

Development and Implementation of a Mandatory Animal Identification System: The Canadian Experience

Jared G. Carlberg

This article provides a brief history of the animal identification (ID) system that previously existed in Canada along with details on efforts to “reidentify” the country’s cattle herd. The current state of ID for various species is summarized, and the state of regulations federally and for major agricultural province are outlined. A short background on the economics of animal ID is provided. Particular attention is paid to the operation of the Canadian Cattle Identification Agency, an industry–government initiative charged with identifying the national cattle herd. The animal ID system in Canada is found to have performed well when called on in times of animal health crises, although there have been notable deficiencies in its performance on occasion. Canada’s animal ID system will continue to evolve as new technologies for tagging and database management (among others) are developed. It is expected the system will play an important role in future attempts to exploit traceability for value-added initiatives.

Key Words: animal identification, traceability, Canadian Cattle Identification Agency

JEL Classifications: H41, K39, Q18

Current efforts to identify each individual member of the cattle herd in Canada have been referred to by Inch (1998) and others as the “reidentification of Canada’s cattle herd.” Stanford et al. (2001) note that from the 1940s through the 1980s, extensive efforts were made to identify animals individually as part of efforts to eradicate bovine brucellosis and tuberculosis. Under the Health of Animals Act, the Canadian government identified and tagged

up to 95% of Canada’s cow herd from farm to slaughter.¹

Early Canadian animal identification (ID) efforts were successful in many ways. Canada’s system for managing animal health crises was tested in 1952, when an outbreak of foot and mouth disease occurred in Saskatchewan, resulting in the closure of the Canadian border

¹There is some disagreement about the percentage of cattle identified under the brucellosis and tuberculosis eradication efforts. Stanford et al (2001) maintain 95% of the cow herd was identified, whereas Inch (1998) suggests the passage of 95% of calves was monitored from herd to slaughter. Kellar (1994) offers a dramatically lower estimate of identification, asserting only 15–20% of cattle were identified annually under the National Animal Health Program.

Jared G. Carlberg is associate professor of Agribusiness and Agricultural Economics, University of Manitoba, Winnipeg, Manitoba, Canada.

to cattle exports (Stanford et al., 2001). Because animals had already been identified as a result of eradication efforts related to the previously noted diseases, the trade disruption was short in duration (a few months) and the industry returned to normalcy relatively quickly. Another major success came when Canada was declared brucellosis-free in 1985.

By the time bovine brucellosis was eradicated in Canada, no serious efforts were being made to maintain enrollment in the national tagging program. Identification numbers declined dramatically with only a small proportion of cattle producers maintaining even a rudimentary ID system for management of their herd. Kellar (1994) observes that the focus during the first half of the 1980s in Canada was on exploring options for electronic ID tools to replace the metal tags that had been in use for several decades.

Formation of the National Advisory Board on Animal Identification in 1990 ushered in an era of renewed collaboration on the issue. The bovine and porcine sectors were both represented on the Board as was the packing sector and both senior (i.e. federal and provincial) levels of government. In 1994, the Board was absorbed as a subcommittee of the Canadian Animal Health Consultative Committee, from which was formed the next year the Canadian Animal Health Network's surveillance subcommittee. This subcommittee was the precursor to the Livestock Identification Working Group (LIDWG), which was given the mandate to explore ID of all livestock species (Inch, 1998).

The decimation of the British cattle industry that followed the Bovine Spongiform Encephalopathy (BSE) outbreak resulted in a renewed sense of urgency about the need to bring Canada's animal ID system up to speed during the 1990s. Attributable in part to the grave situation in Europe, ID of the national cattle herd (as opposed to other species) was deemed the top priority. Accordingly, the Canadian Cattle Identification Agency (CCIA) was formed in 1998, and most of the important components of Canada's current animal ID are either administered by or have grown out of the CCIA.

The Economics of Animal Identification

Although the origins of animal disease economics date back to Morris' (1969) attempt to calculate the value of veterinary services to primary (i.e. animal production) industries, McInerney (1996) laments the lack of an "...established conceptual framework for analyzing [animal] disease as an economic phenomenon. . ." Nonetheless, several studies have attempted to calculate costs associated with animal disease and benefits accruing from its prevention. Avoiding trade losses when disease outbreaks occur is among the most important benefits associated with animal ID systems in exporting countries. Dijkhuizen, Huirne, and Jalvingh (1995) provide a simple graphical model to help conceptualize the welfare effects of such events. Other work has focused specifically on animal ID systems. For example, Pendell et al. (2010) use a multimarket simulation model of the U.S. livestock and meat sector and find only a small increase in domestic demand is required to offset costs associated with an animal IS system.

