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Ajaydeep Singh
Division of Veterinary Physiology and Biochemistry FVSc & AH, SKUAST-Jammu, RS Pura, Jammu, J&K, India

Kawardeep Kour
Division of Veterinary Physiology and Biochemistry FVSc & AH, SKUAST-Jammu, RS Pura, Jammu, J&K, India

Jonali Devi
Division of Veterinary Physiology and Biochemistry FVSc & AH, SKUAST-Jammu, RS Pura, Jammu, J&K, India

D Chakraborty
Div.-AGB, FVSc & AH, SKUAST-Jammu, J&K India

Aditi Lal Koul
Division of Veterinary Physiology and Biochemistry FVSc & AH, SKUAST-Jammu, RS Pura, Jammu, J&K, India

Mandeep Singh Azad
KVK, Reasi, SKUAST-Jammu, J&K India

Correspondence
Ajaydeep Singh
Division of Veterinary Physiology and Biochemistry FVSc & AH, SKUAST-Jammu, RS Pura, Jammu, J&K, India

Effect of seasons on physiological parameters of crossbred cows

Ajaydeep Singh, Kawardeep Kour, Jonali Devi, D Chakraborty, Aditi Lal Koul and Mandeep Singh Azad

Abstract
The experiment was planned to study the influence of different seasons on physiological parameters of crossbred dairy cattle. Physiological variables like pulse rate (PR), rectal temperature (RT) and respiration rate (RR) of individual animals were measured and recorded at a week interval to observe the seasonal variation during different season which were divided into dry hot summer (DHS), humid hot summer (HHS) and winter (W). Data were analyzed by suitable statistical methods. Analysis of variance (ANOVA) showed that seasons had highly significant ($P<0.01$) effect of on all the physiological parameters under study. The mean values for PR, RT and RR were 58.500 ± 0.619, 38.617 ± 0.070 & 30.000 ± 0.516; 52.167 ± 0.601, 38.490 ± 0.020 & 27.667 ± 0.333 and 50.833 ± 0.477, 38.083 ± 0.060 & 25.000 ± 0.365, respectively for DHS, HHS and W seasons. During DHS all the physiological parameters of crossbred cattle increases significantly compared to other two seasons. Different managemental practices should be followed to combat the seasonal variations during different seasons to get optimum production.

Keywords: Crossbred cattle, Pulse rate, Rectal Temperature, Respiration rate and season

Introduction
Productivity in dairy cows depends on the reproductive soundness of the individual, nutritional status and environment in which they are raised. Physiological tolerance of dairy cows is highly influenced by the environmental conditions in which they inhabit. The physiological stress due to adverse climatic condition has great economic impact in dairy animals effecting the production or reproductive efficiency including health and capacity of resistant to disease [1]. Zebu cattle breeds (*Bos indicus*) are more tolerate to thermal stress than to European breeds (*Bos taurus*) and crossbred cattle. Due to increase in environmental temperature the physiology of animals alters. The respiration rate is the best indicator of heat stress [2]. Different managemental, nutritional and genetic procedures help to maintain reproductive and productive efficiency in high-yielding dairy cows and the health status of animals living in hot environments [3]. Therefore, the present investigation was undertaken to study the effect of seasons on physiological parameters of crossbred cows.

Materials and Methods
For the present study the crossbred dairy cows were selected based on following criteria- All the selected animals all clinically healthy & reproductively sound with minimum variations in body weight and all the selected animals had maximum difference ±15days in the initiation of 3rd lactation. Physiological variables like pulse rate, respiration rate and rectal temperature of individual animals were measured and recorded at a week interval to observe the seasonal variation during different season which were divided into dry hot summer (DHS), humid hot summer (HHS) and winter (W). *Pulse Rate*
Pulse rate is measured by placing the sensitive part of index finger on coccygeal artery located at the ventral surface of tail head. The pulse rate was recorded for one minute and expressed in number of beats per minute. *Rectal Temperature* The rectal temperature was recorded with the help of clinical thermometer. It was expressed in degree Celsius (°C) for each animal.
Respiration Rate Respiration rate was determined by observing the flank movement on lower part of abdomen from a distance without disturbing the animal. The reading was expressed as breath per minute (bpm).

The experimental data obtained from three seasons have been subjected to standard methods of statistical analysis [4].

Results and Discussion

Pulse Rate (PR): The analysis of variance (ANOVA) for physiological parameter pulse rate in crossbred cattle showed that the season had highly significant (P<0.01) effect on pulse rate. The mean values of PR have been presented in Table 1. The pulse rate in crossbred cattle was to vary significantly (P<0.01) in dry hot summer from hot humid summer season and winter seasons. But no significant difference was observed in pulse rate of crossbred cattle between hot humid summer and winter season. The highest pulse rate in crossbred cattle was (58.500±0.619/min) during dry hot summer (DHS) and the lowest pulse rate observed was (50.833±0.477/min) during the winter season (Table 1).

The pulse rate increased with increase in environmental temperature and was highest during summer season and lowest during winter season. Similar findings of increased pulse rate in summer and decreased rate in winter were reported that the highest pulse rate during dry summer season compared to other seasons [5, 6, 7].

Rectal Temperature (RT): The analysis of variance (ANOVA) for the different animal parameters under physiological parameters in dairy cattle (Table 1) showed that the effect of different seasons on temperature of the animal were highly significant (P<0.01).

It was observed that temperature in crossbred cattle vary significantly from winter season (38.083±0.060 ºC) to dry hot summer (DHS) and hot humid summer (HHS) season (38.617±0.070 ºC to 38.490±0.020 ºC) respectively, though the difference in temperature of animal did not vary significantly during the summer season (Table 1). The rectal temperature in crossbred cattle increased in summer season as compared to winter season similar results of increase in rectal temperature have been reported [8].

Respiration Rate (RR): The analysis of variance for respiration rate in case of crossbred cattle showed that season had highly significant (P<0.01) effect on respiration rate (Table 1). The respiration rate in crossbred cattle ranged from 30.000±0.516/min during dry hot summer to 25.000±0.365/min in winter seasons.

The present study depicted significantly higher respiration rate in crossbred cattle, which increased with increase in the environmental temperature. The highest respiration rate was recorded during dry hot summer and the lowest during winter season. Similar trend of increased respiration rate from winter to summer season has been observed [7].

Conclusion

The present study reflects that season has highly significant effect on physiological parameters of individuals. During DHS all the physiological parameters of crossbred cattle increases significantly compared to other two seasons. Therefore, managemental practices should be followed to alleviate the physiological stresses during different seasons to get optimum production.

Table 1: Physiological parameters (Mean ± SE) of crossbred cattle in different seasons

	PR/minute	RT (ºC)	RR/minute
Effect of season	**	**	**
DHS	58.500^{b}±0.619	38.617^{c}±0.070	30.000^{c}±0.516
HHS	52.167^{a}±0.601	38.490^{b}±0.020	27.667^{b}±0.333
W	50.833^{a}±0.477	38.083^{a}±0.060	25.000^{a}±0.365

**P<0.0 Means with different superscript differs significantly

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