Animal Identification

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Benefits and Costs Associated With An Animal Identification System for Cattle in the United States

Overview

The announcement on December 23, 2003 that a dairy cow in Washington state had been diagnosed with Bovine Spongiform Encephalopathy (BSE or Mad-Cow Disease) was a watershed event for U.S. livestock markets. Although U.S. consumer demand for beef remained strong following this event, the U.S. beef industry and U.S. government recognized the need to move rapidly forward with plans to implement some type of traceability within U.S. livestock systems. Secretary Ann Veneman (USDA) announced in early January 2004 that USDA planned to begin implementing a "verifiable" animal identification (ID) system in the United States.

There are different reasons for initiating an ID system capable of tracking cattle as they move through the food chain—some directly related to BSE and some indirecly related. The pupose of this fact sheet is to discuss some of the potential reasons for implementing an animal ID system in the United States and some of the possible benefits and costs associated with animal ID systems.

Evolution of Animal Identification Programs in the United States

The National Identification Work Plan (NIWP) was the first official, public effort in the United States to examine the possible implementation of a U.S. animal ID system. The NIWP was developed by a task force formed in April 2002 consisting of over 30 livestock organizations and was coordinated through the National Institute for Animal Agriculture. The U.S. Animal Health Association (USAHA) accepted the NIWP in October 2002 and requested that USDA, APHIS develop a team consisting of representatives from federal and state governments and that USAHA and industry develop an implementation plan for animal ID systems in the United States (NIWP, 2004).

The working plan for the implementation of the animal ID system as suggested by the NIWP was called the U.S. Animal Identification Plan

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(USAIP). The USAIP was approved by the USAHA in October 2003 calling for the establishment of individual premises ID by the summer of 2004, individual animal identification by 2005, and full implementation and compliance (all covered species and their movements - both interstate and intrastate) by July 2006. The USAIP also established a unifrom and nationally recognized numbering system for individual animals and for groups or lots of animals. The stated goal of the USAIP was to facilitate traceback within 48 hours, where traceback is defined as the ability to trace an animal's whereabouts from birth to the date the traceback was originated (USAIP).

The announcement in December 2003 regarding the Washington state BSE case has placed animal ID in a prominent position in the U.S. food policy debate (Farm Foundation, 2004). Since December 2003 the USAIP has evolved into what is now called the National Animal Identification System (NAIS). Most of the essential elements of the USAIP remain the same in the NAIS. Most importantly, the USAIP blueprint relating to standards for data and data flows within the animal ID system remain the same. This includes the numbering system developed by the USAIP.

Animal Disease Control and Eradication

The ability to track animals for animal disease control and eradication was the principal reason for the development of the animal ID plans and programs in the United States. The NIWP, USAIP, and the NAIS have focused on issues of animal health as an impetus for implementing animal ID. For example, all three plans indicate that "Maintaining the health of the U.S. herd is the most urgent issue of the industry and animal health officials to address, and therefore, is the most significant focus of the National Identification Plan" (USAIP, NAIS; National Food Animal Identity Task Force, 2004).

A national animal ID database would allow animal health officials to more easily trace the previous locations of infected animals, which would allow for the identification of other animals that may have come into contact with an infected animal. The need for such a system was illustrated following the December 23rd announcement of a U.S. BSE case. The "index" animal was part of a shipment of 74 animals imported from Canada on September 4, 2001. The USDA was able to determine that an additional eight animals from the same herd in Canada had entered the United States in different shipments (see http://www.usda.gov/news/releases/2003/12/bsechronology.htm). Although U.S. government officials rendered a huge effort to find all of the other animals associated with the index animal, over 50 of the animals were never located (see http://cofcs66.aphis.usda.gov/lpa/issues/bse/BSE_tr_ban%20_ltr_enc_1.pdf).

Diseases other than BSE, including Brucellosis and Foot-and-Mouth Disease, may actually be of equal or even more concern. The ability to track animal movements and associations will provide a critical tool for animal health professionals in controlling and potentially eradicating these diseases.

Because the emphasis of the NAIS and its predecessors has been on animal health, the implementation of the NAIS depends heavily upon the cooperation of state departments of agriculture and specifically state veterinarians. This is necessary because the NAIS specifies that individual states will be responsible for defining premises. State departments of agriculture will also probably be involved in issuing identification numbers for premises and animals (NAIS, 2004).

