HEAT TOLERANCE OF CROSSBRED JERSEY COWS IN SEMI-ARID TROPICAL CLIMATE

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ABSTRACT

The study was conducted at Livestock Research Station, Kattupakkam, Tamilnadu Veterinary and Animal Sciences University with 55 randomly selected Jersey-Sindhi crossbred cattle, subjected to heat tolerance test expressed as index of tolerance to heat (ITH). The ITH of Jersey-Sindhi crossbred cattle was 8.51± 0.03 for lactating cow, 8.71 ± 0.05 for heifer and 8.60 ± 0.04 for dry cow in the scale 0 to 10, with 10 being the most heat tolerant. The heat tolerance index was not significant between seasons and also between different physiological status. The heat tolerating capacity of Jersey-Sindhi cross bred cattle in the present study is well enhanced and may be a choice for developing heat tolerant animals. The average daily milk yield of Jersey-Sindhi cross bred cattle were positively correlated with index of heat tolerance for winter (0.2522) and summer (0.6267) seasons. Hence, the index of tolerance to heat can be used as a tool for comparing animals in different environmental condition for their productive and reproductive performance.

KEYWORDS: Jersey-Sindhi crossbred cattle, heat tolerance test, physiological status, rectal temperature

INTRODUCTION

Animal production system in tropics is often operating on a subsistence level characterized by low input and stressful environment. The climate has direct and indirect effects on the animal performance. To maintain optimum productive and reproductive performance in crossbred cows, it is essential to assess as to what extent the crossbreds could tolerate the tropical heat and humidity. A high level of milk production was associated with a high level of body heat production and this depressed the heat tolerance, therefore high yielding cows were less heat tolerant than low producing cows (Bianca, 1965). The test of tolerance to the heat had high correlation with the productivity of the animals and if the test of tolerance could be applied to the young ones to know the productivity levels in the future it would be a good indicator of productivity (Mc Dowell, 1975). The objective of the experiment was to study the heat tolerance of crossbred Jersey cattle.

MATERIALS AND METHODS

Fifty five Jersey-Sindhi crossbred cows were randomly selected for this study at Livestock Research Station, Kattupakkam, Tamilnadu Veterinary and Animal Sciences University. Of these, 40 animals were lactating, 5 dry and remaining 10 were heifers.

Heat tolerance test

The heat tolerance test (Baccari Junior *et al.,* 1986) was applied to all the 55 animals for a period of six consecutive days each during two seasons namely winter and summer. The test consisted of recording rectal temperature (T^{o}R1) of the animals at rest for a period of two hours under shade. Then the animals were exposed to direct solar radiation for a period of one hour through grazing. Afterward, the animals were allowed to rest in shade again for one hour, rectal temperature (T^{o}R2) was recorded again. The index of tolerance to heat (ITH) was calculated by applying the following formula.

ITH = 10 – (Tº R2 - Tº R1) Where,

ITH is the indices of tolerance to the heat

Tº R1 is the mean rectal temperature at rest before exposure to solar radiation

Tº R2 is the mean rectal temperature at rest after exposure to solar radiation

The differences (10- (TºR2 - TºR1) results in index of tolerance to heat (ITH) of 0 to 10, with 10 being the highest heat tolerance. The data collected were subjected to statistical analysis as per standard procedure described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The index of tolerance to heat of animals in different physiological groups such as lactating cow, heifer and dry cow did not differ significantly. This indicated that heat tolerance level of Jersey-Sindhi crossbred in different physiological status were same. The index of tolerance to heat for winter and summer of various physiological groups of Jersey-Sindhi crossbred were also non-significant. The findings were in agreement with Saxena (1987) who reported that the heat tolerance coefficient between crossbred grades within a season and overall were almost negligible.

The overall index of tolerance to heat calculated for various physiological groups of Jersey-Sindhi crossbred was 8.51 ± 0.03 for lactating cow, 8.71 ± 0.05 for heifer and 8.60 ± 0.04 for dry cow, in the scale 0 to 10, with 10 being the most heat tolerant. The index of tolerance to heat observed for Jersey-Sindhi crossbred was higher than the index of heat tolerance of Jersey x Tharparkar (77.57 ± 0.48), Brown Swiss x Tharparkar (80.31 ± 0.58), Holstein x Sahiwal (80.18 ± 0.42), Brown Swiss x Sahiwal (78.61 ± 0.46), Holstein x Tharparkar (77.57 ± 0.52) in the scale 0 to 100, with 100 being the most heat tolerant observed by Kundu and Bhatnagar (1980). Thus the index of tolerance to heat of Jersey-Sindhi crossbred cows exceeded the other crossbred cattle. Hence it may be stated that heat tolerating capacity of Jersey-Sindhi cross is better in semi-arid region and may be a choice for developing heat tolerant animals.

The average daily milk yield was positively correlated (0.2522) with index of heat tolerance for winter season but did not have significant influence. The average daily milk yield was highly significant ($P < 0.01$) positively correlated (0.6267) with the index of heat tolerance for summer season.

The index of heat tolerance in the winter has got no significant correlation coefficient, though a positive correlation (0.2522) existed between it and average daily milk yield. This is in accordance with the findings of Frisch (1981) who reported that under lack of heat stress there was no advantage in productivity of animal with greater heat tolerance. Indeed, there is absolutely a lack of heat stress in winter for animals dwelling in tropical climate. For that heat tolerance index had got least to do with the daily milk yield of the animals during winter. Unlike the above fact the index of heat tolerance gains a lot of significance when it comes to summer season. A higher positive correlation (0.6267) resulted between index of heat tolerance and average milk yield of summer season. This ultimately drove to a significant relationship between heat tolerance index and average milk yield in summer season. This is in agreement with Kundu and Bhatnagar (1980) who reported a significant relation (0.17) between heat tolerance and milk yield in Jersey-Tharparkar crossbred cattle.

This test of tolerance to the heat has the advantage to be based on the reduction of the body temperature after the exposition of the animals to the natural condition of ambient heat (Baccari Junior *et al.,* 1986). The test of heat tolerance can be easily applied under field conditions existing in livestock farms and could be a practical, simple and trustworthy selection. Therefore it can act as basic criteria for selection of high yielding cows.

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