A few attempts have been made to calculate the costs of potential disease outbreaks in Canada. Krystynak and Charlebois (1987) use Agriculture and Agrifood's major (655 equation) Food and Agriculture Regional Model to discover that even a small Foot and Mouth Disease (FMD) outbreak in Canada would cause farm cash receipts to decline by \$2 billion. More recently, in 2002, Serecon Management Consulting, Inc. (2002) estimated the cost of an FMD outbreak at between \$14 (small scale) and \$46 (large scale) billion depending on the size of the outbreak. Given the comparatively tiny costs of implementing Canada's animal ID system for cattle—the CCIA was established using a \$4 million grant from the federal government (although this obviously understates the total cost of the system)—it seems clear that the real and potential benefits of the system greatly outweigh the costs.

A primary function of animal ID systems is to facilitate rapid traceback of infected animals to prevent disease spread. For a major livestock exporting country like Canada, maintaining trade flows in both live animals and meat

products is of critical importance; this is perhaps the greatest potential benefit of an animal ID system. There is thus a public good (originally described as “collective consumption good” by Samuelson [1954]) aspect to the benefits associated with an effective animal ID system; the benefits are both nonexcludable and nonrivalrous.

Like with many public goods, there is a potential for any animal ID to be undermined by the “free rider” problem. Olson (1965) was among the first to observe that although individuals can be expected to act in their own best interest, groups of individuals cannot necessarily be expected to act in the best interest of the group. For example, nonparticipants in a cattle ID system could share in the benefits of the system (identified by Disney et al. [2001] as limiting disease spread, facilitating faster traceback, limiting production losses, reducing mitigation/eradication costs, and preventing trade losses) without sharing in the costs. Nonparticipants would not only avoid sharing in the costs of the system, but also would inherently pose a greater risk to the livestock system by refusing to participate. Canada’s system for cattle ID avoids this and thus eliminates the free rider problem by mandating participation by all producers with potentially severe penalties for failure to comply.

Current State of Animal ID Systems in Canada

The current systems of ID for the four major commercial animal types (beef cattle, dairy cattle, sheep, and hogs) have important similarities and differences.

Evolution and the current state of the systems in place for the latter three species are overviewed subsequently. The CCIA is discussed in more detail later in the article.

National Livestock Identification for Dairy

Coordination of tagging for dairy animals in Canada (except Quebec) takes place through the National Livestock Identification for Dairy (NLID, 2009). Mandatory ID for dairy cattle was implemented simultaneously with that for

beef cattle in 2002. Both female and male animals are tagged with the same system under NLID, which is responsible for the distribution of tags. Recordkeeping for NLID is coordinated through the Canadian Livestock Tracking System (CLTS) database, which is actually maintained by the CCIA. The CCIA also is charged with assigning tag numbers through NLID, and tags must be registered to an animal’s farm of origin.

Canadian Sheep Identification Program

Animal ID for sheep in Canada became mandatory at the start of 2004, nearly a decade after planning for the initiative began. The notion that a national ID system for sheep should be considered grew out of the LIDWG in 1995, and in 1996, the idea was formally proposed to the Canadian Sheep Federation (CSF). The Board of Directors of the CSF agreed to the development of an ID system for their flock that would serve as a model to be applied to other sectors, including the cattle industry; in fact, it was representatives of that industry who were charged with devising the system (CSF, 2009).

Although a great deal of thinking and loose planning took place over the next few years, the actual decision to develop and implement an affordable, flexible, and effective ID system for sheep did not take place until 2000 (CSF, 2009). Changes to the legislation governing animal ID systems were requested by the CSF; the final version of these changes was arrived at in 2002. The final legislation became effective on January 1, 2004.

Under the Canadian Sheep Identification Program (CSIP), as is the case for most animal ID systems in Canada, an ear tag must be applied to a sheep before it leaves the herd of origin. Tags must be of an approved type with tag numbers being assigned by the CCIA to manufacturers, who supply tags to authorized distributors, who in turn are required to report distribution of which tags are purchased by which producers to the CLTS.

Although the CSIP and CCIA are inextricably intertwined, there are important differences in the animal ID systems for cattle and sheep in Canada.

In an effort to avoid placing an undue financial burden on sheep producers, the use of barcoded tags is not required on sheep. The tradeoff is that producers are required to keep track of animal movements; records must be kept pertaining to all animals entering their farms to form part of the breeding stock, and for all animals older than 18 months leaving the farm for a destination other than an abattoir (CSF, 2009). As a result, tags are not “retired” at slaughter for sheep as they are for cattle, but producers must keep careful record of the whereabouts of their sheep. In the event of an animal health crisis, authorities would be able to trace the sheep back to its herd of origin, at which point producer-maintained records would have to be relied on to pinpoint subsequent animal movements.

Regulatory authority for the CSIP falls to the CFIA under the *Health of Animals Act and Regulations*. CFIA inspectors are charged with the responsibility to attend farms and commercial trading sites to ensure compliance. Although the hope is that provision of education and information on the benefits of identification will be sufficient to ensure participation in the CSIP by producers, the CFIA can administer monetary penalties for violations. Particularly egregious violations could result in prosecution.

