Food cloning – ethical considerations for business organizations

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ABSTRACT

It is apparent that more and more cloned food, meat, and milk products will continue to enter the U.S. food supply and most local markets, some with public and consumer knowledge, but most without. While the mind conjures varied images involving cloning, society and science have conflicting views of what is acceptable and what is not acceptable in the corporate power struggle to move science and cloning forward. Consumers may have skewed views derived from science fiction movies about cloned animals and crops, or just have uncomfortable and mixed feelings about food they think should be "naturally made" are now "man-made". From many past and recent studies, the FDA continues to stand behind their findings that the food supply from cloning methods are as safe as food produced and derived from normal methods, and will not require special labeling when being sold in the market place. Society is struggling with the issues of how much is really known about cloning, how much society really wants to know about cloning and what is there to know about cloning if there was full disclosure. In today's society the corporate world has full control over cloning, the disclosure of what is cloned, how the food supply is cloned and where all the cloned beings exist. Inevitably, final decisions are up to the consumer as to determine if it is time to eat cloned meat and drink cloned milk? ("Time to eat cloned meat and drink cloned milk?", 2007)

Key Words: Food cloning, business ethics, normative (consequentialist) ethical theory

INTRODUCTION

The term cloning brings many ideas to mind. For most of the population images from horror or science fiction movies prevail over sterile laboratory environments. The reality seems to be a mixture of these two ideas. Yes, the unimaginable is now possible and it occurs in a sterile laboratory environment. While the mind conjures varied images involving cloning, society and science have conflicting views of what is acceptable and what is not acceptable in the corporate power struggle to move science and cloning forward.

Society is struggling with the issues of how much is really known about cloning, how much society really wants to know about cloning and what is there to know about cloning if there was full disclosure. The majority of the cloning research is performed by corporations interested in keeping their stakeholders happy for a very long time. In order for the corporation to do this, they must keep all their research proprietary. This poses problems when society wants information and answers. In reality full disclosure of cloning does not exist in today's society. There are also no regulations in place to track what is cloned and what is not cloned. This makes pointing an accusing finger at cloned food products for major outbreaks of sickness or diseases nearly impossible. In today's society the corporate world has full control over cloning, the disclosure of what is cloned, how the food supply is cloned and where all the cloned beings exist.

PURPOSE/ SYSTEMATIC DILEMMA

Cloning methods used in food supply production are quickly increasing in the United States. Unfortunately, corporations utilizing these methods have little government regulation resulting in corporate free range. Cloned food is entering the food chain and food supply with limited testing to determine possible hazards and risks, and with little to no knowledge on the part of the consumers.

Background

The Yang et al. (2007) Risk Assessment of meat and milk from cloned animals discussed the history and commercialization of cloned cattle that had been occurring for over 20 years. It exposed the fact that approximately 1,200-1500 cows and bulls produced by specific cloning methods and used for meat and dairy food consumption, were introduced into the food supply without regulations, inspections, or public knowledge. The offspring from these cloned animals also continued to be introduced into the food chain without regulations and awareness. Obviously, this has raised concerns with the government agencies that create laws and regulations and perform inspections to ensure the safety of the food supply. Also, due to new cloning methods, and cases such as Dolly the Sheep, public knowledge, interest, and anxiety over cloning are quickly becoming a great concern. (Yang et al., 2007)

DEFINITIONS

AI - Artificial Insemination. (Yang et al., 2007)

ARTs - Assisted Reproductive Technologies -The use of medical techniques, artificial insemination, embryo transfer, in vitro fertilization, and embryo splitting to enhance fertility.

