AEXTJ
AGRICULTURAL EXTENSION JOURNAL
ISSN 2582- 564X

Available Online at www.aextj.com
Agricultural Extension Journal 2025; 9(1):35-39

RESEARCH ARTICLE

Postural Behavior of Large White Yorkshire Piglets during Preweaning Period Reared on Cement Concrete Floor

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Received: 02-02-2025; Revised: 02-02-2025; Accepted: 10-02-2025

ABSTRACT

After farrowing, 24-day-old large white Yorkshire piglets of either sex from 3 L were reared on normal conventional concrete flooring along with their mother till weaning (56 days). The behavioral pattern of piglets was studied at different hours continuously from morning 6 am to evening 6 pm at 60-min intervals daily. The behavioral pattern of piglets was recorded by visual recording from outside the pen without interfering with the natural behavior of the piglets during the study period. It was observed that sleeping was one of the prominent behaviors found throughout the experimental period, which was exhibited maximum during the first fortnight. Lying postural behavior was highest during the fourth fortnight. Standing postural behavior was recorded highest during the third fortnight and it was statistically significant ($P < 0.01$) from the first, second, and fourth fortnight. Only very few piglets were observed in sitting posture throughout the experimental period. The mean percentage of moving postural behavior was highest in the third fortnight. There was an increasing trend in agonistic behavior as the age advanced. Nose contact and belly contact social behaviors were expressed highest during the fourth fortnight. Tail-biting social behavior was expressed only during the third and fourth fortnight. Ear-biting social behavior was expressed only at the fourth fortnight during the experimental period.

Key words: Cement concrete floor, large white Yorkshire piglets, postural and social behaviors, preweaning period

INTRODUCTION

Behavior is the reaction of an organism through which it interacts with the environment. Behaviors may indicate animal welfare, particularly in a confinement environment.[6] Behavioral assessment has the advantage of being non-invasive,[9] a quick, and practical technique that measures the status of an individual in relation to the environment.[3]

In recent years, there has been a growing concern about animal welfare due to the undesirable consequences on general productivity performance.[15] Increased demand for quality animal products has led to the intensification of production that compromises animal welfare.[1,4] Animal welfare, among other things, depends on the type of floor in their housing.[14] The floor as the main part of the house influences animal welfare by its design and material, which is then manifested in species-specific behavior, the occurrence of lesions and diseases, and convenience.[11] Flooring type may

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affect animal behavior and growth performance if the flooring material causes stress to the animal. Bedding substrates can help animals adapt to a new environment by providing environmental enrichment. Therefore, the ideal bed needs to be hygienic, dry, resilient, and reasonably temperature resistant.

Earlier, pigs were reared traditionally in small to medium herds, in simple housing to provide comfort and warmth. Over time, pigs are confined and reared under an intensive system of housing.[16] As a result of confinement, pigs exhibit various behavioral changes and many behavioral problems. One of the most essential factors that decide the ability of piglets to adapt to the post-weaning environment is the piglet's pre-weaning experience gained by their various behavioral traits.[7] Piglets are very intelligent and most fascinating creatures which show conspicuously various behaviors. Piglets may exhibit numerous normal as well as several abnormal behaviors and it is important to investigate and understand such behaviors in the interest of improving pig welfare and productivity. Piglet's behavior could vary with the advancement of age. Number of behavioral problems are associated with weaning piglets including belly nosing, ear and tail biting, and low intake of solid food. These appear to be less pronounced in piglets reared on outdoor systems, which initially consume more solid food and show less belly nosing and aggression than indoor-reared piglets.[7]

Time spent resting occupies the majority of the time budget in growing-finishing pigs,[18] and therefore, an adequate lying comfort seems important for their welfare.[19] The aforementioned housing factors can compromise the ability of pigs to perform this activity adequately. Data relative to the allometric space required to satisfy pigs' different lying postures already exists,[10,17] but the quantitative relationships between housing factors and the percentage of time spent lying remain largely unknown. The evaluation of these relationships could provide valuable information to determine the impact of alternative management systems on the welfare of growing-finishing pigs, and how it might be improved.

A pre-weaning housing system may also influence the negative side of the social interactions among piglets, namely their agonistic behavior. Agonistic behavior is important for the establishment of a dominance hierarchy among new group members.[13]

MATERIALS AND METHODS

After farrowing, 24-day-old large white Yorkshire (LWY) piglets of either sex from 3 L were selected from the pig unit and reared on normal conventional concrete flooring along with their mother till weaning (56 days). All the piglets during the preweaning period were housed under conventional housing with concrete floor along with their mother provided with a floor space of 9 m^2/sow in the covered shed with an asbestos roof. The experimental piglets were ear notched for proper recording of the data. The needle teeth of the piglets were cut on the birthday. All the piglets were injected with iron dextran Ferrextran 100 (Ferrextran 100 @100 mg/piglet) on the 4th day and 14th day and vitamin A (Vetinol-A at 3 Lakh I.U./kg body weight) on the 14th day of the experiment.

