Down on the Farm

Genetically Modified Feeds: Are They Fit to Eat?

Genetically altered varieties of some crops are revolutionizing North American agriculture. But how might they affect your Thoroughbreds?

by KAREN BRIGGS

It's the end of another long day, and you're finally taking a moment to relax on the couch and watch some television Flipping channels, you land on CNN, where the news anchor is describing an unearthly scenario—hundreds of protesters, some dressed as life-size cobs of corn, are yelling and waving placards which say "Ban the Frankenfoods!" and "Don't Mess with Mother Nature!" The demonstration, the newscast tells you, is meant to make public widespread concerns over genetically modified foods which are making their way into the food chain. And it hits you, could some of these genetically altered crops be in your horses' feed?

The simple answer is yes. Since their introduction on a commercial level in 1995, genetically modified organisms, or GMOs, have become widely incorporated in livestock feeds. It's estimated, in fact, that some 80 percent of the genetically modified corn produced in the United States is used as animal feed, and that worldwide, approximately 70 percent of GMO soybeans are used for this purpose.

Unfortunately, at the consumer level, most of us really don't know that much about GMO crops, or what their impact might be on the health of our horses. It's easy to get caught up in the alarmist hue and cry over these products, to denounce them as unnatural and insufficiently tested, to panic over the post-apocalyptic implications of altering plants at the genetic level. But is all this hysteria really warranted? Let's take a realistic look at what GMOs are (and what they're not) and see how they might affect the nutritional program for your equine athletes.

CHANGING NATURE'S DESIGN

At first glance, the notion of tinkering with a plant's genetic makeup sounds like something out of a bad, late-night sci-fi movie. But there's nothing particularly new about altering a plant's genetic code or choosing one set of traits over another. We've been doing it by the process of selective breeding, virtually since the beginning of agriculture itself.

The ancestor of the modern corn plant was a grass with only a dozen or so kernels on its seed-head; through a process of selecting and breeding the plants with the largest kernels and the longest seed-heads over many generations, we managed to create the robust, juicy cobs we're familiar with today. Similarly, the modern Thoroughbred was developed from much smaller Arabians crossed with larger, coarser British mares; the fastest, leggiest offspring were bred back to each other to emphasize those qualities and weed out the less desirable traits. Human manipulation of the phenotype (physical traits) has had a hand in the development of nearly every modern variety of commercial crop and domestic animal on the planet today. The difference is that, now that we've unraveled the mysteries of DNA, we're able to select specifically for the traits we want, rather than doing endless breeding by trial and error. Cracking the genetic code has allowed us to cut to the chase.

DNA manipulation has opened up new opportunities to transfer desirable traits from one species to another. This has also been done before—examples of successful hybrids include triticale (a nutritious crop which is a cross of wheat and rye), the "beefalo", and of course the mule. We've even combined genes from one kingdom to another. For instance, medical science has been using modified bacteria to produce human insulin for diabetics—insulin which has fewer impurities and triggers fewer immune problems than that extracted from cattle and swine pancreas tissue—since 1982. Almost a third of the new drugs introduced in recent years have come from this technology. But the knowledge of DNA sequences has made cross-breeding for certain traits far more accurate.

Splicing genes from one species to another, however, is one of the factors which lead some to accuse scientists of creating "Frankenfoods"—plants incorporating genes which would ordinarily not be found in that species. But the technique can provide significant benefits. For example, one of the first genetically modified strains of corn is a variety called Bt corn, which incorporates a protein from a common soil bacterium called Bacillus thuringiensis, making it toxic to caterpillars. The result is that the corn is resistant to attack from the larvae of the European corn borer, a major source of crop damage and reduced yields. (More on Bt corn and its impact on the horse industry in a minute.)

Most of the GMO crops now commercially available have been modified to make them easier for the grower to manage—they are resistant to a common pest, or tolerant of herbicides used to kill weeds in the field. But there are also crop varieties being developed which will have enhanced nutritional value, digestibility, drought resistance, cold-hardiness, or will provide higher yields on the same acreage.

ADDRESSING THE CONCERNS

The big questions with GMO feeds, of course, are these: is it really safe to go messing around with DNA? Are we producing foods which may have uncalculated toxic effects? Could they trigger allergic reactions? What kind of impact will they have on the environment?

As with any new frontier, there are many unknowns. One thing is certain, however: the perception that GMO foods are inadequately safety-tested is seriously undeserved. In fact, testing of these products is exhaustive and thorough. And it takes big bucks. Gord Surgeoner Ph.D, president of Ontario Agrifoods Technologies and a professor of Plant Agriculture at the University of Guelph, says, "Each GMO crop which is now commercially available has to have been approved by the Food and Drug Administration in the United States, or the Canadian Food Inspection Agency in Canada. It costs, on average, between $10 and $20 million for each variety, so companies only take that step when they feel they have a safe and beneficial product. The process takes about 10 years (from concept to commercial availability)—it's a major commitment."