ARTs are referred to as the common/traditional forms of reproduction, outside of natural breeding. (Rudenko et al., 2007)

Cloning -The transfer of genes from an adult cell to create an identical copy by inserting the adult nucleus into an egg from which the nucleus has been removed, stimulating embryogenesis, and implanting the embryo into the uterus of a surrogate mother. Reproductive cloning of sheep, mice, goats, cows, pigs, and mules has been widely accomplished. (Rudenko et al., 2007)

CVM - Center for Veterinary Medicine - A U.S. government agency within the FDA that regulates the manufacture and distribution of food additives and drugs that will be given to animals. These include animals for human consumption, as well as food additives and drugs for pet animals. (Rudenko et al., 2007)

ECNT - Embryonic Cell Nuclear Transfer - A method of nuclear transfer cloning that uses cells from early embryos as the donor source, splits them, and then transplants them into multiple unfertilized female egg cells for the purpose of superior and desired traits. (Yang et al., 2007)

Embryogenesis - Developing of offspring. (Rudenko et al., 2007)

EPA – The Environmental Protection Agency is a government agency that aides in the regulation of genetically modified foods. (Savino, 2002)

FDA - Food and Drug Administration – A U.S. government agency that enforces laws on manufacturing, testing, and use of drugs, and must approve drugs for market before they are made available to the public. (Rudenko, Matheson, & Sundolf, 2007)

GE-free - Genetically engineered-free. (Weissman, 2000)

GM - Genetic Modification of food. (Frewer, Miles, & Marsh, 2002)

GMA – The Grocery Manufacturers Association who works with government officials and agencies to ensure all laws and regulation on food production and marketing are practical and based on solid, truthful information. (Weissman, 2000)

LMOs - Genetically modified (GM) living organisms. (Sand, 2006)

Progeny - Offspring or descendant.

rDNA –A technological advance, recombinant deoxyriboncucleic acid, which can change genetic composition by mixing genes on the cellular and molecular level to create new breeds of plants for food consumption. (Savino, 2002)

SCNT - Somatic Cell Nuclear Transfer - Also known as Reproductive cloning, and is the creation of an animal that is an exact duplicate copy of the DNA of its donor. The DNA from the nucleus of a donor adult cell is transferred to an egg cell that has had its own nucleus extracted. This type of cloning was used to create Dolly the sheep. (Rudenko et al., 2007)

USDA - The U.S. Department of Agriculture is a government agency that aides in the regulation of genetically modified foods. (Savino, 2002)

ETHICAL ISSUES IN THE BUSINESS ENVIRONMENT:

Information Limitations, Safety & Risks

The Runkenko et al. (2007) Animal Cloning and the FDA commentary discussed a risk assessment conducted by the Food and Drug Administration (FDA) to determine the safety of dairy and meat products of animals created by somatic cell nuclear transfer (SCNT). The study concentrated on food composition of the meat and milk produced from the cloned animals and also the health hazards and risks of the clones and their descendants. The assessment was suggested by the Center for Veterinary Medicine (CVM) due to the increase of cloning practices by food companies, as well as the limited public knowledge and information of the practice. The CVM asked that the food companies that utilize cloning to withhold clones, their offspring, and their products from the food supply, while the assessment and risks were being conducted and analyzed. (Rudenko et al., 2007)

The FDA considered all cloning methods to fall into the overall category of assisted reproductive technologies (ART) which includes the commonly utilized artificial insemination, in vitro, as well as embryo transfer and splitting (ECNT) and SCNT. Therefore, the FDA inspected and regulated the food for consumption from all these cloning methods in the same way. Although ARTs and ECNT had been in practice since the 1980s, the new SCNT could produce unlimited duplicates of adult animals with the desired and tweaked performance and traits. For this reason, the CVM and FDA reconsidered their inspection methods to include a much closer and detailed look at the SCNT cloned animals and their food products. Since SCNT clones were no longer a normal part of the food chain, this could introduce possible risks and hazards that would be very slight in nature, and could possibly pass through the normal inspection processes. (Rudenko et al., 2007)

