CHAPTER I

INTRODUCTION

Approximately 90% of the poultry diets are based on the corn-soybean meal, which supplies majority of the energy and protein in the diet. Soybean meal (SBM) is an excellent source of protein and contains well-balanced amino acid profile. This makes SBM a valuable ingredient in the diets of poultry. However, it contains antinutritional factors like trypsin inhibitors, hemagglutinins, nonstarch polysaccharides (NSP) and phytate phosphorus (Marsman et al., 1997; Pack and Bedford, 1997; Zanella et al., 1999; Malathi and Devegowda, 2001). The negative effects of these trypsin inhibitors and hemagglutinins are normally eliminated by heating, although over processing can reduce the availability of protein (Araba and Dale, 1990).

The soluble fractions of NSP are known to increase the gut viscosity and decrease the digesta passage rate. This favors the colonization of anaerobic bacteria affecting the gut health and brings down the nutrient absorption in the intestine and affects indirectly the growth performance of the birds (Annison, 1991; Annison and Choct, 1991; Choct and Annison, 1992; Nagalakshmi and Devegowda, 1992). The addition of enzymes to diets rich in NSP results in a significant reduction in the intestinal viscosity and bacterial load, enhances energy and protein utilization and in turn improves the performance (Bedford, 2000a; Kocher et al., 2000; Ramesh and Devegowda, 2004).

Only limited information is available on the use of enzymes in corn-soybean meal based diets in broilers. Multi-enzyme preparations (carbohydrases) designed to act on NSP of SBM failed to induce any improvements in the growth performance of broiler chicks (Irish and Balnave, 1993). In contrast to this, Bhat (1998) and Zanella et al. (1999) showed that both nutrient digestibility and broiler performance were improved with the use of an enzyme mixture (amylase, protease and xylanase) in corn-soybean meal based diets. Marsmann et al. (1997) also reported a synergistic effect of protease and carbohydrase enzymes on body weight gain and feed conversion ratio as compared with the separate enzyme treatment and also found significantly increased crude protein and NSP digestibility.
About two third of the total phosphorus contained in the feed ingredients of plant origin occurs as phytate. Phytate phosphorus is either unavailable or poorly utilized by poultry due to insufficient quantities of endogenous phytase (Nelson, 1967). Bioavailability estimates of P in corn and SBM for pigs and poultry range from 10 to 30% (Jongbloed and Kemme, 1990). Phytic acid present in the feed ingredients binds to the minerals, proteins, lipids and starch, reducing their availability. Addition of phytase releases phosphorus from phytate molecule and improves the metabolizable energy and ileal amino acid digestibility (Sebastian et al., 1997; Ravindran et al., 1999; Sohail and Roland, 1999; Jayashree et al., 2001).

Enzyme complex used in the current study is produced by solid state fermentation technology using a non-genetically modified Aspergillus niger. The organism is known to produce range of carbohydrases and proteases in addition to phytase. Data on the effects of enzymes on the ileal and cecal microflora of broilers fed corn-soybean meal based diets are lacking.

An effort has been made in the current study to utilize both NSP and phytate phosphorus using an unique enzyme complex containing protease, amylase, cellulase, xylanase, beta-glucanase, pectinase and phytase with the following objectives:

- To study the effect of enzymes supplementation on performance and intestinal viscosity of broiler chickens.
- To evaluate the influence of enzyme addition on gut bacterial load.
- To study the effect of enzymes supplementation on toe ash content.
- To study the effect of enzyme supplementation on nutrient digestibility.

Optimization of nutritional matrix of enzyme complex for corn-soy based broiler diet.