

# ALKACEL 20X

## Targeted Exogenous Enzyme for NSP in Brans

**ALKACEL 20X** is an exogenous enzyme pack designed to hydrolyze the major NSP in **rice bran, pollard and wheat**, and other related cereal by products, releasing and making available the trapped energy and proteins.

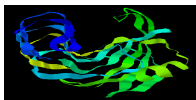
**ALKACEL 20X** allows maximized use of nutrient dense, lower priced **brans** (>20%) and similar ingredients without the negative effects previously encountered.

**ALKACEL 20X** also exhibits significant **cellulase** and **betaglucanase** side activities, digesting other major NSP forms in vegetable energy and protein sources

**CONTENTS/kg:** *Xylanase* 750,000 U, *Beta-glucanase* 40,000 U and *Cellulase* 800,000 U; **min. activity**

### RECOMMENDED DOSE AND USE:

Mix 3 gms/kg of bran incorporation (300gms to 900 gms/ton of feed) . A dose of 300 gms/ton will support full wheat incorporation.



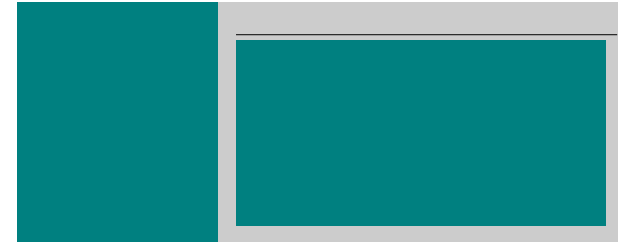
Molecular View of Xylanase Enzyme



**MAKING THE MOST OUT OF FEED!**

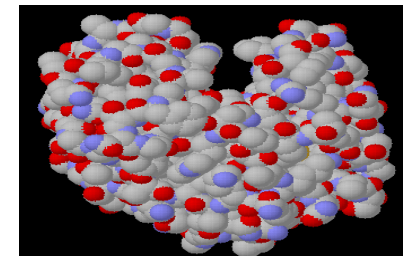
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## NON-STARCH POLYSACCHARIDES (NSP)

*Impact on Feed Digestibility  
and Feed Conversion*



**ALKACEL 20X**

**Feed Grade Enzyme Supplement  
for Maximized Rice Bran,  
Pollard and Wheat Usage**

# Non-Starch Polysaccharides

*Description, Digestive System Impact, Presence in Bran and other Feedstuffs*



Non-Starch Polysaccharides or NSP are the main storage forms of sugars in aleurons (seeds) of some cereals and the endosperm (meats) of nuts. 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 – xylans, beta-galactomannans, betaglacans, celluloses, among others.

## ANALYZED NSP CONTENT OF COMMON FEEDSTUFFS

Ingredient	ADF %	HC %
Pollard	11	25
Wheat bran	13	29.1
Rice bran	13.9	9.8
Wheat, hard red	4	9
DDGS	12.8	30.2
Soybean meal	9.4	4.0
Corn	2.8	6.8
Copra meal	25	26
Palm kernel cake	39	21

From: USNRC 98, AGRlaccess data 2001-2009

ADF = Acid Detergent Fiber cellulose+lignin HC = hemicellulose

## IMPLICATION

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

## RICE BRAN, POLLARD AND WHEAT AND RELATED HIGH NSP INGREDIENTS

BRANS are relatively nutrient dense (up to 16%CP and up to 3200 kcal DE), and low priced considering their content. More than 50% of total sugar and up to 40% of proteins are bound in NSP, identified primarily as **xy-lans,arabinoxylans, betaglacans, mannans and celluloses**.

This high percentage of NSP has been traced to be responsible for the reduced productive performance encountered in high usage (>10%), due to reduced actual available nutrients, high heat increment (HI) resulting from high energy expense in digestion and utilization, increased viscosity of feed, and ability to restrict intake.

## USE OF **ALKACEL 20X** IN DIETS CONTAINING HIGH LEVELS OF BRAN AND RELATED INGREDIENTS

**ALKACEL 20X** is a targeted exogenous enzyme blend designed to hydrolyze the **beta** bonds in BRAN NSP into the component parts – xylose, arabinose and other glucosides – the forms now recognizable and available to body cells:

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. Significantly reduces body energy expense in digestion and utilization and resulting HI
4. Allows maximized incorporation/usage of lower priced but nutrient dense BRANS and related ingredients (>20%) with the least of the negative effects previously encountered.
5. Improves digestion and feeding value of other ingredients with similar NSP.

## Major Sources:

1. Characterization of Water Extractable Non-Starch Polysaccharides and Non-Starch Polysaccharide Digesting Enzymes in Wheat. Cleemput, G. Laboratory of Food Chem., 1996
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3. Enzymatic Method for Fiber Free Extraction. Molina et.al., J. Food Sci.38
4. Exogenous Enzymes Release Energy from Rice bran, Copra meal and Canola. Pluske, et.al.; Massey U., NZ.
5. Effect of Enzyme Supplementation of Diets Containing 20% Copra Meal On Performance of Broilers. Dingle, J. et.al.; U. of Queensland Gatton
6. Enzymatic Modification of Mannans and Cellulose Derivatives. Siika-aho Matti, et.al.;VTT Biotech and Food Res.
7. Organic and Biochemistry. Seager and Slabaugh, 2nd. Ed.,1994
8. AGRlaccess Digestibility data 2001