

MANNANASE PLT

Targeted Exogenous Enzyme for NSP in Palm Kernel Cake

MANNANASE PLT is an exogenous enzyme preparation designed to hydrolyze the NSP **beta-galactomannan and cellulose** in palm kernel cake (PKC) and related ingredients, releasing and making available the trapped energy and proteins.

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

MANNANASE PLT also exhibits significant **betag-lucanase** side activities, digesting other major NSP forms in vegetable energy and protein sources

CONTENTS: *beta-galactomannanase* , 900 units/gm
cellulase 700 units/gm; *Minimum activity*

RECOMMENDED DOSE AND USE

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



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NON-STARCH POLYSACCHARIDES (NSP)

*Impact on Feed Digestibility
and Feed Conversion*



MANNANASE PLT

**Feed Grade Enzyme Supplement Powder
For Maximized Palm Kernel Cake Use
in Poultry and Hog Rations**

Non-Starch Polysaccharides

Description, Digestive System Impact, Presence in Palm Kernel Cake 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. 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, xylans, mannans, betaglacans, celluloses, among others.

ANALYZED NSP CONTENT OF COMMON FEEDSTUFFS

Ingredient	NSP %	<i>Beta-galactomannan</i> 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 gum	up to 78%	>90.0

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.

PALM KERNEL CAKE

Palm kernel cake is relatively nutrient dense (16%CP and up to 3200 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** . PKC also possesses very high levels of cellulosic complexes. This high percentage of NSP and cellulose have been traced to be responsible for the reduced productive performance encountered in high usage (>5%), due to **reduced actual available nutrients, increased viscosity of feed, and ability to restrict intake - effects more pronounced in poultry with limited gut capacity.**

USE OF **MANNANASE PLT** IN DIETS CONTAINING HIGH NSP PALM KERNEL CAKE AND RELATED INGREDIENTS

MANNANASE PLT is a targeted exogenous enzyme formula designed hydrolyze the **beta** bonds in galactomannan and cellulose of PKC into the component parts – mannose, 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' 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:

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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. Palm Kernel Cake NSP Analysis and Digestibility Data. AGRIaccess, 2001.
7. Boateng, M. PhD. Evaluation of Palm Kernel Cake as Non- Ruminant Feed. Kwame Nkrumah University of science & Tech., Ghana. 2010