National Identification and Traceability System for Hogs

The hog industry is critically important to the Canadian agricultural economy. Over 31.5 million pigs were marketed in Canada in 2007 with approximately 9 million head exported. The Canadian Pork Council (CPC) notes that close to a billion pounds of pork products worth almost \$2.5 billion left Canada for export markets in over 100 countries that year (CPC, 2009).

Given the importance of export markets, the need for an effective traceback system for hogs in Canada is clear. Some estimates have placed the costs of a serious animal disease outbreak at up to \$45 billion (CPC, 2009). At the annual CPC board of directors’ meeting in 2002, a commitment to enhance preparation for disease outbreaks was made, and the need to focus on

ID of both animals and premises was identified. Subsequently, work has been progressing on implementation of an ID system (National Identification and Traceability System for Hogs [NITSH]) that will be closely associated with the CCIA/CLTS, Agri-Tracabilite Quebec (ATQ), or both.

A partial system for hog traceability existed before the NITSH. Under this system, a shoulder slap tattoo (literally applied to the shoulder of a hog by slapping it with a tattooer containing removable dies to which ink is liberally applied) is placed on a hog before it is shipped for slaughter. The primary use of the shoulder slap tattoo for hogs has been the ID of animals at slaughter to facilitate producer payment. This system has not been without its problems; a 2004 study found that 13.5% of tattoo numbers being used in Canada were duplicated. This is because tattoo numbers were allocated to producers by individual provincial hog associations. The shoulder slap tattoo would be unlikely to suffice for large-scale (national) ID; although the industry’s national tattoo number standardization strategy has eliminated the problem of duplicate tattoos, there is still the issue of efficiency of animal movement through the ID system. Tags are viewed as a much better solution than tattoos for ID when large numbers of animals must be identified in a timely fashion.

The vision for the NITSH is comprised of four elements, each of which is necessary to the development of an effective system (Murphy et al., 2008). The first is a livestock premises registration system and database. Premises ID is a key pillar of most animal ID systems. The second is a national tattoo numbering registry for slaughter hogs. Third is a regional (as distinguished from national) database for slaughter swine and relevant marketing boards, and fourth is a national movement reporting system and tracking database.

Although there were hopes for the hog ID system to be completed by the summer of 2008, Clark (2009) indicates there is some distance to go before the process is completed. The industry is working with the federal government on appropriate amendments to the *Health of Animals Regulations* with respect to animal ID and

movement tracking. Premises ID requirements will be implemented by provincial agencies/governments, because such requirements apparently fall outside federal jurisdiction. Implementation of the system is likely to be completed by mid-2010 and is expected to be voluntary for the first year or 18 months, similar to what was done for cattle ID.

Canadian National Goat Federation

Although not as economically significant as the major commercial animal species, the goat industry has similar concerns to other sectors when it comes to animal ID. The Canadian National Goat Federation (CNGF) is a founding member of the CLIA and has remained engaged in issues pertaining to animal ID in Canada. The industry plans to move to a voluntary identification/traceability system in 2009 (CNGF, 2009).

Provincial Animal ID Initiatives

There are three levels of government in Canada: federal (government of Canada), provincial (governments for each province), and local (urban and rural municipalities). The federal and provincial governments are commonly referred to as “senior” levels of government, and they tend to have shared authority for regulating most public affairs. It is generally the case that provincial regulations are more stringent than federal in areas where both apply. In most cases, provincial government legislation cannot “override” that of the federal government.

Regulations pertaining to animal ID are no exception. For example, the national mandatory ID systems in place for cattle, bison, and sheep are the result of federal legislation and the federal government has enforcement authority through the CFIA. However, in a few cases, provincial governments have gone beyond the federal requirements for ID and enacted their own legislation.

Perhaps the most advanced animal ID system exists in Quebec, and the province of Alberta has recently enacted new legislation that goes beyond the requirements of the

federal system. Each is described in moderate detail subsequently. Most other provinces do not have mandatory animal ID initiatives that go beyond the national programs, although some provinces (especially west of the Maritimes) are making strides in that regard. For example, Hunter (2009) notes that the province of British Columbia is moving toward mandatory age verification. As well, the province of Manitoba announced funding late in January 2009 for the development of an agrifood premises ID system. The Saskatchewan Cattlemen’s Association recently indicated support for mandatory age verification along with premises ID (SCA, 2009). Ontario has a not-for-profit traceability agency named Ontrace that is charged with building and implementing a system of traceability for agrifood sectors in that province. In June 2008, Ontrace’s (non-mandatory) Ontario Agri-food Premises Registry took effect, and in September, Ontrace announced a partnership with ATQ to facilitate the exchange of information pertaining to premises ID. Ontrace has also been working with industry groups to facilitate premises ID; in May, a partnership with Ontario Corn Fed Beef was announced, and in October, a similar agreement with Dairy Farmers of Ontario was signed (Ontrace, 2009).