Experimental piglets during the preweaning period were provided with the creep ration as per ICAR (2013), and the composition of the creep ration is presented in Table 1.[2] Creep feed was provided to piglets during the preweaning period once a day *ad libitum* in the creep area from the 21st day of age. Behavior recording was done by scan sampling (collecting data at specified time intervals, and noting what each animal is currently doing) as per Crews *et al*.[8] The investigator himself recorded all the behavioral parameters for the purpose.

The behavioral pattern of piglets was studied for a continuous period of 56 days from birth to weaning during the preweaning period by recording the behavioral traits at different hours continuously from morning 6 am to evening 6 pm at 60-min interval daily. Data of various postural and social behaviors recorded at hourly interval were tabulated and daily and fortnightly average for each behavior was calculated. The behavioral pattern of piglets was recorded by visual recording from outside the pen without interfering with the natural behavior of the piglets during the study period.

Various postural and social-behavioral traits of piglets were observed and recorded through scan sampling procedure. The description of various recorded behavior activities of piglets given by Cox and Cooper[7] is as follows.

The average number of animals exhibiting each behavior was computed fortnightwise to observe the effect of age on each behavior during pre-weaning period. The proportion of each behavior was calculated from the obtained average and data were again transformed to meet the assumptions of normality and homogeneity, necessary for further statistical analysis. Behavioral data were analyzed by General Linear Model One-way Analysis of Variance. Tukey's Honest Significant Difference test was used to test the differences among the fortnights of each behavior. The trial version of the Statistical Package for the Social Sciences (version 25.0; SPSS, 2019) was used for statistical analysis using SPSS statistical software.

RESULTS

Postural Behaviors

Different postural behaviors studied in LWY piglets during the preweaning period were sleeping, lying, standing, sitting, and moving. Data on fortnightly mean percentage of postural behaviors are accessible in Table 2.

Table 1: Description of various postural and social behaviors in pigs

Postural behaviors	Description
Sleeping	Piglet lies with eyes closed and may show signs of reflex activity such as ear twitch and body twitch
Lying	Piglet lies with open eyes
Standing	Piglet supports self by standing on all four legs, with no other activity
Sitting	Piglet sits like a dog supporting itself on its rear and two fore-legs
Moving	Piglet walking by lifting limbs separately or running by lifting front limbs separately and both hind limbs together

Sleeping

The fortnightly mean percentages for sleeping behavior were 61.98 ± 1.85, 59.40 ± 2.11, 41.77 ± 3.34, and 33.14 ±1.61 during the first, second, third, and fourth fortnight, respectively. It was observed that sleeping was one of the prominent behaviors found throughout the preweaning period of piglets, which was exhibited maximum during the first fortnight. It was observed that the fortnightly sleeping percentage of LWY piglets decreased as the age advanced during the preweaning period. Statistical analysis revealed that the sleeping percentage of piglets was highest and comparable during the first and second fortnight and differed significantly ($P < 0.01$) with the third and fourth fortnight. Sleeping postural behavior was comparable between the third and fourth fortnight.

Lying

The fortnightly mean percentages of lying behavior were 15.08 ± 1.38, 12.18 ± 1.10, 16.62 ± 1.04, and 20.88 ± 1.49 during the first, second, third, and fourth fortnight, respectively. Statistical analysis revealed that lying behavior was highest during the fourth fortnight and was statistically significant ($P < 0.01$) from the first and second fortnight but was comparable with the third fortnight.

Standing

The fortnightly mean percentages of standing postural behavior were 0.30 ± 0.16, 0.82 ± 0.31, 2.21 ± 0.52, and 0.62 ± 0.22 during the first, second, third, and fourth fortnight, respectively. Standing postural behavior was recorded highest during the third fortnight and it was statistically significant

Table 2: The mean % piglets expressing postural behaviors during different fortnights preweaning

Postural behaviors	Fortnights				SEM	*P*-value
	1	2	3	4		
Sleeping	61.98±1.85^{a}	59.40±2.11^{a}	41.77±3.34^{b}	33.14±1.61^{b}	1.979	0.000
Lying	15.08±1.38^{b}	12.18±1.10^{b}	16.62±1.04^{ab}	20.88±1.49^{a}	0.747	0.000
Standing	0.30±0.16^{b}	0.82±0.31^{b}	2.21±0.52^{a}	0.62±0.22^{b}	0.189	0.001
Sitting	0.65±0.27^{a}	0.47±0.21^{ab}	0.00±0.00^{b}	0.00±0.00^{b}	0.092	0.017
Moving	11.88±1.46^{b}	15.80±1.35^{ab}	18.38±1.46^{a}	16.15±1.44^{ab}	0.763	0.020
N	14	14	14	14		

Means with different superscripts row-wise differ significantly: $P<0.01$

($P < 0.01$) from the first, second, and fourth fortnight. Standing postural behavior among the first, second, and fourth fortnight was non-significant and it was highest during the second fortnight followed by the fourth and first.

