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RESPONSE OF PIGS TO THERMAL STRESS UNDER INTENSIVE SYSTEM OF REARING

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ABSTRACT

Twenty pigs from each breed of Ghunghroo, Niang Megha and crossbreds (50% Hampshire Boar X 50% Ghungroo Sow) maintained under similar managemental conditions at National Research Centre on Pig, Guwahati were selected for behavioural response studies with respect to varied THI. Also, a pilot study was conducted to observe the feeding behaviour of 20 adult Hampshire and Ghungroo pigs under different seasons (Summer - July and August & Winter - December and January). During summer season, difference in the percent of animals panting, using the covered space and postural variations among different breeds in response to heat stress was observed. Crossbreds suffered more, and among indigenous breeds, Niang megha was found to be suffered more as compared to Ghungroo. Niang Megha was found to be comparatively tolerant to cold stress as compared to Ghungroo and crossbreds. Heat production mechanism in term of average feed intake per minute was found to be more pronounced in Hampshire as compared to Ghungroo pigs. From the behavioural manifestations, the Ghungroo is found to be more adapted to the agro-climatic conditions of Assam as compared to Niang Megha and crossbreds.

Keywords : Behaviour, Ghungroo, Niang Megha, Stress.

Pigs are more sensitive to high environmental temperatures as compared to other species of farm animals because they cannot sweat and do not pant so well. They respond to heat stress by invoking a complex of physiological, behavioural and anatomical mechanisms aimed at facilitating heat loss to, or minimizing heat gain from, the environment. Managing stressors is essential for optimizing pig growth performance[8]. The optimum temperature range for finishing pigs[6] is between 10 and 23.9°C, and temperatures above 23.9°C decrease voluntary feed intake and pig growth[4]. There is no report available regarding behavioural response of indigenous and crossbred pigs under different micro-climatic conditions. So, the present investigation was aimed to document the behavioural manifestation of indigenous and crossbred pigs with respect to variable thermal stress under intensive system of rearing.

MATERIALS AND METHODS

Twenty pigs from each breed of Ghungroo, Niang Megha and crossbreds (50% Hampshire Boar X 50% Ghungroo Sow) of either sex at the age of 2-3 years maintained under similar managemental conditions at Farm Complex of National Research Centre on Pig, Guwahati were selected for behavioural response studies. General behavioural response with respect to body movement/posture was noted using video camera (Panasonic with 2.8 mm fish eye lens) installed in the shed.

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Animals were observed at hot hours (12:00 Noon to 4:00 PM) during day time in the month of July to September to find percent of animals present at open area/ inside closed area, percent of animals panting and postural variations among different breeds for dissipation of heat. The animals were observed thrice in a week at hourly interval for a period of 12 weeks, hence a total of 3600 observations were recorded for each breed in order to document the behavioural response of pigs to thermal stress. In order to document the behavioural response of pig to cold stress during winter, animals were observed at hourly interval during night hours (10:00 PM to 4:00 AM) in the month of December to January to find percent of animals present at open area/ inside closed area and percent of animals huddling in order to conserve energy. A total of 2400 observations were recorded for each of the three breeds.

A pilot study was conducted to observe the feeding behaviour of 20 adult Hampshire and Ghungroo pigs of either sex available at NRC on Pig, Rani under different seasons (Summer - July and August & Winter - December and January). Animals were kept under restricted feeding resume and vigilance. This group of animals was observed to find the breed variations in feeding behavioural response under different seasons.

Temperature-Humidity Index (THI) inside the shed was measured for the given period by the formula given by Johnson *et al* (University of Missorie Experimental Station, Research Bulletin-846, Columbia). **THI = $0.8xT_a+(RHx(T_a-14.4)/100)+46.4$;** Where Ta is temperature in centigrade; RH in %. The data were analyzed by analysis of variance technique[7].