Agri-Tracabilite Quebec

In concert with the renewed interest in traceability taking place elsewhere in Canada, in March 1998, the provincial government and agricultural producers’ association (union des producteurs agricoles) agreed that a permanent ID and traceability system should be implemented for selected agricultural products in Quebec (ATQ, 2008). As a result, ATQ was officially formed in September 2001 with a broad mandate to implement traceability for cattle, sheep, and pigs (cervids were added in 2008). Its stated mission is to not only help protect food safety in Quebec, but also to enhance the competitiveness of the province’s agricultural producers.

There are three principle objectives for Quebec’s traceability system (ATQ, 2008). The first relates to effective management of crises

related to food safety or animal health. The second involves tracking of animal origin and movements, and the third focuses on the ability to monitor animal imports/exports to mitigate risks associated with movements of animals beyond provincial borders. The ATQ has specific mandates to standardize traceability systems for the various agricultural products/commodities over which it has jurisdiction, to facilitate the transfer of information among agrifood industry stakeholders, and to consolidate traceability activities in the province within a single location/database.

Development of Quebec's system of traceability was funded by the provincial government, which provided a sum of \$21.5 million over 4 years for the implementation of ATQ. The result has been a detailed framework that maintains an extensive multispecies database on individual animals. Very soon after birth (7 days for cattle, 30 days for sheep according to Sanderson and Hobbs, 2006), producers are required to "activate" an animal's tag, providing details as to birth date, gender, and production site. Animal movements between premises such as pastures, auction barns, fairgrounds, and slaughterhouses are also tracked. Provincial income support programs are tied in an important way to ATQ.

ATQ is governed by a board of seven directors, three of whom are designated as executive directors (ATQ, 2008). A senior manager oversees the managers of three departments: development and information, management and operational services, and computer services. The organization houses six specialized committees as well: an advisory committee (provides technical advice on issues) of technical representatives from industries associated with ATQ; implementation committees for each of the four affected animal species (bovine, ovine, porcine, and cervid) comprised of representatives from the appropriate sector; and a sectorial committee for table eggs traceability. There are also a number of technical and interim committees that exist to provide support to senior management.

ATQ has broadened its focus considerably beyond animal ID issues, as evidenced by some of the research-based initiatives it has undertaken. It has recognized the dearth of traceability for

crop and horticulture products; this was the impetus for ATQ's pilot project for the ID and traceability of lettuce. Objectives of the project include testing of product ID methods and labeling/marketing equipment and evaluation of an information management system that would be used for recall purposes if a food safety event were to occur. A similar pilot project is underway to address deficiencies in the traceability system for table eggs.

Traceability Premises and Livestock Identification in Alberta

Alberta is the heart of Canada's beef industry and has the greatest stake in the development and implementation of a full traceability system for cattle. To this end, new legislation has just come into effect to move Alberta's cattle industry toward full traceability. As of January 1, 2009, the Animal Health Act came into effect in Alberta to replace the Livestock Diseases Act. Simultaneously, three new regulations were also implemented: Reportable and Notifiable Diseases Regulation; Traceability Premises Identification Regulation; and Traceability Livestock Identification Regulation. The latter two regulations pertain directly to animal ID.

The new regulations are intended to move the province to full implementation of what are commonly referred to as the "three pillars" of traceability: animal ID, premise ID, and animal movement tracking. Animal ID for cattle has been mandatory for some time under the national system, but premise ID and animal movement tracking were required only in Quebec up to this point. Premises ID had been required in the province previously to access its Alberta Farm Recovery Plan II "disaster funding" program.

Under the Traceability Premises Identification Regulation, all owners of "recordable animals" (i.e. everything except household pets) must apply for a premise ID account and premise ID number within 30 days of acquiring ownership of a recordable animal (Alberta Queen's Printer, 2008a). Owners of "commingling sites" must also obtain both a premise ID account and premise ID number within 30 days

of taking ownership of the commingling site. Under the regulation, 17 specific types of commingling sites are identified, ranging from abattoirs to community pastures to veterinary stations.

Full contact information for the producer is required on the application for a premises ID account. A legal land description or georeferenced coordinates for the premises must be provided to obtain a premises ID number. If the producer has previously elected to obtain a premises ID number from either the CCIA or Alberta Pork Producers, that number must also be provided on the application. The species of recordable animals that may be present at each location must also be specified along with the maximum capacity of each species of each recordable animal that may be present at the location.

The Traceability Animal Identification Regulation applies to all cattle born in Alberta beginning on January 1, 2009. The new regulation makes age verification mandatory in the province (voluntary age verification is already in place nationally within the CLTS) and also implements a partial movement-tracking system for cattle. Both individual cow-calf producers and cattle feeders are affected by the new regulation.

