CHAPTER 1

INTRODUCTION

Poultry production is one of the best available systems for the production of high biological value animal protein for human consumption and thus has emerged as a good substitute of beef and mutton production, especially in underdeveloped countries. Therefore, broiler production particularly, is playing a pivotal role in check and balance for stabilizing the prices of these commodities. However, its efficiency is constrained by environmental stresses particularly the high ambient temperature and relative humidity which have been reported to be the important variables affecting feed intake, weight gain, feed efficiency and survivability of broilers (Hurwitz *et al.*, 1980; Yahav *et al.*, 1996; Wiernusz 1998; Temim *et al.*, 2000). Thereby, leading to lower efficiency and profitability of poultry meat production in hot climates (Jovanovic *et al.*, 1995; Deeb and Cahaner, 2001).

Heat stress has also been reported to affect various physiological parameters of birds like increase in rectal temperature (Ching and Ching, 1992; Deyhim and Teeter, 1994; Salvador *et al.*, 1999) and increase in respiration rate (Arieli *et al.*, 1980; Raup and Bottje 1990; Inoue *et al.*, 1995). Decrease in packed cell volume and red blood cells (Furlan *et al.*, 1999), increase in heterophil/lymphocyte ratio and decrease in serum levels of K^+, Na^+, and Cl^- (Salvador *et al.*, 1999) have also been reported due to high ambient temperature. These changes have a direct bearing on the production efficiency of the birds and may also be life threatening to the birds.

The effect of heat stress can be appeased by the use of various cooling devices which may help in increasing the feed intake, consequently resulting into improved performance of the birds (Njoku *et al.*, 1989; Ali *et al.*, 1995). However, these cooling practices raise the cost of production. Therefore, poultry farmers have to bear all risks because they cannot afford expensive and pocket snatching cooling

practices. But in countries like Pakistan if they do so, it will be at cards because their production cost will increase and they will have to face economic losses.

Measures such as running automatic feeders more frequently or physical shaking of feeders, slow walking in the flock, continuous lighting and use of high nutrient density rations have also been used by the farmers (Wiernusz, 1998) to enhance feed intake during summer, which may increase heat production and thus mortality. Feed restriction has been reported as a measure to reduce the mortality during summer (Gonzales *et al.*, 1998a). Therefore, the objective may change from production to survival of the birds during the period of heat stress.

To alleviate the effects of heat stress, various feeding practices, like intermittent feeding or short term feed withdrawal during the hottest hours of the day have been used. Periodic feeding of broilers provides better feed efficiency than continuous feeding (Reece *et al.*, 1986). Limiting the feed or nutrients intake of young broilers is sometime considered as a means of reducing the incidence of metabolic disorders and sudden death syndrome (Shah and Peterson, 2001).

In subtropical zone area, time limit feeding during cool hours is a common practice for combating heat stress. Yousaf (1985) recommended that birds should not be fed during afternoon when there is potential for heat prostration. Feed deprivation in broilers during the hottest hours of the day in the summer months, may help to resist heat stress possibly because of much easier regulation against the expected rise in their body temperature due to discontinuation of further heat production during that critical period. As an inference of this study, time limit feeding during the hot hours of the day may reduce the chances of heat prostration in the birds. Therefore, feed withdrawal during hot hours of the day may be a choice to reduce the effect of broiling temperature during summer and to reduce the extra cost for the installation of cooling devices in the poultry houses.

Nutritional manipulations such as addition of fat, reduction of protein and addition of essential amino acids is another option to be followed to ameliorate the effect of heat stress in the fowls. Various scientists have observed that reduced

growth rate due to heat stress (Dale and Fuller, 1980) can partially be overcome by increasing the fat calories of the diet. As a result of these findings the nutritionists are boosting the energy level in poultry rations by incorporating additional fat. This practice not only increases the energy intake, but also reduces the specific dynamic effect of the diet thus helping birds to cope better with heat stress (Fuller and Rendon, 1977).

Keeping in view the above discussion, it can be envisaged that feeding management and nutritional manipulation may help in combating heat stress but a combination of these therapies may be more effective for controlling the adverse effects of high environmental temperature and relative humidity on the production performance of the birds. Therefore, a project was planned to study the effects of feeding management and nutritional manipulation, on the production performance, slaughter characteristics, haemotochemical profile, hormones, enzymes and immune responses of broilers reared in conventional poultry houses under stressful environmental conditions.

OBJECTIVES

1. Development of and automatic feeding system to carry out intermittent feeding in open sided poultry houses.
2. To investigate the impact of feed restriction methods and nutritional manipulation on production performance and carcass characteristics of commercial broilers.
3. To demonstrate haematochemical and hormonal profile of broilers raised under different feed restriction methods and nutritional manipulation regimes during summer.
4. To determine the immune response of broiler under different feeding management practices during hot and humid climatic conditions.
5. To figure out the most suitable and economical feeding management during summer in order to enhance the production performance in terms of feed efficiency.