

Animal Identification



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Animal ID: Opportunities for Value-Added Marketing and Production Efficiencies

Overview

The implementation of traceability systems such as the National Animal Identification System (NAIS) proposed by the United States Department of Agriculture (USDA) is commonly motivated by the desire of governments and/or producer associations to minimize liability and potential for bad publicity resulting from food contamination and disease outbreaks. Indeed, traceability systems help reduce the costs of recalls by quickly isolating the source and scope of a food safety issue, but traceability systems may also provide additional benefits to all members of the food marketing system (producers, processors, distributors, and retailers). Potential benefits include access to new markets, access to new data sources that aid increasing the efficiency of animal production, and increased revenue resulting from verified quality product price premiums.

Producers may use traceability systems to differentiate their products, which may increase product value and lead to revenue gains through price premiums. Differentiated products often contain quality attributes (both content and process) that cannot be verified through physical inspection, and thus are virtually unknown to the consumer at the time of purchase unless they are either labeled that they contain these attributes or the information about the presence of the attributes is communicated to consumers in some other way. Examples of such quality attributes include free-range, organic, natural, and lean, as well as many others. The only way to verify these quality attributes is through record-keeping, which establishes and preserves that the attribute(s) actually exist in the product. Food traceability systems can be designed to provide the breadth of information necessary for this type of quality attribute verification.

Why Might a National Animal ID System be Important?

Producers and/or governments often establish traceability systems such as animal identification to facilitate traceback during food-borne disease outbreaks. Traceability systems can help the food industry reduce costly recalls by minimizing liability and the potential for bad publicity. Although governmental food



safety standards in the United States have reduced food safety hazards to a minimum (Ballenger and Blaylock, 2003), the introduction of new imports, or foods produced overseas, and the increased use of technology in food production, including biotechnology, provide for increased risk.

For example, StarLink, a genetically-modified corn product, had not been approved by the U.S. government for human consumption because it contained a possible human allergen (Cry9C). An environmental activist group was able to prove that StarLink had been introduced into the human food supply chain in spite of government inspections. The result was a very broad-scaled and costly recall program, which by some estimates cost Adventis, the inventor of StarLink, \$500 million to complete (Food Traceability Report, 2001). In December of 2003, the USDA announced the first U.S. case of Bovine Spongiform Encephalopathy (BSE), also known as Mad-Cow Disease, found in a Holstein (dairy) cow in south-central Washington state. This discovery led to a two-month investigation, which ended with the traceback of only 28 of the 80 cows that entered the United States from Canada with the infected cow. The incident closed several overseas markets for U.S. beef that previously had accounted for approximately 10% of U.S. beef production (Lehner, 2004). One of the largest of these markets, Japan, still remains closed because Japanese officials claim that the U. S. investigation following the discovery of the BSE cow in Washington failed due to the large number of cows that remain missing.

Even though food safety breakdowns in the U.S. food system have and will continue to occur (Salin and Hooker, 2001), most American consumers continue to have a high degree of confidence in the federal government to assure food safety (Christensen et al., 2003; Loureiro and Umberger, 2003). However, such confidence does not always hold for consumers in other countries, especially in Europe, where some European governments made public assurances to consumers that beef products were safe to eat during outbreaks of BSE. BSE outbreaks led to a virtual collapse in the European beef market and a shattering of consumer confidence in the ability or appropriateness of governments to make these types of assurances when strong scientific evidence emerged linking the human disease, new Variant Creutzfeldt-Jakob Disease (vCJD) with the eating of BSE-contaminated beef (Christensen et al., 2003).

The NAIS, the animal traceability system proposed by the USDA, calls for establishing a system with the capability to track animals or groups of animals from slaughter back to their herd or premises of origin. The tracking system will include identification numbers for the animal, the herd of origin, and the premises (farm) of origin (USAIP, 2004). Additionally, a comprehensive record system of animal movement will be developed. Officials hope that the NAIS will assure consumers both in and outside of the United States of the safety of U.S. beef products.

