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Behavioural responses of Large White Yorkshire weanling piglets to cold stress#

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Abstract

A study to investigate the behavioural responses of Large White Yorkshire weanling piglets to cold stress during the post-monsoon season in Kerala was carried out at the Centre for Pig Production and Research, Mannuthy. Forty piglets were randomly allotted to four treatment groups with ten animals each, and animals of three treatment groups were reared on different bedding materials, and animals of the remaining one treatment group was kept as control and werereared on concrete floor without any bedding material. The analysis of the recordeddata regarding the microclimatic environment of the animals revealed the presence of cold stress during the study period. Behavioural response scores of animals indicated that the provision of bedding materials provided climatic comfort and acted as a good source of enrichment adding to the welfare of the weanling piglets.

Keywords: *Large White Yorkshire, behaviour, cold stress, weanling piglet*

Pig farming is one of the most important income generating enterprises of rural India. According to the available reports, there is a declining rate of pig population in India in the past 15 years (Basic Animal Husbandry Statistics, 2019). Post weaning stress plays a major role in the decrease of welfare and growth of piglets.The variations in thermal environment of the piglets add to the weaning stress and can aggravate the stress which may lead to incidence of diseases and mortality which causes huge economic losses in pig farming. Therefore, utmost importance must be given to the welfare and comfort of weanling piglets.The provision of different bedding materials

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was known to be a good environmental enrichment methodwhich increased the comfort and production of animals (Geetha*et al.*, 2021). This study was conducted to investigate about the variations inthermal environment of the weanling piglets in the post-monsoon season and their responses to these variations with the provision of different bedding materials.

Materials and methods

The study was conducted at Centre for Pig Production and Research, Mannuthy, Thrissur, Kerala with total of forty Large White Yorkshire piglets in the post weaning period of 45-90 days of age during the post-monsoon season (October-January) as described by Joseph (2011). The piglets were grouped into four treatment groups with ten animals each.The animals of each treatment group were housed in pens of dimensions 4m×2.5m.The animals in treatment group 1 were reared on concrete floor (control). The piglets in treatment group 2, treatment group 3 and treatment group 4 were reared on bedding materials of wood shavings, rice husks and paddy straw of 10cm thickness, respectively. The bedding materials were spread evenly in the pen covering the whole pen except the waterer and drainage areas in the pen. Feed was provided in elongated iron feeders. The bedding materials were replaced at 4 to 5 days interval based on the moisture content of the bedding materials.

Recording of microclimatic variables inside the shed

The microclimatic variables like air temperature and relative humidity inside the shed for every hour for forty five days were recorded using mini data logger (testo 174h). The logger was placed at a height of about two metres from the ground.

Recording of behavioural observations as a response to cold stress

Behavioural data were recorded using closed circuit television cameras fixed in each individual pen (WBOX 2 MP HD DOME CAMERAS).Behavioural responses were recorded two days in a week at 7.00 AM and evening 5.00 PM during the 45 days study period, as per Hayne *et al.* (2000). Each behavioural category was recorded as per the description mentioned in Table 1. Observations for the behavioural category of burrowed were not found in the study.

Table 1. Ethogram: Description of recorded behavioural responses to cold stress in piglets

Behavioural Category	Description
Overall resting	Pooled observations of all resting behaviour
Huddled sternal	Pig lying in contact with another pig insternal lying posture, with body supported by all four legs
Huddled relaxed sternal	Pig lying in contact with another pig in relaxed sternal lying posture, with body supported by two or three legs
Huddled lateral	Pig lying in contact with another pig laterally on side with no leg support
Alone sternal	Pig lying without any contact with another piginsternal lying posture, with body supported by all four legs
Alone relaxed sternal	Pig lying without any contact with another piginrelaxed sternal lying posture, with body supported by two or three legs
Alone lateral	Pig lying without any contact with another pig laterally on side with no leg support
Piled	Pig lying with part or all of its body on top of another pig
Burrowed	Pig lying with part or all of its body under bedding, huddled or alone
Overall activity	Pooled observations of all active behaviour. Including: eating, nest-building, fighting, playing, rooting and standing

Scan sampling method was used to observe the animals in each treatment group. This method involved continuous observation of all the animals for 15 minutes. At 30 sec intervalsin this 15min, the number of piglets engaged in each behaviour was identified as described in Table 1and was noted. A score of zero was given for a behaviour if it was absent and a score of one was given for behaviour if it was present. The scores from behavioural observations of individual treatment groups were summed for each behavioural category for each dayand further for each week. The weekly scores were summed to give a total score for each behavioural category for each treatment indicating the behavioural responses for the entire duration of the study.The collected behavioural and microclimatic environmental data were statistically analysed using SPSS version 24.0.

