



MultiGrain™

MULTIGRAIN

Multiply the benefits

NUTRITION • HEALTH • SUSTAINABLE LIVING



DSM

BRIGHT SCIENCE. BRIGHTER LIVING.

MULTIGRAIN: Multiply the benefits

WHAT IS MULTIGRAIN?

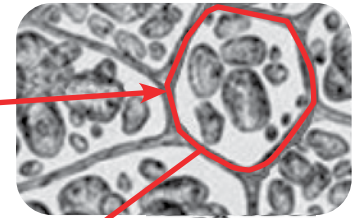
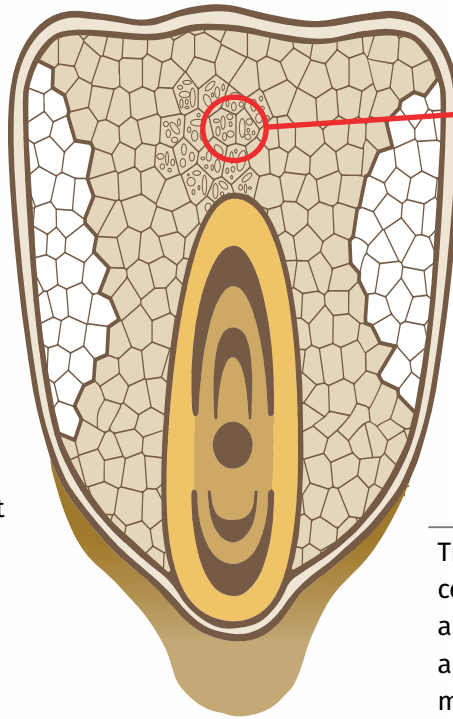
MultiGrain is an NSP (nonstarch polysaccharide) solution that combines the power of debranching enzymes with several important carbohydrases, like no other on the market.

Given the complexity of carbohydrates in the feed, more than one carbohydrase activity is required to improve the release of entrapped nutrients and reduce the viscosity.

MultiGrain is composed of a unique blend of xylanase, glucanase and cellulase enzymes that dismantle the complex carbohydrates found in corn and other ingredients.

MultiGrain also includes:

- ✓ Debranching enzymes
- ✓ Amylase
- ✓ Pectinase
- ✓ Protease
- ✓ Mannanase



Nutrients (starch and protein) entrapped by the cell walls

The main chemical components in cereal cell walls in the endosperm are cellulose and arabinoxylans. The structure of the arabinoxylan differs across cereals, and is more heavily branched in corn.

What does MultiGrain do and how does it work?

In cereal grains, the outer layer and cell wall are mainly made up of arabinoxylan, cellulose and glucans in a tightly woven matrix.

Corn contains multiple complex fibers

- In corn, the arabinoxylan is found primarily in the pericarp that covers the kernel and protects starchy endosperm
- More than 90% of the corn arabinoxylan can be substituted with various side groups such as galactose, glucuronic acid and xylose, which hinders xylanase from degrading arabinoxylan
- MultiGrain targets the multiple fibers within corn, and removes the attachments to allow xylanase to effectively produce xylooligosaccharides (XOS) and 'de-cage' nutrients
- XOS meets the classification of prebiotics, which serve as a food source for beneficial bacteria for energy production for the animal, to ultimately improve the nutritional value of cereals through the action of xylanase

What's a debranching enzyme?

Debranching enzymes assist in degrading NSPs in corn and SBM.

- Corn pericarp (the outer region of the corn kernel) is 'coated' with phenol compounds to naturally protect against molds/mycotoxins
- The phenol compounds are bound to the arabinoxylan in corn and represent branches and crosslinks
- Phenol compounds block xylanase from breaking down the arabinoxylan in corn
- Debranching enzymes remove phenol compounds to allow xylanase to more effectively degrade arabinoxylan
- Broiler performance is significantly improved when debranching enzymes are added with xylanase in feeds
- MultiGrain is uniquely equipped with a wide range of important carbohydrases and debranching enzymes

MULTIGRAIN DELIVERS:

- ✓ Reduced feed costs
- ✓ Improved energy utilization
- ✓ High retention after pelleting
- ✓ Effective in corn-based diets



MultiGrain and Metabolizable Energy with 15% DDGS or Wheat

Trial	Treatment	Kcal/lb uplift*
University of Illinois	Corn/SBM + MultiGrain	+52
University of Illinois	Corn/SBM + DDGS + MultiGrain	+39
University of Georgia	Wheat + MultiGrain	+68

*The control in all studies is the diet listed, with no MultiGrain.

