattening, animal welfare, ethological assessment, indoor air quality

Literature

Literature references can be called up under LT 04505 via internet <http://www.landwirtschaftsverlag.com/landtech/local/literatur.htm>.

At present, animal welfare and environmental sustainability are increasingly becoming key issues for the acceptance of the different sections of animal husbandry and of their products in society and in the related public discussion. This is especially the case with pig husbandry. At the same time, farmers are confronted with an increasing cost pressure and decreasing profit prospects. This research project aims to combine animal welfare and good profitability for family farms in new housing systems for fattening pigs.

Animals, Material and Methods

In the framework of the field study, four housing systems for fattening pigs are evaluated for one year. Each system is represented by five similar stables that are monitored, altogether 20 pig houses. With a random sample of five stables per system it is possible

to reduce the strong, and often underestimated effect of the farmer for the functionality of the respective systems. Moreover also different influences at different locations can be tested like the climate for a single system. The housing parameters for the four systems to be investigated are defined in table 1. The pen area offered to each of the pen mates is due to its economic importance the most important criterion. In addition, the proportion of the laying area as well as the occupational offers to the pigs are important concerning legal regulations and consumer requirements.

In all of the farms three-lines hybrids or fatteners from the cross of German Landrace x Pietrain are used. The average size of the pig houses is between 300 and 1000 fattener places. When selecting the farms, attention paid to a uniform standardisation. However all criteria could not always be fully met when the farms had been selected in practice.

Fig. 1: Acceptance of the laying area in investigated pig-fattening systems - winter section

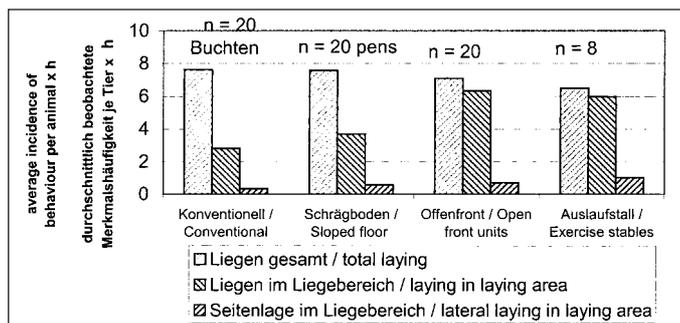


Table 1: Definition of the investigated housing-systems

System brief description	I Improved conventional system	II Sloped floor system with minimal litter	III Open front unit with sleeping boxes	IV Exercise stable with two-area pen and litter
aeria-offer per 110 kg LW	1.0 m ²	1.0 m ²	1.0 m ²	>1.0 m ²
minimum laying area per pen	30 % (slot-reduced)	70 % (plan)	50 % (plan)	50 % (plan)
maximum slatted floor per pen	70 %	30 %	50 %	50 %
littering (straw)	no	minimal litter	facultative	litter
occupation - offer	yes	yes	yes	yes
climatic areas	same	same	separate	separate

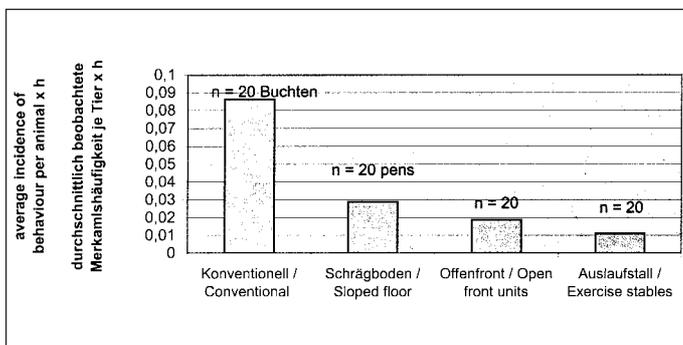


Fig. 2: Tail- and earbiting as examples for abnormal behaviour in the investigated pig-fattening systems - winter section

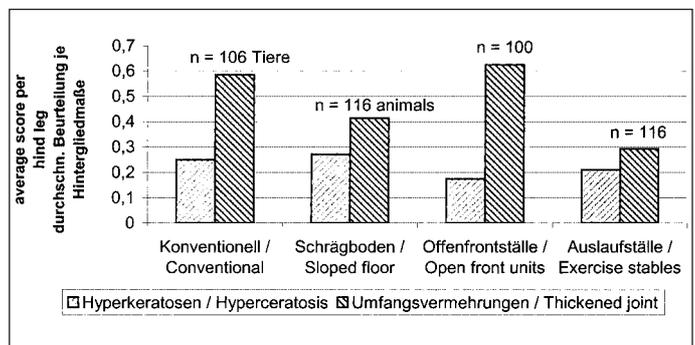


Fig. 3: Damages at the hind legs versus housing systems - winter section

Experimental Design

The investigation period is divided, similar to the seasons, into four blocks to be able to recognise any seasonal effects. In every observation period each pig house is investigated once for two consecutive days. Two farms are investigated per week and hence in a ten weeks period all pig houses are inspected. Within the blocks the individual systems are successively processed within five passages. The single systems and farms are distributed in every season randomly with the restriction, that farms with all-in-all-out procedures must be investigated purposefully in the required life weight ranges. Once in a while, alternative dates have to be accepted, too, if this is explicitly desired by the farmer.

