

MANNANASE PM Targeted Exogenous Enzyme for Digestion of NSP of Copra Meal

MANNANASE PM is an exogenous enzyme preparation designed to hydrolyze the main NSP **beta-galactomannan** and **cellulose** in copra meal, releasing and making available the trapped energy and proteins.

MANNANASE PM allows maximized use of nutrient dense, lower priced copra meal (>20%) without the negative effects previously encountered.

MANNANASE PM also exhibits significant **betaglucanase** side activity, digesting other major NSP forms in vegetable energy and protein sources

CONTENTS: **beta-galactomannanase , 1,000 units/gm**

Cellulase 400units/gm; Minimum activity

RECOMMENDED DOSE AND USE: 5 gms/kg of meal incorporation (1/2 - 1 kg/ton of feed); To ensure thorough mixing/even dispersion, mix first with copra meal before adding other ingredients in the mixer.



MAKING THE MOST OUT OF FEED!

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NON-STARCH POLYSACCHARIDES (NSP)

*Impact on Feed Digestibility
and Feed Conversion*



MANNANASE PM

**Targeted Feed Grade Enzyme
Supplement Powder for Copra Meal**

Non-Starch Polysaccharides

Description, Digestive System Impact, Presence in Copra meal and other Feedstuffs



Non-Starch Polysaccharides

(NSP), are the main storage forms

of sugars in the endosperm (meats) of coconuts 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. NSP 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 SOME COMMON FEEDSTUFFS

Ingredient	NSP	<i>Beta-galactomannan</i>
	% of total starch	as a % of NSP
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
Copra meal	up to 52%	>61.0
Palm kernel cake	up to 60%	>35.0
Guar gum	up to 78%	>90.0

From: Chesson, Solminski, Molina, Pluske, Sikaaho-Matti ;Agriaccess data 98-2004

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.

High NSP levels in feed invariably cause negative digestive effects , reduced growth rates and lower feed efficiency .

COPRA MEAL

Copra meal (and similar oil seed meals like palm kernel meal, guar meal, canola meal) is nutrient dense (>20%CP and up to 3200 kcal GE), and low priced considering the content. Up to 60% of the total sugar and up to 40% of the proteins are bound in NSP, mainly in the form of **beta-galactomannan**. This high percentage of NSP has been traced to be responsible for the reduced productive performance encountered in high usage, due to **lower actual available nutrients, increased viscosity of feed, and ability to restrict intake., specially in poultry.**

ENZYME ACTION SPECIFICITY

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

USE OF **MANNANASE PM** IN DIETS CONTAINING HIGH LEVELS OF COPRA MEAL

MANNANASE PM* is an exogenous enzyme designed to hydrolyze the **beta** bonds of the NSP *betagalactomannan* and *cellulose* in copra meal into the component parts – mannose and galactose, and glucose respectively – the forms now recognizable by 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' energy 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 oil seed meals (>20%) without the negative effects previously encountered.
4. Improves digestion and feeding value of other ingredients with similar 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.
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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