The first hypothesis from the risk assessment was simply that a healthy animal will produce safe food products. The second hypothesis stemmed from the first and stated that healthy cloned animals would also produce safe food products, and that these food products did not differ from the food products of traditional animals. The composition and key nutritional components of the cloned food products were materially the same. (Rudenko et al., 2007)

For the results of beef livestock, the risk assessment found that there was, in fact, health risks involved in SCNT cloning of animals, but that these risks were also the same risks found in other methods of ARTs and ENCT, as well as natural breeding. The food products of meat and milk derived from the SCNT clones had no major changes and had no additional risk, and were considered as safe to eat as the food derived by common and traditional methods. The FDA plans to stay highly involved in continuing to research and monitor the progression and increased usage of cloning methods and the resulting food products. The FDA also plans to increase public education and understanding, to ensure consumer confidence in the scientific methods used to analyze and monitor the food supply. (Rudenko et al., 2007)

As mentioned earlier, the Yang et al. (2007) risk assessment encompassed views and information on natural breeding methods, artificial insemination (AI), assisted reproductive technologies (ARTs), cloning, embryonic cell nuclear transfer (ENCT), and somatic cell nuclear transfer (SCNT). It raised concerns over the role of government, concerning cloning methods,

and the introduction of cloned animals and products into the food supply without public knowledge. SCNT and ECNT methods were specifically studied due to their human and animal health concerns. Issues in animals were low success rates of embryos, large cloned offspring, and other abnormalities. Issues in humans were the safety of cloned animal food and products intended for consumption. (Yang et al., 2007)

The ENCT portion of the study involved Holstein cows, including cloned animals as well as non cloned animals, produced for the purpose of meat and dairy products. Comparisons were made between the cloned and noncloned milk production, to include fat and protein content. It was found that there were no significant differences in percent fat, protein, total solids, or PH between the animals. The only slight difference found was in acid levels of the milk determined to be the result of different feed and physical locations of the animals, and not the cloned versus noncloned factor. The meats examined from both animals were also similar in the amount of fat and muscle. The ECNT animals were also found to be valuable breeding animals. (Yang et al., 2007)

The SCNT portion of the study also included cloned and noncloned cows from breeds of Brown Swiss and Holstein Jersey cows. Like the ENCT study, meat and milk products and composition were all similar, with only slight differences resulting from feed, seasons, and geographic locations rather than cloned versus noncloned factors. It was noted that these differences are seen in natural breeding methods as well. While SCNT cloning is the newest and currently the most expensive, it is the only method that can guarantee exact duplicates of the most desirable traits of the animals for food consumption. (Yang et al., 2007)

Like the Runkenko et al. (2007) risk assessment, the Yang et al. (2007) risk assessment also confirmed that there were no scientific differences in the composition of meat and milk from cloned cattle as compared to cattle produced by natural reproductive methods. As these food products have entered the food supply, no problems or health issues have been reported. (Yang et al., 2007)

Problems – Contamination

For food companies utilizing cloning or genetically modified or engineered food and products, their reputation on safety is a must to stay profitable and competitive. Genetic contamination could be a major problem given the continuing unsteady support and varying concerns of GM foods by consumers. Unfortunately, a major genetic contamination occurred in September of 2000 when millions of pounds of corn were contaminated by GM corn, not intended for human consumption. The major food brands and companies of Kraft, Phillip Morris, and Taco Bell were affected by this contamination and regulatory meltdown. (Weissman, 2000)

The contamination occurred with Starlink brand corn which was genetically modified with protein to kill insects and pests. This type of corn was only allowed in the U.S. for the purpose of animal feed and other non food purposes, due to its possible allergic reactions in humans. Starlink corn was only approved for use after farmers were educated and complied with the critical rules of keeping Starlink specific corn separate from their other corn crops. Extra acreage was also required as buffer zone between the plantings of the different corn types. Farmers also had to ensure that corn types were never mixed in grain or farming equipment. This particular contamination happened by the mixing of corn in grain elevators by uninformed farmers. (Weissman, 2000)

