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V Vinitha

M.V.Sc., Scholar, Department of Livestock Production Management, Veterinary College and Research Institute (TANUVAS), Orathanadu, Tamil Nadu, India.

A Clement Ebenezer Henry

Assistant Professor, Department of Livestock Production Management, Veterinary College and Research Institute (TANUVAS), Orathanadu, Tamil Nadu, India

A Paramasivam

Associate Professor and Head, Department of Livestock Production Management, Veterinary College and Research Institute, Orathanadu, Tamil Nadu, India

G Rajarajan

Assistant professor, Department of Livestock Products Technology, Veterinary College and Research Institute, Orathanadu, Tamil Nadu, India

T Sivakumar

Professor and Head, Department of Livestock Production Management, Madras Veterinary College, Chennai, Tamil Nadu, India

Corresponding Author

A Clement Ebenezer Henry

Assistant Professor, Department of Livestock Production Management, Veterinary College and Research Institute (TANUVAS), Orathanadu, Tamil Nadu, India

Consequences of early weaning on behaviour of large white Yorkshire piglets

V Vinitha, A Clement Ebenezer Henry, A Paramasivam, G Rajarajan and T Sivakumar

Abstract

An experiment was conducted to study the influence of early weaning on different behaviour pattern of Large White Yorkshire piglets. Piglets from three distinct sows of the same parity were considered as three treatment groups (T₁, T₂, and T₃), each with eight piglets, and weaned at 28 days (T₁), 42 days (T₂), and 56 days (T₃) of age, respectively. Behavioural observation was carried out among three weaning groups which includes playing, fighting, tail biting, ear biting, feeding, water intake, sleeping and belly nosing which were observed for 24 hours with the help of closed-circuit camera for 15 days. The time (minutes) spent with percentage of time spent in a day for playing was (31.98 ± 1.55) with 4.85 per cent ($P < 0.01$), fighting (1.15 ± 0.07) with 0.17 per cent ($P < 0.01$), tail biting (0.78 ± 0.07) with 0.12 per cent ($P < 0.01$), ear biting (1.42 ± 0.34) with 0.22 per cent ($P < 0.05$), feeding (54.16 ± 0.36) with 8.66 per cent ($P < 0.01$) and belly nosing (0.64 ± 0.18) with 0.10 per cent ($P < 0.01$) were significantly more in 28th day (T₁) weaned piglets followed by 42nd day (T₂) weaned piglets and lesser in 56th day (T₃) weaned piglets. Water intake (2.48 ± 0.09) with 0.29 per cent ($P < 0.01$) and sleeping (798.09 ± 6.12) with 91.76 per cent ($P < 0.01$) were significantly more in 56th day (T₃) weaned piglets followed by 42nd day (T₂) weaned piglets and lesser in 28th day (T₁) weaned piglets. From the study, it is understood that certain vices were comparatively more in early weaned piglets. Hence, it was concluded that provision of environmental enrichment like chain, wood, toys, fabric sacks and rope in early stage of life is advisable to reduce the damaging behaviour in early weaned piglets.

Keywords: early weaning, behavioural pattern, piglets, environmental enrichment

Introduction

Livestock sector plays a major role in Indian economy and also forms an essential part of Indian agriculture. Swine rearing has enormous potential and prospects because of its excellent attributes such as high fecundity, better feed conversion efficiency, early maturity and short gestation interval. The dressing percentage in pig is high with 65 to 80 per cent (Bhat *et al.*, 2010) [1]. Pork is a high-protein meat that also contains a variety of vitamins and minerals. Taking time to look at the behaviour of pigs can provide about their health status and welfare before visible problems arise. Understanding the sensory capabilities and normal behavioural patterns of pigs will help us to prevent the occurrence of abnormal behaviours in swine production. Improper management and environments could cause changes in normal behaviour of piglets. Hence the present experiment is undertaken to study the various behavioural patterns at different weaning age.

Materials and Methods

Study area

The study on effect of early weaning on behaviour of Large White Yorkshire piglets were carried out at modern pig breeding unit of Livestock Farm Complex, Veterinary College and Research Institute, Orathanadu.