A survey of state veterinarians conducted by Utah State University indicated that strong support exists among the state veterinarians responding to the survey for implementing a national animal ID system (Bailey and Slade, 2004). The same survey found that state veterinarians responding to the survey supported animal ID principally as a means to control animal disease (including BSE) and for the purposes of bio-security.

Food Safety and Bio-Security

Traditional food safety systems were designed assuming that the highest risk of food-borne illness from beef came from bacterial contaminations such as E. coli O157:H7 or listeria, not BSE. Because the greatest risk for bacterial contamination has typically been in the processing and preparation of meat for human consumption, government food inspections have traditionally concentrated on identifying bacterial contamination in food processing plants and at the food preparation level such as in restaurants.

BSE is a fundamentally different problem than bacterial contamination. Because BSE is believed to originate with contaminated feed produced from the byproducts (spinal cord and brain material) of infected cattle, it is a problem originating at the farm level. The current U.S. system was not designed to routinely track individual or groups of animals once they left their farm or ranch of birth. Cattle are typically commingled from different locations to facilitate grazing and feedlot fattening for slaughter.

Due to the long incubation periods for BSE, symptoms of the disease typically do not express themselves until the animal is at least 30 months of age. At this age, the animal has likely changed ownership a number of times. For example, cattle usually have 5 to 6 different owners between the time of birth and slaughter. Once an animal with BSE has been identified, the ability to track the animal backward through the system becomes critical because companion animals may also be infected. Additionally, feed sources throughout the animal's lifetime must be identified.

Large food recalls occur frequently in the United States. Traceability systems, including animal ID, may help to make food recalls more efficient. This would continue to help ensure a safe food supply while limiting any potential damage to the image of beef as a general product or to specific brand names for beef products.

There is a clear role for both the public and private sectors to ensure food safety, including unintentional contamination and intentional contamination (bio-terrorism). Animal identification and other traceability mechanisms may or may not act as a deterrent to bio-terrorism. Most importantly, traceabil-

ity systems would allow food contaminations to be tracked to their source more quickly and easily than is now possible. This may be critical in stopping the spread of contaminated food products so as to limit the impact on human health and limit the economic damage resulting from such an event.

Market Preservation and Market Development

At the time the NIWP was first being considered, traceability systems that included animal ID as part of the system had been developed or were in the process of being developed in a number of countries. Many of these countries were either principal competitors or customers of the United States in global meat trade, including the European Union (EU), Canada, Japan, Australia, and New Zealand (Hobbs, 1996a; Hobbs, 1996b; Liddell and Bailey, 2001).

Several economic studies have suggested that there may be important economic reasons for adopting animal ID systems besides animal health. Animal ID is an essential component of traceability, and these studies have suggested that credence characteristics that can be certified with traceability are valuable to some consumers (e.g., Hobbs 1996a; Hobbs, 1996b; Dickinson and Bailey, 2002; Dickinson and Bailey, 2003; Ward, Bailey, and Jensen, 2004).[1] These studies all suggest that consumers value traceability. However, the greatest value for traceability appears to be when it is "bundled" with other characteristics that can be verified using traceability, such as verifying the processes used to produce a product (e.g., Dickinson and Bailey, 2002; Dickinson and Bailey, 2003; Ward, Bailey, and Jensen, 2004). The precise definition of what traceability is or should be can be different from one country to the next. These differences are important because they may relate to the integrity of traceability systems and the value consumers believe that traceability provides.

Different Traceability Definitions

As U.S. systems such as animal ID evolve toward more traceability, important questions remain regarding what similarities and differences should exist between the United States and other systems. The EU legal definition for traceability is EU General Food Law Reg. EC No. 178/2002 and states, "The ability to trace and follow a food, feed, food-producing animal or substance intended to be or expected to be incorporated into a food or feed, through all stages of production, processing and distribution" (Farm Foundation, 2004). Consequently, the EU law appears to require a farm-to-fork traceability system. Many U.S. agribusiness firms and producers are uncomfortable with the EU definition for traceability, believing that it is broader than what is actually needed to achieve specific food safety or quality assurance goals. A possible alternate definition for traceability that might better fit American agriculture is "The efficient and rapid tracking of physical product and traits from and to critical points of origin or destination in the food chain necessary to achieve specific food safety and/or assurance goals" (Farm Foundation, 2004). This alternative definition would allow traceability to be customized by specific industries and firms to meet specific goals for food safety or other types of quality assurances.

