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**PERSPECTIVES ON TRACEABILITY AND BSE TESTING
IN THE U.S. BEEF INDUSTRY**

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IN THE U.S. BEEF INDUSTRY

DeeVon Bailey and James Robb

ABSTRACT

[insert abstract here]

PERSPECTIVES ON TRACEABILITY AND BSE TESTING IN THE U.S. BEEF INDUSTRY

International debate has been elevated on meat traceability and customer assurance programs by BSE in Europe, Japan, and more recently in Canada and the United States. However, significant disagreements exist, both between countries and within countries, about how to best accomplish tracking products through the supply chain and also on the role that BSE testing should play. Resolving these differences is an important aspect of reducing trade frictions, but ultimately eliminating these differences will require a common definitions or at least an acceptance of a set of protocols that meet specifications for international trade. By most accounts, the United States has reacted relatively slowly, compared to major customers and competitors in international meat markets, to the growing international call for traceability in meat markets and trade (Liddell and Bailey). However, the discovery of a dairy cow with BSE in Washington state in December 2003 removed any doubt that a method for tracking and testing meat in response to the threat of BSE in the United States needed to be implemented.¹

One important consideration evolving out of the pressure placed on the United States to develop some type of meat tracking system following December 2003 is how to address the food safety concerns related to BSE effectively without drastically disrupting the current domestic meat production and processing system. The dominant existing model for traceability is in the European Union (EU) and calls for farm-to-fork traceability systems² for meat and other food

¹ See Dickinson and Bailey (2002, 2005) and Golan et al. for other potential reasons for implementing traceability systems.

² EU General Food Law Regulation EC No. 178/2002, Article 18 specifies: "Food and feed business operators shall be able to identify any person from who they have been supplied with a food, a feed, a food-producing animal, or any substance intended to be, or expected to be, incorporated into a food or feed. To this end, such operators shall have in place systems and procedures which allow for this information to be made available to the competent authorities on demand" (Farm Foundation, p. 11). This establishes a "one-step backward" approach

items, a system many in the food system consider too costly to implement in the U.S. system. A new U.S. model may need to be developed that could address concerns about food safety related to BSE while being cost effective.³

In general, North American agribusiness firms desire flexibility in establishing protocols for traceability in meat products and other food items indicating that a regulated or “one-size fits all” approach would be inappropriate (Farm Foundation). At this point, the U.S. meat tracking system is developing into a two-step process. The first step of this process is the eventual implementation of an animal identification (ID) system from farm to slaughter called the National Animal Identification System (NAIS). The NAIS is being implemented, at least initially, on a voluntary basis beginning with a series of pilot projects that will eventually provide the basis for a national system. The second step of the process would then have meat being tracked after it leaves the packing plant. This two-step approach creates a “break” in traceability at the processing plant.

Robb and Rosa explain why this break would exist and also explain some of the difficulties associated with a farm-to-fork beef traceability system in the United States. When beef packing moved from selling whole carcasses to selling cuts derived from primal cuts, the link between the identity of the animal(s) and beef cuts was broken. Transforming cattle into beef is a disassembly process. That is, rather than assembling inputs into a final product, as is done in most manufacturing processes, an animal entering a processing plant is broken into many

that can essentially be used to establish a chain of custody for meat and other food products throughout the marketing chain.

³ Various estimates are available for implementing animal ID and meat traceability systems. These include an estimated \$122 million annually for all species for the NAIS (USAIP). Sparks Companies Inc. estimated that the capital investment required to implement a farm-to-fork system for cattle only would be approximately \$140 million with an additional annual variable cost of about \$108 million.

products or cuts and these parts are then reassembled with the same or similar cuts from other animals and then typically placed in a box for shipment.

