

May 18, 2004

Professor Dale Sullivan
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Dear Professor Sullivan:

Enclosed is the final report concerning a transgenic product, specifically recombinant bovine growth hormone for the web-based section of *English 320 – Practical Writing* at North Dakota State University.

The report is an overview of the major downfalls of the use of this product. The intention is to inform the reader of these dangers and persuade them to become an opponent of the products use.

If any further information is needed, please contact me at the address below.

Sincerely,

Kari LaFrance
North Dakota State University

Enclosure

RECOMBINANT BOVINE GROWTH HORMONE

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English 320 Practical Writing – Web Based

May 18, 2004

ABSTRACT

This report looks into the major issues concerning the safety of recombinant bovine growth hormone, a transgenic substance injected into dairy cattle to increase milk production, in hopes to persuade the reader to realize the dangers of the substance and take action against its use. The major issues that this report focuses on are the flawed approval of rBGH by the United States Food and Drug Administration, the dangers it poses on cattle health and human health, antibiotic contamination in the milk, increased production costs, and ethical issues.

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INTRODUCTION TO RBGH

On November 5, 1993, the United States Food and Drug Administration approved the use of recombinant bovine growth hormone, as produced by the Monsanto Company as the drug Posilac. According to the FDA, the hormone (referred to as rBGH) is “a protein hormone produced in the pituitary gland of animals including humans and is essential for normal growth, development, and health maintenance.” It was discovered in the 1930’s that injecting dairy cattle with this hormone caused increased milk production (United States Food and Drug Administration, 2004). The increase in milk production is an average of 8 to 12 pounds per day per cow. Today, over a quarter of United States milk cows are in herds that are supplemented with Posilac and the average dairy producer using the drug supplements over half of the herd at any one time (Monsanto Company, 2003).

While rBGH may increase the milk produced by dairy cattle, the negative aspects of using this drug, including dangers to both cattle and human health, far outweigh the benefits. The major downfalls of rBGH are increased health problems in dairy cattle, potential health problems in humans consuming the milk, antibiotic contamination in the milk, increased costs in dairy production due to higher veterinary bills and higher culling rates, and purely ethical issues such as the quality of life of cattle injected with rBGH.

HOW RBGH IS CREATED

rBGH is a transgenic product. The Monsanto Company (well known for their production of RoundUp Ready Soybeans) creates Posilac through recombinant technology. The area of DNA from a cow which controls the production of bovine

growth hormone is combined with a plasmid vector from E. Coli bacteria. This is then allowed to reproduce, creating large amounts of the hormone.

HOW RBGH WORKS

rBGH works through a series of different biological processes in cattle. While rBGH isn't directly responsible for increased milk production, it causes the release of "an unnaturally large amount of a second powerful growth hormone – IGF-1 (short for insulin-like growth factor-1). It is this second hormone, IGF-1, which directly stimulates milk production" (Vermont Public Interest Group, 2002). This hormone also increases blood flow through the mammary gland, increases the number of mammary cells, increases the ability of existing cells to synthesize milk, decreases the ability of the body to synthesize fat therefore making free fatty acids available for milk production, and conserves nitrogen allowing more amino acids to be available for milk production and lowering the levels of urea nitrogen (Monsanto Company, 2003).

FLAWED APPROVAL

The process through which the United States Food and Drug Administration approved the use of rBGH has been greatly questioned. One reason for this is the connection between officials on the FDA Board of Approval and the Monsanto Company. One official who approved rBGH was Michael Taylor. Before Taylor was employed by the FDA, he was employed by a law firm. This law firm was the same that was employed by Monsanto to present the case of rBGH to the FDA. Taylor is now employed by Monsanto once again (Vermont Public Interest Research Group, 2002).

A similar situation was present with the FDA employee Margaret Miller. Miller “initially signed off on the human safety issue and was involved in virtually every major decision about rBGH.” Miller was also a former employee of Monsanto (Vermont Public Interest Research Group, 2002).

The approval of rBGH in the United States can also be analyzed by comparing it with the laws of other countries. The United States is the only industrialized country in the world in which rBGH is not banned (Green, 2002). In November, 1999, the European Commission banned the use of rBGH in Europe. Canada has also banned its use (Bedford, 2000). The only countries in the world where rBGH is approved are the United States, Mexico, and South Africa.

HEALTH ISSUES IN DAIRY CATTLE

According to the Vermont Public Interest Group, as well as several other studies, the most common side effect in dairy cattle injected with rBGH is mastitis (2002). Mastitis is an inflammation of the udder of a cow and is viewed by dairy producers as the most expensive and damaging health problem in dairy cattle. The risk of mastitis is 25 percent greater with the use of rBGH with cases being more severe and long-lasting. Besides mastitis, cattle have an “18 percent increased risk of infertility and an 18 percent increased risk of lameness”, both of which are major financial issues in the dairy industry (Vermont Public Interest Group, 2002). The Monsanto Company itself lists mastitis as a major issue as well as the increased risk of 20 negative side effects including cystic ovaries, uterine disorders, and digestive disorders (Monsanto Company, 2003).

HEALTH ISSUES IN HUMANS

Dairy cattle are not alone in showing negative side effects due to rBGH. “The average person living in the United States consumes over 600 pounds of dairy products every year” (Green, 2002). Because of this, it would be ignorant to overlook the possible health problems in humans consuming milk that has been produced by cows injected with rBGH.