[1] Examples of potentially valuable meat characteristics that could be certified using traceability include assurances about human animal treatment, free of genetically modified (GM) material, environmental responsibility, and social responsibility.

Why Different Traceability Systems Exist

The EU suffered a massive breakdown in consumer confidence in their food system as a result of their BSE crisis in the mid-1990s. This breakdown was attributable to the fact that governments and scientists in the EU had assured consumers that no connection existed between BSE and human disease. When the probable connection between BSE and a human disease, variant Creutzfeldt-Jakob Disease (vCJD) became apparent, literally thousands of BSE-infected animals had already passed through the food chain to human consumption. This created a crisis on a huge scale compared to the single BSE cases that were discovered in Canada and the United States during 2003.

In general, European consumers have less confidence than American consumers in their governments' abilities to ensure a safe food supply (Christensen et al., 2003). For example, Christensen et al. (2003) found in surveys of British and American consumers that British consumers prefer private certifications regarding the safety of beef products while Americans prefer food safety certifications to be made by government agencies such as USDA.

Precautionary Principle vs. "Sound" Science

The huge scale of the European BSE crisis during the 1990s, coupled with the lack of confidence European consumers have in the government to make food safety certifications, signaled a severe breakdown in communication between producers and consumers in the European beef marketing channel. This led to the development of traceability systems that required accountability at each level of the marketing chain (beginning at the farm level) and also the rise of the "precautionary principle" (PP) in public food policy in the EU (Davies, 2002). The PP has long been associated with environmental protection policy, where it had been applied when a lack of full scientific certainty of an outcome of a certain policy existed (e.g., the impact of an oil spill on wildlife and the environment). The PP applied to food policy basically states that short-term food policy decisions may have long-run consequences, but are often made without conclusive scientific evidence of the absence of any long-run harm. Consequently, precaution should be exercised in developing policy without conclusive scientific evidence (Davies, 2002). Many Americans believe that the PP has been applied in trade policy debates as a method to paralyze action where non-zero risk is present, such as in the introduction of genetically modified (GM) corn and soybeans altered to resist specific herbicides (Farm Foundation, 2004). While this does not necessarily mean that a food product must be proven to have no significant risk to human health, it may mean that significant restrictions on the sale of the product or strict labeling may be required (Davies, 2002).[2]

The PP stands in contrast to the concept of "sound" science. The sound science argument contends that as long as no scientific evidence of harm exists, food products should be considered safe. Conversely, the PP argues that food products should not be considered safe until the absence of harm has been proven. Thus, the PP shifts the burden of proof of no harm to the food product's producer.

[2] For example, the EU currently proposes to label GM food products as a method to overcome trade policy disagreements with the United States. The United States opposes the labeling requirement.

The U.S. food industry has usually resisted the types of restrictions proposed by the EU arising from the PP, such as requiring GM labeling, on the grounds that 1) the restrictions can be applied even in the absence of scientific evidence of potential harm, and 2) the restrictions principally affect products imported into the EU and are, in fact, trade barriers. Two of the most notable conflicts resulting from these differences are the EU ban on U.S. beef because of added growth hormones and the more recent controversy about GM foods and food ingredients.

The rise of dichotomous systems in world meat markets (i.e., those systems with animal ID (traceability) and those without) was not only driven by the emergence of BSE as a threat to meat markets, but is also currently being used as a strategy to differentiate products (Bailey, Jones, and Dickinson, 2002). The existence of different systems has led to significant frictions in trade. For example, the EU's requirements for traceability and labeling have led to recent U.S. threats to take the issue to the World Trade Organization as non-tariff trade barriers with no scientific basis (Clapp, 2004). Consequently, market considerations are important when considering the implementation of animal ID programs, even though they were not the primary emphasis of the NIWP or the USAIP.[3] Another fact sheet in this set (see the fact sheet by Curtis, entitled "Animal ID: Opportunities for Value-Added Marketing and Production Efficiencies") discusses some of the possible value-adding strategies that could emerge for beef producers as a result of the implementation of animal ID.

