Applied Animal Behaviour Science 165 (2015) 66–71

Contents lists available at ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

Rooting area and drinker affect dunging behaviour of organic pigs

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ARTICLE INFO

Article history:
Accepted 18 January 2015
Available online 29 January 2015

Keywords:
Pigs
Behaviour
Dunging
Organic
Rooting
Drinking

ABSTRACT

Hygiene is a common problem on outdoor runs of growing organic pigs. Manure and urine are mainly excreted outdoors and tend to spread all over the run. Reducing the soiled surface area may be beneficial to animal welfare, hygiene, ammonia emissions and labour, not only in organic but also in conventional systems. The objective was to reduce the soiled surface area in the pen and to make the outdoor run more attractive for pigs. Introduction of a rooting area and drinker in the outdoor run was tested in a 2 × 2 factorial design. In total, four replicates were studied in a room with two rows of four pens containing 14 pigs each. More pigs went outdoors in pens with rooting area access than in pens without a rooting area (11.2 *vs.* 8.5%, $P = 0.003$). This was due to more pigs entering the rooting area and an adjacent slatted floor. Addition of a drinker did not attract more pigs outdoors ($P = 0.53$).

The rooting area improved the cleanliness of the whole pen ($P < 0.001$). However, in some cases the rooting area was also used as a dunging area. The area around the additional outdoor drinker was cleaner, but on the whole, pens were dirtier ($P = 0.011$). Introduction of an outdoor drinker resulted in more indoor pen fouling, especially around the indoor drinker ($P < 0.001$). An outdoor rooting area makes the outdoor run more attractive for pigs and reduces the dunging area. This study contributes to the knowledge base on how to reduce the dunging surface in pens for organic pigs.

1. Introduction

All organic pigs should have access to an outdoor run (EU, 2008). Growing-finishing pigs from 85 up to 110 kg live weight require an indoor area of 1.3 m^2 bedded with straw and an outdoor run of 1.0 m^2. This is approximately 2.5 times the space allowance for conventional pigs. In the Netherlands, organic sows should have access to pasture, but weaners and growing-finishing pigs have a bare, partly roofed, partly slatted concrete run. Environmental enrichment is mainly provided indoors. Commonly, the majority of excretory behaviour occurs on the outdoor run and the straw bedded indoor area remains clean and dry. Up to half of the concrete outdoor floor space may be slatted. Consequently, a proportion of the manure and urine will be excreted on the solid floor outside. This soiling of the outdoor run necessitates extra cleaning labour to maintain hygiene and ammonia emission standards.

Domesticated pigs under semi-natural conditions dung at least 5 to 15 m from their nests (Stolba and Wood-Gush, 1989). Under husbandry conditions Baxter (1984) states that pigs also prefer to move away from their selected lying

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http://dx.doi.org/10.1016/j.applanim.2015.01.007
0168-1591/

area during excretion in order to find a colder, safer and secluded dunging location. Olsen et al. (2001) found that in pens with an outdoor run most dunging took place outside, away from the lying and roughage feeding area.

Halberg et al. (2010) demonstrated that organic pig production places a higher burden on the environment than conventional production in terms of mineral leaching and gaseous emissions. When excretory behaviour is restricted to a slatted area pen fouling and mineral losses are reduced. Scientific information concerning excretory behaviour on the outdoor run is limited, more information is available for conventional pigs kept indoors (Hacker et al., 1994; Fraser, 1985; Aarnink et al., 1996). Pen design, equipment and climate control may affect excretory behaviour (Pedersen et al., 2003). Further reductions in area used for excretion behaviour could eventually result in the development of a pig toilet for both organic and conventional systems. Since outdoor runs for pigs often lack any enrichment materials, fibres or other items (*i.e.* feeders or drinkers), additional provisions may enhance use outdoor runs, allowing species-specific behaviour like rooting, improving animal welfare and reducing pen fouling (Bracke et al., 2006; Van de Weerd and Day, 2009). Increasing outdoor activity will reduce the potential area used for excretion.

The objective of this study was (1) to reduce soiled surface area of organic pig pens and (2) to make outdoor runs more attractive for organic pigs, by including a rooting area and an additional outdoor drinker.

