# Overview of Triticale Grain for Poultry & Swine TriMark™ Triticale Grain Program

## TriMark™ Triticale: Fulfilling the Promise

Triticale is the result of crossing wheat and rye. Naturally occurring crosses between wheat and rye have been occurring for thousands of years, but it was not until the 1960's that commercial development of the wheat-rye cross was actively pursued. Excitement about triticale's vigorous growth, wide adaptability, pest tolerance, and nutritional quality fueled unreasonable expectations about how quickly triticale would become an important grain crop. The first varieties of triticale were inadequate in terms of grain yield and agronomics. Now after decades of plant breeding, the developers of TriMark triticale varieties have succeeded in fulfilling triticale's promise as an important feed grain.

"The rapid transformation of triticale from a scientific curiosity into a viable commercial crop has been a remarkable achievement in plant breeding. The first commercial cultivars were released in 1969 and currently (1996) triticale is grown on nearly 6 million acres worldwide."

P. Bruckner
Cereal Breeder
Montana State University

## Major Differences among Triticale Varieties

Few growers would plant wheat seed without knowing the identity and characteristics of the variety. Knowing the identity and characteristics of triticale varieties is even more important because they differ even more widely than wheat. Just like wheat, triticale varieties vary over a full range of maturity types, winter hardiness, and areas of adaptation. In addition, most triticale varieties now available in the U.S. were developed specifically for production of forage and are not well suited for grain production. Even among varieties bred for grain, differences can be significant in terms of yield, bushel weight, and feed value.

## Feed Value of Triticale Grain for Poultry and Swine

- Most varieties of triticale are excellent feed grains.

"For growing-finishing swine (50 pounds to market weight) triticale can satisfactorily replace all of the corn and part of the soybean meal in the diet. When fortified with synthetic lysine and methionine, triticale can replace all the soybean meal in the diet for finishing swine (145 pounds to market weight). Also, studies have shown that triticale-

fed pigs produced carcasses that were comparable with corn-fed pigs. Thus, triticale is an excellent grain for swine feeding."

M. Terry Coffey
Director of R & D
Murphy Farms, Inc.

"Triticale may be used as a partial or sole grain source in diets for all classes of swine . . . "Furthermore, with triticale as the feed grain, compete elimination of soybean protein may be possible for finishing pigs (55 to 110 kg) with lysine and threonine supplementation."

R. O. Myer
Animal Nutritionist
University of Florida

". . . triticale (Florida 201) can be used in broiler diets and can completely replace yellow corn without any detrimental effect on growth, feed efficiency, and yield."

D.V. Maurice
Poultry Nutritionist
Clemson University

"These results confirm that the nutritive value of some cultivars of triticale (e.g. Lasko and Purdy) for chicks is similar to that of wheat, and that these varieties could be used at high inclusion rates in poultry diets; however, there are some varieties (e.g. Proteus) that have lower nutritive value."

M. P. Flores
Veterinary Faculty
Animal Production Dept., Spain

"We have confirmed triticale's potential for reducing levels of corn and soybean meal in the diets of broiler chickens, and in supporting early growth of broiler chicks."

P. Vohra
Avian Sciences
University of California, Davis

## Use of Triticale Grain for Poultry and Swine

- Can serve as the sole cereal grain in the diets of pigs, poultry, and ruminants
- With supplemental amino acids, can largely or entirely replace soybean meal

Research has shown that when used as the sole cereal grain in the diets of pigs, poultry, and ruminants, some varieties of triticale provide feed intake, feed efficiency, and rates of gain similar or superior to that of corn and the other commonly used feed grains.

Furthermore, several studies have shown that in addition to replacing corn in the diet, triticale in combination with supplemental amino acids can largely or entirely replace soybean meal and other protein supplements because most triticale contain significantly more of the most limiting amino acids than corn.

## Differences in Feed Value among Triticale Varieties

- Triticale varieties can differ significantly in chemical composition and feed performance

Although most varieties of triticale grain have been shown to be excellent feed, research has shown that some varieties may differ significantly. Metabolizable energy, amino acids, and non-starch polysaccharides can vary tremendously among varieties, and result in substantial differences in feed intake and productivity.

In some poultry feeding studies, the feed performance of some varieties of triticale has been improved by the addition of enzymes to facilitate the breakdown of non-starch polysaccharides. Although rarely an issue for modern varieties of triticale, differences also have been shown in anti-nutritional factors such as trypsin inhibitors and alkyl-resorcinols.

