CHAPTER I

INTRODUCTION AND AIMS

Buffalo was recognized for thousands of years as a draught animal and is among the most productive of domestic animal. It is also a source of quality meat which, as a result of a unique conversion capacity, can be produced more cheaply than from cattle and perhaps any other animals. The buffalo as a remarkably versatile animal but it is not invariably adaptable in the physiological sense.

In comparative histological study of the skin of buffalo and cattle showing the thickness of buffalo's skin is greater than that of cattle (Hafez et al., 1955). The great thickness of skin hinders the dissipation of heat load through convection and radiation. The buffalo has a small number of hair follicle on its body when compared to those of cattle (Nair and Benjamin, 1963) and each hair follicle is accompanied by one sweat gland in both species (Hafez et al., 1955). The lower number of sweat gland of buffalo (Prusty, 1965) is correlated to the lower values of secretory volume coefficient (Hafez et al., 1955) which indicating the role of this gland is not significant camparing to the role of sweat glands of cattle (Nair and Benjamin, 1963). These cause a little evaporative cooling from the outer body surface of buffalo to occur. The pigments of buffalo's skin were darker and the degree of pigmentation were higher in buffalo than in cattle (Hafez et al., 1955). Dark pigments increase

the absorptivity of red and infrared rays raising the skin temperature. In cattle, the skin is more effective in heat regulation than in buffalo. For these reasons the buffalo will suffer discomfort when subjected to direct solar radiation or heat for any length of time.

Heat stress in domestic ruminants caused many physiological changes. Among these changes, control of water balance and electrolytes was important in the survival of animals in hot environments (Findlay, 1958 ; Collins and Weiner, 1968). It has been found in buffalo that short term of heat stress cause a tendency to decrease in haematocrit value and a change in urinary electrolyte excretion (Chaiyabutr et al., 1983). Buffalo showed the increase in total body water (Kamal and Seif, 1969), water turnover rate (MacFarlane, 1964) and a tendency to increase in plasma volume (Garg and Nangia, 1981) due to the effect of increase in environmental temperature. There are no reports whether the decrease in haematocrit value relate to the increase in plasma volume during heat stress. The 24 hour-heat stressed cattle showed a significant reduction in plasma aldosterone level (El-Nouty et al., 1980) which was associated with a slight rise in urinary sodium excretion. The investigation on the effect of aldosterone on urinary electrolyte excretion of buffalo under heat stress, especially sodium, has not been reported. There are also no reports of the change in ruminal fluid volume and its outflow rate due to the effect of heat stress.

The aims of the present investigation was to study, firstly, whether the effect of acute heat stress affect on renal electrolyte excretion, total body water, water turnover and ruminal fluid volume.

Secondly, whether the changes in electrolyte excretion levels are associated with changes in plasma aldosterone levels during acute heat stress.