The major stages involved in beef processing at a packing plant are illustrated in Figure 1. Cattle ready for slaughter typically are purchased from feedlot operators and are then shipped to the processing plant. Stage 1 at the processing plant involves slaughtering the animal as it enters the plant (Figure 1). The internal organs and hide are then removed from the animal and the carcass is split in two. These two halves are left hanging on hooks that are part of a trolley system that moves through the plant. In Stage 2, the carcass temperature is reduced when the carcass is stored in the plant's cooler. This is also the stage in which carcass grading typically takes place (Figure 1). Stage 3 of the processing operation is the fabrication stage (Figure 1). In this stage, the carcass leaves the cooler and is reduced into large primals (typically quarters of the carcass). During fabrication, parts of the carcass move in different directions in the plant while being further cut, trimmed, and sized. Many different butchers work on the different cuts and parts of the carcass as it moves through the fabrication stage of the production process. At each cutting stage of the fabrication process trim from the process is collected from different carcasses. The fabrication stage of the process involves preparing the meat to meet customer specifications such as cut, size, grade, or other special requirements. USDA's Institutional Meat Purchase Specification (commonly called the IMPS code) indicates that there are approximately 30 beef products just from the loin each with four standard weight ranges and 20 "portion cuts." This describes how many different cuts and specifications might be dealt with in the fabrication stage. The final stage in a typical U.S. packing plant (Stage 4 in Figure 1) involves moving boxes of cuts to coolers to await transportation to customers.

Figure 1 illustrates that the breakdown in linear traceability between the animal's carcass and the beef exiting the processing plant is in the fabrication stage. Tracking within processing plants can be accomplished to the carcass cooling stage relatively easily if technology is invested in to connect animal ID information to a microchip embedded in the hook carrying the carcass through the plant on its trolley system. Tracking meat once it is in the box to the end user is also relatively easy using bar coding on boxes or some other type of identification method.

Complete (farm-to-fork) traceability assumes that information flows forward with the product through the production stages and can also be followed back through the production stages. The speed and volume of meat moving through large U.S. packing plants makes tying individual cuts moving through the fabrication floor and into boxes back to animals entering the plant virtually impossible with current commercial scale technology. With effort and investment, fabrication stage tracking on a batch or time basis can occur. This is most easily done for whole muscle meat cuts (e.g., steak), but further processed items like mixed and ground trim components (hamburger), present even more traceability problems.

Economic research consistently finds that a significant number of persons are willing to pay additional money for meat products with extra-quality assurances such as traceability, humane animal treatment, or environmental stewardship. For example, Dickinson and Bailey (2002, 2005) examined willingness to pay (WTP) for meat traceability and meat characteristics that could be verified with traceability. They found that, on the average, consumers in the United States and some of America's principal customers and competitors in world meat market value information that can be offered by traceability (also see Hobbs et al.). But how should traceability be defined? Are consumers equally happy with a two-stage process for tracking as

they would be with farm-to-fork traceability? These are questions that should be considered as the U.S. beef industry develops its own tracking system.

Perhaps just as controversial as traceability is the issue of BSE testing. Clearly, the critical factor to assuring cattle and human food safety is the removal of Specified Risk Materials. Testing in the beef processing system is a standard statistical practice for monitoring procedures (e.g., testing for *E-coli*). But beyond that, testing for BSE is now often discussed as a consumer assurance attribute.

The USDA, Animal Plant Health Inspection Service (APHIS) has undertaken a nonrandom BSE testing program for cattle considered to be in the "high-risk" population. The high-risk population is defined as those animal exhibiting clinical signs involving the central nervous system that could be consistent with BSE and also dead and nonambulatory cattle where such clinical signs can not be evaluated (APHIS). The APHIS testing program is in contrast to the EU system that does random testing of the general slaughter population as well as testing cattle in the high-risk category. However, APHIS states that their testing program would be able to detect one animal with BSE out of 10 million with 95% confidence.

The Japanese recently agreed to accept USDA's BSE testing protocols as long as meat imported to Japan comes from animals under 20 months in age, have all specified risk material removed, and which have been in an USDA-approval animal ID program. Other issues relating to methods for verifying the maturity of meat from cattle slaughtered and exported to Japan have slowed the resumption of trade with the Japanese.