The Starlink corn contaminated other corn that was used in making Taco Bell brand taco shells and sold in supermarkets by Kraft, a subsidiary of Phillip Morris. Once the possible

contamination was tested and confirmed, Kraft quickly responded by recalling and withdrawing the products to ensure that safety and regulatory policies were followed. Kraft was applauded by the public for acting in the best interest of their consumers despite the cost, and encouraging stronger regulation of GM foods. (Weissman, 2000)

Unfortunately, the FDA had a much slower response. After receiving news of the possible contamination, the FDA had just requested a sample of the taco shells on the same day that Kraft had already tested and pulled their products from the shelves. Therefore, the FDA fell under public scrutiny due to the rulings that GM food is basically the same as other food and should follow the same regulations and guidelines. Critics demand that GM food be tested in the same manner that brand new food additives are tested before being allowed to enter the market. Critics also state that consumers are treated like guinea pigs, due to limited testing and unknown risks. Critics strongly disagree with the FDA rulings on voluntary labeling. (Weissman, 2000)

Labeling

In January of 2008, after results of numerous studies proving the scientific safety of food and food products from cloned animals or genetically modified food crops, the FDA declared that it would not require any special labeling on such foods. Companies utilizing cloning methods support this decision stating that companies producing food by traditional breeding methods do not have to disclose details on the conception of those animals. Some consumer groups are demanding that the FDA require the companies utilizing the traditional methods be labeled clone free for the public's knowledge, which would most likely create great public debate regarding cloning. ("To label or not", 2008)

The labeling of genetically modified food and the "right to know" or "need to know" for consumers continues to be a big controversy. Sands (2006) Labelling Genetically Modified Food: The Right to Know study focused on several obligations to disclose any applicable risks for genetically modified (GM) foods such as disclosure to governments, citizens, investors, and consumers. Governments need to be informed of any environment impacts as well as risks to industry. Citizens need to be informed because it is their right to know in their personal lives, workplaces, and communities. Investors need to be informed due to their part in corporate financial accounting. Finally, consumers need to be informed due to the possible safety issues and hazards of the products. (Sand, 2006)

Food regulation and labeling has always been a concern for consumers as well as the government, and this has increased dramatically due to the increased amount of GM food into the food chain and supply. National regulation of labeling varies greatly as factors of environment, cultural, religious and government diversity have to be taken into account. The U.S. still stands on the decision that labeling of GM foods is strictly voluntary, due to the safety of GM foods. The U.S. decision seemed out of character for a country that was known for open citizen access to environmentally related issues. Critics feel that the U.S. has moved from a right to know State, to more of a State determining what you do or do not need to know. (Sand, 2006)

As an example of one state's response to the U.S. decision on GM food labeling, Grobe and Raab (2004) conducted the study Voters' Response to Labeling Genetically Engineered Foods: Oregon's Experience. Due to the increasing amounts of GM foods such as corn and soybeans entering their market, this study displayed the results of a November 2002 vote on Measure 27, a measure to label GM food. Measure 27 would have required food companies to label GM food and food products sold in, or distributed in or from the state. Despite public

concerns of risks, too much government control on knowledge, and issues of ethics and morals, Measure 27 did not pass proving that the majority of Oregon residents agreed with the FDA decisions on GM food labeling. (Grobe & Raab, 2004)

The study also revealed that while most Oregon consumers had some knowledge of GM food, an alarmingly high percentage were unaware of the large amounts of GM food produced and available in their supermarkets, and possibly already consumed by them. Despite this, consumers still voted against the measure due to various reasons, one including cost. While consumers had the alternative of purchasing organic foods, due to the decline in the economy, most families opted for their normal cheaper choices, which could be GM foods. Consumers were also concerned about the cost of implementing Measure 27 for the State and local industries, which would eventually trickle down to the tax payers. Another reason was the fact that they were probably already consuming GM food with no ill health or side effects, so they had confidence in the government's decision that the GM food was safe for consumption. (Grobe & Raab, 2004)