Sitting

As per Table 2, it was seen that the fortnightly mean percentage of sitting behavior were 0.65 ± 0.27, 0.47 ± 0.21, 0.00 ± 0.00, and 0.00 ± 0.00, respectively, during the first, second, third, and fourth fortnight. Sitting behavior at the first fortnight was highest and statistically significant ($P < 0.05$) from the third and fourth fortnight but non-significant with the second fortnight. Sitting postural behavior was not expressed during the third and fourth fortnight but did not differ significantly with the second fortnight.

Moving

The fortnightly mean percentage of moving postural behavior were 11.88 ± 1.46, 15.80 ± 1.35, 18.38 ± 1.46, and 16.15 ± 1.44 during the first, second, third, and fourth fortnight. Statistical analysis revealed that the mean percentage of moving postural behavior was highest at the third fortnight and differed significantly ($P < 0.05$) with the first fortnight and non-significantly with the second and fourth fortnights. Means in the second and fourth fortnight were comparable to each other and differed non-significantly from the means in the first fortnight.

DISCUSSION

Sleeping

The fortnightly mean percentage for sleeping was 61.98 ± 1.85, 59.40 ± 2.11, 41.77 ± 3.34, and 33.14 ± 1.61 during the first, second, third and fourth fortnight, respectively. It was observed that sleeping was one of the prominent behaviors found throughout the preweaning fortnights of piglets, which was exhibited maximum during the first fortnight. It was observed that the fortnightly sleeping percentage of LWY piglets decreased as the age advanced during the preweaning period. The present findings are in agreement with Cox and Cooper[7] and Li,[12] whereas, Cherryl *et al.*[5] have reported maximum proportion of piglets sleeping at 4th week, hence dissimilar to the present findings.

Lying

The fortnightly mean percentage of lying were 15.08 ± 1.38, 12.18 ± 1.10, 16.62 ± 1.04, and 20.88 ± 1.49 during the first, second, third, and fourth fortnight, respectively. Statistical analysis revealed that lying postural behavior was highest and statistically significant ($P < 0.01$) from the first and second fortnight but was comparable with the third fortnight. The lying postural behavior percentage was higher in the first fortnight than the second fortnight but did not differ significantly. The present findings are in agreement with Cox and Cooper,[7] Breuer *et al.,*[2] and Cherryl *et al.*[5] where no effect of age on lying during preweaning period was recorded.

Standing

The fortnightly mean percentage of standing were 0.30 ± 0.16, 0.82 ± 0.31, 2.21 ± 0.52, and 0.62 ± 0.22 during the first, second, third, and fourth fortnight, respectively. Standing postural behavior was recorded highest during the third fortnight and it was statistically significant ($P < 0.01$) from the first, second, and fourth fortnight. There was no effect of age on standing behavior and it is supported by the findings of Cox and Cooper[7] and these results are contrary to Cherryl *et al.*[5] who have reported increase and stabilization in standing behavior as the age advanced.

Sitting

The fortnightly mean percentage of sitting was 0.65 ± 0.27, 0.47 ± 0.21, 0.00 ± 0.00, and 0.00 ± 0.00, respectively, during the first, second, third, and fourth fortnight, respectively. Sitting postural behavior in the first fortnight was highest and statistically significant ($P < 0.05$) from the third and fourth fortnight but non-significant with the second fortnight. Only very few piglets were observed in sitting posture throughout the preweaning period

which was supported by the findings of Cox and Cooper,[7] Li,[12] and Cherryl *et al.*[5]

Moving

The fortnightly mean percentage of moving was 11.88 ± 1.46, 15.80 ± 1.35, 18.38 ± 1.46, and 16.15 ± 1.44 during the first, second, third, and fourth fortnight. Statistical analysis revealed that the mean percentage of moving postural behavior was highest in the third fortnight and differed significantly ($P < 0.05$) with the first fortnight and non-significantly with the second and fourth fortnight. Movement of the piglets varied with age and there was an increasing trend from birth to third fortnight and slight decrease at fourth fortnight. These findings are in concurrence with Cherryl *et al.*[5]

CONCLUSION

Concrete floor did not cause any stress on piglets during the preweaning period as reflected by normal postural and social behavior expressed by LWY piglets during the preweaning period.

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