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Outdoor climate kennel housing

Function areas and their utilisation by feeding pigs

In a comparison of systems animal behaviour was analysed on a commercial farm within an outdoor climate kennel house with part-slatted flooring, an outdoor climate house with littered dunging area and a conventional insulated house. No fundamental differences emerged. The influences of the climate outside and inside the houses, the animal liveweight and the function areas were distinct. A good through-ventilation of the kennels in summer affects success. When compared, proportions of behavioural trends were similar in conventional insulated housing.

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Outdoor climate housing has natural ventilation, and insulation for heat retention is limited to the animal lying areas. According to their requirements the animals can move between the two climate zones and establish areas for lying, feeding and dunging. Such functionally-designed systems have been already individually described [1, 2, 3, 4, 5, 6]. Directly comparable conditions are, however, not available. The aim was to assess under comparable conditions the animals' function-oriented utilisation of the buildings differentiated according to systems with and without straw, feeding phase, stocking density and time of year .

Materials and method

On a farm (*fig. 1*), three units each of 64 animals in four pens were compared (conventional insulated house with part-slatted flooring (kW), outdoor climate house with kennels and part-slatted flooring (AKt), outdoor climate house with kennels and littered dunging area (AKe)) [10]. The pens (width 2.60 m) were arranged in two rows parallel to the roof ridge. Positioned along the wall sides were insulated lying kennels with openings towards house middle curtained with plastic strips.

Stocking at 32 animals per pen for growers meant space per animal of 0.44 m^2 whilst during the main feeding phase pigs were stocked at 14 to 18/pen giving 1.01 to 0.79 m^2 apiece. Feeding was via mash tube automatic at pen walls. Feeding and dunging areas had slatted flooring. In the littered trial (AKe) these areas were covered with sand-coated wood fibre sheets. There, about 100 g straw per animal was littered and dung removal took place every second day.

The Pi x DL piglets in the trial came as a single batch from a breeding farm. Management was all-in, all-out and, at initial housing, the lying areas were prepared with around 30 litres of sawdust or feed. The weaners were rehoused after three to five weeks. Outdoor, in-house and kennel interior temperatures are given in *table 1*.

Per housing system, two pens (grower) or four pens (main feeding phase) were observed over 24 hours on each of two days to record pig positions, utilisation of function areas and the proportion of behavioural modes (lying on belly, on side, standing, feeding). The pens were divided into function areas: the kennel as resting place, the dunging area for movement, dunging and urinating, the animal-length radius semi-circle around the feed automatic for feeding.

Group animal behaviour was evaluated through the multi-moment method (192 observations per day). In a two-factorial variance analysis without measurement repetition, the pens were compared during all evaluation days with regard to all investigated parameters. In this way it was possible to assess the behaviour of the animal groups (pens) within the systems, between these and with regard to the time of year.

Results

Different animal behaviour between the pens within a system occurred only in association with the assessed day. Seen over the year, these allowed the recognition of strong temperature influence. The behaviour differed in the first days of the grower phase with regarded to time spent outwith the kennel, in belly lying and in standing in the dunging area. This can be attributed to learning ability, or on individual social requirements [7, 8]. In the main feeding phase (14, 16, 18 animals per pen), behavioural differences that emerged over the days concerned lying

Table 1: Animal behaviour in kennel housing for fattening pigs

	Growing						Feeding					
Date	6.2.	8.2.	29.4.	30.9.	17.6.	18.6.	19.2.	20.2.	25.4.	26.4.	1.7.	2.8.
Weight kg	38,5	38,5	30,0	28,5	28,5	28,5	46,5	46,5	79,0	79,0	38,5	57,5
Temp. house °C	3,8	2,2	10,6	14,0	18,6	15,7	6,3	7,1	15,2	17,3	20,0	23,3
Temp kennel °C	24,4	23,9	28,4	28,1	26,9	25,2	24,6	25,1	25,4	24,8	27,7	27,0
In the kennel %	86,7	85,4	89,4	60,4	73,7	83,6	88,2	88,4	60,6	57,6	86,0	59,9
Lying on belly %	0,1	1,2	0,2	19,2	4,7	2,7	0,1	0,1	23,9	21,4	0,8	4,4
Lying on side %	0,0	0,2	0,0	11,4	5,8	0,0	0,0	0,0	6,6	11,6	4,5	24,5
Standing %	3,3	5,2	3,5	3,7	7,1	6,6	4,2	4,4	4,0	4,5	4,1	7,2
Feeding %	9,9	7,9	6,9	5,3	8,7	7,1	7,5	7,1	5,0	4,9	4,7	4,0

