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Improving non-starch polysaccharides by the use of feeds enzyme

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Abstract
The main problem with poultry farmer is the cost of feed which is given to the birds. The cost of feed is about 70% of the total cost. The bird cannot produce the enzymes that are able to digest the polysaccharides present in feeds. These polysaccharides are very rich in feed. So to avoid this feeding problem for birds, we add supplements, i.e. NSP enzymes (non-starch polysaccharides) these are the enzymes that a bird cannot produce. As we know, enzymes are biocatalysts that improve the reaction without being altered. They also increase the bird's growth, and as the decreases in the wastage of feed, the effect of the bird dropping on the environment also decreases. This overview shows us how enzymes help the environment and poultry farmers.

Keywords: NSP enzymes, poultry, feed supplements

1. Introduction
Poultry feed contains starch, proteins, fats and fibers. In these, the main ingredients of the cereals are cellulose, 1-3, 1-4-β-glucans and pentosans. Due to the ability of NSP enzymes which hydrolyze grain components, a class of feed additives containing NSP enzymes in feeds is mixed. These enzymes help the bird to hydrolyze the feed. An increase in feed conversion of birds from 0.00% to 9% was observed. Even better results are observed in pigs. Since the day the farmer used feed enzymes, it has been observed that bird growth has continued to increase. And these enzymes are compared to the probiotics available for humans. But the only difference seen here is that probiotics are living bacteria, while NSP enzymes not alive, but only proteins, but both are naturally available in nature and in function. In general, soybean meal and cornmeal are used to fed the birds. Since they are available at very low cost, the non-starch polysaccharide content in Soya is 29%, while that of Corn meal it is 9%. The effect of exogenous enzymes on SBM and CM is less comparable to that of ray and wheat based diets. Exogenous enzymes with SBM and CM are actually high in ducks compared to chickens. It has also been found that single enzymes as the cocktail of enzymes provide good results.

2. How NSP compounds effect the growth of bird
- NSP compounds of feed is not digest by the endogenous enzymes of poultry
- Feed digestibility is decreases
- As the bird cannot break down the components of the cell wall, the other beneficial and digestible components are also lost as they are taken up by the NSP components.
- The feed intake increases, the feed utilization by the birds decrease and cost increases.
- The ingested feed by the bird is not digested and the intestinal viscosity increases.
- Bile juices absorption increases.
- The growth of microbial flora of intestine is increases and altered the gut enviroment.
- The competition between microbial flora and the bird increases for the nutrition.
- The sticky dropping of indigested feed is observed as the feed is not completely utilized and it absorbs high amount of water.
- Increased rate of mixing of bile, pancreatic and intestinal secretions with digesta increases the viscosity and increase the amount of sticky dropping.
- As this feed is not completely utilized, this feed is not eliminated and as a result the passage will be blocked and food intake will decrease.
- As feed intake is high and endogenous enzymes are secreted.
- The loss of endogenous enzymes is observed.
- In birds, reduced nutrient availability and distortion of growth and feed conversion ratio are observed.
- The eggs are dirty as the viscosity of the dropping is high.
- It affects the environment with a high amount of nitrogen and phosphorus because the diet is not completely digested.

3. NSP enzymes
Exogenous enzymes capable of hydrolyzing non-starch polysaccharides present in feed given to birds. These carbohydrates can not be digested by birds because they are unable to produce enzymes, because of this reason farmers have practiced using the exogenous enzyme, or the cocktail of enzyme. This cocktail contains enzymes such as xylanase, amylase and protease. These enzymes are produced from microbial sources. The microbial sources used here are chosen in such a way that they not only produce the enzyme, but also act as probiotics for the birds.

4. The care should be taken when the microbial source is selected are

- The strain should not be a parasite and should be eco-friendly
- It should be suitable for the production in Industrial scale
- It should grow with minimal nutrition
- Should produce higher amounts of enzyme

The organisms used mainly for the production of enzymes are: The fungal source

- *Aspergillus spp.* (*A. niger*)
- *Penicillium spp*
- *Humicola spp.* (*H. insolens*)
- *Trichoderma spp.*

These are the largest groups of enzyme producing fungi. These organisms have a common thing among them: they can produce enzymes which can breakdown various substances. The degradation of plant cell wall components is mainly composed of polysaccharides.