Under the regulation, producers are required to keep somewhat detailed records for reporting purposes for each animal. The producer's premises ID number, the tag number of the animal, birth date information (actual date or start of calving), and method by which birth date is determined must all be recorded (Alberta Queen's Printer, 2008b).

Feedlots are also subject to additional reporting requirements under the new regulation; the new regulation implements a partial movement tracking system. Within 7 days of new animals arriving at the premises, their tag numbers must be reported along with the premises ID number of the feedlot. Similarly, the tag numbers of all animals moving out of the feedlot—unless the animals are destined for slaughter—must be reported within 7 days of the animals leaving the premises.

Responsibility for retagging animals that have lost their Health of Animals Regulations-approved tag is also assigned to anyone who owns, possesses, or has care of or control of an

animal under the regulation. Full information regarding the retagging of the animal must be reported within 30 days (or before the animal leaves the farm of origin) by producers or within 7 days (or before the animal leaves the feedlot) by cattle feeders. All reporting of information is done through the CLTS.

The last component of full animal traceability to be implemented in Alberta will be full animal movement tracking. It will take some time for the details of this system to be worked out given that full movement tracking is both more complex and more costly to producers than simple animal and premise ID.

Canadian Cattle Identification Agency

History and Alternatives Considered for Adoption

The CCIA was formed in 1998 as an industry-led agency designed to implement a national animal ID system for cattle and bison. The Canadian Livestock Identification Program came into effect on January 1, 2001, and required that all cattle and bison be identified with a CCIA-approved tag before leaving the herd of origin or commingling with animals from another herd. An exception existed for animals leaving the herd of origin only temporarily before returning and for animals that were to be tagged once arriving at a CCIA-approved site after leaving the herd of origin.

The major choice to be made among alternatives was with respect to overall structure and scope of the system. One alternative available to the model adopted in 2001 was that chosen by the E.U. in the wake of the BSE crisis. In 1997, the EU adopted regulation 820/97 pertaining to the ID of cattle and the labeling of beef products (Canada Gazette, 2000). The E.U. regulation was viewed as somewhat onerous given it required multiple tags per animal, tagging within a specified time after birth, and premises registration as well as movement tracking. There were also provisions that required beef products to be traceable back to the animal from which it was derived as well as the animal's country of origin.

The E.U. system and other alternatives were considered but not selected for a variety of reasons mostly associated with concerns over

placing excessive financial burdens on individual producers as well as the industry as a whole. Essentially, anything that is currently part of the system could have been included at inception, but it would have been more expensive and time-consuming to do so. In other words, the animal ID system is evolving to include the elements not selected at initial implementation (i.e. premise ID, age verification, and movement tracking) as well as elements subsequently recognized as being of value (i.e., GIS/zoning and value-added modules).

Aside from the choice of structure and scope, choices also had to be made about a number of issues. One of the most important of these revolved around the selection of the physical ID method to be approved for use by the CCIA. Barcode tags were selected from among alternatives as a result of ease of use and low cost; it was also necessary to choose styles and manufacturers of tags to ensure the system would function efficiently. Rigorous testing of tags took place before final selection of manufacturers was made.

Regulatory Framework

The enabling legislation for animal identification in Canada is the *Health of Animals Act*, which received royal assent on June 19, 1990. Described as “An Act respecting diseases and toxic substances that may affect animals or that may be transmitted by animals to persons, and respecting the protection of animals,” section 64(1)(y) grants the Governor in Council (i.e., the government) the authority to make regulations for the purpose of protecting human and animal health by “establishing and governing a national identification system for animals that provides for standards and means of identification” (Department of Justice Canada, 1990).

The Act is augmented by the *Health of Animals Regulations*; the two are often jointly referred to as the *Health of Animals Act and Regulations*. Part XV of the *Regulations* describes the provisions that apply to animal identification. Minor modifications to the scope of the legislation are typically made by amendments to the *Regulations* rather than the Act itself. This process has been used to amend

the *Regulations* twice, first in 2000 to facilitate the reidentification of the national cattle herd under mandatory cattle ID as of 2001 and again in 2003 for the purposes of adding sheep to the list of animals for which mandatory ID existed (as well as making a few minor changes to the *Regulations* to improve their general efficacy).

The Canadian Food Inspection Agency (CFIA) is charged with enforcing the *Health of Animals Act and Regulations* and thus the requirements of the CCIP. In this role, CFIA inspectors conduct audits to ensure compliance and have the authority to assess monetary penalties or even prosecute offenders if non-compliance is detected (CFIA, 2009). Audit results reported by CFIA for 2006 indicated 230 fines (administrative monetary penalties) were issued to producers, the vast preponderance of which went to cattlemen. However, compliance rates by producers exceeded 95% for bison producers, 96% for sheep producers, and 99% for cattle producers (CCIA, 2007).

