

# ALKACEL 20X

## Targeted Exogenous Enzyme for NSP in Corn-soy Rations

**ALKACEL 20X** is an exogenous enzyme preparation designed to hydrolyze the major fibers/NSP of plant sourced ingredients in corn-soy diets, releasing and making available the trapped energy and proteins.

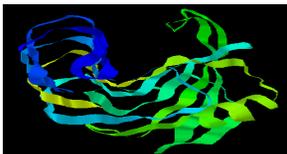
**ALKACEL 20X** allows maximized use of nutrient dense, lower priced grains, wheat, brans, DDGS and similar high NDF/fiber by product ingredients without the negative digestive effects previously encountered.

**ALKACEL 20X** exhibits pronounced, quantifiable and measurable **xylanase, cellulase and betaglucanase** activities, digesting the major NSP in corn-soy rations, directly improving FCR and feed costs.

CONTENTS/kg: **Beta-glucanase** 40,000 U, **Cellulase** 500,000 U, **Xylanase** 750,000 FX U

#### RECOMMENDED DOSE AND USE:

Use Premix at 300 to 500grams/ton of feed



Molecular View of Xylanase Enzyme



## MAKING THE MOST OUT OF FEED!

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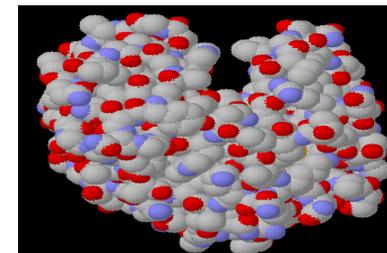
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*NUTREX*  
*Current Nutrition*  
*Technology*  
*Exponents*

## NON-STARCH POLYSACCHARIDES (NSP)

*Impact on Feed Digestibility  
and Feed Conversion*



## ALKACEL 20X

**Feed Grade Enzyme Supplement  
for Corn Soy Rations & DDGS**

# Non-Starch Polysaccharides

*Description, Digestive System Impact, Presence in Plant Sourced 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 – beta-galactomannans, xylans, betaglucans, celluloses, among others.

## ANALYZED NSP CONTENT OF COMMON PLANT ORIGIN FEEDSTUFFS

Ingredient	ADF %	HC %
Pollard	11.0	25.0
Wheat bran	13.0	29.1
Rice bran	13.9	9.8
Wheat, hard red	4.0	9.0
DDGS	12.8	30.2
Soybean meal	9.4	4.0
Corn	2.8	6.8
Copra meal	25.0	26.0
Palm kernel cake	39.0	21.0

FFrom: USNRC 98, AGRlaccess data 2006

ADF = Acid detergent fiber (cellulose+lignin) HC = Hemicelluloses

## 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.

## GRAINS, By-products AND RELATED HIGH NSP

### INGREDIENTS

All plant origin ingredients contain significant amounts of NSP, from a low of 9% (corn) to high of 60% (PKC). Brans, DDGS and related by-products are relatively nutrient dense (11-15%CP and up to 3400 kcal DE), and low priced considering their content. More than 30% of the total sugar and up to 40% of the proteins are bound in NSP, identified primarily as **xylans**, **celluloses** and **betaglucans**.

This high percentage of NSP has been traced to be responsible for the reduced productive performance encountered in high usage of by-products(>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 CORN-SOY DIETS

**ALKACEL 20X** is a targeted exogenous enzyme capable of hydrolyzing the major **beta** bonds of celluloses and hemicelluloses in plant fibers/NSP into the component parts – glucose, mannose, xylose, and other glucosides – the forms now recognizable and available to body cells:

1. Makes available to the animal most of the meals' carbohydrates 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, DDGS 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
2. Supplementary Enzymes to Improve Utilization of Pig and Poultry Diets. Chesson, A., in Recent Advances in Animal Nutrition 1987
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. Small Animal Clinical Nutrition, 5th Ed. Hand, et.al.
8. Agriaccess Digestibility Trials, 1996-2009