Of course, supporters of Measure 27 had differing opinions about why the measure should have been voted in. Most stated they would not purchase food that was labeled as genetically modified or engineered, and choose organic alternatives not utilizing genetic engineering instead. Supporters argue that if GM food is truly safe, then there was no reason why the foods should not be labeled as GM, and that non GM food be labeled as well. But, due to the fact the labeling of non GM food is voluntary, those companies would carry all the costs for enforcing those types of labels. Supporters also argue that the government is interfering and limiting the knowledge and details given to consumers about the GM foods they are purchasing, because of economic concerns. (Grobe & Raab, 2004) While the information, publicity, and controversy over labeling continues, this debate is mostly likely to go on for a long time.

Savino (2002) made a valid point concerning the make up of the genetically modified foods. If someone is allergic to the newly introduced gene, who will be responsible for their health issues, or possible death from consuming the modified food? An example would be an allergy to nuts. If a company decided it wanted to incorporate the properties of the almond (that helps lower cholesterol) into an avocado (which is high in fat), who would be responsible for the individual's health? Savino points out that of three governmental regulation agencies, none of them require labeling of genetically modified foods. These agencies include the FDA (Food and Drug Administration), EPA (Environmental Protection Agency) and USDA (United States Department of Agriculture). Due to the proprietary nature of the cloning and genetic engineering processes, the consumer may never know where they came in contact with the nut allergen.

Attitudes, reactions, responses, and perceptions

The Sparks et al. (1995) study researched the public's perception and ethical obligation on gene technology and the genetic modification of food. The method utilized was a questionnaire that began with a description of gene technology that was to include the transfer of genetic material from one living thing to another to include animals, plants or microorganisms for the use of food production. The understanding at the time was that the overall public had limited knowledge and understanding of the emerging technology, but that this knowledge and acceptance was needed in order to further the technology. Interest and popularity of this area of technology was increased due to the media, as well as consumer and environmental groups with

concerns of changes in agriculture, cloning, biodiversity, ecological impacts, and overall ethics. (Sparks et al., 1995)

The study utilized ten potential outcomes, or consequences, that could stem from the use of gene technology for food production to assess participants' beliefs, results, and evaluations. These ten included increased food production, ecological damage, cheaper food, animal or plant extinction, pesticide increase or decrease, animal welfare, improved food quality, possible animal or plant mutations, and economic growth. Several expectation questions were incorporated such as, how likely do you think you will eat genetically modified food in the future, and do you think you will support this technology in future food production? Ethical questions were also included such as, do I feel I am obligated to avoid eating genetically modified food, and do I have an obligation to support modification in food production? Finally, control questions were included such as, how much control do you think you have over the use of genetic modifications in future food production, or how much control do you think you have on eating genetically modified food in the future? (Sparks et al., 1995)

While more research and studies were needed, the overall findings indicated a major association between the participants' beliefs and outcomes listed, along with the overall attitudes, expectations, behaviors, and morals of their personal lives. There appeared to be great environmental, moral, ethical, and safety issues and concerns relating to the prediction of eating GM food in the future. (Sparks et al., 1995) Much has evolved and changed since the time of this study, including the introduction of cloned and genetically modified foods into the food supply, yet public knowledge has not evolved as quickly.