Estimated Costs of Implementing Animal ID

Prior to December 2003, the full implementation costs (all species with interstate and intrastate movements tracked) for the USAIP were estimated to total over $500 million for the first six years of the program (USAIP, 2004). The precise plan for how these costs would be shared between the public and private sectors was not defined in the USAIP, although some funding for the first year of the project had been requested from the Commodity Credit Corporation (CCC) (USAIP, 2004). As a result, USAIP was a plan that did not initially have a clear format for funding the full cost of its implementation. A separate cost study completed by Sparks Companies Inc. estimated that the capital investment required to implement a source verification system for cattle would only be approximately $140 million with an additional annual variable cost of about $108 million.[4]

Buhr (2002) estimated the costs of implementing a farm-to-fork traceability system for a single supply chain in Europe to be between $10-$12 million. Consequently, traceability systems such as those that could be established using animal ID are not costless and, as a result, they raise questions about which firms, based on size and market, will be able to implement such protocols most profitably.

Blasi et al. (2003) estimated the costs of implementing a RFID system at the producer level for cow/calf operators and feedlots and included the costs of transponder tags, electronic readers, computer hardware, computer software, internet access, required upgrades,

[3] "Off-the-record" discussions with persons close to the NIWP and the USAIP indicate that consensus to support these plans within their working groups could only be achieved if the emphasis remained on animal health as the reason for developing animal ID systems.

[4] The Sparks study and the estimates for the USAIP are not directly comparable. Sparks examined the costs only for cattle and also estimated costs based on a farm-to-fork tracking system, while USAIP included several meat species that would be tracked only from farm to slaughter.

Table 2-1. Blasi, et al.'s Estimated Annual Costs for a RFID System for a Cow/Calf Operation.

Size of Cow Herd	Total Estimated Annual Cost/Cow
63	$24.49
125	$13.78
188	$10.14
250	$8.34
625	$5.08
938	$4.35
1,250	$3.99

Source: Blasi et al.

Table 2-2. Blasi, et al.'s Estimated Annual Costs for a RFID System for a Feedlot Operation.

Number of Head	Total Estimated Annual Cost/Head
2,500	$5.40
5,000	$3.61
10,000	$2.72
15,000	$2.42
20,000	$2.27
35,000	$2.08
50,000	$2.00

Source: Blasi et al.

and labor (Tables 2-1 and 2-2). Their results indicate that substantial economies of size (i.e., average costs decline dramatically as the size of the operation increases) in implementing animal ID exist at the producer level. This could place small producers at a disadvantage to large producers. However, the cost differences between large and small producers estimated by Blasi et al. may be somewhat overstated because they did not account for the possibility of pooling some of these costs (e.g., in some instances small producers might be able to share costs for computer hardware or electronic readers). However, the largest single difference in cost between large and small producers is labor. This suggests that animal ID programs will probably provide incentives for small producers to work cooperatively in placing identification devices such as eartags on cattle and in collecting and disseminating this information.[5]

USDA, APHIS received a transfer of $18.8 million from the CCC during fiscal year (FY) 2004, and President Bush's budget for FY 2005 requests $33 million for animal ID. During FY 2004, APHIS plans to spend this money to establish cooperative agreements that will assist implementing animal ID, establish a national premises allocator and repository to begin allocating premises identification numbers, and identify and qualify third parties that have ID technology and products so that they can be integrated into the national system (NAIS, 2004). The USDA is initiating the program on a voluntary basis, although it may become mandatory over

[5] For example, cattle pools may become more popular in an animal ID system because costs can be shared or labor used more efficiently than if small operators shoulder all costs independently.

time as the system becomes fully functioning (Collins, 2004).[6]

At this point, the funding available to USDA will probably cover only the costs of developing the national databasing system for animal ID. This means that the costs for identification devices such as eartags and data gathering devices such as hand-held computers will be borne by individual firms (producers, sale barns, order buyers, etc.) and not the U.S. government.

The initial investment of implementing traceability protocols can be expensive. However, they will potentially provide benefits from several perspectives including animal disease control and food safety. Also, once implemented, there may be long-run niche marketing opportunities because of the ability animal ID systems will have to gather and certify data about production inputs and processes leading to the identification of cost efficiencies or market opportunities.