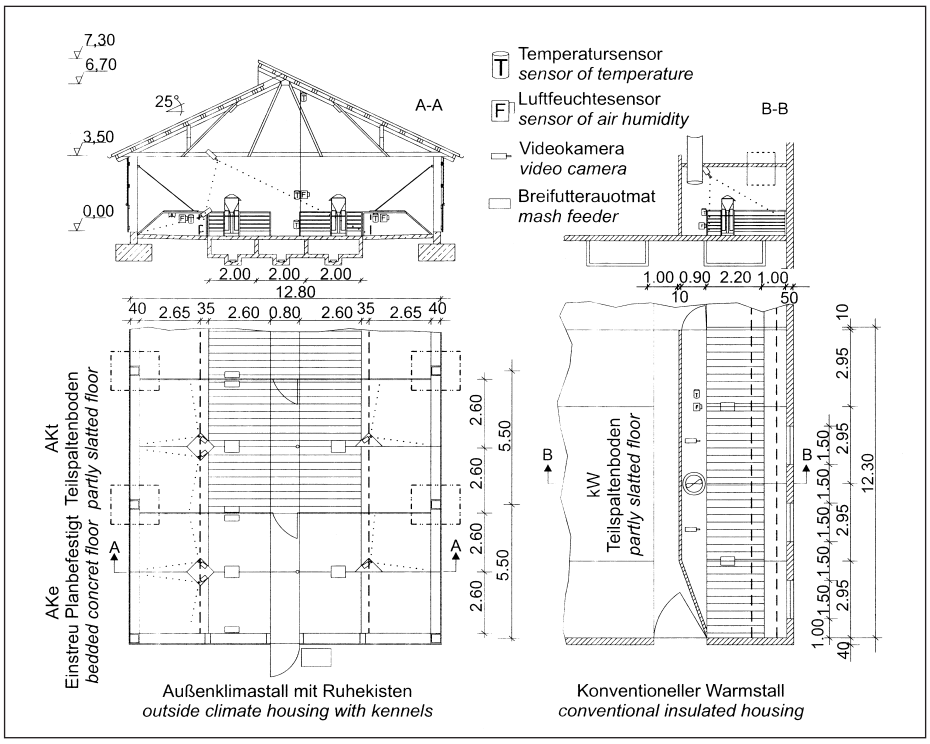

Fig. 1: Ground plans and sectional views of the experimental units

and standing only. The variations of recommended stocking rates had no influence. The combination of heavy animals and higher temperatures led to a more marked utilisation of the area around the feed automatics and the dunging area. Significant differences were more numerous the further apart the days.

No important differences between the housing systems were determined for any of the pig location preferences. There emerged a stronger influence of animal size and a lesser influence from house and kennel temperature. Because of this, data was collated and analysed according to feeding phase, time of year, temperature and function area for further evaluation.

In the grower phase (table 1) the animals spent 80% of the time in the kennels. During only two days following initial housing of heterogeneous groups of weaners which were not yet used to the function areas, only 60% respectively 74% of the time was spent in the kennels. These were also the days when the belly and side-lying behaviour outwith the kennel emerged over up to 19% of the time. The behavioural modes feeding and standing showed no mentionable difference and together reached in most cases a fraction of around 13%. Despite high house inside and interior kennel temperatures, the 37 to 40 kg lw pigs showed a high kennel utilisation in summer as in winter. Compared with slatted flooring, the solid floored and littered dunging and activity area had no influence on the length of time in the kennels.

In the main feeding phase, the animals preferred the kennels as location (88%) when temperatures were low. Where house interior temperature was over 15°C, the heavier animals (79 kg) were seen lying more over the entire pen area. Maximum cooling effect with the side-laying mode was preferred at housing temperatures from 20 °C.

On average, the animals stayed in the area of the feed automatics 8% of the day. Main activity was feeding (5 to 7%), and only a maximum of one fifth of the animals were standing about. Where temperatures were low only the behavioural modes feeding and standing were apparent at the feed automatics. Especially in the main feeding phase, high temperatures led to an increased utilisation of the feeding area for lying (belly and side positions).

The time in the slatted floor area, or on the solid floored dunging area, were used for the planned functions dunging, urinating and for movement. With low temperatures (February), and especially in the pre-mast (growers) phase, the animals left the kennels often only for short spells spending time on an investigational walk, paused (dunging, urinating was partly determinable), feeding at the automatics on the way back to the kennels and then disappeared into the said kennels. During the main feeding phase, temperature had the biggest influence on utilisation (time on the slatted area up to 20%) – especially with the heavy animals. The behaviour on the slats was characterised by the mostly high and, with 3 to 6%, relatively constant proportion of time spent standing. With higher temperature, lying in the slatted area was determined at the beginning of the feeding period. This can be explained through the initial housing and the heterogeneity of the animals [9]. In the main feeding phase lying on the slats increased along with the temperature and liveweight.

Discussion and conclusions

With two investigation days per housing system, time of year and feeding phase, and four pens per system there resulted a wide sample containing seasonal variations. Determined as the most important behavioural mode were, as in [1] and [6], lying, feeding and other activities.

As shown by comparisons with the literature, lying in each case represented 80 to 90% of the 24-hour day. Where the animals lay down was determined by the house climate, the available space per pen and kennel details. During summer, in own investigations, many more animals lay in the kennels compared with [1] and [6] findings. For these, rectangular and not so deep kennels were used which were only ventilated through the strip curtains at the opening. The result in summer were kennel temperatures which were even substantially over the house interior temperatures. In own investigations, direct ventilation from outside and the raising of kennel lids where temperatures were high allowed a rapid air exchange and, with that, similar temperatures inside and outside of the kennels.

With the behavioural mode feeding, the results agreed with one another on the whole. The high proportion in summer with [6] can be attributed to the definition "feeding" also referring to presence of the animals in the feeding area. Also agreed upon was that older animals lay longer because of their lesser requirement for warmth, but lay less within the kennels. The influence of house temperature on the behaviour and utilisation of the function areas was clear in all investigations. According to own results, the lower threshold value here , wherein only necessary, short, stays outwith the kennel took place, occurred at 10 to 15 °C house temperature, depending on the growth phase. [6] gives a value of 8 °C for over 70 kg lw animals. With rising house temperatures the animals, through their stays in the kennel, and the farmer through altering the air throughflow, steer their temperature. With well-ventilated kennels, the air warming flow is higher so that the heat given-off by the animals at the same temperature difference can be higher. This explained why, with [6], with house temperatures from 17 °C and [1] (from 20 °C), the usage of the kennels sank notably.

Our investigations brought no significant behavioural differences between bedded and bare-floored kennel houses. In the conventional insulated house the animals lay 75 to 85% of the day and almost exclusively on the slatted flooring. This result agreed with [6].