

Double access to starch in corn-based poultry diets

By: Inge Knap

Global Category Manager Enzymes

An innovative new addition to DSM's feed enzymes portfolio, RONOZYME® HiStarch is an α -amylase that improves the ability of poultry to digest the starch contained in corn, sorghum and wheat-based diets. It offers particular benefits to poultry producers seeking high performance in today's broilers.

Improving the digestibility of starch

Starch is the main energy source in poultry feed. However, at 85-95% for corn and sorghum and 70-97% for wheat, current starch digestibility levels leave room for improvement. Moreover, starch is harder to access in the gut when present in the form of pelleted feeds as opposed to crushed feeds.

RONOZYME® HiStarch allows faster starch degradation and energy absorption in the small intestine and therefore more energy to be generated, thus saving costs for livestock producers.

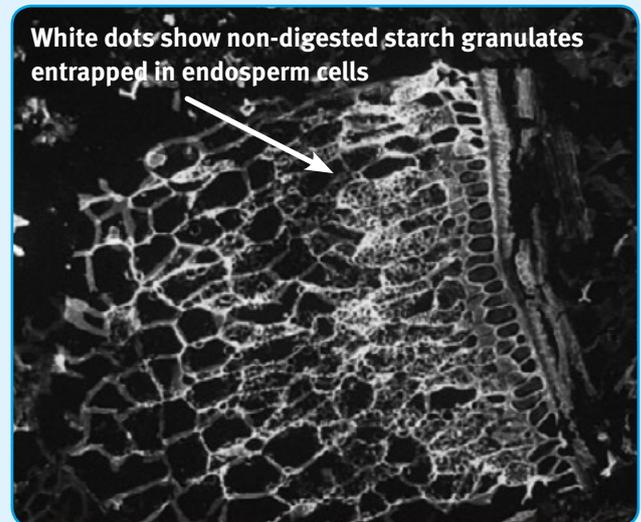
Accessing the energy in starch

Starch is the main carbohydrate in cereal grain and roots. It accounts for up to 65% of the total energy requirements of poultry.

Starch in the diet can be hard to access during the digestive process, as it is stored in the form of granules within the endosperm cells inside the grain of cereals.

Each endosperm cell is surrounded by a cell wall which is difficult to break down, meaning that a proportion of the starch granules go undigested as they are trapped within the endosperm cells (Figure 1).

Figure 1: Microscopy image of non-digested starch in broiler diet



Encapsulated starch granules remain undigested by animal – non-maximized energy uptake

Source: Peron et al., 2007, Br. Poult. Sci. 48, 370-380

Another factor that influences the bioavailability of starch is its composition. Starch is composed of amylose and amylopectin, and cereals high in amylose are harder to digest. This is because amylose molecules offer a smaller surface area for feed enzymes to engage with and they have H-bonds, making them less susceptible to attack by amylase. Also, amylose easily forms complexes with other compounds, which lowers enzyme activity in the gut.

Factors that inhibit full access to the starch content in the diet

Recent research has revealed other factors that inhibit full utilization of the available starch content. Rougiere et al. (2009) demonstrated that fast-growing broiler breeds of the modern type digest the starch in the diet less efficiently than slow-growing breeds. They therefore need more amylase in the diet.

Svihus & Hetland (2001) showed that pelleted feed is associated with lower starch digestion and higher feed intake compared with crushed feed.

Noy & Sklan (1995) found that the production of amylase in the pancreas is not clearly correlated with levels of starch digestion: comparing birds at 14 and 42 days of age, they found that starch intake increased by over 200%, while pancreatic production of amylase increased by only 95%. Sakamoto et al. (2009) ascertained that the excretion of pancreatic amylase was limited for broilers during the grower and finisher phases, during which high levels of dietary starch are required. Meanwhile Gacia et al. (2003) determined that amylase can increase starch digestion both at 7 days and at 28 days.

RONOZYME® HiStarch CT provides double effectiveness:

- Demonstrated reliable efficacy in scientific and commercial field trials. It improves feed conversion ratio (FCR) and weight gain in fast-growing broilers and releases up to 150 Kcal/kg in corn-based broiler diets, offering a return on investment (ROI) of 3:1. Dose response tests on dent corn show an optimal dosing of approximately 80-120 KNU/kg diet.
- 2 times more effective than RONOZYME® A. In tests, at the recommended dose of 133 ppm it delivered significantly better performance in broiler trials than the recommended dose of 400 ppm RONOZYME® A.
- Available in a heat-stable, dust-free CT form that can be mixed into premix or feed directly.

References available on request from DSM.