Results and discussion

Thermal stress experienced during the post-monsoon season

As evident from Tables 2 and 3,the animals were in a thermal environment with temperatures varying from 22.30°C to 33.70°Cinside the shed. The lower critical temperatureof weanling pigletswasreported to be near to 24°C for three weeks post weaning (Close and Stanier, 1984). A minimum recorded air temperature of 22.3°C inside the shed indicated the presence of cold stress in piglets.According to Kutty(2021) in a study about the pattern of seasons in Kerala, the post-monsoon season recorded the lowest temperature and relative humidityout of the four seasonsstudiedin a year. The THI reported in this season was lowest out of all the seasonscausingmildcoldstress in animals. The study also stated that Kerala lacked a winter season except in the high ranges of the state.These findings substantiated the fact that a state of cold stress was incident in the present studyaslower ambient temperatures and RHwererecorded during the post-monsoon season of Kerala.

Behavioural responses to cold stress in piglets

The behavioural response score indicating behavioural responses to cold stress showed significant differences between different treatment groups for behavioural categories like huddled lateral, overall active and overall resting (Table 4). Hayne *et al.* (2000) in a study reported that piglets reared in greater amounts of straw bedding adopted lateral postural states more frequently. This could be compared to the finding in the present study where piglets in treatment groups with beddings adopted more of huddled lateral postural states than the treatment group with

Table 2. Air temperatures in the interior of the shed

Time	Interior air temperature(°C)		
	Mean± SE	Maximum	Minimum
8.00 a.m.	24.40 ± 0.19^{B}	28.50	22.30
1.00 p.m.	30.78 ± 0.15^{A}	32.80	28.00
5.00 p.m.	30.77 ± 0.16^{A}	33.70	27.80

*A,B- Means with different superscripts within the same column differ significantly (P<0.05)

Table 3. Relative humidity in the interior of the shed

Time	Interior relative humidity (per cent)		
	Mean ± SE	Maximum	Minimum
8.00 a.m.	71.89 ± 1.02^{A}	84.60	54.20
1.00 p.m.	49.87 ± 0.90^{B}	62.80	29.50
5.00 p.m.	48.24 ± 1.05^{B}	62.60	32.10

*A, B- Means with different superscripts within the same column differ significantly (P<0.05)

Table 4. Behavioural response score of different treatments

Behavioural category	Treatments* (Mean ± SE)			
	T1	T2	T3	T4
Huddled sternal	355.33 ±105.08	516.33± 64.08	395.83± 110.84	437.00± 51.23
Huddled relaxed sternal	75.66 ±28.04	45.83 ±27.47	102.83 ± 62.35	49.50± 19.75
Huddled lateral	213.16± 36.49^{c}	236.83± 81.06^{b}	458.83± 86.11^{a}	256.33± 48.26^{b}
Alone sternal	28.00± 12.15	88.83± 34.55	84.50 ±29.88	64.83± 44.22
Alone relaxed sternal	34.00 ± 21.27	69.33± 28.42	92.66 ± 47.66	72.83± 32.24
Alone lateral	89.33 ± 48.62	75.33± 20.33	52.33± 19.71	42.00± 16.56
Piled	134.50± 37.05	93.16 ± 30.23	118.83 ± 17.69	164.33± 51.15
Overall activity	525.50± 93.61^{c}	881.66± 81.70^{a}	755.33 ± 94.57^{b}	767.16± 82.92^{b}
Overall resting	930.00 ±128.55^{c}	1125.66±125.14^{b}	1305.83±116.20^{a}	1086.83± 85.56^{b}

*a-c – Means with different superscripts within the same row differ significantly (P<0.05)

no bedding. This could be because the presence of beddings gave enough thermal comfort to the animalsso that they did not have the need to change to thermoregulatory postures like sternal postures. The overall resting category also had higher scores for the treatment groups with bedding materials than concrete floored group which can be considered as an indication of more thermal comfort provided by the presence of bedding materials on the floor. The overall active behavioural category revealed more active behaviour in the treatment groups with beddings compared to concrete floored group. This finding was similar to the findings of Day *et al.* (2008) and Amaral*et al.* (2021) and in those studies more active and diverse behaviour was present due to the presence of bedding materials like straw, wood shavings and rice husk.

Conclusion

The present study revealed that the piglets experienced thermal stress during the post-monsoonseasonwithvaryingtemperatures and relative humidity inside the shed throughout the day. The lower temperatures recorded during the morning hours indicated the presence of cold stress during the study period. The provision of bedding materials thus benefited in alleviating the cold stress experienced as significantlyhigher overall resting behaviour was observed in bedded treatments when compared to concrete floored treatment group. A significantly higher overall active behaviour in bedded groups also revealed the added welfare benefit of expression of natural exploratory behaviour in piglets.

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