How Might an Animal ID System Impact My Bottom Line?

Animal ID May Provide Access to New Markets and Price Premiums

Obviously, implementing an animal ID and tracking system will entail significant costs, and producers and other members of the U.S. meat industry wonder if any of these additional costs can be recouped. The traceability and record-keeping component of the NAIS may provide an attractive way for beef producers to differentiate their products and reap such benefits as increased sales, price premiums, and lasting consumer loyalty. Loader and Hobbs (1996) speculate that traceability in the beef industry may have hidden benefits, including the reorientation of the industry towards the consumer.

Consumers worldwide are increasingly concerned with the quality standards and other characteristics of the foods they consume. Studies show that this phenomenon can be attributed to rising consumer incomes, especially in developed nations (Ballenger and Blaylock, 2003). A study by Lino et al. (1999) found that the Healthy Eating Index (HEI), which measures an individual's overall diet quality, increases as his/her level of education and income rises, although income generally needs to be three or more times higher than the poverty level for this to occur. Higher income households tend to consume more fruits, vegetables, fish, and poultry and are also more likely to spend more money on high quality foods and meals away from home than do lower income households (Ballenger and Blaylock, 2003). When consumers eat

more meals away from home, the control the consumer has over the food preparation process is reduced, which increases consumer uncertainty regarding the safety level of the foods they eat. Hence, consumers seek assurances from the food industry regarding the safety precautions and processes implemented, moving a larger portion of the burden of ensuring food safety to all levels of the food industry, including restaurants, processors, and growers alike (Unnevehr, 2003).

An efficient food marketing system produces food products with the characteristics consumers want at a price consumers are willing to pay. When consumers receive positive utility from food consumption (are satisfied with the characteristics of the food they consume, can afford it, and are willing to pay for it), then the consumer perceives that the food product has value and is willing to pay for that value. Quality characteristics in the beef industry may be process-oriented such as use of growth enhancers, antibiotics, pesticides, feed, animal treatment, environmental responsibility, and safety procedures, or they may be content-oriented such as the fat content (lean), marbling, etc.

However, many of these quality characteristics cannot be discerned by physical inspection at the time of purchase, creating a level of uncertainty for the consumer about whether or not these characteristics exist in the product. Characteristics that cannot be discerned by physical inspection (sight, smell, etc.) but are still present in a product are referred to as credence characteristics. For example, the safety level of a food product (e.g., the pres-

ence of *E. coli*) is not known by the consumer at the time of purchase or consumption, and in many cases may not be detected immediately after consumption due to the potentially extended length of time between consumption and illness. Research confirms that consumers find it difficult to form meat quality expectations through physical inspection of the product (Grunert, 2001), and that consumer attitudes toward beef products are significantly influenced by verifiable health and safety evaluations (McCarthy et al., 2003). Furthermore, consumers are often willing to pay price premiums for enhanced safety assurances. For example, Shogren et al. (1999) found that consumers would be willing to pay a 10% premium for chicken that had been irradiated to reduce food related illness.

Consumers are worried about meat quality, its origin, and its integrity from farm to table. Thus, they need additional assurances about the product's quality characteristics, either from industry or governmental providers (Arana et al., 2002). The existence of credence characteristics must be communicated to the consumer in the form of a label, advertisement, certification, or some other way besides physical inspection by the consumer. Traceability systems such as the NAIS and certification programs that may evolve from the NAIS may provide consumers with lower levels of uncertainty regarding the quality characteristics of the meat products they eat than if no such system were in place. This lower level of uncertainty should provide many consumers with an increased level of utility and could result in consumer willing-

ness to pay premiums for enhanced assurances about food safety and other credence characteristics in meat products if this information is communicated appropriately and effectively to them. For example, Dickenson and Bailey (2002) found that consumers in Logan, Utah had a positive willingness to pay for beef products with food safety certifications and other credence characteristics including humane animal treatment and traceability. As a result, producers who incorporate traceability and/or certification programs into their production and marketing processes may potentially improve market prices and market access for their products.