RESULTS AND DISCUSSION

The temperature humidity index (THI) varied from 79.73 ± 1.58 to 82.89 ± 1.86 in summer season (July to September), whereas in winter season (December to January), THI varied from 69.44± 0.98 to 71.43± 0.38. Both of these THIs were found to be very stressful to pigs under different seasons.

During the specified period of summer season, it was observed (Table-1) that there was significant difference in the percent of animals panting, using the covered space and postural variations among different breeds in response to heat stress. The results are in agreement with few workers[2, 5] who reported that the pigs could modify their postures in relation to ambient conditions, to either increase or decrease heat loss. Crossbreds suffered more in terms of increased panting, occupying covered space, sluggishness, lateral recumbency and wallowing. Among indigenous breeds, Niang megha was found to be suffered more as compared to Ghungroo which may be attributed to the origin of breed (in other words acclimatization of breed to its original long term environmental variables) as Niang megha is of hilly origin, whereas Ghungroo is from West Bengal having varied environmental conditions. In nature, wild pigs can wallow in mud or water when necessary, shelter during hot periods of the day and shift their activity from day to night[5]. Pigs also shifted their excreting area to the solid floor and daubed themselves with manure and urine to cool themselves by evaporative cooling. It was observed that on hot days pigs changed their lying position from sternal to lateral and avoided physical contact with other pen mates[1]. So, in the present context, Ghungroo was found to be more thermotolerant and crossbreds were found to be most thermo-susceptible for the region.

Similarly during cold season, it was observed that there was significant difference in the animal's response to cold among different breeds (Table-2). Niang Megha was found to be comparatively tolerant to cold stress as compared to Ghungroo and crossbreds. In all cases, whether cold or heat stress, Ghungroo was found to be of sluggish nature as manifested from recumbency and standing/moving behaviour.

The primary consequence of heat stress is that animals reduce feed intake progressively with increased temperature[3]. The average feed intake was normal in both seasons as they were under

restricted feeding resume and all the feed offered to them were consumed. But the consumption time varied significantly in both the seasons irrespective of breed (Table-3). The average feed intake per minute was more in winter suggestive of more heat production by specific dynamic heat. This heat production mechanism was found to be more pronounced in Hampshire as compared to Ghungroo pigs. This behaviour too suggests sluggish nature of Ghungroo pigs.

Table-1. Behavioural response of animals to heat stress

Breed	% of animals		Posture variations (% of animals)			
	Panting	Occupying covered space	Lateral recumbency	Sternal recumbency	Standing/ moving	Wallowing in feed trough
Ghungroo	19.03	80.57	63.56	17.41	15.38	1.62
Niang Megha	20.92	81.04	29.41	19.61	39.87	11.11
Cross bred	29.68	95.05	53.36	16.25	20.85	8.83

Table-2. Behavioural response of animals to cold stress

Breed	% of animals huddling	% of animals using covered space	Lateral recumbency	Sternal recumbency	Standing/ moving
Ghungroo	86.67	59.62	40.88	46.23	11.21
Niang megha	78.26	80.00	31.47	39.25	16.23
Cross bred	69.44	60.00	16.21	51.02	25.14

Table-3. Feeding behaviour response of pig in different seasons

Particulars	Summer		Winter	
	Hampshire	Ghungroo	Hampshire	Ghungroo
Average feed intake per animal (Kg)	2.3	2.32	2.37	2.55
Average feeding time per animal (Min)*	23.17	47.4	12.75	19
Average Feed intake/ minute per animal (gms/min)*	100.94	52.21	185.85	134.48

* Significant at 1 % level for season

CONCLUSION

The behavioural manifestation of indigenous and crossbred pigs with respect to variable thermal stress under intensive system of rearing suggested that crossbreds suffered more, and among indigenous breeds, Niang megha was found to be suffered more as compared to Ghungroo in hot-humid environment, however, Niang Megha was found to be comparatively tolerant to cold stress as compared to Ghungroo and crossbreds. The average feed intake per minute was more in winter suggestive of more heat production by specific dynamic heat irrespective of breed.

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