



Behavioural Response of Crossbred Weaned Pigs Reared on Concrete, Woodshaving and Sand Floors

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Abstract

Bedding material is an important constituent of the swine production system. It is a key factor in the wellness and comfort of the animal thus affecting animal behavior. Thus a research was conducted to determine the behavioural responses of crossbred weaned pigs reared on concrete and bedded floors. Eighteen (18) weaned pigs obtained from piggery unit of the Teaching and Research Farm of the Oyo State College of Agriculture and Technology, Igboora. The pigs were allotted into three treatments of six animals per treatment and two animals per replicate. The treatments were T1 (Concrete floor), T2 (Wood shaving floor) and T3 (Sand floor). The concrete floor was constructed using cement, gravel, sand and water. Wood shavings were collected from sawmills within Igboora metropolis and dirt, pebbles, iron metals, broken bottles were removed and later spread on the cemented floor to make wood shaving floor and replaced when the wood shaving had been wet. For sand floor, a fine sand were collected from the gutter after rainfall and spread on the cemented floor to make sand floor. The pigs were acclimatized for a week before the commencement of the research work. Behavioural observation was carried out by using video camera installed at the roof of the pen to monitor focal pigs in each replicate twice in a week and data were collected on resting, rooting, standing, eating, drinking and tail biting. The experimental design used was completely randomized design. Result revealed that pigs reared on bedded floors (wood shaving and sand) had the highest behavioural activities, resting: wood shaving and sand floors (5.65 and 9.43), rooting: (wood shaving and sand floors (6.67 and 8.68), standing: wood shaving (15.00) and drinking: wood shaving (20.00) and improve the animal welfare and behavior. It can be concluded that rearing pigs on bedded floor improve animal welfare and behavior and increase skin lesions score of the animal.

Keywords: Behaviour, concrete, floors, sand, weaned pigs, wood shaving

Introduction

Swine production is an important economic activity in tropical regions of the world. Generally, conventional system of pig production under smallholder farmer systems are associated with poor animal performance and welfare that results in deterioration of pork quality (Ngapo *et al.*, 2004). This conventional system of production using concrete floor and manure handling in confinement lead to negative environmental impact (Wang *et al.*, 2011). Pig production sectors often looked for alternative systems that lead to less environmental impact and reduce maintenance cost. The use of deep bedding in pig production has been on increased as it facilitates and reduces the cost of waste management, it also improves the physical comfort of the floor and it functions as crucial motivation and outlet for exploration behaviours (Tuytens 2005). Laishram *et al.*, (2018) opined that pigs housed in deep bedding have lower susceptibility to diarrhea,

appetence fevers, eye and skin infections, compared to those in conventional housing systems. One of the challenges for any swine production is to meet the demand of environmental sustainability while providing the animals the quality physical environment for enhanced well-being and thus productivity (Oliveira 2000). In intensive pig production systems, pigs in enriched environments have been discovered to have a greater variety of behavioural adoptions thus they are competent in carrying out an array of their species-specific habits (Mason *et al.*, 2007). Molina and Balbino (2010) opined that in pig farming, welfare conditions should be especially observed at critical stages especially weaning, when piglet performance may be affected by behavioural, physiological, immunological and microbiological changes. Deep litter floor bedding materials provides pigs with adequate sources of manipulating objects to exhibit rooting and other natural behaviours (Gentry *et al.*, 2004). Bolhuis *et*



al., (2005) stated that pigs raised on concrete floor have prevalence of skin lesions. A thin layer of wood shavings has been reported to increased possibility of forelimb skin abrasions among piglets (Moultou and Hatchell, 1999). Bedding material is a key factor in animal production. The choice of material is generally based on comfort, cleanliness and moisture absorbance (Breen *et al.*, 2009). The bedding can consist of different materials including straw, hay, corn cobs or stover, wood (sawdust, chips and shavings), sand, feathers, soybean residue and newspaper (Saastamoinen *et al.*, 2015). Bedding for an animal must be comfortable, clean and absorbent because discomfort of an animal leads to sores and other ailments. The breed and age of animal, housing, flooring and population density will dictate the type and amount of bedding needed. This study was therefore carried out to determine the behavioural responses of crossbred weaned pigs reared on concrete, wood shaving and sand floors.

Materials and Methods

Experimental location:

The experiment was conducted at the piggery unit of the Teaching and Research Farm of Oyo State College of Agriculture and Technology, Igboora. Igboora is in the savannah forest vegetation located on latitude 7° 43N, longitude 3° 28E and altitude of 140m above sea level. The average minimum temperature is above 21.5°C and maximum average temperature is about 32.5°C (Google Earth, 2021)

Experimental animals and management:

Eighteen (18) crossbred weaned (Large white X Landrace) pigs with an average weight of 9.0kg were obtained from a reputable commercial farm in Ibadan, Nigeria. The pigs

were kept and monitored for one week for acclimatization before the commencement of the experiment for proper adaptability. Water and feed were offered *ad libitum* for the eight weeks experimental period. The diets were formulated to meet the nutrient requirements of the weaner pigs according to the Nutritional Research Council requirements (NRC, 2012) as shown in table 1.

Animal housing and management:

Concrete floor: The concrete floor was constructed using cement, gravel, sand and water. The floor is subjected to chemical attack by cleaners, feed acids, manure and gases and to mechanical impact from animals and high pressure cleaning.

Wood shaving floor: The wood shavings were collected from sawmills and after the debris, dirt, iron metals, broken bottles had been removed, the wood shavings were spread on the cemented floor to make wood shaving floor.

Sand floor: Fine and debris-free sand was collected from gutter after rainfall and spread on the cemented floor to make sand floor after it has been well drained.