What Types of Quality Assurances Do Consumers Look For?

According to recent literature examining consumer demand for beef products and what types of beef qualities consumers find most important in their purchasing decision, the most important characteristic was the origin of the beef, which related to the safety and/or freshness of the product. Roosen et al. (2003) found that consumers surveyed in France and Germany considered the origin of the beef product the most important component in their purchasing decision over such things as fat content and price. A study by Becker et al. (2000) found that consumers considered the origin of the beef as the most important indicator of its safety. Consumers also indicated that the price was not a good indicator of quality, and hence, alternative quality measures were perceived. A study by Bernues et al. (2003) suggested that consumers considered the origin and expiration date, as well as

information about the system of production and the traceability and quality control of the beef, to be the best determinates of quality.

Additionally, studies indicate that consumers may be willing to pay a premium for beef products from preferred origins. Loureiro and McCluskey (2000) found that high quality “Galician Veal” bearing the Protected Geographic Identification (PIG) label brought a premium price in the market. Loureiro and Umberger (2003) found that consumers in Colorado were willing to pay on average \$184 per household annually for a country of origin labeling program, as well as \$153 more per pound annually for steak labeled “U.S. Certified Steak.” Additionally, Umberger et al. (2003) found that consumers in Denver and Chicago were willing to pay positive premiums for country-of-origin labeling of beef; however, a primary reason for consumers’ interest in country-of-origin labels was because they believed the labels provided increased food safety.

Many of the quick-service restaurants, including McDonald’s, Jack in the Box, and Red Lobster, covet meat from processors who ensure higher safety standards. Rewards for meeting safety standards include guaranteed sales through marketing contracts and premium pricing (Golan et al., 2004). Meat processors who want to protect “high safety” markets will look to cattle producers who can provide evidence of safety procedures in production through animal identification and record-keeping. In fact, McDonald’s plans to have a minimum of 10% of its U.S. beef purchases source traceable by the end of 2004, and 100% source traceable in the near future

(Ag Observatory, 2004). McDonalds hopes its traceability policy will instill consumer confidence in its ability to contain food safety problems quickly and manage any resulting ramifications.

In addition to food safety levels, consumers often exhibit preferences for products produced using natural or organic methods, and the verification of these and other characteristics can be enhanced using traceability systems. Natural production methods prohibit the use of animal byproducts or proteins in feed. Feed is strictly vegetarian to include natural pasture grass, hay, and whole grains. In the case of organic beef, feed must also be organically grown. Additionally, antibiotic and growth hormone use is prohibited, and only botanical pesticides are allowed. Organic products must be inspected by USDA, certified “organic” by a third party, and contain a USDA organic label on all packaging. Beef products which hold a natural label must contain the USDA definition of “natural” on the packaging, but are not certified by a third party.

Maverick Ranch has marketed both organic and natural beef products for over five years. Although its natural beef products do not have the USDA certified organic label, it uses Guaranteed Analytical Labs to test for antibiotics, growth hormone, or pesticide residue on all of its carcasses. Additionally, Maverick Ranch uses the Sanova food safety rinse on all of its beef carcasses. Sanova is a USDA-certified organic citrus rinse that eliminates 99% of the pathogenic bacteria, including Salmonella, E. coli, and Listeria. Coleman Natural Meets also has a natural beef

product produced in much the same way as that of Maverick Ranch. Production processes include free-range grazing on natural grasses, no use of hormones or antibiotics, and no use of animal byproduct feeds. Coleman also adheres to humane and unconfined treatment of its animals. Coleman uses a USDA-approved “natural beef” label. The USDA strictly controls label use and conducts audits to verify the accuracy and completeness of Coleman records. (Visit <http://www.maverickranch.com> and <http://www.Colemannatural.com> for further information.)