Who Will Benefit from the Implementation of Animal ID?

Results from a survey of the leaders of state cattlemens organizations indicate that different perceptions exist about who will benefit from the implementation of an animal ID system and why they are expected to benefit (Bailey and Slade, 2004). While over 90% of state cattle producer association respondents indicated support for a national cattle ID program, only 41% indicated that they supported the USAIP when the survey was administered (January 2004). This may help to explain why the USAIP has continued to evolve as producer groups have applied political pressure to add more flexibility to the national animal ID plan (Farm Foundation, 2004).

The desire for flexibility in implementing traceability systems such as animal ID has been a constant theme with U.S. agribusiness firms when discussing issues relating to traceability. Farm Foundation (2004) reports that U.S. agribusiness firms would prefer market solutions rather than government regulation and mandates when traceability systems are implemented, except in the case of life-threatening food safety concerns. Bailey and Slade (2004) reported average responses from a survey of leaders of state cattle producer associations for both USAIP supporters and non-supporters. While the average responses for supporters tended to be higher (more favorable about the possible benefits of the USAIP) for most questions than for non-supporters, both supporters and non-supporters ranked the maintenance of international markets as the most important reasons for implementing the USAIP (Bailey and Slade, 2004). Bailey and Slade (2004) report that the state veterinarians responding to a similar survey ranked consumer issues only fourth, based on the average response, as the most important reason for implementing the USAIP. This may help explain why support for the USAIP varied between state veterinarians and producer groups. State veterinarians see animal ID principally as an animal and public health issue, while state producer associations place at least an equal weight on market issues as they do health issues as reasons for implementing animal ID. Veterinarians would be expected to support the implementation of standardized programs that safeguard animal and human

[6] One recent study indicated that 69% of U.S. consumers responding to a survey would prefer mandatory animal ID over voluntary animal ID (Ward, Bailey, and Jensen, 2004).

health because this is their area of responsibility. Conversely, leaders of cattle producer organizations would be expected to be most concerned about implementing a flexible system that can adjust to market conditions.

On average, supporters of the USAIP had a more positive perception of the USAIP from the perspective of food safety and preserving international markets than did non-supporters. In fact, the results suggest that the most positive feelings non-supporters had about the USAIP were from the perspective of animal disease control and eradication. This may help explain why the national effort to develop an animal ID plan continues to build by focusing on animal disease control issues.

A further statistical analysis[7] revealed that if the state cattle producer organization leaders perceived that processors (packers) would benefit more from the USAIP than farmers and ranchers, they were less likely to support the USAIP than if they perceived no difference in benefits between producers and processors. This illustrates that some of these leaders saw costs, but only limited benefits from animal ID while believing that most of the benefits would be captured by downstream firms. The respondents seemed to understand the health issues (both animal and human) associated with animal ID as well as the potential positive impact on international markets, all of which should offer direct or indirect benefits to producers.

Issues relating to the potential shift in liability in the marketing chain toward producers as a result of animal ID are often brought up by producers when discussing traceability issues (Farm Foundation, 2004; Roberts and Pittman, 2004). This might explain why some industry leaders see fewer benefits for producers as a result of implementing animal ID compared to other levels of the marketing channel. They may perceive shifts in liability away from packers and toward farmers would likely reduce producer support for animal ID programs.

Summary and Conclusions

Few issues in the U.S. livestock industry in recent years have been more controversial than animal ID. Significant barriers remain to be crossed before animal ID is implemented on a national basis in the United States. For example, issues relating to how liability will be shared or limited in a system with animal ID and how costs of implementing animal ID will be allocated remain to be addressed. Questions about which technology or technologies will be used in a national animal ID system and how these technologies will interface in transferring information to a national database also need to be resolved. Despite these challenges, animal ID offers opportunities for controlling animal diseases, standardizing beef trade in world markets, and expanding niche market opportunities to beef producers. Although the precise form in which animal ID will be implemented in the United States remains somewhat cloudy, a significant commitment on the part of industry and government currently exists that has not existed in the past. This commitment should provide the ability to overcome the apparent obstacles standing in the way of implementing animal ID in the United States.

[7] Probit analysis reported in Bailey and Slade (2004).

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