In some feeding studies, inclusion of some varieties of triticale at 100% of the cereal grain component reduced feed intake, feed efficiency, or rates of gain. In some studies, blends of triticale and corn or other cereals have resulted in better feed performance than either of the grains alone.

As the use of TriMark grain in commercial settings is being refined, the feeding of blends of TriMark grain with other cereal is a logical first step.

## Grain Protein and Amino Acid Profile

- Protein content of triticale grain is usually similar to that of wheat and significantly higher than corn.

- Amino acid profile of triticale grain is better than that of wheat or corn.

The protein content of triticale vary among varieties and production conditions, but typically are similar to that of wheat. Lysine and threonine constitute a higher percentage of the protein of triticale than that of wheat, however, so when both have the same amount of crude protein, the feed value of triticale protein is higher than that of wheat.

Prediction equations are available for the content of key amino acids in triticale as a function of crude protein. These equations will be further refined for TriMark Grain varieties as more data are obtained.

Prediction equations for the content of key amino acids in triticale as a function of crude protein (Degussa).

Lysine = 0.159 + 0.0209 x Crude Protein
Threonine = 0.053 + 0.0264 x Crude Protein
Methionine = 0.027 + 0.0147 x Crude Protein
(Amino acids and crude protein in % of dry matter)

## Metabolizable Energy of Triticale Grain

- Metabolizable energy of triticale grain for poultry and swine is typically equal to or slightly below that of corn.

The energy content of triticale varies among varieties and growing conditions but is typically similar to wheat, and equal to or slightly below that of corn. For swine, the metabolizable energy content of triticale has been reported to be approximately 98% of that of corn, with a range of 90 to 100% of that of corn. For poultry, the reported range has been wider. Heat treatment during extrusion and enzyme supplementa-tion may increase the metabolizable energy of some varieties for poultry. An increase of 9% was reported in one recent study.

| | Metabolizable Energy | |
|---|---|---|
| | Representative Value | Range |
| | kcal / kg dry matter | |
| Swine | 3650 | 3352 to 3724 |
| Poultry | 3465 | 3315 to 3801 |

A range of energy values been reported based on recent research.

## Carcass and Meat Quality from Triticale-based Diets

In five recent research evaluations of triticale grain as pig feed, triticale grain produced carcass and meat quality equal to or better than that with corn or barley.

In one study, triticale-fed pigs had the highest average grade index and eye muscle depth. Although not statistically significant, broiled loin chops from pigs fed triticale are

reported in another study to be notably more tender and have better scores for juiciness and cooking loss.

In a third study, carcass characteristics were marginally better with triticale than with corn; in another study, carcass, cooking, and eating characteristics of triticale-fed pigs scored better than those of corn-fed pigs, and in a fifth study triticale produced higher dressing percent, eye muscle area, and less back fat, although differences were not statistically significant in any of the three studies at the 0.05 level.

For poultry, tenderness based on shear value and sensory evaluation increased significantly with increasing dietary triticale. Meat from the triticale-fed birds had less cooking and drip losses, and better moisture retention and sensory juiciness.

## TriMark Grain for Better Crop & Animal Use of Nitrogen and Phosphorous

- Some triticale varieties of triticale are significantly more efficient than wheat or barley for uptake and use of soil nitrogen and phosphorous during crop production.

- The bioavailability of the phosphorous in triticale grain is significantly higher than that in standard corn.

- The protein content and amino acid profile of triticale grain is superior to that of corn, and can be used to significantly reduce nitrogen effluent from animal feeding.

For pigs, the bioavailability of the phosphorous in triticale grain is over three times higher than that of standard corn. For poultry chicks, it is almost twice as high.

University research in the Southeast U.S. suggests that nitrogen effluent from animal feeding operations may be reduced by 21% to 34% by feeding triticale grain and supplementary amino acid instead of a diet of corn and soybean meal. Other published research measured a 12% reduction in nitrogen excretion when triticale grain without supplementary amino acids replaced two-thirds of the corn and soybean meal even though nitrogen intake was higher with the triticale diet. Apparent nitrogen retention was increased 28% relative to the corn-soy diet.

Triticale varieties from TriMark-affiliated breeding programs are being grown commercially in the Southeast and Northwest U.S. to improve the management of nitrogen and phosphorous from dairies, swine, and other animal feeding operations.