

HEAT TOLERANCE STUDIESONCATTLE IN WET TROPICS.THE IMPORTANCE OF COAT COLOUR IN THE THERMO-
REGULATORY MECHANISM OF ZEBU-HOLSTEIN CROSSES
WITH PARTICULAR REFERENCE TO OUTPUT OF SWEAT

By

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The ability of an animal to be agriculturally productive depends fundamentally on the degree of adaptation of its physiological functions to a given environment. Cattle and other farm animals are homeotherms. They attempt to maintain their body temperature within a range suitable for optimal biological activity. This they do by trying to maintain a balance between heat production and heat dissipation. Under hot tropical conditions, the effort tends towards heat dissipation rather than heat conservation. Apart from the heat produced internally by the metabolic processes plus heat produced in the alimentary canal of the animal, a large part of its heat load is absorbed from solar radiation. Under the hot tropical climate, this additional heat can be overwhelmingly high. Indeed, Riemerschmid (1943 b) observed that a brown coloured cow absorbed three times as much heat from solar radiation as it produced in the same period and that shade could reduce this radiation heat load by about 70%. The colour of the coat of an animal might thus be an important factor in its adaptability to regions of intense radiation since the colour of the coat influences the amount of solar radiation which may be absorbed by the animal.

The colour of the coat if proved to be an important factor in heat

tolerance of cattle, might be of great practical value in breeding of cattle suitable for tropical climate. The great majority of the indigenous tropical breeds of domestic oxen are ^{Zebu} Sebus of one variety or another. They form the bulk of cattle of Asia and Africa and are characterised by a complex range of all possible colour, including white, black, grey, dun brown, red, yellow, cream, blue and their various combinations. In Africa and Asia where there are a large number of indigenous cattle and where standards of feeding and management are poor, local breeding policies have in the main tended to be the selection for productive ability of well adapted but not very productive indigenous cattle. Several workers have shown that a white, yellow or red coat with a smooth glossy texture is best for minimising the adverse effects of solar radiation and that the black coat has the highest absorptivity percentage. Selection for light colours would therefore increase the adaptability and hence the productive ability of indigenous tropical cattle. In tropical areas of Australia, Americas and the Caribbean, where there are no indigenous cattle, a large number of temperate and tropical breeds have been introduced. Breeding policies have tended to take either or both of two forms. The first is selection for adaptation of ill-adapted but highly productive temperate breeds. The second is the crossing of suitable tropical and temperate breeds followed by intense breeding and selection. Breeding policies in which adaptation is of paramount importance, selecting for light colours such as white, brown or red and their combinations might be of great value. The selection and use of White Friesians for instance, might result in a greater adaptation and productivity of the Holstein-Zebu cross breeds in the tropics.