The issue of testing raises questions about how much testing is needed and whether or not testing can serve as a substitute in the minds of consumers for farm-to-fork traceability. A survey of consumers near supermarket meat counters conducted in December 2004 and February

2005 in a small city (Preston, Idaho), a small to mid-sized city (Logan, Utah), and a larger city (Salt Lake City, Utah) asked their opinions about two-stage traceability, farm-to-fork traceability, and BSE testing. In the survey, participants were asked for their hypothetical preferences if given a choice between a baseline USDA inspected beef steak that might have been tested for BSE (i.e., the possibility that USDA testing for BSE might have been performed on the animal producing the steak) and three other steaks with enhanced characteristics offered at the same price as the baseline steak. If the enhanced steak was preferred, the respondents were then asked to indicate how much more they would be willing to pay, if anything, for the enhanced steak compared to the baseline steak. The respondents were told that they should consider their responses based on the baseline steak being part of a two-stage tracking system. The choices were done in a pairwise fashion with each of the three enhanced steaks being compared one at a time with the baseline steak. One of the enhanced steaks was traceable to the farm level and just like the baseline steak also might have been tested for BSE (Steak 1), another was traceable to the farm level with a guarantee that the animal had been tested for BSE (Steak 2), and the final steak was not traceable to the farm level but was guaranteed that the animal had been tested for BSE (Steak 3).

Table 1 demonstrates a stated preference by the survey respondents for traceability and/or guaranteed testing over two-stage tracking with well over 80% of respondents preferring one or both to just two-stage tracking at the same price. A more general WTP appears to exist for guaranteed testing compared to traceability (higher percentage willing to pay a 5% premium or more for Steaks 2 and 3 than for Steak 1) and traceability and guaranteed testing (Steak 2) had a slightly more general WTP than only guaranteed testing (Steak 3). This survey suggested that

many consumers deem a two-stage tracking process inadequate, compared to farm-to-fork traceability and/or guaranteed testing for BSE.

Agribusiness firms also view traceability and characteristics that can be verified using traceability as methods for either capturing market share or maintaining brand equity in the case of a crisis. For example, McDonald's has indicated that a significant portion of its beef needs to be "source-verified." Source verification, as defined by USDA requires that tracking must begin at birth and that a livestock identification method be implemented so that the location(s) where cattle were born, raised, fed, slaughtered, and processed are transferable to the next production step. The identification of the producer(s) must also be provided.

Given that incentives exist to develop farm-to-fork traceability in trade and in domestic markets, one can ask if a two-step process represents the future of the U.S. meat industry. Cost effective technologies are needed to facilitate a traceable meat system on a large scale in the United States, especially for beef. In the meantime, smaller meat processors will likely have an advantage over large processors in providing source-verified meat products because the scale of their operations fit lot sizes from individual farms and feedlots better than high volume plants. This assertion appears to be supported by the fact that most firms participating in source verification are small to mid-sized.

Beef processing is moving at a slower rate to implement tracking systems than are swine and poultry, perhaps not surprisingly because the industry structures for these meat are different. However, regardless of whether the pressure for better tracking comes from consumers, suppliers, or procurers, it appears certain that the U.S. meat system will continue to move toward more traceability.

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Table 1. Utah/Idaho Survey Responses to Questions Relating to Two-Step Traceability and BSE Testing.