How the Cattle Identification System Works

As noted, items pertaining to animal ID are contained in Part XV of the *Regulations*, specifically sections 172 through 189. The *Regulations* spell out the requirement that sales of CCIA-approved tags must be reported by retailers within 24 hours of sale (s. 174); that a CCIA-approved tag is properly affixed to an animal before it leaves the farm of origin and that proper records are kept (s. 175) and that the animal may not be transported or received without an approved tag (s. 177); the strict conditions under which an animal may be moved from its farm of origin before having an approved tag affixes (s. 183); the process that must be followed when an animal that does not bear an approved tag is detected (s. 184); the process that must be followed for the retirement of a tag on animal death or slaughter (s. 186, s. 187); and the requirements for reporting tag numbers on animal export (s. 188) or applying approved tags on animal import (s. 189).

For practical purposes, the cattle identification system consists of four simple components (CCIA, 2009a): 1) an approved tag is affixed to the ear of each animal before it leaves

the herd of origin; 2) tags containing a unique ID number are allocated by the CCIA, fabricated by an approved manufacturer, and distributed to producers through authorized retailers; 3) tag retailers report issuance of tags securely to the CCIA's national database; and 4) each animal retains its unique ID number through to slaughter or export.

Needless to say, this characterization of how the system works is greatly simplified. In fact, massive efforts have been and are required to implement and maintain the cattle ID system. Tags had to be tested, producers and distributors trained in the use of the system, an extremely complex database designed and constantly upgraded and updated, monitoring and enforcement mechanisms designed, and innumerable other tasks completed for the system to function effectively.

CCIA Database and CLTS

Design and maintenance of its database has been among the most important of the CCIA's responsibilities. Since the Agency's inception, the database has been relied on to accommodate a steadily increasing volume of information as new species and applications have been added. What began as a database housing information on only cattle and bison has evolved into a multispecies records system that accommodates not only animal ID, but several other important components of traceability.

A number of both minor tweaks and major upgrades to the database have occurred over the years. Although the database always housed information on cattle and bison, the CCIA was also given responsibility for administering programs associated with mandatory ID for sheep in 2004. Perhaps the most important upgrade was the release of the CLTS in January 2006. Properly speaking, the CLTS was "just" a major update to the CCIA's existing animal ID database. Premises ID, age verification, and movement tracking capabilities, each an important component of full animal traceability, are present in the CLTS.

The CLTS resource center (www.canadaid.com/info/index.html) provides a wealth of information for CLTS users. Instructions and use

templates are provided on how to properly navigate any of the system's features: entering birth date data; crossreferencing new with old CCIA tag numbers; tracking movement of tags among manufacturers, distributors, dealers, and producers; documenting importing and exporting of animals; showing movement of animals from one party's inventory to another's; and sighting of CCIA tags (arbitrary observation of a CCIA tag number on an animal) (CCIA, 2009b).

The CLTS is unquestionably the nerve center of the CCIA. Its time-tested ability to perform reliably on a day-to-day basis, provide timely information in animal health crisis situations, and evolve almost continuously to provide new services to users is a testament to the care and skill with which it has been crafted. Any animal ID initiative modeled after the Canadian system should thus carefully follow the roadmap laid out by the CLTS.

CCIA Performance and Enhancements

Because a primary goal of the CCIA is to function effectively in the event of an animal health crisis, it is perhaps most appropriate to rate the system's performance based on the role it has played when called on in such situations. The CCIA had barely been operating for 1 year before the May 2003 announcement that BSE had been discovered in a downer cow in the Peace River region of Alberta. Thirteen more cases of BSE have occurred since that time, including the Washington state case where the animal was traced back to Canada.

The CFIA and CCIA met in late November 2006 to discuss the CFIA's evaluation of the performance of the ID system for the nine BSE cases that had occurred to that point. Several deficiencies to the system were identified at that time (CFIA, 2006). They included (not all applied to each case) an inability to trace the index cow to its herd of origin; the failure to report tag numbers during movement; supply chain members (truckers, auction markets, abattoirs) accepting untagged animals; failure to retire tag numbers; failure of producers to report animal ID against a tag number; failure to tag all animals as required at every tagging

site; failure to crossreference or record re-tagging of animals; and the exchange of tags among producers in violation of regulations.

Despite these deficiencies, the CCIA has performed several critical tasks to aid with investigation of the BSE cases: the CCIA provided a tag inventory to the CFIA of the quarantined herds involved in the traceback process as well as the history of activity for all relevant tag numbers; it provided tag retirement data from packers and deadstock operators; it supplied export data on animals and regarding American plants to which Canadian cattle had been shipped; and it provided scanners containing tag inventories (as well as personnel to assist with using the inventory data) to facilitate selection of animals for testing. Because of these contributions to the investigative process, the international committee struck to review Canada's BSE cases providing a positive assessment of the CCIA's performance.