Design of experiment

For the experimental study the piglets from three different sows of same parity were considered as three treatment groups (T₁, T₂ and T₃) having 8 piglets each, selected on the basis of weight and weaned at 28 days (T₁), 42 days (T₂) and 56 days (T₃) of age respectively. T₁ group and T₂ group piglets were provided with specially prepared pre-weaner diet (skimmed milk powder plus starter feed with 20 per cent CP and 3360 Kcal/kg ME) supplied by the Department of Animal Nutrition, Veterinary College and Research Institute, Orathanadu on ad libitum basis

from the date of weaning to 56 days of age, then from 56 days onwards normal weaner diet will be followed for all three groups of piglets. The effect of different behavioural pattern of piglets was studied immediately after weaning in all the three groups and the observations were recorded for a period of 15 days during 24 hours interval. All the piglets were housed in the weaner pens with the dimensions of 3.40 m x 3.17 m covered area having slatted flooring pattern with semi-automatic feeding and watering systems. The following behavioural activities were recorded with the help of closed-circuit camera connected with monitor fixed inside the shed.

Playing behaviour

Playing behaviour was observed by suckling littermates, scratching their own bodies, crawling and pushing littermates.

Fighting behaviour

Fighting behavior was observed by attacking, threatening, defending littermates. It happens mainly due to social conflict with another animal.

Tail biting behaviour

Tail biting was observed while they biting tails of other piglets. It is considered as a vice.

Ear biting behaviour

Ear biting was observed while they biting ear flap of other piglets. It is also considered as a vice.

Feeding Behaviour

Feeding behaviour was observed when the piglets spent on

voluntary oral ingestion of feed offered.

Water Intake behaviour

Water intake behaviour was observed when the piglets spent on voluntary oral ingestion of water offered.

Sleeping Behaviour

Sleeping behaviour was observed when the piglet lies with closed eyes, and may shows signs of relax activity, such as ear twitch and body twitch.

Belly Nosing Behaviour

A peculiar sequence in which piglets rubs a littermate's belly with rhythmic up and down movement with its snout.

Statistical analysis

The data obtained on various parameters relating to production, feeding, and behaviour were statistically analyzed using Snedecor and Cochran's techniques (1994) [2]. The experimental data were statistically evaluated using IBM SPSS Statistics Version 25.0 (IBM Corp. Released, 2017) [3] and statistical methods such as one-way analysis of variance (ANOVA) was followed. Tukey's test was used for post-hoc comparisons.

Results and Discussion

Mean \pm SE of average time (min) spent on various behaviour by piglets was presented in the Table 1. Percentage (%) of time spent on various behaviour by piglets after weaning in a day was presented in Table 2

Table 1: Mean \pm SE of average time (min) spent on various behaviour by piglets after weaning in a day (n = 15)

Behaviours	Treatment (T ₁)	Treatment (T ₂)	Control group (T ₃)	F-Value
Playing	31.98 \pm 1.55 ^a	22.84 \pm 1.53 ^b	18.10 \pm 0.90 ^c	26.81 ^{**}
Fighting	1.15 \pm 0.07 ^a	0.89 \pm 0.05 ^b	0.74 \pm 0.03 ^b	16.20 ^{**}
Tail biting	0.78 \pm 0.07 ^a	0.58 \pm 0.07 ^a	0.09 \pm 0.03 ^b	33.34 ^{**}
Ear biting	1.42 \pm 0.34 ^a	1.04 \pm 0.28 ^{ab}	0.42 \pm 0.15 ^b	3.56 [*]
Feeding	54.16 \pm 0.36 ^a	50.30 \pm 0.20 ^b	46.70 \pm 0.32 ^c	154.29 ^{**}
Water intake	1.60 \pm 0.07 ^a	1.90 \pm 0.07 ^b	2.48 \pm 0.09 ^c	34.91 ^{**}
Sleeping	572.54 \pm 10.42 ^a	635 \pm 6.04 ^b	798.09 \pm 6.12 ^c	223.05 ^{**}
Belly nosing	0.64 \pm 0.18 ^a	0.21 \pm 0.07 ^b	0.00	9.10 ^{**}

*Significant (The values with different superscript in the same row (a and b) differed significantly ($P < 0.05$))

**Highly significant (The values with different superscript in the same row (a, b and c) differed significantly higher ($P < 0.01$))

Table 2: Percentage (%) of time spent on various behaviour by piglets after weaning in a day (n = 15)