Data collection

Determination of behavioural activities:

Behavioural activities of the focal pigs which include resting, rooting, standing, eating, drinking, tail biting, belly nosing were observed with the aid of a video camera mounted 3m above the pen to capture the behaviours as described by Knowles *et al.*, (1999). Eight hours recordings of the pigs' behaviours for three (3) consecutive days in a week for eight (8) weeks duration were obtained. The focal pigs exhibiting a particular activity within one (1) hour of direct observation were counted and noted.

Table 1: Gross composition of experimental diet

Ingredients	Kg
Maize	25.00
Corn bran	35.00
Palm kernel cake	25.00
Groundnut cake	7.00
Fish meal	3.00
Bone meal	3.00
Lysine	0.50
Methionine	0.50
Salt	0.50
Premix	0.50
Total	100.00
Calculated Analysis	
Metabolizable Energy (Kcal/Kg)	2850.00
Crude Protein (%)	20.00



Table 2: Behavioural response of crossbred weaned pigs reared on concrete, wood shaving and sand floors

Parameters	T1(Concrete)	T2(Wood shaving)	T3(Sand)	SEM
Resting	1.67 ^c	5.65 ^b	9.43 ^a	0.83
Rooting	0.00	6.67 ^b	8.68 ^a	1.67
Standing	10.00 ^b	15.00 ^a	5.00 ^c	2.21
Feed intake	25.00 ^a	16.67 ^b	25.00 ^a	2.74
Drinking	10.00 ^b	20.00 ^a	10.00 ^b	2.78
Tail biting	20.00 ^a	8.00 ^b	5.00 ^c	7.27

abc means on the same rows having superscripts are significantly different ($p < 0.05$)

Results and Discussion

Effects of floor types on behavioral characteristics of weaned pigs are presented in Table 2. Resting and rooting behaviours ranged from (1.67-9.43 and 0.00-8.68) respectively. The highest standing behavior was recorded for pigs kept in wood shaving floor while the least mean value was obtained on pigs maintained in sand floor. The mean values of feed intake behavior ranged from 16.67-25.00. Pigs reared on wood shaving floor had the highest value (20.00) of drinking behavior while pigs kept on concrete and sand floors compared favourably with the mean value of (10.00). Tail biting was highest (20.00) in pigs reared on concrete floor while the least value (5.00) was recorded for pigs kept in sand floor. Significant ($p < 0.05$) differences were noted for resting, rooting, standing, feed intake, drinking and tail biting. Pigs in bedded floors exhibited the highest behavioural responses. There were differences in the time spent resting as influenced by temperature, differences between floor types and bedding depth as this would be expected to influence the animal's thermal comfort (Hyun *et al.*, 2005). The findings of this study was contrary to the report of Hotzel *et al.*, (2009) who reported no differences for the time spent by the animals lying down on wood shavings, paddy husk and concrete flooring. Fraser (1985) opined that under cool conditions growing pigs prefer to lie in straw, at higher temperatures, they prefer bare floors and as a result of the tropical conditions of the study, pig exhibit higher frequency of resting on concrete floor while lesser time resting on bedded floor that raise thermal stress in the animal as a result of heat of fermentation from the wood shaving and sand floors. The digging behavior, characteristics of animals reared in their natural habitat was higher in the concrete floor ($p < 0.05$). The deprivation of environmental stimuli and lack of substrates, leads to frustration which reflects stereotypes behaviors (Braga *et al.*, 2006) and increased negative interactions among group members. This may explain the higher frequency of the

act of rooting of the animals kept in concrete floors compared to other floors, since the animal of this treatment spent much time digging up the floor of the stall and their companions, clearly demonstrating a stereotyped behavior. The greater availability of resources reduces the need for aggression in pigs reared on deep bedding, since their attention is diverted from stall companions to bedding materials (Hemsworth and Barnett 2001). There was an effect of floor type ($p < 0.05$) for the standing position which is explained by the fact that animals in wood shaving bedding spend more time standing than animals in other floors. Alternatively, the wood shaving may be more attractive than other floor type as a source of rooting or more comfortable for resting idly. The pigs housed in the wood shaving pens spend more time standing, played more and were less time idling than those kept in the concrete and sand floors. The values of time spent for drinking were significantly ($p < 0.05$) higher in wood shaving followed by sand and concrete floors respectively. The findings of this study on drinking behaviors were well corroborated with the observation of Haskell *et al.*, (1996) who reported the animals spent more time and there was higher rate of drinking in substrate enriched pen as compared to barren environment. Cordeiro *et al.*, (2007) also opined that there was variation in water intake by pigs kept in different types of floor. However, the differences on the values of drinking behavior might be due to increase in body weight, climate, feed composition, and housing and management systems. Anderson *et al.*, (2014) advocated that the number of pigs reared per pen might also have influenced the drinking behavior. The time spent on feed intake was higher in the concrete floor followed by floor of wood shavings and of sand ($p < 0.05$) respectively. This may be related to lack of other stimuli in their environment for animals to develop other activities. These results agreed with Morrison *et al.*, (2007) who reported that pigs kept in deep beddings spent less time at the feeder



and has less feeding events. The findings of this study was in contrary to the report of Pazzini *et al.*, (2014) who opined that pigs in deep bedding system spent more time in eating as compared to pigs kept in concrete floor, this difference might also be due to the variation in the materials of the housing system and climatic conditions. Pigs housed in deep-bedded floors spent less time performing the stereotyped behavior and the mouth-holding/biting tail behavior.

Conclusion and Recommendation

It can be concluded based on the findings of this study that beddings in swine production eliminate vice behavioural activities in pigs and hence might lead to improve animal productivity and animal welfare.

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