Participation by producers and compliance is another reasonable way to rate the performance of the system. By almost any objective measure, the combination of education and enforcement has led to a system widely embraced by producers of cattle, sheep, and bison. In addition to the high compliance rates for the three species mentioned earlier, there has been an enthusiastic response to voluntary age verification. By May 2007, over four million birth dates had been registered with the system since it became active in 2005. The CCIA's Report to the Community for 2007/2008 stated that the system was handling more than 130,000 "events"² per day (more than four million per month) and had allocated more than 65 million unique ID numbers. Fourteen million tag numbers had been retired at that point (CCIA, 2008a).

The CCIA has thus performed well by any objective measure. It has provided timely and effective assistance when called on in times of

animal health emergencies; it has successfully identified Canada's cattle, bison, and sheep herds; and the CLTS has evolved relatively seamlessly into a multispecies, multimodule database able to provide a suite of key traceability capabilities to the country's livestock sectors.

The Future of Animal ID in Canada

Although much has been accomplished during the evolution of Canada's animal ID system to its current state, much more is left to do before full animal traceability is accomplished. It is fair to say animal ID in its broad form is now finished. Age verification for cattle is nearly complete, and other important commercial species will not be far behind. Premise ID is not as close to realization as age verification and will take slightly longer to come to fruition because it is an area of provincial rather than federal jurisdiction. This means that all provinces will move to premise ID at different paces: Quebec and Alberta are already there, some provinces are closing in, and others are just getting started. There is also variation by species, although it is likely most provinces will implement regulations for multiple species simultaneously, as Alberta recently did.

Full movement tracking, the third so-called "pillar" of traceability, is more cumbersome and expensive than animal ID (easiest) and premise ID (also fairly easy). It will be some years before full movement tracking is implemented nationally on a mandatory basis. This will hinder the process of "zoning," which allows the ID of all animals having been in a given zone (area) within a specific period of time. It is generally recognized that a lack of movement information in the event of an animal disease outbreak will severely limit the effectiveness of emergency management measures. As such, it is critical for all livestock sectors as well as both levels of government to continue to work together on this important task.

The CCIA recognizes that technology moves quickly and efforts to improve performance from a technical standpoint must be ongoing. The current RFID tag technology is considered obsolete and developmental work is being done on RFID tattooing (Hunter, 2009).

²A "tag event" occurs when a tag is allocated, distributed, issued, returned, or withdrawn. An "animal event" takes place when a birth date is recorded or audited; when a cross-reference, importation, exportation, movein, moveout, or sighting is reported; or when a tag number is retired.

The agency is also striving to increase of the user-friendliness of its database for producers entering information (the “front-end” of the CLTS) while improving the partitioning of the “back-end” of the system to allow efficient use by various groups in accordance with their mandates. It is also hoped the U.S. will become a more cooperative partner with respect to Canada’s animal ID system.

The longer-term vision for Canada’s livestock traceability system focuses on the potential for the development of an integrated value chain. Key elements of such a strategy are to increase consumer confidence in products while increasing access to markets and remaining competitive (CCIA, 2008b). An enhanced CLTS (or parallel database) could allow value chain partners to access information pertaining to commodities used in processing.

There have been early successful examples of the role of animal ID systems in creating value-chain partnerships. Hunter (2009) notes the CCIA’s age verification process has been important to McDonald’s in sourcing beef for its Angus burger in Canada. Other potential value-added attributes that could be verified by an ideal traceability system include genomics, vaccination and feed protocols, production practices, animal feeding performance, carcass quality, and psychographic attributes (e.g. natural/organic; environmentally sound) (CCIA, 2008b).