Trial details

- MultiGrain tested in three different scenarios
- University of IL: chick battery trial to test Apparent Metabolizable Energy in corn/SBM and corn/SBM + 15% DDGS
- University of GA: tested MultiGrain with wheat dose in roosters for Metabolizable Energy

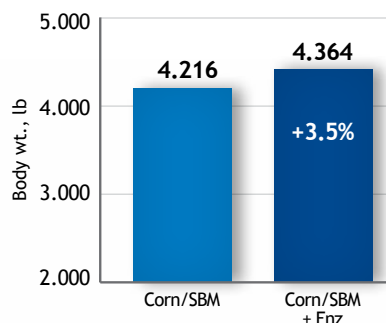
Summary

MultiGrain gave excellent results for energy uplift in diets of corn/SBM, corn/SBM + 15% DDGS, and wheat

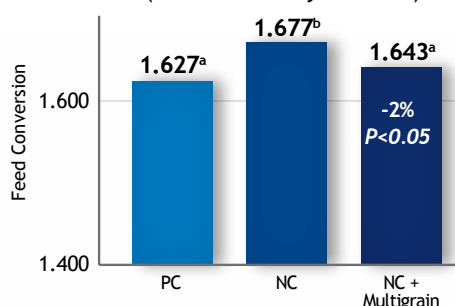


MultiGrain improves performance

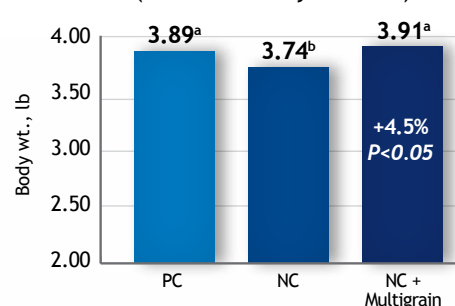
MultiGrain Increased 35-day Body Weight of Broilers (University of Maryland)



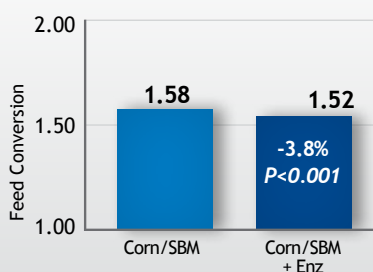
35-day Feed Conversion of Birds Fed MultiGrain (Southern Poultry Research)



35-day Body Weight of Birds Fed MultiGrain (Southern Poultry Research)



MultiGrain Improved 35-day Broiler F/G During Grower Period (University of Maryland)



Optimal product formulation

Comparative testing has shown that MultiGrain is one of the most thermostable multicomponent product on the market today

As the degree and duration of heat processing at feed mills intensifies, enzyme stability becomes a key concern. MultiGrain recovery throughout the complete feed manufacturing process is excellent. Other benefits of the formulation are its dust-free nature and flowability. Both of these advantages contribute to excellent mixability in both premixes and feed.



Recommended inclusion levels in grams/ton feed

Species	Metabolizable energy uplift kcal/lb feed	
	30 kcal	20 kcal
Broilers	90-100	55-65
Turkeys	100-110	60-70
Laying hens	72	46

- ✓ Heat-stable
- ✓ Free-flowing for accurate dosing
- ✓ High particle number for superior homogeneity
- ✓ Virtually dust-free for safe handling



**ONE OF THE MOST
THERMOSTABLE
MULTICOMPONENT
PRODUCTS**
ON THE MARKET TODAY

Learn more about the difference MultiGrain can make in your formula. Speak to your DSM representative or visit dsm.com.

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