The more recent Townsend et al. (2004) Effects of Context and Feeling on Perceptions of Genetically Modified Food produced the exact opposite results as compared to the Sparks et al. (1995) study. The more current study revealed that compared to traditionally produced foods, participants had no additional concerns or dread about GM foods. Participants believed the changes in GM technology for food production were controllable and posed no real ethical issues or health risks. (Townsend, Clarke, & Travis, 2004)

It is possible that public perception to cloning and GM foods could be changing partly due to the media and differing perceptions of risk and attitudes. The Frewer et al. (2002) study concluded that there are constant changes of support and attitudes towards genetically modified foods and their health risks and social implications. Of course, these differing feelings and concerns were highest during the increased levels of reporting and information disseminated by the media. In turn, when reports and newness of the story subsided, so did public concerns. Unfortunately, the public's trust level of the governing bodies regulating the food supply did not correlate to the public's perceptions. Instead, perceptions were spurred on by debates, controversies, and media coverage. (Frewer et al., 2002)

By 2008, Miller (2008) tackled the cloning debate quite differently. Miller claimed the FDA should push forward with promoting the use of cloning to improve the food supply in all aspects. With the FDA stating food from clones is safe, a voluntary action for not selling cloned food for human consumption was finally brought to a close. Miller was of the opinion cloning is excellent for people, the economy and the environment.

Coates, Mahaffie and Hines (1997) were for increasing the awareness and implementation of cloning. These authors put forth a very optimistic and aggressive view of the future of cloning and the natural world. The authors' intention for cloning and genetic engineering is to create a new and quicker path towards a natural selection of our choosing. The

authors acknowledge this power will no doubt spur debates on the ethical and moral issues of cloning.

The most alarming information from Coates, Mahaffie and Hines (1997) is the proposed ease of manipulating the current population of humans and animals. Farmers will be able to special order customized stock for their farms, ranging from plants to animals. Designer or transgenic animals will be created specifically to handle conditions for certain parts of the country or the world. The examples in the article included taking the desired gene from one animal and placing it into an entirely different animal, and taking the gene from an animal and placing it into a plant.

Coates, Mahaffie and Hines (1997) refered to the improvements genetics can have on the health of the population. While this concept sounds appealing, it is just the beginning. The authors continued with an explanation of how genetics can be used to make the population smarter. Parents will be able to choose which genes they would like for their children to have, everything from language skills to honesty. The question is then raised, what will these extremely smart offspring do with their half witted parents?

Government

The Multinational Monitor (1999) covered the FDA's internal inconsistency toward genetically modified foods. The article provided information stating the FDA scientists were not 100% behind the FDA's approval of genetically modified foods. These rogue FDA scientists claimed the foods should be tested long term to identify any potential toxins that may not be evident during initial testing. The article's main purpose was to bring forth the FDA's responsibility to protect the people and not to line the pockets of corporations or elected officials.

Miller (2001) summarized the FDA's stand on cloning during 2001 which was made public due to rumors of corporations planning to begin human cloning trials. At this time, the FDA stated cloning produced increased mortality rates and abnormalities than the normal reproductive process. Thus raising the questions of who should be held responsible for a human clone. Will human clones have the same rights and responsibilities as non cloned individuals? If the clone produces traits not normally seen in the human populations, will the clone be allowed to exist and live the rest of its life or will the clone be exterminated as an experiment gone wrong?

Miller explained the reasoning behind the FDA becoming involved in the clone debate. Stating, the FDA is seeking to expand its territory, establish itself within the realm of corporations prepared to move forward with cloning, and the FDA is careful not to make broad sweeping claims. This is due to the potential misconduct or liabilities associated with such statements.

Riddle (2007) approached the cloning debate from the legal aspect of the FDA and how the FDA assesses the risk of cloning. Even though cloning has been legal since 2001, corporations have voluntarily chosen not to sell the by-products of cloned animals. This creates a dilemma for the animal breeders that are using cloning as a method for producing consistently top quality stock. They are investing large amounts of money to create the cloned animals, anywhere from $15,000 to $20,000 per animal cloned.

