

MANNANASE GUAR

Targeted Exogenous Enzyme for NSP in Guar Meal

MANNANASE GUAR is a TARGETED exogenous enzyme preparation specifically designed to hydrolyze the NSP **beta-galactomannan** and **cellulose** in guar meal and related ingredients, releasing and making available the trapped energy and proteins.

MANNANASE GUAR allows maximized use of nutrient dense, lower priced guar meal (up to 20% in pigs; up to 15% in poultry) and similar ingredients without the negative effects previously encountered.

MANNANASE GUAR also exhibits significant **betaglucanase** activity, digesting the other major NSP form in the meal and in other vegetable energy and protein sources

CONTENTS: **beta-galactomannanase** *, 1,100units/gm

cellulase 400 units/gm; Minimum Activity

RECOMMENDED DOSE AND USE

5 gms premix/kg of guar meal incorporation (1/2-1kg/ton of feed). For assured dispersion, mix with guar meal first before adding the other ingredients in the mixer.

*Guar gum , containing >90% betagalactomannan, is the substrate used in the lab assay of Mannanase Guar - proof of targeted, specific action



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NON-STARCH POLYSACCHARIDES (NSP)

*Impact on Feed Digestibility
and Feed Conversion*



MANNANASE GUAR

**Targeted Feed Grade Enzyme Supplement
For Maximized Guar Meal Use
in Poultry and Hog Rations**

Non-Starch Polysaccharides

Description, Digestive System Impact, Presence in Guar Meal and Related Feedstuffs



Non-Starch Polysaccharides

(NSP) are the main storage forms of sugars in the endosperm (meats) of nuts and aleurons (seeds) of some cereals. Although similar to starch in chemical formula, these polymers differ in the way the individual sugars are attached – “**beta**” linkages in NSP and “**alpha**” in starch. NSPs are **indigestible** to monogastrics like pigs and poultry, as they lack the enzymes necessary to digest the “**beta**” type of linkages.

Effect of NSP in the Digestive Tract

1. Up to 60% of the total sugars and up to 40% of total proteins of NSP containing ingredients are bound and trapped by the NSP, rendering them indigestible and unavailable to the animal
2. NSP increase the viscosity of ingesta in the gut, effectively slowing down nutrient diffusion and hindering absorption of nutrients
3. NSP possess high water absorbing capacity, significantly increasing the ingesta volume once inside the gut, restricting feed intake .

Biochemical screening of common vegetable sourced ingredients reveal significant levels of NSP – beta-galactomannans, mannans, xylans, betaglacans, celluloses, among others.

ANALYZED NSP CONTENT OF COMMON FEEDSTUFFS

Ingredient	NSP %	Beta-galactomannan as a % of NSP
Palm kernel cake	up to 60%	>35.0
Copra meal	up to 51%	>36.0
Soybean meal	22.7	16.1
Corn	11.7	4.4
Wheat	18.9	3.6
Pollard	33.7	2.0
Canola meal	23.6	24.1
Guar meal	up to 38%	>60.0

From: Chesson, Solminski, Molina, Pluske, Sikaaho-Matti; AGRIaccess data

IMPLICATION

Although the energy and proteins in NSP carrying ingredients are analyzable, the trapped nutrients are not available to the organisms, requiring downward adjustment in actual nutritive value.

GUAR MEAL AND RELATED HIGH NSP INGREDIENT

Guar meal is relatively nutrient dense (39%CP and up to 3100 kcal DE), and low priced considering its content. More than 60% of its total sugar and up to 40% of its proteins are bound in NSP, mainly in the form of **beta-galactomannan**. Guar meal also possesses high levels of cellulosic complexes. This high percentage of NSP have been traced to be responsible for the reduced productive performance encountered in high usage (>5%), due to **lower actual available nutrients, increased viscosity of feed, and ability to restrict intake - effects more pronounced in poultry with limited gut capacity.**

ENZYME ACTION SPECIFICITY

Enzymes act only on the specific substances they are designed for (lock and key principle). For example, lactase acts only on lactose, mannanase only on mannans, and betagalactomannanase only on betagalactomannans.

USE OF **MANNANASE GUAR** IN DIETS CONTAINING HIGH LEVELS OF GUAR MEAL AND RELATED INGREDIENTS

MANNANASE GUAR is a **targeted** exogenous enzyme formula designed to hydrolyze the **beta** bonds in beta-galactomannan and cellulose in guar meal into the component parts – mannose and galactose, and glucose respectively – the forms now recognizable and available to body cells. The hydrolyzing action also frees and makes available the bound proteins:

1. Makes available to the animal most of the meals' starches and proteins trapped in the NSP
2. Removes the viscosity increase, nutrient absorption reduction and intake volume restriction effects of NSP.
3. Allows maximized incorporation/usage of lower priced but nutrient dense PKC and related ingredients (up to 20%) without the negative effects previously encountered.
4. Improves digestion and feeding value of other ingredients with NSP.

Major Sources:

1. Supplementary Enzymes to Improve Utilization of Pig and Poultry Diets. Chesson, A., in Recent Advances in Animal Nutrition 1987
2. Studies on Utilization of Coconut Meal: Enzymatic Method for Fiber Free Extraction. Molina M., et. al. J. Food Sci. 38
3. Exogenous Enzymes Release Energy from Rice bran, Copra meal and Canola. Pluske, et.al.; Massey U., NZ.
4. Effect of Enzyme Supplementation of Diets Containing 20% Copra Meal On Performance of Broilers. Dingle, J. et.al.; U. of Queensland Gatton
5. Enzymatic Modification of Mannans and Cellulose Derivatives. Siika-aho Matti, et.al., VTT Biotech and Food Res.
6. NSP Analysis and Digestibility Data. AGRIaccess, 2001.