Category vs. Baseline Steak	Percentage Preferring Enhanced Characteristic	Percentage WTP at Least 5% More
Steak 1: Traceable/Maybe Tested N=103	82%	57%
Steak 2: Traceable/Tested N=104	90%	76%
Steak 3: Non-Traceable/Tested N=105	87%	72%

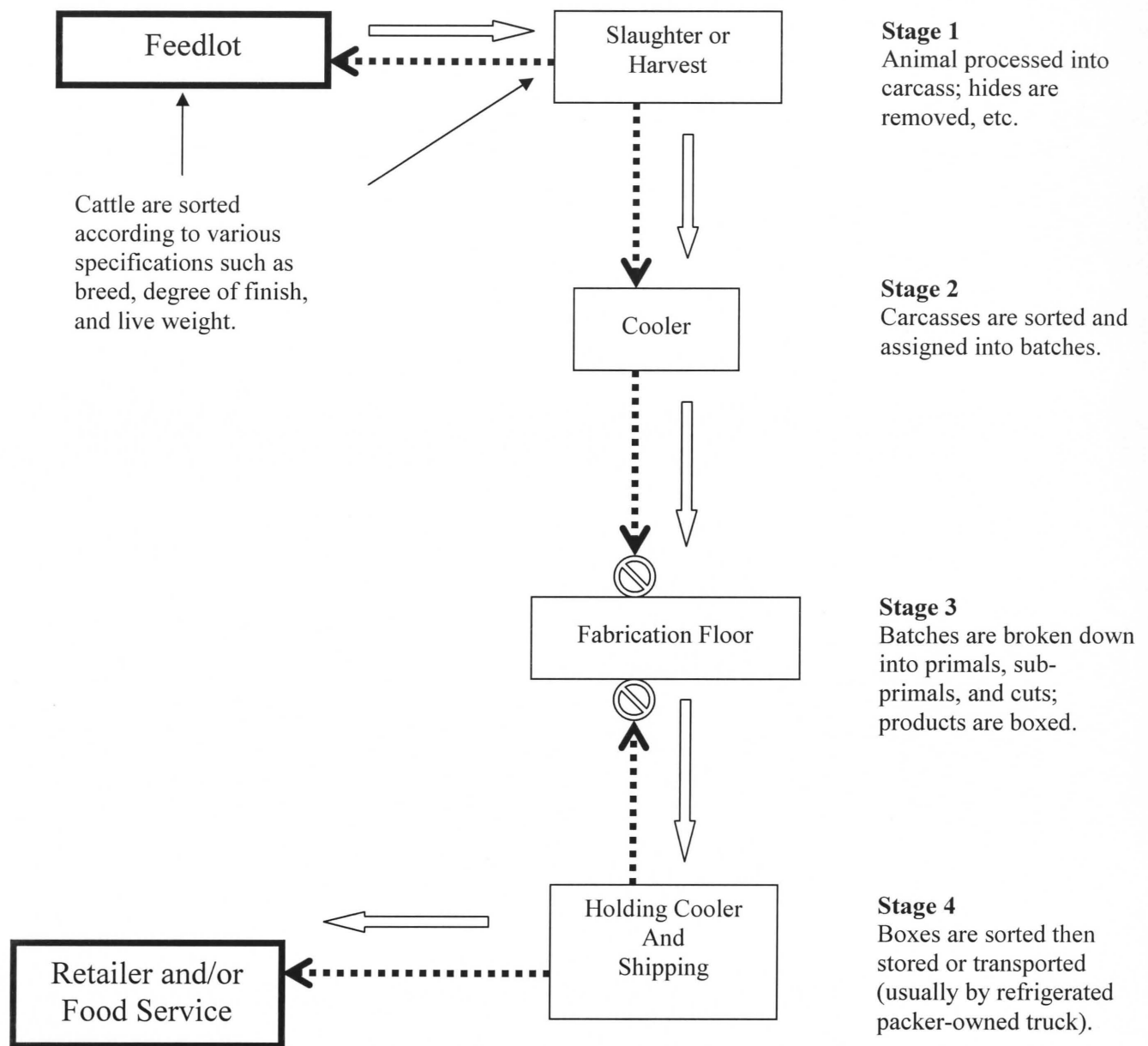


Diagram Legend

Cattle, Carcass and Meat Flow

Continuous Traceability and Identification Flow

Figure 1. Schematic of Wholesale (Packer) Sector Stages and Linkages.