The FDA's risk assessment stated clones from cattle, pigs or goats and their milk pose no additional threat to the safety of food and its consumption. The FDA further stated the risk to the surrogate mother was not of a significantly higher rate than would be expected with traditional

means of reproducing. The FDA suggested that cloning and the consumption of cloned meat and milk continue without any further testing, tracking or labeling. (Riddle, 2007)

Riddle (2007) stated that only 6% of cloned cattle survive and are healthy. The remaining percentages either never develop or are born with severe deformities. The FDA stated in its report that all clones result in some sort of gene reprogramming error, the worst possible result being death. Another factor that follows with reprogramming errors is when the alterations to the gene results in protein defects or abnormalities that may take years to surface. When the cloned animals reproduce, this further complicates the problems which may exist in the reprogrammed genes.

Riddle (2007) also connected the cloning industry with the organic foods industry. The organic foods industry does not allow reproductive intervention in order for the foods to be labeled organic. No artificial or outside stimulants are used when breeding or harvesting organic meats and animal byproducts.

Theory in for Business Implications:

In order to place the cloning industry within Normative (Consequentialist) ethical theory, the understanding of the variety of cloning perspectives must be explored. On the left side of the cloning spectrum are those who would have everything, including humans, cloned. These individuals see no harm or risk involved with cloning. The right side of the spectrum includes individuals who would not support cloning on any level. These opponents to cloning are not due to uneducated people and the fear of the unknown. They base their information on the results of scientific research that supports their views. In the middle of these two extremes is another spectrum of ideas and opinions about cloning. The middle left has those who are for cloning yet not to the extreme of cloning a human. On the middle right are the individuals who would agree to clone only plant life and not animals or humans. With all these varying degrees of what should and should not be the standards, corporations and regulating bodies must decide what is the right decision to make for the consumer, the stakeholder and the product outcomes.

Kraft is an excellent example of how the Normative theory works with a corporation establishing norms and standards to use in their business practices. Kraft was proactive in their decision to test and recall the products contaminated by the Starlink corn. Kraft had already completed testing of the products before the FDA even began to look into the allegations. This is what all businesses should be doing within their business practices concerning cloned foods. Being proactive could keep outbreaks of bacteria and other harmful agents from becoming epidemic. It also establishes the company as having integrity in their business practices.

The organic farmers associations across the country take a similar yet more basic approach to be proactive in the maintaining of safe foods. The organic farmers never allow the use, sale of or reproduction of cloned animals or their offspring. The organic farming community strives to provide the safest possible foods and animal byproducts.

If Kraft and organic farmers are examples of what ought to be the standard, the FDA is the exact opposite. The FDA is slow to react as seen in the Kraft example. Kraft had already completed its analysis and was moving forward with corrective action prior to the FDA beginning testing. In the case of the organic farmers, the FDA does not compare. Organic farmers are not willing to accept cloned foods or animals simply because it has not been proven conclusively that cloned foods, animals and animal byproducts are the safest alternative to natural reproduction.

With these examples it would be in the FDA's best interest to continue further testing and lengthy trials to determine the outcomes of further generations of clones and the effects of cloning on the animals themselves.

Summary:

It is apparent that more and more cloned food, meat, and milk products will continue to enter the U.S. food supply and most local markets, some with public and consumer knowledge, but most without. Consumers may have skewed views derived from science fiction movies about cloned animals and crops, or just have uncomfortable and mixed feelings about food they think should be "naturally made" are now "man-made". Many argue that cloned offspring may live shorter lives and have increased abnormalities that could be passed down into food products. Others argue that these same risks are evident in normal animals and natural breeding methods as well. It is also argued that ARTs and many "unnatural" breeding methods have been utilized for decades, without much public knowledge, risks, or concerns. From many past and recent studies, the FDA continues to stand behind their findings that the food supply from cloning methods are as safe as food produced and derived from normal methods, and will not require special labeling when being sold in the market place. Inevitably, final decisions are up to the consumer to determine if it is time to eat cloned meat and drink cloned milk? ("Time to eat cloned meat and drink cloned milk?", 2007) According to the Townsend et al. (2004) study, consumers are becoming increasingly more comfortable and accepting of GM food, with no real differing concerns from non GM foods.

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