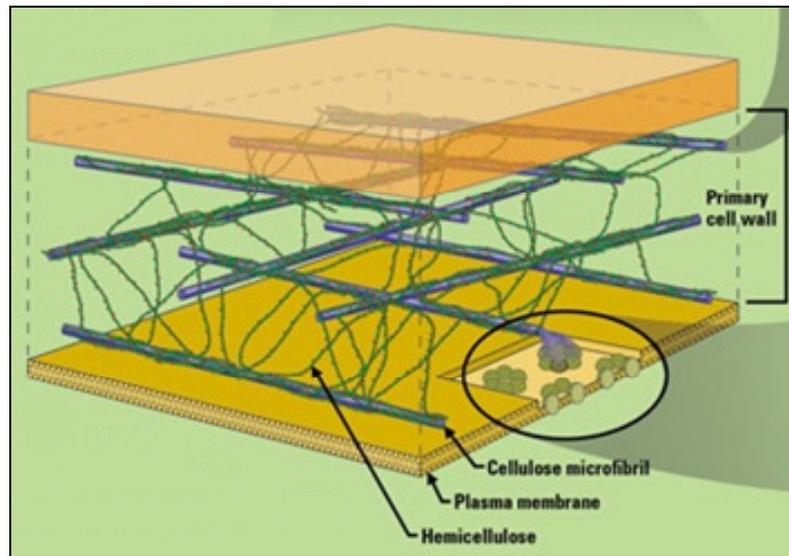


Culturing Excellence in Animal Nutrition

AO

Aspergillus Oryzae Fermentation Extract

Aspergillus Oryzae (AO) fungi produce natural enzymes that digest fibrous materials that animals cannot. Hemicellulases are a key class of enzymes from AO. They break down hemicellulose, which represents the largest fraction of fibrous cell walls. The diagram illustrates how hemicellulose is a network of sugar-based chains that crosslink to bind cellulose microfibrils and other nutrients together. Left intact, hemicellulose polymers reduce digestion because they create thick gels that encapsulate the otherwise digestible starches and proteins. Animals cannot digest hemicellulose or the nutrients trapped in it, so important feeding value escapes undigested.



Fungi naturally grow in the rumen and produce hemicellulase. One of their functions is to break down hemicellulose gels and increase the surface area of the fiber. Over time, this gives rumen bacteria more access to cellulose and other nutrients. To accelerate fiber digestion, feed formulators supplement rations with exogenous AO fermentation extract.

Feedstuffs vary in hemicellulose content

The impact of AO enzymes partly depends on the amount of hemicellulose in the diet. The higher the hemicellulose, the more viscous gels are present to interfere with digestion and the more benefit one would expect from an AO enzyme. The table below ranks common feedstuffs based on hemicellulose content. It is reasonable to expect more response to AO in rations with high hemicellulose like wheat middlings, grass hay or

Nature's Mill

cottonseed hulls than rations with corn, soy or citrus pulp.

Feedstuff	Hemicellulose
Wheat middlings	25%
Grass hay	17-22%
Cottonseed hulls	20%
Barley	14%
Legume hay	12-15%
Cottonseed meal	11%
Alfalfa meal	9%
Corn	7%
Soybean meal	4%
Citrus pulp	2%

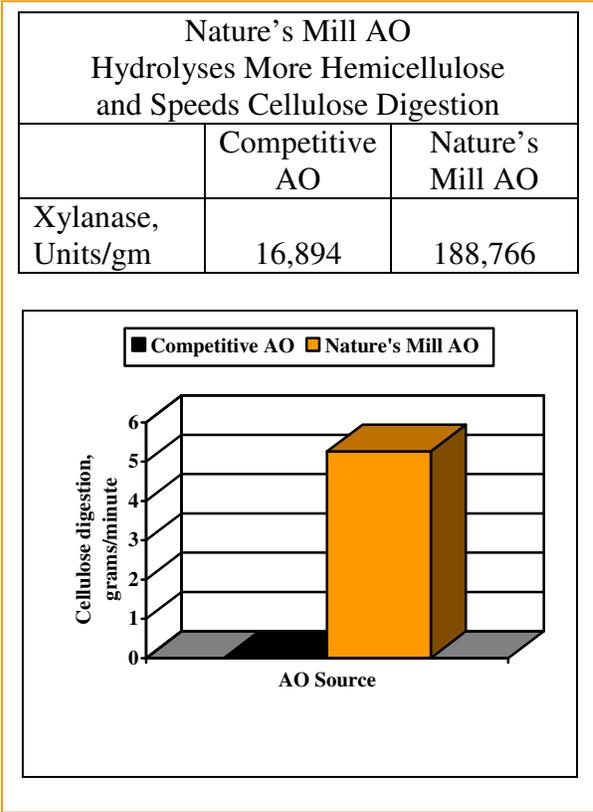
AO sources differ in purity

It is vital for the AO extract to be as rich as possible. This increases the chance of breaking up the gel quickly, reducing viscosity, increasing nutrient absorption, speeding rate of passage and thereby increasing voluntary feed intake. Different sources of AO vary in purity. If a product contains less of the broth extract, it will provide less hemicellulase enzyme. This means the rumen activity will be less than optimum, and consequently more of the gel and entrapped nutrients pass out of the rumen before being broken down.

AO products are rapidly improving with technology. Fermentation advances are allowing AO extracts to be produced with greater enzyme activity. This results in faster hemicellulose breakdown and quicker fiber digestion. These digestion improvements increase energy production, improve feed conversion and speed rate of passage to stimulate greater feed intake.

The table and graph at right show how effectively Nature’s Mill AO improves fiber digestion. Xylanase, the most abundant hemicellulase enzyme, was measured in both Nature’s Mill AO and a competitor. The richer hemicellulase activity in Nature’s Mill AO accelerated fiber digestion, as indicated by faster cellulose breakdown in grams per minute.

The microscopic photos below show differences in AO products at 45X magnification. Both start as a liquid broth of



AO fermentation. In the competitive AO, about 25% broth extract is dried on 75% wheat bran carrier. Nature's Mill AO is a richer product comprising 100% fermentation crystals with no bran carrier.

Nature's Mill AO
Fermentation crystals



Competitive AO
(25% extract dried on 75% wheat bran)



Similar potency differences can be measured by rinsing samples through a filter with water. Rinsing the competitive AO dissolves the 25% broth extract, leaving 75% bran carrier on the filter. Because Nature's Mill is pure dehydrated fermentation extract, it completely dissolves and passes through the filter.

Nature's Mill AO employs the newest fermentation technologies. Its higher hemicellulase activity helps improve the rumen microbes' access to fiber, improving nutrient digestion and increasing energy production. The net result is more feeding value from both forages and grains.