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Assessment of Adaptability of Zebu and Crossbred Cattle to Tropical Climatic Condition

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Abstract—*There are certain significant differences between Tharparkar (zebu) and Karan Fries (crossbred) cattle in the parameters related to thermal stress. The ability of Karan Fries cattle to protect themselves from the harmful radiation of sunlight by melanisation was significantly less compared to Tharparkar and it was found to be declined with heat stress. The physiological responses are important to cope up the animals to the harsh environment. The respiration rate (RR), pulse rate (PR) rectal temperature (RT) and skin temperature is recorded higher in crossbred cattle as compared to Zebu cattle. The resistance of dermal fibroblasts to thermal stress differed between Tharparkar and Karan Fries cattle. The skins of Zebu cattle are soft, smooth and clean due to the superior skin blood circulation as compared to crossbred cattle. The hair and skin pigmentation is also one of the adaptive traits of heat tolerant animals. Less pigmentation of melanin was observed during summer compared to winter in Tharparkar cattle which help to reduce the heat absorption from solar radiation. Melanin pigmentation helps in adaptive mechanism and act as an antioxidant. Dermal fibroblasts of Tharparkar were more heat resistant than crossbred Karan Fries cows. Sweating rate is significantly higher in zebu than exotic cattle. Inducible HSPs expression, plasma cortisol level and ROS formation on exposure to heat stress were comparatively lower in indigenous than European breed. However, many other mechanisms are likely to contribute to the difference in thermotolerance between the zebu and crossbred cattle. Zebu breeds have small size, low body weight with small barrel shaped body, slender legs and Low metabolic rate which help in efficient heat dissipation and production respectively. Therefore, it may be concluded that zebu cattle have certain unique parameter from European cattle that contribute to their superior adaptability to tropical climatic condition with high solar radiation.*

Keywords*: Adaptability, Climate, Physiological, Karan Fries, Tharparkar.*