The research method described in the following is based partly on direct animal observations by different (in general by three) persons. The individual observers are distributed again randomly for the individual farm visits.

Ethological Assessment Concept

The whole concept of ethological assessment is based on four methods. The first method is the direct observation of animal behaviour, the second method is the integument scoring of randomly selected individual animals, the third method is the scoring of the general housing conditions and of pen soiling. The fourth method is the general farm recording of the individual pig houses and their comparison with literature data and their compliance with governmental regulations. Additionally accompanying investigations are accomplished, like the measurement of stable climate parameters and of noxious gas concentrations.

The observation by use of the scan sampling method is divided into two parts. At first it is scored, where are the animals and what position has their body. Based on these results, an essential requirement from the animal welfare side can be inspected. In the second part, certain behavioural patterns are scored to classify the systems, like e. g. bar biting as an indicator for an abnormal idle behaviour [1]. By using the scan sampling method, all animals are counted, which show the particular behaviour patterns in certain

time-intervals. The advantages of direct observations are, that it is done with all senses (also with the hearing) and that it allows a spatial view [2]. The observation of those pen areas that cannot be directly observed (exercise areas, sleeping boxes) takes place by the means of a mobile video technique with simultaneous radio transmission being monitored from a raised chair. Every observation is done parallel in two pens in an alternating rotation interval of three minutes during the main activity periods in the morning and in the late afternoon for 96 minutes each. Additionally an adaptation period for animals-observer of at least 24 min. before every observation period has to be respected. The data acquisition is done with a fully ruggedised tablet-PC. An own observation software (ETHOSCAN 04) had been developed to further standardise data-collection [3].

For the integument assessment following the method „Ekesbo“, 20 % of the animals from four randomly allotted pens get scored. With this method the direct impact of the housing environment (e.g. sharp edged slatted floor) as well as its indirect impact (e.g. abnormal idle behaviour because of missing stimuli) are investigated. For the compilation of the criteria catalogue, its practicability under field conditions had been an important aspect. Compared to literature [4] it was created without being too detailed. In relation to earlier and other methods as for instance carcass rating, the method Ekesbo has the clear advantage of a special feasibility under field conditions (also from non-veterinarians) and the suitability for large sample sizes.

For the observations and scorings animals in two live mass (LM) categories (40 to 50 kg and from 70 to 80 kg) have been rated. For both methods several observers are used. Therefore regularly comparative observations are carried out. The resulting correlation coefficients ranged between 60 and 95 %.

Results

The first results concerning the question whether the animals are able to recognise the designated structure of the pen and if they

accept the given functional areas are presented in fig. 1.

The animals in the housing systems with separate climatic areas lay nearly with the double frequency during the total observation period in the laying area than the animals in the conventional system or in the sloped floor system. In the same way also the share of the parameter „lateral laying in the laying area“ increased. Therefore systems with separate climatic areas can be rated higher from the viewpoint of animal welfare requirements.

In the second part of the ethogramme, certain behavioural activities had been scored. The parameter „rooting“, characterising the satisfaction of species-typical behavioural needs is registered more frequently in the variant with strong littering than in the others. As a negative indicator parameter the abnormal behaviour „tail- and ear-biting“ was integrated. This appeared more frequently in the conventional system; in the system with exercise yards and littering it was rarely observed (fig. 2).

In analysing data from the integument scores, it has to be differentiated for different reasons. In systems with concrete floors without littering, thickened joints at the hind legs were determined more often (fig. 3). On the other hand integument changes could be observed as a consequence of conflicts between pen mates. A mean number of scratches mainly occurred in the conventional system and the scoring frequency continued to decrease down to the open front units. It is surprising that in the exercise yard system the number of scratches raised again. This could possibly be explained due to the winter situation, when the animals in buildings of inferior insulation have to fight more for the best sleeping places.

Conclusion and Outlook

The first analysis showed that the investigation concept enables a differentiation and thus also an evaluation of the single housing systems. The first preliminary descriptive results have still to be validated by the subsequent investigation periods through a final analysis of variance.