

Hinrich Snell, Stephan Dellwisch and Herman Van den Weghe, Vechta

Piglet rearing in natural climate housing

Animal welfare and biological performance

In a natural climate house for rearing piglets in large groups behaviour, biological performance and house climate were investigated during two rearing periods in winter. The results confirmed that the investigated production system enabled good livestock performance despite the simple housing construction. Many, especially technical, indicators showed that the investigated production system could be described as welfare oriented.

In the following work it was investigated whether a simple natural climate house offered a housing system that was welfare-oriented as well as capable of encouraging rearing performance.

Production system

The studies were carried out during two rearing cycles (23. 12. 1999 to 18. 2. 2001; 2. 3. 2000 to 27.4. 2000) within a natural climate house used exclusively for piglet rearing on an Emsland farm.

Accommodation comprised 14 piglet huts (6000 • 2500 mm). On one side of each hut was a run (7500 • 2500 mm) with the hut wall open for its whole height on the same side. The air exchange area between hut and outside climate could be regulated via different adjustable elements. As with the remainder of the house, the huts were not heatable. Only exception was a small nursery area.

In every hut were two dry feed automatic feeders and eight drinking bowls.

With 75 piglets per pen, stocking was 0.45 m²/piglet (hut 0.2 m²/piglet, run 0.25 m²/piglet), an animal:feeding space ratio of 6.25:1 and animal:drink place ratio of 9.38:1.

Littering was long straw from big square bales with one bale distributed per hut run before stocking. Subsequent littering started after around 10 days of occupancy. When the pigs were moved on, the house was mucked-out and disinfected.

At the time of the investigation stocking took place with a nine-week rhythm and around 1000 to 1050 hybrid piglets from mixed sources at around 8.5 kg average weight.

During the whole rearing period individual piglets were continually sorted from one pen to another to achieve a more uniform size in pens. The house was emptied when the pigs reached around 30 kg lw.

Performance recording and evaluation

Recording of animal behaviour took place each Monday on an hourly basis from 8 am to 6 pm in each pen by the same person throughout the investigation using scan sampling system, direct observation of anonymous piglets and individual marked focus piglets. In different positions within the house as well as at a particular point in the outside run, continuous and intermittent housing climate measurements were carried out.

Cleanliness of individual pens was subjectively evaluated during the pig observation days.

[1] contains a detailed description of the method.

Biological performance

In the statistical evaluation of the focus animals' biological performance the actual batch has a substantial and significant influence. Comparing the sexes showed that the female piglets had less weight than males at the end of the feeding period despite almost identical initial weights and a (not significant) longer rearing period.

About half of the focus animals weighed more than 8.5 kg at housing. Piglets with higher housing weights also achieved a higher weight at the end of the feeding period.

Dr. Hinrich Snell is scientific assistant, cand. agr. Stephan Dellwisch is diploma student and Prof. Dr. Ir. Herman Van den Weghe is incumbent of the chair for Procedural Engineering, at the Weser-Ems Research and Study Centre for Livestock Economy, University of Göttingen, Universitätsstr. 1, D 49311 Vechta, e-mail: hsnell@gwdg.de.

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Keywords

Piglet production, piglet rearing, large groups, natural climate housing

Tab.1: Intermittently recorded house climate data (LSM)¹⁾

| | | Rearing period | | Pen area ²⁾ | | | |
|--------------------------------------|-----|-------------------|-------------------|------------------------|-------------------|-------------------|-------------------|
| | | I | II | 1 | 2 | 3 | 4 |
| NH ₃ -concentration [ppm] | LSM | 2.46 ^a | 1.83 ^b | 4.41 ^a | 2.31 ^b | 1.73 ^c | 0.16 ^d |
| | SE | 0.14 | 0.14 | 0.20 | 0.20 | 0.20 | 0.20 |
| Ventilation velocity [m/s] | LSM | 0.22 | 0.22 | 0.15 ^b | 0.17 ^b | 0.18 ^b | 0.38 ^a |
| | SE | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 |

¹⁾ Calculations were limited to pens occupied on the recording day, n = 160. Values within one line and one influence factor showing no identical high letter differ significantly (p<0.05). Where no high letters are shown, differences were not significant.

²⁾ 1 Trough area; 2 Hut entrance; 3 Dugging area; 4 Division wall between run and feeding passage

od, although lighter animals were kept longer in the house. The average rearing period for piglets with a housing weight of up to 8.5 kg was 51.6 days; over 8.5 kg, up to 43.8 days.