2. Material and methods

The experiment was performed over a period of 1.5 years from September to March at the organic finishing unit of the research farm in Raalte (The Netherlands). In total, four replicates were studied in a room with two rows of four pens containing 14 pigs each. Each pen had an indoor area with a 1.50 × 3.15 m kennel on one side, a feeder with two feeding places on the opposite side and a concrete outdoor area roofed for 75%. Water was available *ad libitum* indoors in a bowl (Egebjerg, DRIK-O-MAT® STANDARD) on the side partition above the slatted floor (Fig. 1). Each pen was 4.57 m wide and 4.65 m deep indoors and 3.20 m deep outdoors. This provided an indoor area of 1.5 m^2 and 1.0 m^2 outdoor area for each pig. Each pen contained a 16 cm raised concrete slatted floor indoors that was 4.57 m wide and 1.60 m deep near the side wall and a 1.60 m deep slatted floor on the outer side of the outdoor run. All solid concrete floors had a slope of 1–2% towards the slatted floor. The pigs were fed a daily amount of approximately 0.5 kg of chopped (5 10 cm) straw per pen on the solid floor in the kennels. Pen partitions were solid to prevent neighbouring pens in different treatments affecting each other, except on the outdoor run.

The upper 2 m of the 3.5 m high side wall consisted of a fabric with 50% apertures and a manually operated windbreak curtain. An open ridge served as the main air outlet. An indoor kennel 1.75 m deep and 3.00 m wide fronted with a transparent curtain provided the required microclimate for the pigs. No heating was provided in the finishing room.

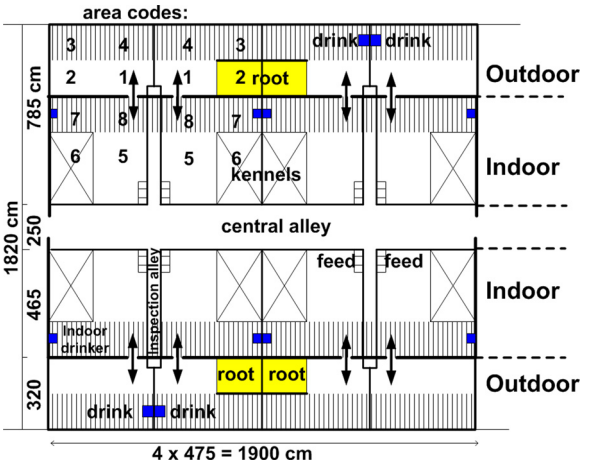

Fig. 1. Layout of the room with four pens on each side; the upper left pens show the area codes used in this study with areas 1 and 8 always on both sides of the exit.

The piglets (Large White × (Large White × Dutch Landrace)) entered the room at 25 kg (10 11 weeks) and were ready for slaughter at 110 kg (27 weeks). The animals were kept according to the EU regulations for organic pigs (EU, 2008). Each pen contained a mixture of both gilts and barrows.

2.1. Treatments

A 2 × 2 factorial experiment was designed to test the effect of an outdoor rooting area and a drinking bowl, resulting in four treatment combinations.

Rooting area—In half of the outdoor runs a rooting area was available ("root") that was covered daily around 9 a.m. with a 10 cm layer of fresh chopped lucerne hay. Dirty material was removed on a daily basis if necessary. The rooting area (1.60 × 2.00 m) was placed in area 2 (Fig. 1), *i.e.*, on the solid floor of the outdoor run with a 0.90 m high solid partition adjacent to the slatted floor with a low 0.26 m high barrier as entrance. In the remainder of the outdoor runs no rooting area ("noroot") or materials were available.

Drinker—Half of the outdoor runs with and without rooting area were installed with an additional automatically filled frost-free drinking bowl (Ritchie Thrifty King for Swine HG2) ("drink"). This was placed above the slatted floor in area 4 (Fig. 1). The remaining pens had no additional drinker available ("nodrink").

2.2. Observations

A camera was installed 4 m high above the centre of the outdoor run in each pen to record still images every 15 min. The outdoor run was divided into four areas (Fig. 1) and the presence of pigs in each of the four areas was counted using the images. This presence was only recorded in the outdoor part of the pen. A total of 27,648 images were collected: four replicates from eight pens during 9 days for 24 hours every 15 min. Recordings were analysed from Mondays, Wednesdays and Fridays in weeks 4, 9 and 14 after the start of each