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 From Dairy and Animal Science at Penn State

BIOTECHNOLOGY IN THE BARNYARD

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During the next 40 years, the amount of food needed for the growing world population will approximate that produced in all the years since the beginning of humankind.

To meet these needs, animal and plant scientists are developing new biotechnologies that promise to increase productivity, enhance productive efficiency (unit of food produced/unit of resource input), and alter food composition to produce more nutritious and higher-quality foods.

The issue of food composition is particularly important to the meat animal industry because of the

need to reduce the fat content of both fresh and processed meat products by means that are more cost-effective and efficient than the current practice of simply trimming off the excess fat. Based on current expectations, many of these biotechnologies will be integrated into food production and food processing systems between now and the end of the century. As a result, it will be important that producers and consumers understand the benefits and safety of these approaches. In this article I will briefly discuss two biotechnologies that shortly will be used in animal agriculture.

First, What Is Biotechnology?

Although biotechnology has been touted as a recent development, it has been used for thousands of years to make bread and fermented foods and beverages.



Terry D. Etherton

Biotechnology is simply the use of biology to make a product or develop a process that is of value to society.

Today, biotechnology is not only being used in the food production and processing industries, but also to develop new and improved human and veterinary health care products, to increase mineral and oil recovery, to produce fuels that will be an alternative to petroleum-derived fuels, and for novel approaches to degrading toxic and solid waste materials.

Somatotropins
 As for animal agriculture, two of the first biotechnologies that shortly will receive regulatory approval from the Food and Drug Administration (FDA) for use in dairy and pork production are bovine somatotropin (BST) and porcine somatotropin (PST). Somatotropin or growth hormone is a naturally occurring protein hormone made in the pituitary gland of all mammals. It is the master hormone that regulates growth of humans and animals. When administered to dairy cows, BST increases milk production 15 percent to 20 percent and enhances feed efficiency by about 10 percent.

Studies we have conducted in the Department of Dairy and Animal Science have shown that when PST is administered to growing pigs, growth rate increases by 10 percent to 20 percent, and carcass fat is reduced — sometimes by as much as 70 percent. This change in growth rate is accompanied by a marked increase in muscle growth (up to 50 percent) and feed efficiency (by 15 percent to 35 percent). These technologies may also help reduce environmental pollution, since using less feed means using less fertilizer and other inputs associated with growing, harvesting, processing, and storing animal feed.

widespread public misunderstanding concerning their benefits and safety.

It is difficult for many consumers to accurately evaluate the products of biotechnology because they may not have a scientific background. As a result, they are sometimes misled by campaigns conducted by opponents of biotechnology who often falsely condemn these technologies.

The fact that these technologies involve food plays into another issue of great importance to consumers — food safety.

Public discussion between proponents and opponents of biotechnology has been controversial and typically has involved scientists responding to misinformation disseminated by groups which, for various reasons, oppose the use of biotechnology. While the motivation of these groups for opposing biotechnology is not always apparent, it is clear that many of their claims are designed to frighten the consumer rather than address the scientific facts as we know them.

From a scientific viewpoint, the emerging agricultural biotechnologies are effective and safe. Nonetheless, it is the attitudes and beliefs of the consumer that will determine whether society will benefit from using them.

In this environment, it is important that institutions of agricultural science across the United States inform the public about the benefits of agricultural biotechnology. One challenge is to develop effective programs that educate the

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