Animal behaviour

Observation of anonymous piglets

The trail feeding period had a significant influence on the number of piglets in the run. In period I (II) the average of the hourly recordings totalled 174.7 (228.5) piglets in the 14 runs. Also the number of lying pigs 56.3 (148.7) in the runs and the number of feeding piglets 71.1 (58.2) were significantly influenced by the feeding period. This factor, however, did not significantly influence the drinking activities 8.0 (8.5).

All four characteristics mentioned were significantly influenced by the week of the rearing period. Contrary to this, time of observation had a significant influence only in feeding and drinking.

Independently of the feeding period the piglets frequented the run more often with increasing age. Especially the younger piglets were more seldom in the run in the mornings as later in the day.

In the first half of the rearing period the run was hardly used at all for lying. Starting from the sixth week at least 10% of the piglets could be observed lying in the run regularly. The feeding activity increased as the day proceeded during the first rearing period. This effect was not noted in the second one. On some days, especially around noon, fewer piglets were registered at the feeding places. Statistically this relationship showed significant interaction between feeding period and time of day.

Focus piglet observation

Evaluation of the individually marked focus piglet behaviour showed that female piglets stood more often in the run compared with males. Piglets with high initial weight were more often observed standing in the runs compared with their group companions. However, no weight-related differences emerged regarding lying frequency.

Production environment

The temperature in the runs was generally the same as the outside one. In the huts the temperatures in general was substantially higher (~20 – 25°C), and these varied less than the outside conditions.

In the statistical analysis of the intermittently recorded climate data (table 1) the influence of the feeding period, location in pen and rearing week on NH₃ concentration were shown as highly significant. The air ve-

locity in-house also was associated with highly significant influences of pen areas and rearing week. The feeding period, however, did not significantly influence the recorded results. Here, the influence of the air velocity on the rearing week could not be explained by stage of rearing, it was instead a reflection of varying outside climate on the different recording days.

As one would expect, the pens got dirtier as the rearing period progressed. This development proceeded only slowly at first in the lying area and was not observed in the trough area. During the whole period, conditions in the huts were cleaner than in the runs and only the drinking area of the huts become increasingly dirty as the rearing period progressed.

Discussion

Several characteristics were highlighted by the above work which can be used as indices for evaluation of animal welfare. The technical indicators include the parameters of house climate and temperature. During winter the shell of the building led to only a limited difference in temperature between inside and outdoors. In the pen runs the temperature was almost the same as outside. Even the technical indicators showed that this situation was unproblematic for the piglets. Litter, and the increasing biological activity in the dung mattress during the rearing period, increased piglet tolerance to low air temperatures. Also, the air velocities inside the house during the entire investigation were so low there influence can be ignored. Finally, the combination of a warm hut and a run which was cold during the investigations led to the piglets always having the choice of more comfortable conditions. According to the results of the focus animal observations it appears that lighter and therefore lower-ranking, piglets did not seem to be obstructed in their choice of location.

Measurement of the NH₃ concentration in the interior air indicated increased concentrations inside the huts although, even there, they lay at a very low level.

The level of pen dirtiness should also be mentioned in the context of the recorded technical indicators. Naturally the dirtiness increased with the rearing period. This process appeared unproblematic when, in the first place, the building was mucked-out between each rearing period and secondly where, during the rearing, the pig's natural separation of function areas, especially the permanent use of a dunging place, was followed. Both conditions were present in the investigated farm.

Further technical indicators such as the presence of occupational material in the

form of litter, available floor space and the natural rhythm of light intensity require no deeper discussion.

Regarding the farmer-associated indicators of welfare, this included the direct handling of the animals. In this relationship the effect of the continual re-sorting of the piglets from pen to pen, as carried out in the investigation farm, should be evaluated in terms of animal welfare. Here it must also be born in mind that the effect of larger groups on the welfare aspect of production is not yet sufficiently researched.

Performance related criteria could only in certain cases be used for evaluating animal welfare, although losses are relevant in such cases. Piglet losses in the investigated housing conformed to the average of other farms in the piglet production ring [1].

Alongside the already discussed characteristics, information on piglet behaviour with regard to use of run and feeding behaviour was recorded. The results confirmed that the run was widely used by the piglets and increasingly so as the rearing period progressed.

Summary

Results show that despite the simple building form the investigated system allowed good livestock performance. With regard to the available literature [2, 3], the discussed indicators also show that the investigated production system can be described as a welfare-oriented method under piglet rearing systems. There are, however, individual aspects which require critical testing and other aspects should be the subject of deeper research.

Literature

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