Monsanto claims many times that rBGH is not responsible for health problems in humans (Monsanto, 2003). This may be true, as it is not directly the cause, but it is, however, the cause for increased amounts of IGF-1, as mentioned above. It is this hormone that causes the problems. Human IGF-1 and bovine IGF-1 are chemically the same, allowing the bovine hormone to be biologically active in humans (Vermont Public Interest Group, 2002). Human IGF-1 is naturally broken down in the stomach; however casein, the major protein in milk, prevents this from occurring (Montague, 1998). This can lead to many problems.

In 1990, a study was conducted by Monsanto scientists that showed the connected between rBGH and the development of prostate and thyroid cancer in rats. The results of this study were submitted to the FDA and the product was still approved. It has since been proven that IGF-1 is indeed a cancer promoted present in the human body. It is not generally a problem, as it is present in small amounts. However, when biologically active bovine IGF-1 is ingested by humans in greater amounts, it becomes a more active, and more dangerous, substance.

In the last 50 years, the time span in which rBGH has been used, the “incidence of breast cancer in U.S. women was one in 20, a percentage that has grown to one in eight

women” (Green, 2002). Both a low-calorie diet and low birth weights can protect against breast cancer, but both a low-calorie diet and low birth weight also decrease the amounts of IGF-1 in the blood. A study was conducted showing a seven time increased risk of breast cancer in pre-menopausal woman with high levels of IGF-1 in their blood and a four time increase of prostate cancer in men with high levels of IGF-1 in their blood. There is even a program being researched in which levels of IGF-1 in the blood will be used as a means to detect individuals at higher risk of cancer (Montague, 1998).

Though it is still a speculation, rBGH may also be the cause of the decreasing average age of girls in the United States showing first signs of puberty and menstruation (Green, 2002). Children are also at risk for abnormal development “because their bodies, especially their reproductive and immune systems, are still developing, premature growth stimulation is a real concern with sustained intakes of high levels of IGF-1” (Vermont Public Interest Research Group, 2002).

ANTIBIOTICS

The health dangers in dairy cattle caused by rBGH can in itself cause another serious health problem in humans consuming their milk. With a higher incidence of infection, such as mastitis, in cows injected with rBGH, there is an increased demand for the use of antibiotics. These antibiotics can then be found in the milk produced. Many people are allergic to antibiotics and so may find themselves in dangerous situations, having allergic reactions to the milk they are consuming. There is danger, also, for those who are not allergic to antibiotics. Antibiotic resistance in bacteria is a growing concern in the United States today; causing common antibiotic medicines to become useless as

bacteria becomes immune to them. For humans to steadily consume small amounts of antibiotics, such as those present in the milk of cows given antibiotics, the resistance bacteria has will grow (Vermont Public Interest Research Group, 2002).

Another concern with antibiotic use in rBGH injected cows is not health related, but a legal issue. The FDA has “approved 30 antibiotics for use on cows, but the U.S. General Accounting Office reported 50 illegal antibiotics are commonly used.” There is no regulation of bovine antibiotics by prescription. They are often found at farm supply stores. With such loose control and so many illegal varieties found, the increased need will force many farmers to pursue the less expensive, less refined, and therefore less safe, illegal antibiotics (Vermont Public Interest Research Group, 2002).

INCREASED PRODUCTION COSTS

The use of rBGH can increase milk production. As stated earlier, the Monsanto Company reports that users of Posilac found an increase of 8 to 12 pounds of milk per day per cow (Monsanto Company, 2003). This may seem beneficial as more milk will be produced by each cow, therefore either the number of cows necessary to get the same amount of milk will be less and feed costs will be less, or more milk will be produced by the same number of cows increasing profits. However, this is not a complete analysis. It is commonly thought among dairy producers that the most economically valuable trait in cattle is reproductive soundness. With rBGH, reproductive ability is at great risk. Also, mastitis is increased along with other health problems, creating greater veterinary costs and pharmaceutical costs. Finally, as mastitis and other health problems render a great

portion of cattle ineffectual, culling rates (the number of cows removed from the herd) are higher causing high replacement costs.

As the issues and dangers surrounding the use of rBGH in dairy production surface and become public, there is a great possibility that the consumers will rebuff purchasing milk from these cows. Jeremy Foltz, an assistant professor of agricultural and applied economics at the University of Wisconsin-Madison, along with Tirtha Dhar, a research associate with the Food System Research Group, did a study on the consumer buying habits over five years. Looking at milk purchases in 12 key metropolitan areas, they found that “consumers pay up to \$1.50 per gallon more for milk labeled rBGH-free and \$3.00 per gallon more for milk labeled organic” (Roseboro, 2003).

ETHICAL ISSUES

Beyond health and financial aspects of the use of rBGH, dairy producers and dairy consumers must take in to mind ethical issues. It is not a far-fetched thought that the quality of life of cows injected with rBGH decreases. On top of the aforementioned health problems, rBGH “can extend lactation periods for up to three times their normal length”, with the record being 1,374 days of milk production. This doubles the metabolic stress on the cow, draining the cow of necessary nutrients such as calcium and phosphorus. With these health related and nutritional problems, the cows are subjected to painful and debilitating situations, often showing signs of great stress, listlessness, and depressed character traits (Bedford, 2000).

CONCLUSION

The use of recombinant bovine growth hormone is not an issue that only affects dairy producers. Any person consuming milk, milk products, or antibiotic medications is affected by the use of this hormone. While it does increase the amount of milk an individual cow can produce, the negative consequences to the health of both the cattle injected with rBGH and the humans drinking this milk, the antibiotic contamination of the milk, the increased production costs, and the ethical issues behind this practice make the use of rBGH unhealthy, impractical, and immoral. The United States can join all other industrialized nations in the world in the wise decision of banning the use of rBGH if consumers take action supporting milk that is not produced with transgenic hormones and speaking out against this dangerous substance.

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