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PERFORATED-FLOOR PREFERENCE OF WEANLING PIGS

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ABSTRACT

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Groups of 4 weanling pigs were placed for 1 h in a 1.22 × 1.22 m pen which had a different floor type in each quadrant. The 4 perforated floors were: expanded metal, plastic-coated expanded metal, fiberglass slats, and molded plastic. The floor on which the pigs stood or lay was noted at 1-min intervals during the first 60 min of exposure to the floors at ambient temperatures of 18 or 27°C. Time spent standing was relatively constant for all floors and appeared to represent the time required for pigs to make an initial choice concerning the floor on which to lie. Pigs spent much more time ($P<0.05$) on the plastic-coated expanded metal than on the other 3 floors, which did not differ significantly. It was concluded that time spent lying was the best single indicator of overall preference for a floor type. Pigs lay down earlier at 27°C than at 18°C, with the consequence that the time spent on the plastic-coated expanded metal was increased ($P<0.05$). The reasons for the choice by the pigs have not been elucidated, but weaned pigs can quickly make clear-cut decisions about their initial preference when simultaneously offered 4 different floor types.

INTRODUCTION

In the swine industry, there is a trend for producers to install raised decks in nursery rooms for weanling pigs. The raised, perforated floors keep pigs cleaner, save labor and improve performance when ambient conditions are appropriate (Lefebvre and Rousseau, 1978). Producers presently choose from among many floor types which are commercially available, on the basis of subjective evaluation of some of the following factors: floor cost plus installation cost, traction, abrasiveness, warmth, ease of cleaning, durability and pig performance. However, producers make the selection decisions without knowing the preference of the animals themselves. The ability to exhibit

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preference for a floor type has been demonstrated in dairy cows (Hacker et al., 1969), laying hens (Hughes and Black, 1973), and weanling pigs (Marx and Schuster, 1980). In the latter study, observations concerning floor choice began 6 h after the pigs entered the weaning pens.

The major objective of the present study was to determined which perforated floors were chosen by weanling pigs during the first hour of exposure to the floors. Such an indication of pig preference could be considered by producers when purchasing flat-deck flooring. Because a wide range of ambient temperatures is found in farm practice, the trials were performed at 2 temperatures which represented common upper and lower limits of the range.

MATERIALS AND METHODS

Four floor types were studied: yellow rerolled expanded metal with diamond-shaped holes 13 mm wide; orange plastic-coated expanded metal with diamond-shaped holes 12 mm wide; white fiberglass T-bar slats 38 mm wide, with 10-mm spacing; white premolded structural plastic in 305 × 610 mm sections, with 10-mm wide slots 32 mm apart. A 1.22 × 1.22 m enclosure with solid walls 0.61 m high was constructed to simulate a weaning pen. Four 0.61 × 0.61 m sections of floor (one of each type) were used as the flooring within this enclosure. The pen was located centrally in a room in which the windows were covered and which contained no animals. Crossbred Landrace × (Lacombe × Yorkshire) pigs from the university herd were used which were 4—5 weeks old and had been nursed on concrete floors with wood shavings for bedding. Four to five days prior to the trial, pigs were weaned into group pens with rough concrete floors partially bedded with wood shavings. Barn temperature was approximately 20°C and a portion of the bedded area was warmed by infrared lamps. Feed and water were constantly available. Pigs were chosen at random from the stock, except that no pig was exposed to the test-pen more than once. Twenty-four groups, each of four pigs, were placed in the center of the experimental pen. Twelve groups were tested at 18°C and twelve at 27°C. The locations of individual pigs within the pen and whether they were standing or lying were then recorded at 1-min intervals for 60 min. Records were made by means of time-lapse photography (Model XL401, Super-8, Minolta Camera Inc., Mississauga, Ont.) in the absence of a human observer. On the assumption that the photographs represented the pigs' location and posture for the subsequent minute, a total of 2880 pig-minutes (4 pigs × 12 groups × 60 exposures) was determined at each temperature. Between pig groups, the locations of the floors were changed so that each floor type was located in each quadrant of the test pen an equal number of times. The positions of the 4 floor types relative to one another were also changed between pig groups and the floors were cleaned thoroughly. No feed or water was available during the tests.

The data were analyzed by a 3-factor analysis of variance for floor, temperature and time. Four 15-min periods were used to evaluate changes with time. A 1-factor analysis of variance was used to examine differences due to

TABLE I

Time spent by weanling pigs (pig-minutes) on each of 4 floor types when given a simultaneous choice among these floors at 2 ambient temperatures

Floor type	18° C			27° C		
	Standing	Lying	Total	Standing	Lying	Total
Plastic-coated expanded metal	637	475 a	1112 y	572 a	998 a	1570 x
Fiberglass slats	462	20 b	482 z	331 b	80 b	411 z
Molded plastic	523	102 b	625 z	246 b	73 b	319 z
Expanded metal	624	37 b	661 z	444 ab	136 b	580 z
Total			2880			2880

[a,b]Data within columns followed by different letters differ ($P<0.05$).
[x–z]Data within the two columns headed "Total" followed by different letters differ ($P<0.05$).

