CHAPTER II

BACKGROUND INFORMATION

Hafez et al., (1955) found that the skin of buffalo had more pigmentation and less number of sweat gland than that of cattle. The similar result of less sweat gland density of buffalo was found by Nair and Benjamin (1963), and Prusty (1965). Nair and Benjamin suggested that the role of sweat glands of buffalo in thermoregulatory function was less than that of cattle. This showed that buffalo was a lower heat tolerance capacity than cattle (Prusty, 1971). Furthermore many physiological changes of buffalo might follow the effect of heat stress.

Effect of heat stress on cardiorespiratory frequency and rectal temperature

When the buffalo was exposed to sun for 30 minutes and 1 hour, there was an increase in respiratory rate, heart rate and rectal temperature (Pandey and Roy, 1969a). The similar result was also observed by Mullick (1960) in buffalo after 2 hours exposure to the sun. The cardiorespiratory rate, rectal temperature of buffalo exposed to a hot environment during summer were higher than those of buffalo under artificially cooled shed (Pandey and Roy, 1969 b). Tilakaratne and Ranawana (1982) reported the increase in cardiorespiratory rate and rectal temperature in relation to the increase in environmental temperature. The increase in rectal temperature of

buffalo under exposure to sun comparing with Shorthorns indicated buffalo to be less heat tolerance (Moran, 1973). Chikamune (1983) also reported that buffalo was more sensitive to the exposure to sunlight than the cattle. He suggested that the dark and hairless hide may be the reasons why buffaloes cannot withstand to heat exposure.

Effect of heat stress on body fluid volume and water turnover rate

Ranawana et al., (1984) studied the effects of deprivation of wallowing on water turnover of buffaloes. It appeared that the buffaloes increased their daily water turnover and that wallowing played a crucial role in their mechanisms for losing heat. This indicated that buffaloes were adversely affected by restriction of wallowing. Studying the effect of controlled ambient temperatures on total body water of water buffalo in a climatic chamber showed the increase in total body water related to the elevation in ambient temperature (Kamal and Seif, 1969). Siebert and MacFarlane (1969) found the rising in water turnover rate of the buffalo with the increasing temperature. The similar result of increasing in water turnover rate was also reported by Kamal (1982). Plasma volume of buffalo was also higher in the months when the ambient temperature was high. The haematocrit value had a tendency to decrease during heat exposure (Chaiyabutr et al., 1983). These changes in total body water, turnover rate of water, plasma volume and haematocrit values of buffaloes under heat stress of hot environment were due to the physiological changes of body in order to lose heat from the body (Garg and Nangia, 1981; Kamal and Seif, 1969 and MacFarlane, 1964).

Effect of heat stress on urinary electrolyte excretion and plasma aldosterone levels

After the experiment of stress of exercise in buffalo calves, there was a decreasing in plasma concentration of sodium and chloride (Sodhi and Singh, 1974). These same results were found by Bhutani and Nangia (1975) in the buffalo calves under stress of exercise and of water deprivation. During the 4 hours of sun exposure in buffalo, urinary excretion of sodium increased but of potassium and chloride decreased. Renal blood flow was significantly increased whereas no significant changes in GFR, indicating the buffalo's kidney played a role of conservation of both salt and water during heat exposure (Chaiyabutr et al., 1983). Cattle showed a significant reduction in plasma aldosterone level after 24 hours of heat exposure (El-Nouty et al., 1980). This finding might be related to the change of urinary sodium in heat stressed buffalo.