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Studies on effect of phytase on serum enzyme activity in broiler chicks

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ABSTRACT

A total 20 one day old broilers were taken in order to assess the effect of phytase supplementation to diet. The experiment was conducted to study the effect of phytase (wheat) supplementation in chicks fed different levels of phytase on performance of serum enzyme activities. Control without phytase was used. Phytase supplementation increased serum aspartate aminotransferase (AST) activity and reduced serum alanine aminotransferase (ALT), alkaline phosphotase (ALP) activities. These results demonstrated that phytase supplementation influenced serum AST, ALT and ALP activities.

Key words : Phytase, AST, ALT, ALP

The primary constituents of diets for poultry are plant based ingredients which come primarily from the seeds of plants. Most of the stored phosphorus in plants is found in seeds mainly as a component of a molecule called phytin. Phytin phosphorus is poorly available to poultry and this availability varies both within and among the ingredients. The enzyme phytase releases phosphate groups from phytin potentially making this released phosphorus available to the animal. Phytase is the only recognized enzyme that can initiate the release of phosphate from phytin. Enzymes are proteins or protein-based substances that speed up or catalyze chemical reactions. For example, an enzyme in saliva (amylase) helps in break down of starch in the mouth. Enzymes are very unique, in that they are highly selective for substrate (substance or molecules they act upon) and for the end products they produce. Since enzymes are proteins, they are susceptible to possible denaturation or destruction by digestive enzymes or anything that can change their structure. Enzymes typically have ideal conditions (temperatures, pH, etc.) where they function more readily. As an example, plant phytases work better at 45 to 60^{0}C whereas microbial phytases work more readily at wider temperature ranges, 35 to 63^{0}C.

Phosphorus is the second most abundant mineral in the animal body, approximately 80% of which is found in bones and teeth. As with calcium, the formation and maintenance of bone are quantitatively the most important functions. The 20% of P not present in the skeletal tissues is widely distributed in the fluids and soft tissues of the body, where it serves a range of essential functions (Underwood and Suttle, 1999). Approximately two thirds of the total P in plants, which are the major constituents of poultry diets, is in the form of phytate (Punna and Roland, 1999; Viveros *et al.,* 2000) and is unavailable or poorly utilized by humans and other monogastric ani mals. This unavailability is due to the very low phytase activity found in the digestive tract (Pallauf *et al.,* 1994). Therefore, diets of monogastric animals are often supplemented with sources of inorganic P to meet the P requirements of the animal, which increases the cost of the diets and contributes to environmental pollution. Phytase also influences the serum enzyme activity (Aspartate aminotransferase (AST), Alanine aminotransferase(ALT) and Alkaline phosphatase (ALP).

MATERIALS AND METHODS

A total of 20 one day old male broiler chicks were obtained from commercial hatchery (Tirumala Breeders Pvt Ltd.).The birds were housed in brooders in an environmentally controlled room with 24 hours constant over head lighting for 3 weeks, to receive two dietary treatments. At the end of the 3 week, birds were moved from starter to grower-finisher. The experiment consisted of the treatments with controlled and experimental diet, the birds of the control group were fed with a sequence of starter (3wk), grower–finisher (3 to 6 wk). Diets in pellet form and water were provided. The weight, mortality, feed consumption were recorded daily .For determination of serum enzyme activity at 21 day of age ,blood samples were collected by cardiac puncture of bird for determination of serum enzyme activity (Aspartate aminotransferase(AST), Alanine aminotransferase (ALT) and Alkaline phosphatase(ALP).

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