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STUDIES OF SOME EFFECTS  
OF HOT CLIMATIC CONDITIONS ON THE PERFORMANCE  
OF FRIESIAN AND SAHIWAL X FRIESIAN HEIFERS.

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## ABSTRACT

Two Friesian heifers and two Sahiwal x Friesian (F1 ) heifer calves were subjected to 33°C air temperature in a climate chamber for 12 weeks. Another two pairs of calves were kept in a 'control' room maintained at 15.5°C ambient temperature. All heifers were fed hay during the first 6 weeks of the trial. A concentrate diet was fed the following 6 weeks. In each period, records were taken during the last four weeks only.

The measurements taken twice daily included, the voluntary intake of water (VWI) and feed (DMI); the rates of sweating (SWR) and respiration (RR); and the rectal temperature (TR) of each animal. Liveweight gain and growth rate of the hair coat were calculated from measurements taken at the beginning and at the end of each period.

The experiment was repeated using the same calves, but exchanged between temperatures. Concentrate feeding was carried out during the first half of Trial 2. Hay was then fed for the following 6 weeks.

The data were analysed using the multivariate analysis of variance technique for repeated measurements. The results indicated that high ambient temperatures increased significantly the rectal temperature, respiration rate and the voluntary intake of water by all calves. Intake of DM and DE were significantly reduced ( $P < 0.05$ ) by the exposure of calves to a hot environment. The rate of liveweight gain was reduced from 0.67kg/day at 15.5°C to 0.39kg/day at 33°C. ( $P < 0.05$ )

The Sahiwal x Friesian heifers were less affected by hot conditions than were Friesians. They had significantly lower TR ( $P < 0.05$ ) and drank comparatively less water than did the Friesian heifers on exposure to 33°C ambient temperature. Their RR was lower than that of the Friesians, however the interaction between the effects of ambient temperature and breed on RR, was not significant.

The greater heat tolerance of the Sahiwal x Friesian heifers as compared with that of their Friesian counterparts was associated with their faster rates of sweating. Greater rates of sweating were suggested to facilitate faster evaporative loss of heat from the body.

Of all the variables, DEI showed the greatest response to diet treatment factor. The heifers consumed more digestible energy, under concentrate feeding than when hay was fed. As a result, faster rates of LWG were achieved during concentrate feeding than during hay feeding. Further analysis demonstrated that the declines in DEI were responsible for the slow rates of LWG, achieved on exposure of animals to high ambient temperatures.

The analysis of the growth rate of the hair coat indicated that exposures to cool conditions resulted in faster rates of growth of hair, than observed under hot conditions. The effect was probably associated with intake of dry matter. It was found, however, difficult to justify this suggestion because of the confounded effects of photoperiodicity.

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