5. The Bacterial source

- *Bacillus spp.* (α-Amylase, proteases)
- *B. licheniformis* and *B. subtilis*

These are the largest group of bacteria used as probiotics for birds and also used for the production of multiple enzymes.

5.1 Microbial enzyme advantages

- Variety of enzymes is produced by microbes.
- Due to high production capacity, there is unlimited supply of enzymes.
- By strain improvement, production capacity can be expanded.
- They can be easily manipulated in the laboratory.
- A large number of enzymes can be obtained economically from microorganisms. Only well-designed and intensive search among microbial strains can usually find a suitable organism to produce an enzyme.
- Genetic modifications can be introduced relatively easily due to the simplicity of their genomes.
- Their growth requirements are simple and precisely definable, which is of great importance in industrial production in order to maintain the consistency of product quality.
- Specific enzyme conversion is required. The only drawback is the presence of contaminating enzymes that can cause undesirable reactions. These contaminated enzymes can be removed by enzymatic purification techniques

6. Characteristics of Dietary Enzymes

- For enzyme action the temperature must be around 40°C
- Should resist low pH
- Specific site for degradation in the molecule
- Water content
- The presence of inhibitors
- Substrate concentrations

7. Enzymes and its Actions

- α-amylase: Endo-hydrolysis of α-1, 4-glucosidic linkages
- β- glucanase: Degrades β-glucan by breaking β-1,3glucosidic linkages
- Pectinase: Degrades pectin α-1,4-linked anhydrogalacuronic acid
- Xylanase: Hydrolysis of 1,4-beta-D-xylosidic

8. Characteristics of enzymes used in animal feed

- Acidic pH condition of stomach suitable for action
- Resist low pH
- Resist pepsin proteolytic action
- It should act in digestive tract

9. Role of Poultry Enzymes

- Poultry do not synthesizes enzymes for hydrolyses of these non-starch polysaccharide (NSP) present in the cell wall of the grains.
- Addition of exogenous enzymes specific for a given feed formulation will enhance the availability of feed components to the birds.
- Increase the energy by hydrolyzing the fibrous contents present in feed.
- These exogenous enzymes act endogenous enzyme supplements in conditions like more stress and at the early aged birds
- Calcium and phosphorus precipitations are prevented and absorption of them is promoted by these enzymes
- These exogenous enzymes will complement endogenous enzymes in few conditions at the early age of the birds.
- The production of endogenous enzymes may be limiting in conditions like age, health, climatic conditions etc. at times these exogenous enzymes help digestion in birds.
- Exogenous enzymes help bird to digest the NSP of cell wall.
- As the NSP components of cell wall breaks the other useful components which are entrapped are also available to the birds
- The viscosity of the bird dropping decreases
- The intake of feed and its utilization increases, intestinal flora is maintained properly
- There will be no Loss of endogenous proteins
- The starch in the cereals get unmasked as the cell wall breaks and the high amount of energy is produced to bird
- The proteins are also utilized up to maximum extent and the maximum absorption of minerals and maximum utilization of feed nutrients is observed

10. Conclusion

It has been observed that the use of poultry dietary enzymes has increased massively in the last decade. The use of these exogenous enzymes is a good practice for poultry producers as it lowers the costs of production for the farmers. Enzymes not only benefit economically but also have many social benefits. We can say that these enzymes are the best tools in the poultry sector. Although these enzymes are useful in the poultry industry, isolation of these enzymes is the main task, we need to make sure that the enzyme isolation comes from a source

that does not affect the bird and purification must be done properly. Even after the isolation and purification of these enzymes, the cocktail must be prepared; this mixture must be in right proportion. The formulation is to be done best according to the bird.

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