Behaviours	Treatment (T ₁)	Treatment (T ₂)	Control group (T ₃)
Playing	4.85	3.19	2.09
Fighting	0.17	0.12	0.08
Tail biting	0.12	0.08	0.01
Ear biting	0.22	0.15	0.05
Feeding	8.66	7.04	5.37
Water intake	0.24	0.27	0.29
Sleeping	85.99	88.84	91.76
Belly nosing	0.10	0.03	0.00

Playing behaviour

The playing behaviour in the present experimental study includes when two piglets engage in social interaction in which physical contact, pushing one another, suckling littermates, scratching their own bodies, crawling, it does not involve competition. High significant difference ($P < 0.05$) was observed in time (min) spent for playing behaviour among the three treatment groups. However, the time (min)

spent with percentage of time spent in day for playing behaviour was more in 28 days (T₁) weaned piglets (31.98 \pm 1.55) with 4.85 per cent followed by 42 days (T₂) weaned piglets (22.84 \pm 1.53) with 3.19 per cent and least observed in 56 days (T₃) weaned piglets (18.10 \pm 0.90) with 2.09 per cent. These results showed that the 28 days weaned piglets played well and are socially active when compared to other groups of piglets. The findings were in accordance with the work reported by Hohenshell *et al.* (2000) [4]; Davis *et al.* (2006) [5]; Suryanarayana *et al.* (2011) [6]; Sravanthi *et al.* (2015) [7]; Banuprakash *et al.* (2016) [8]; Ramyasree *et al.* (2017) [9] who all found that early weaned piglets spent more of their time for playing. Boe (2009) [10] and Ramyasree *et al.* (2017) [9] added that environment also plays a key role in altering playing behaviour of piglets. Enlarged spaces probably stimulate preweaning play behaviour in piglets which was mentioned by Chaloupkova *et al.* (2006) [11].

Fighting behaviour

The fighting behaviour in the present experimental study

includes attacking, threatening, defending with inmates. It happens mainly due to competition for food and social conflict with other animals. High significant difference ($P < 0.05$) was observed in time (min) spent for fighting behaviour among the groups. However, the time (min) spent with percentage of time spent in a day for fighting behaviour was more in 28 days (T₁) weaned piglets (1.15 ± 0.07) with 0.17 per cent followed by 42 days (T₂) weaned piglets (0.89 ± 0.05) with 0.12 per cent and least observed in 56 days (T₃) weaned piglets (0.74 ± 0.03) with 0.08 per cent. These results showed that the 28 days weaned piglets are aggressive when compared to other groups.

The present results were in accordance with the work reported by Hohenshell *et al.* (2000)^[4]; Jarvis *et al.* (2007)^[12]; Ramyasree *et al.* (2017)^[9] in which they found that early weaned piglets spent more of their time for fighting. Similarly, the present findings were in contrary to Suryanarayana *et al.* (2011)^[6] who said that late weaned piglets showed more fighting behaviour than early weaned piglets. Tsuji *et al.* (2004)^[13] and Ramyasree *et al.* (2017)^[9] found that the increase of aggressive behaviour was related to stress caused by early weaning. Debreceni *et al.* (2014)^[14] and Ramyasree *et al.* (2017)^[9] reported that hot climatic condition might be the reason for more fighting behaviour in early weaned piglets. Andersen *et al.* (2004)^[15] and Turner *et al.* (2001)^[16] also added that pigs were able to alter their behaviour concur to how the actual competitive situation changes with group size.

Piglets reared in indoor environment has performed more evidently harmful activities such as fighting which is mentioned by Cox and Cooper (2001)^[17]. Parratt *et al.* (2006)^[18] and Hwang *et al.* (2016)^[19] reported that mixing of litters showed more fighting after weaning but in the present study the piglets were not co-mingled in order to reduce fighting between the litters and comparatively all the treatment groups in the study spent less time for fighting out of the total time observed for all the behaviours.

Tail biting behaviour

The tail biting behaviour in the present experimental study was observed while they biting tails of other piglets which is considered as a vice. High significant difference ($P < 0.05$) was observed in time (min) spent for tail biting behaviour among the groups. However, the time (min) spent with percentage of time spent in a day for tail biting behaviour was more in 28 days (T₁) weaned piglets (0.78 ± 0.07) with 0.12 per cent followed by 42 days (T₂) weaned piglets (0.58 ± 0.07) with 0.08 per cent and least observed in 56 days (T₃) weaned piglets (0.09 ± 0.03) with 0.01 per cent. These results showed that the occurrence of tail biting was more in 28 days weaned piglets when compared to other groups.