Farmland Industries, Inc., a farmer-owned cooperative, was the first farmer-owned pork company approved to use the USDA-processed verified logo. Farmland’s process verification system provides guidelines to owner farmers regarding genetics, animal nutrition, animal health and welfare, on-farm food safety measures, and environmental resource protection. Owner farmers agree to restrict antibiotics and sulfa drugs, submit to environmental audits, and practice humane treatment of animals. The verification system, implemented through the America’s Best Pork program, allows for 100% traceability of all pork products in the program. (Visit <http://www.farmland.com> for further information.)

Animal ID May Aid in Production Efficiencies

Traceability systems not only allow for the breadth of information needed for quality attribute verification, but they can also provide the information needed to track an animal’s performance from weaning to slaughter and to identify the genetics which are most profitable.

Ranchers can use performance measurements at all stages of the production process (stocker, feed lot, and carcass) to manage herds and sell off low performing cattle before spending additional dollars. Additionally, reproduction of identified high performance genetics can increase herd performance over time, resulting in cost efficiencies and improved profits.

Ranchers Renaissance is a cooperative of ranchers, stockers, feeders, processors, and retailers that sells its beef under the Cattleman’s Collection, Harris Rancher, and Ranchers’ Reserve brands. Ranchers Renaissance has used electronic animal ID since its inception in 1997. The company states that this is the most efficient and economical way to collect data on each animal. This information is then shared with all partners in the production chain. The data collected includes animal source verification, process verification, and genetic verification. Tom Woodward, a manager for Broseco Ranchers and a member of the Ranchers Renaissance cooperative, attested that the use of electronic animal ID to track animal performance has increased revenues by \$2 to \$3 per hundred-weight on each calf (McGinnis, 2004). (Visit <http://www.ranchersrenaissance.com/index.html> for more information.)

Summary

Today’s consumer is living longer at a higher standard of living than ever before. This trend has created a demand for high-quality foods, high levels of food safety, and convenience as demonstrated by the increased frequency of eating away from home. However, there is currently consumer uncertainty



surrounding the quality and safety levels of beef primarily due to the credence nature of many of the process and content attributes and the difficulty the food industry has in verifying and communicating the existence of these attributes due to the liabilities associated with credence claims. Traceability systems with control and verification measures may reduce consumer uncertainty. A study by Latouche et al. (1998) found that consumers were waiting for greater traceability in the beef industry, and were willing to pay for it. Hence, consumer-focused production can lead to improved pricing (value-added) and access to new markets, both in and outside the United States. As exemplified by the “natural” beef product lines of Maverick Ranch and Coleman Meats, these two companies have oriented their product lines to consumers looking for natural- and/or organically-produced beef products. The traceability and control systems in place make it possible for these two companies to label their products as such by passing USDA inspections and auditing. In the case of Ranchers Renaissance, its goals are perhaps more production-focused than consumer-focused. However, the traceability and record system used allows Ranchers Renaissance to improve their profit margins through more efficient product management.

References

- Ag Observatory. *McD's Traceable Beef Plan*. Publication of the Institute for Agriculture and Trade Policy, July 2, 2004. Online. Available at: <http://www.agobservatory.org>.
- Arana, A., B. Soret, I. Lasa, and L. Alfonso. “Meat traceability using DNA markers: application to the beef industry.” *Meat Science*. 61(2002):367-73.
- Ballenger, N., and J. Blaylock. “Consumer-Driven Agriculture: Changing U.S. Demographics Influence Eating Habits.” *Amber Waves*. 1(2)(2003):28-33.
- Becker, T., E. Benner, and K. Glitsch. “Consumer perception of fresh meat quality in Germany.” *British Food Journal*. 102(3)(2000): 246-266.
- Bernues, A., A. Olaizola, and K. Corcoran. “Labeling information demanded by European consumers and relationships with purchasing motives, quality and safety of meat.” *Meat Science*. 65(2003):1095-1106.
- Christensen, B.J., D. Bailey, L. Hunnicutt, and R. Ward. “Consumer Preferences for Public and Private Sector Certifications for Beef Products in the United States and the United Kingdom.” *International Food and Agribusiness Management Review*. 6. 2003. Online. Available at <http://www.ifama.org/members/IFAMR/v6:3.htm>.
- Dickinson, D.L. and D. Bailey. “Meat Traceability: Are U.S. Consumers Willing to Pay for It?” *Journal of Agricultural and Resource Economics*. 27(2)(2002):348-364.
- Food Traceability Report. *StarLink Lessons Learned*. Washington, D.C.: FCN Publishing, 2001.
- Golan, E., T. Roberts, and M. Ollinger. “Savvy Buyers Spur Food Safety Innovations in Meat Processing.” *Amber Waves*. 2(2)(2004):23-29.