References

- Agri-Tracabilite Quebec (ATQ). (2008) “Activity Report 2007–2008.” Internet site: www.agri-tracabilite.qc.ca (Accessed June 4, 2010).
- Alberta Queen’s Printer. (2008a) “Animal Health Act Traceability Premises Identification Regulation.” Internet site: www.qp.gov.ab.ca/documents/orders/orders_in_council/2008/1208/2008_563.html (Accessed June 4, 2010).
- . (2008b) “Animal Health Act Traceability Livestock Identification Regulation.” Internet site: www.qp.gov.ab.ca/documents/orders/orders_in_council/2008/1208/2008_562.html (Accessed June 4, 2010).
- Canada Gazette. “Regulations Amending the Health of Animals Regulations.” Volume 134, No. 25, June 2000.
- Canadian Cattle Identification Agency (CCIA). “A Report to the Community 2005/2006.” Calgary, Alberta, 2006.
- . “A Report to the Community 2006/2007.” Calgary, Alberta, 2007.
- . “Community Report 2007/2008.” Calgary, Alberta, 2008a.
- . Calgary, Alberta: Traceability and the Canadian Livestock Value Chain, 2008b.
- . (2009a) “The Canadian Cattle Identification Agency: A World Leader in Animal Identification.” Internet site: www.canadaid.com/about_us/documents/InsertSheets.pdf (Accessed June 4, 2010).
- . (2009b) “CLTS Resource Centre.” Internet site: www.canadaid.com/info/index.html (Accessed June 4, 2010).
- Canadian Food Inspection Agency (CFIA). Ottawa, Ontario: CFIA Program Reports to the CCIA Board, 2006.
- . (2009) “The Canadian Cattle Identification Program.” Internet site: www.inspection.gc.ca/english/anima/trac/catbetide.shtml (Accessed June 4, 2010).
- Canadian National Goat Federation (CNGF). Internet site: www.cangoats.com/en/index.php (Accessed June 4, 2010).
- Canadian Pork Council (CPC). Internet site: www.cpc-ccp.com/industry/traceability_e.cfm (Accessed June 4, 2010).
- Canadian Sheep Federation (CSF). “The Canadian Sheep Identification Program.” Internet site: www.cansheep.ca (Accessed January 4, 2009).
- Clark, J. Producer services manager, Manitoba Pork Council. Personal communication, February 2009.
- Department of Justice Canada (DJC). (1990) “Health of Animals Act.” Internet site: <http://laws.justice.gc.ca/en/ShowFullDoc/cs/H-3.3/en> (Accessed June 4, 2010).
- Dijkhuizen, A.A., R.B.M. Huirne, and A.W. Jalvingh. “Economic Analysis of Animal Diseases and Their Control.” *Preventive Veterinary Medicine* 25(1995):135–49.
- Disney, W.T., J.W. Green, K.W. Forsythe, J.F. Wiemers, and S. Weber. “Benefit–Cost Analysis of Animal Identification for Disease Prevention and Control.” *Scientific and Technical Review* 20(2001):385–405.
- Hunter, B. Communications coordinator, Canadian Cattle Identification Agency. Personal communication, February 2009.
- Inch, C. “Reidentification of Canada’s National Cattle Herd.” *The Canadian Veterinary Journal*.

- La Revue Veterinaire Canadienne* 39(1998): 578–88.
- Kellar, J.A. “Canadian Progress Towards Establishing a National ID System.” *Proceedings of the 1994 National Livestock Identification Symposium*. St. Louis, MO: Livestock Conservation Institute.
- Krystynak, R.H.E., and P.A. Charlebois. “The Potential Economic Impact of an Outbreak of Food-and-Mouth Disease in Canada.” *The Canadian Veterinary Journal. La Revue Veterinaire Canadienne* 28(1987):523–27.
- McInerney, J. “Old Economics for New Problems—Livestock Disease: Presidential Address.” *Journal of Agricultural Economics* 47(1996): 295–314.
- Morris, R.S. “Assessing the Economic Value of Veterinary Services to Primary Industries.” *Australian Veterinary Journal* 45(1969):295–300.
- Murphy, R.G.L., D.L. Pendell, D.L. Morris, J.A. Scanga, K.E. Belk, and G.C. Smith. “Review: Animal Identification Systems in North America.” *The Professional Animal Scientist* 24(2008):277–86.
- National Livestock Identification for Dairy (NLID). Internet site: www.nlid.org/English (Accessed February 4, 2009).
- Olson, M. *The Logic of Collective Action*. Boston, MA: Harvard University Press, 1965.
- Ontrace Agri-food Traceability (Ontrace). Internet site: www.ontraceagrifood.com (Accessed January 2009).
- Pendell, D.L., G.W. Brester, T.C. Schroeder, K.C. Dhuyvetter, and G.T. Tonsor. “Animal Identification and Tracing in the United States.” *American Journal of Agricultural Economics* 92(2010):in press.
- Samuelson, P. “The Pure Theory of Public Expenditure.” *The Review of Economics and Statistics* 36(1954):387–89.
- Sanderson, K., and J.E. Hobbs. *Traceability and Process Verification in the Canadian Beef Industry*. Calgary, AB: Canfax Research Services, 2006.
- Saskatchewan Cattlemen’s Association (SCA). *Policy Statement: Working for a Sustainable and Prosperous Saskatchewan Beef Cattle Industry*. Outlook, SK: Spring Creek Land & Cattle Consulting, 2009.
- Serecon Management Consulting, Inc. “Economic impacts of a potential outbreak of Food and Mouth Disease in Canada.” Report prepared for the Canadian Animal Health Coalition, Calgary, Alberta, 2002.
- Stanford, K., J. Stitt, J.A. Kellar, and T.A. McAllister. “Traceability in cattle and small ruminants in Canada.” *Scientific and Technical Review* 20(2001):510–22.