The present results were similar to Suryanarayana *et al.* (2011)^[6]; Banuprakash *et al.* (2016)^[8]; Ramyasree *et al.* (2017)^[9] in which they found that early weaned piglets spent more of their time for tail biting as compared to conventionally weaned piglets. The present findings were also in accordance with Cox and Cooper (2001)^[17]; Moinard *et al.* (2003)^[20]; Van de Weerd *et al.* (2005)^[21]; Boe (2009)^[10]; Taylor *et al.* (2010)^[22]; Ramyasree *et al.* (2017)^[9]; Haigh *et al.* (2019)^[23]; Niemi *et al.* (2021)^[24] who all reported that postweaning environment has a major influence on the frequency of abnormal behaviour in early weaned piglets, which was mainly due to absence of rooting resources like chain, wood, toys, fabric sacks and rope. Hakansson and

Bolhuis (2021)^[25] who observed that piglets that do not bite tail are socially less interactive, whereas piglets that do tail bite also engage more often in other damaging behaviour and are more socially which was in accordance with present study.

Ear biting behaviour

The ear biting behaviour in the present experimental study was observed while they biting ear flap of other piglets which is considered as a vice. High significant difference ($P < 0.05$) was observed in time (min) spent for ear biting behaviour among the groups. However, the time (min) spent with percentage of time spent in a day for ear biting behaviour was more in 28 days (T₁) weaned piglets (1.42 ± 0.34) with 0.22 per cent followed by 42 days (T₂) weaned piglets (1.04 ± 0.28) with 0.15 per cent and least observed in 56 days (T₃) weaned piglets (0.42 ± 0.15) with 0.05 per cent. These results showed that the occurrence of ear biting was more in 28 days weaned piglets when compared to other groups.

The present results were similar to Banuprakash *et al.* (2016)^[8] and Lange *et al.* (2020)^[26] who both reported that early weaned piglets spent more time in ear biting as compared to conventionally weaned piglets. The present findings were also in accordance with Haigh *et al.* (2019)^[23] found that biting risk can be reduced by the addition of enrichments like chain, wood, toys and rope to the postweaning environment. Lange *et al.* (2020)^[26] added that greater space allowance also not beneficial but resulted in positive effects on incidence of biting which was correlated with present findings. Blackshaw (1981)^[27] also added that biting is a learned response spread by visual communication which was in accordance with the present study.

Feeding behaviour

The feeding behaviour in the present experimental study was observed when the piglets spent on voluntary oral ingestion of feed offered. High significant difference ($P < 0.05$) was observed in time (min) spent for feeding behaviour among the groups. However, the time (min) spent with percentage of time spent in a day for feeding behaviour was more in 28 days (T₁) weaned piglets (54.16 ± 0.36) with 8.66 per cent followed by 42 days (T₂) weaned piglets (50.30 ± 0.20) with 7.04 per cent and least observed in 56 days (T₃) weaned piglets (46.70 ± 0.32) with 5.37 per cent. These results showed that the feeding was more in 28 days weaned piglets when compared to other groups.

The present results were similar to Ramyasree *et al.* (2017)^[9] who reported that early weaned piglets spent more time in feeding as compared to conventionally weaned piglets. The present results were in accordance with the work reported by Gonyou *et al.* (1998)^[28]; Widowski and Torrey (2003)^[29] who studied the behaviour of weaned piglets and observed delay in eating by the earlier weaned piglets and suggested that additional improvements in early weaning management are desirable. Gonyou *et al.* (2001)^[30] and Ramyasree *et al.* (2017)^[9] added that grow-finish pigs spent 5 to 10 per cent of their time for eating which was in consistent with the present study.