When a GMO product is submitted for FDA approval, the agency demands a wide range of test results. "They look at the proteins created (by the genetic alteration), compare it to known allergens, do skin testing for allergic reactions, see how long the proteins last in the gut of an animal, and do nutritional studies on animals with a short reproductive turnaround, like mice or chickens," says Surgeoner. "They also examine the environmental impact of the crop—how long it takes for the proteins to break down in the soil, for example, and how it might affect beneficial insects."

Marnie Webb, consumer response representative for the Food Biotechnology Communications Network in Guelph, Ontario, agrees that "it's a common misconception that these products are not tested," and adds that "the monitoring continues after the crop is approved."

There are some questions still to be addressed. Allergic responses are a real concern, and each GMO must be examined individually for its allergic potential. Another problem is that some crops which pollinate by air or by insects may distribute their genetically modified pollen to non-GMO fields—essentially letting the genie out of the bottle. Researchers are still working to establish recommendations for 'buffer zones', and control techniques between GMO fields and unaltered varieties.

On the whole, though, GMO crops have become a tightly-controlled, well-regulated industry, with a high concern for safety. Why, then, all the paranoia? Surgeoner says, "I think much of the hysteria has little to do with safety, and everything to do with anti-globalization and a backlash against large research corporations. Any time something new is introduced there's bound to be consternation. I remember when we all got hysterical over microwave ovens."

In addition, he says, it's often hard for consumers to see the plus-side of GMO crops, because the immediate beneficiary is the grower. Most of the GMOs available at the moment are tailored for herbicide tolerance and/or insect resistance, not for properties which are easily apparent to the horse-owner or supermarket shopper. Consumers may not stop to consider that an insect-resistant crop variety doesn't need to be sprayed with pesticides, so it may arrive at the feed mill having been exposed to far fewer toxic chemicals.

In the case of Bt corn, insect resistance has another important benefit; corn which has been attacked by European corn borers becomes vulnerable to fungus and mold infestations, which can be fatal to horses. Because Bt corn isn't compromised by the corn borer, it has a much lower incidence of fungus and mold—and that could mean fewer equine deaths due to moldy corn poisoning.

NOW AND IN THE FUTURE. . .

According to Webb, there are several GMO varieties of corn which are now being widely grown across North America and may find their way into horse feeds. Soybean is another crop on which the biotechnology industry has focused; generally, GMO varieties are designed to be herbicide-tolerant or provide higher digestibility of proteins. (Soybean is used in horse feeds only in small quantities, as a protein supplement for broodmares and young growing stock.)

Continued on page 70

DOWN ON THE FARM Cont.

Two other crops have GMO varieties and may occasionally be found in horse feeds are flax (a.k.a. linseed) and cotton, both of which serve as protein supplements in the form of linseed meal and cottonseed meal. There is also a new GMO variety of sugar beets which was approved in November, 2000 but is not yet being commercially grown; it may eventually make up part of the beet pulp found in some high-fiber grain mixes.

Other grains commonly fed to horses, such as oats and barley, have not yet been the focus of much interest from the GMO industry, because they're grown in such small amounts (compared to corn, soybeans, and wheat) that GMO varieties would most likely not be commercially viable.

Pasture crops may also be genetically modified in the future. GMO varieties of alfalfa are currently in development, according to David Gauthier, Ph.D, MBA, of Foragen Technologies Management Inc. "There's quite a bit of work being done on alfalfa right now," he says, "with respect to altering its sugar and carbohydrate levels, and making it more productive."

The bottom line for most of us, however, is still whether these products are truly safe for our horses. Surgeoner is confident that they are. "These products have been available for over five years now, and I have never seen or heard of a single animal or human incident that could be related to them," he says.

Jimmy Clark Ph.D., a professor of ruminant nutrition at the University of Illinois, concurs. He recently did a literature review on GMO safety in livestock species world-wide. Upon cross-referencing 23 different experimental studies, conducted over the past four years at universities throughout the United States, Germany and France, on chickens, sheep, and cattle being fed genetically modified corn or soybeans, he found that, in every case, there was no significant difference in the animals' ability to digest the GMO crops. There was also no significant difference in the weight gain, milk production, milk composition or overall health of the animals when compared to animals fed non-GMO crops. Clark says, "We tried to go over all the studies we could find on the nutritional impact of GMOs on livestock and found that in terms of digestibility and nutrient content, there was no detrimental effect at all."

While reassuring, this data does have one snag: none of the tests were done on horses. But Clark feels relatively confident that we can expect similar results in equines. "I can't say that absolutely, of course, but normally you'd expect there to be no difference," he says.

In the end, you have to make up your own mind about GMOs. Unfortunately, there's no way to tell whether these crops have been incorporated into the sweetfeed, pellets or extruded feeds you buy, because government regulations don't currently require them to be labeled separately. It's best to assume they're in there and that this will become more and more likely through the coming years. If you choose not to feed your horses GMO products, however, you can still do so by choosing straight oats or barley rather than a commercially mixed ration with corn and/or soy in it.