- Golan, E., B. Krissoff, F. Kuchler, K. Nelson, G. Price, and L. Calvin. "Traceability in the US Food Supply: Dead End or Super-highway?" *Choices*. (2nd Quarter 2003):17-20.
- Grunert, K. G.. "Current issues in the analysis of consumer food choice." In *71st EAAE Seminar: The food consumer in the early 21st century*, Zaragoza, Spain, 19-20 April 2001.
- Latouche, K., P. Rainelli, and D. Vermersch. "Food safety issues and the BSE scare: some lessons from the French case." *Food Policy*. 23(5)(1998):347-356.
- Lehner, U.C. "Understanding the animal-ID system." *High Plains Journal*. (2002). Online. Available at <http://www.hpj.com>.
- Lino, M., P.P. Basiotis, R.S. Anand, and J.N. Variyam. "The Diet Quality of Americans: Strong Link with Nutrition Knowledge." *Nutrition Insights*. 12(1)(1999). A publication of the Center for Nutrition Policy and Promotion, USDA.
- Loader, R. and J.E. Hobbs. "The hidden costs and benefits of BSE." *British Food Journal*. 98(11)(1996):26-35.
- Loureiro, M.L. and W.J. Umberger. "Estimating Consumer Willingness-to-Pay for Country-of-Origin Labeling." *Journal of Agricultural and Resource Economics*. 28(2)(2003):287-301.
- Loureiro, M.L., and J.J. McCluskey. "Assessing Consumer Response to Protected Geographical Identification Labeling." *Agribusiness*. 16(3)(2000):309-320.
- McCarthy, M., M. de Boer, S. O'Reilly, and L. Cotter. "Factors influencing intention to purchase beef in the Irish market." *Meat Science*. 65(2003):1071-1083.
- McGinnis, M.. "Texas rancher says he profits from animal ID." *High Plains Journal*. (July 29, 2004.) Online. Available at <http://www.hpj.com>.
- Roosen, J., J.L. Lusk, and J.A. Fox. "Consumer Demand for and Attitudes Toward Alternative Beef Labeling Strategies in France, Germany, and the UK." *Agribusiness*. 19(1)(2003):77-90.
- Salin, V. and N.H. Hooker. "Stock Market Reaction to Food Recalls." *Review of Agricultural Economics*. 23(1)(2001):33-46.
- Shogren, J.F., J.A. Fox, D.J. Hayes, and J.Roosen. "Observed Choices for Food Safety in Retail, Survey, and Auction Markets." *American Journal of Agricultural Economics*. 81(5)(1999):1192-1199.
- Umberger, W.J., D.M. Feuz, C.R. Calkins, and B.M. Sitz. "Country-of-Origin Labeling of Beef Products: U.S. Consumers Perceptions." *Journal of Food Distribution Research*. 34(3)(2003):103-116.
- United States Animal Identification Plan (USAIP) (2004). Background Handout. Online. Available at <http://www.usaip.info/>.
- Unnevehr, L. "Food Safety: Setting and Enforcing Standards." *Choices*. (1st Quarter 2003):9-13.