Water intake behaviour

The water intake behaviour in the present experimental study was observed when the piglets spent on voluntary oral ingestion of water offered. High significant difference ($P < 0.05$) was observed in time (min) spent for water intake behaviour among the groups. However, the time (min) spent

with percentage of time spent in a day for water intake behaviour was slightly higher in 56 days (T₃) weaned piglets (2.48 ± 0.09) with 0.29 per cent followed by 42 days (T₂) weaned piglets (1.90 ± 0.07) with 0.27 per cent and comparatively least in 28 days (T₁) weaned piglets (1.60 ± 0.07) with 0.24 per cent. These results showed that the water intake was slightly higher in 56 days weaned piglets when compared to other treatment groups.

The present results were similar to Banuprakash *et al.* (2016)^[8]; Ramyasree *et al.* (2017)^[9] who reported that conventionally weaned piglets spent slightly higher time for water intake as compared to others. The present results were in accordance with the work reported by Dybkjaer *et al.* (2006)^[31] who studied that drinking time increased with increasing preweaning growth rate and weaning weight.

Sleeping behaviour

The sleeping behaviour in the present experimental study was observed when the piglets lie with closed eyes and may shows signs of relax activity such as ear twitch and body twitch. High significant difference ($P < 0.05$) was observed in time (min) spent for sleeping behaviour among the groups. However, the time (min) spent with percentage of time spent in a day for sleeping behaviour was higher in 56 days (T₃) weaned piglets (798.09 ± 6.12) with 91.76 per cent followed by 42 days (T₂) weaned piglets (635 ± 6.04) with 88.84 per cent and comparatively least in 28 days (T₁) weaned piglets (572.54 ± 10.42) with 85.99 per cent. These results showed that the time spent for sleeping was higher in 56 days weaned piglets when compared to other groups.

The present results were similar to Ramyasree *et al.* (2017)^[9] who reported that conventionally weaned piglets spent higher time for sleeping as compared to others groups. The present results were in accordance with Gonyou (2001)^[30]; Ekkel *et al.* (2003)^[32]; Debreceni *et al.* (2014)^[14]; Cheryl *et al.* (2016)^[33] who all studied that grow-finish pigs spent 75 to 85 per cent of their time for lying.

The present results were in contrast with Honhenshell *et al.* (2000)^[4]; Suryanarayana *et al.* (2011)^[6] who studied the effect of weaning at different age groups on behavioural patterns of piglets and observed that no significant difference was found in the time spent for lying among the groups.

Belly nosing behaviour

The belly nosing behaviour in the present experimental study was observed when the piglets rub a littermate's belly with rhythmic up and down movement with its snout. High significant difference ($P < 0.05$) was observed in time (min) spent for belly nosing behaviour among the groups. However, the time (min) spent with percentage of time spent in a day for belly nosing behaviour was slightly higher in 28 days (T₁) weaned piglets (0.64 ± 0.18) with 0.10 per cent followed by 42 days (T₂) weaned piglets (0.21 ± 0.07) with 0.03 per cent and absent in 56 days (T₃) weaned piglets. These results showed that the belly nosing was slightly higher in 28 days weaned piglets when compared to other treatment groups.

The present results were similar to Banuprakash *et al.* (2016)^[8]; Ramyasree *et al.* (2017)^[9] who reported that early weaned piglets spent slightly higher time in occurrence to belly nosing as compared to conventionally weaned piglets. The present results were in consistent with Worobec *et al.* (1999)^[34]; Jarvis *et al.* (2007)^[12]; Rzezniczek (2015)^[35] who reported that decreased weaning age linearly increased the incidence of belly nosing in piglets.

Similarly, the present findings were also in accordance with Li *et al.* (2002)^[36] who concluded that belly nosing is more closely associated with social interaction. Weary *et al.* (1999)^[37] who studied that separation distress and frustration of suckling motivation are significant problems when piglets are weaned at an earlier stage of life which was in accordance with the present study.

Conclusions

From the present study, it may be concluded that majority of the early weaned piglets at 28 days spent more time in playing, fighting, tail biting, ear biting, feeding and belly nosing behaviour as compared to 42th day and 56th day weaned piglets during the postweaning period of 15 days. It was also observed that water intake and sleeping behaviour was more in 56th day weaned piglets as compared to 28th day and 42th day weaned piglets. Certain vices and behaviour pattern were comparatively more in early weaned piglets which may be overcome by provision of environmental enrichment in term of proper housing, supplementation of quality protein diet, surrounding space and enrichment materials like chain, wood, toys and rope to the piglets in early stage of life to reduce the detrimental behaviours.

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