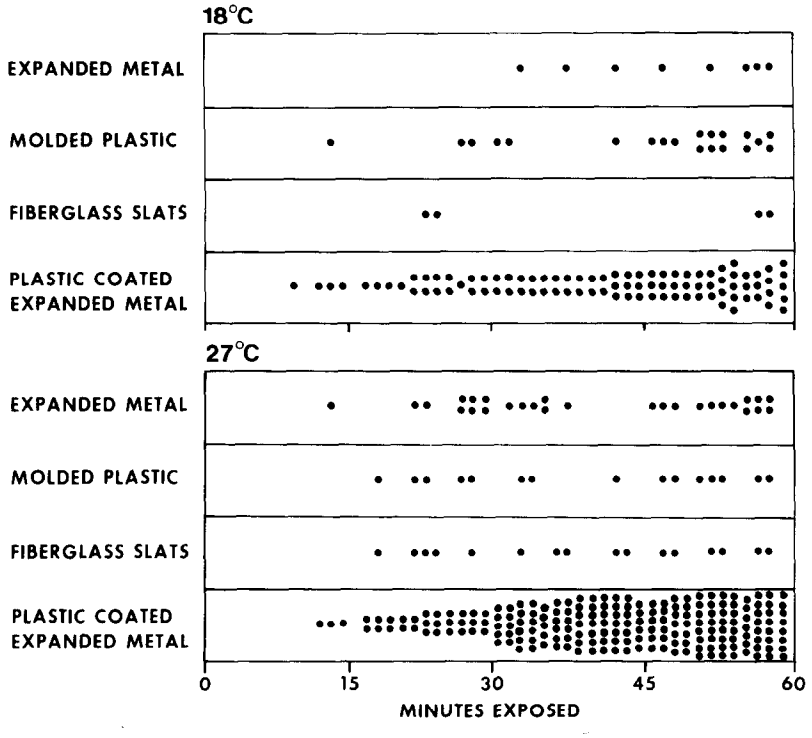

Fig. 1. Changes in the lying incidence of pigs during the first hour of simultaneous access to 4 floors at 2 ambient temperatures. Each dot represents 5 pig-minutes.

quadrant. When significant effects were found, Duncan's multiple range test was used to evaluate differences among means (Steel and Torrie, 1960).

RESULTS

The total number of minutes spent by the pigs on each floor type at each ambient temperature are shown in Table I. The onset and duration of pig-minutes spent lying on the 4 floors are illustrated in Fig. 1.

DISCUSSION

Pigs were allowed to distribute the time they spent standing and/or lying among the 4 floor types. The most striking result was that their overwhelming preference was to lie on the plastic-coated expanded metal. When results at both temperatures were combined, pigs spent 46.6% of the total time on plastic-coated expanded metal as opposed to 15.5% on fiberglass slats, 16.4% on molded plastic, and 21.5% on expanded metal. The plastic-coated expanded metal was preferred to a greater extent at 27 than at 18°C (54.5 vs. 38.6%). There was no difference in preference among the other 3 floors at either temperature, although pairwise choice tests have shown that they are not all equally preferred (Farmer and Christison, 1982). Time spent standing was relatively constant on all floors at each temperature. It was concluded that, of the variables measured, time spent lying on a floor could be used as the single best measure of overall preference for a floor type. At both temperatures, the number of pig-minutes lying was higher ($P<0.05$) in the final 15-min than in the first 15-min period. The lying incidence (44%) at 45–60 min at 18°C was markedly higher than the 8% lying incidence noted after 60 min at approximately 20°C by Farmer and Christison (1982). Group size, age and floor type were similar in that experiment, but the room contained several pens of pigs. Presumably, the thoroughly-cleaned floors and the absence of feed and of other pig groups predisposed the animals in the present experiment to settle more quickly. Pigs spent more time lying at the higher temperature, and accomplished this by lying down sooner (Fig. 1). This behavior may result from a reduced rate of heat loss to the floor because of the smaller temperature gradient between skin and floor, but floor preference of weanling pigs was not correlated with heat loss to the floor (Farmer and Christison, 1982).

In addition to floor, temperature and time effects, there was also a quadrant effect. Pigs preferred ($P<0.05$) to stand and lie in one of the quadrants regardless of floor type. They spent a total of 2022 pig-minutes in that quadrant, versus an average of 1246 (± 116 SE) pig-minutes for the other 3 quadrants, when both temperatures were combined. The reason for the quadrant effect is not known, but the preferred quadrant was the one farthest from the door and was therefore the location from which the pigs could best see over the solid wall and observe the departure and possible return of the ex-

perimenter. This suggestion is supported by the fact that the standing incidence was higher ($P<0.05$) in that quadrant than in any of the others.

It appeared that the preliminary choice of a floor on which to lie was made while walking or standing on the floor. It was uncommon for pigs to stand up and move to a different floor once the choice to lie had been made (Fig. 1). There is a group-huddling tendency in pigs (Boon, 1981), and therefore the lying location of the first pig probably affected the positions of all other pigs. In the short-term, therefore, the initial choice of a floor on which to lie appeared to depend on physical characteristics perceptible via the pig's feet or eyes. Later work has shown that weanling pigs take from 2 to 10 h to establish a long-term preference for a floor type (Farmer and Christison, 1982). The reasons for the observed preference are not known, but may be influenced by previous experience (Taylor et al., 1967), color, heat loss, traction, abrasiveness, or some permutation of these and other factors. Nevertheless, we have confirmed the conclusions of Marx and Schuster (1980) that weaned pigs can make clear-cut decisions about their preferences for different types of floors, and we have demonstrated that initial decisions can be made within a 60-min period. This implies that elucidation of the reasons and subsequent effects on production for these preferences would be of benefit to pig producers. These results also indicate that in flat-decks for weanling pigs, it should be possible to control the location within a pen where pigs lie by using more than one floor type. Different floor types may also make it possible to control other behavior, such as the location of defecation.

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