

Update on the USDA National Animal Identification System (NAIS) Program^a

Mark F. Spire, DVM, MS, DACT

Technical Services Manager, Schering-Plough Animal Health, Manhattan, KS 66502

Abstract

The National Animal Identification System proposed and under development by the USDA-APHIS is a comprehensive program designed to provide rapid response following the introduction of a foreign animal disease (accidental or intentional), the discovery of an emerging pathogen or within the framework of existing regulatory programs for currently known domestic animal diseases. It is being planned as a three-part voluntary program: premises registration, individual or group/lot animal identification and animal movement tracking. The premises and animal identification components of the program fit well with other USDA programs, particularly the Agricultural Marketing Service source and age verification program, for use by producers for value discovery in animals entering marketing channels.

Keywords: bovine, animal ID, identification

Résumé

Le système national d'identification des animaux, tel que proposé et développé par le USDA-APHIS, est un programme complet conçu de façon à permettre une réponse rapide suivant l'introduction (accidentelle ou intentionnelle) d'une maladie animale étrangère ou la découverte d'un nouveau pathogène et dans le cas des maladies connues des animaux domestiques grâce aux processus réglementaires déjà existants. Ce système comporterait trois volets opérant sur une base volontaire: enregistrement des entreprises, identification individuelle ou de groupe des animaux et surveillance des déplacements des animaux. L'identification des entreprises de même que celle des animaux s'insère bien dans le cadre des programmes déjà existants de l'USDA, en particulier le programme de vérification de l'âge et des sources de l'Agricultural Marketing Service, qui sont utilisés par les producteurs pour vérifier la valeur des animaux qui entrent sur le marché.

How did the idea for a comprehensive national identification program come about?

The concept of a comprehensive animal identification system has been evolving for a number of years, primarily as the result of the decline in numbers of identification tags placed on animals through program diseases such as brucellosis and tuberculosis, and the evolution of enhanced risk assessment and management tools. The current system typically would allow an orderly trace back of affected animals, but is slow, expensive and incomplete. In the last ten years, leadership in animal identification and traceability has been led by the National Institute of Animal Agriculture (NIAA) and the swine and dairy industries. Several states, most notably Michigan and Wisconsin, have developed sophisticated animal traceability programs. In 2001, industry leaders across multiple species (cattle/bison, swine, sheep, goats, equine (horses, mules, burros and donkeys), cervids (deer and elk), and camelids (llamas and alpacas) began meeting with USDA officials to develop a national plan. This evolved into the United States Animal Identification Plan (USAIP). In conjunction with NIAA and the US Animal Health Association (USAHA) efforts, the proposed USAIP was sent to USDA-APHIS in 2004. The plan became the basis for a draft "User Guide and Additional Information Resources" released for comment in November 2006 under the heading National Animal Identification System (NAIS), accessible through http://animalid.aphis.usda.gov/nais/naislibrary/documents/instructions_guidelines/NAIS-UserGuide.pdf. The focus is on animal health (foreign animal diseases, domestic animal diseases and emerging animal diseases), not on source and age verification or other marketing tools.

Where are we today?

Besides the declining number of identification tags placed in animals for traditional regulatory programs,

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the need for a national animal identification program stems from this country's concerns with the realities of living in a post-9/11 world, management of the food supply chain and in maintenance and expansion of consumer confidence in both domestic and export markets. In its most basic form, the national need for a comprehensive animal identification program is all about money: not in the context of greed, but in looking at the US position in world trade, the economics of protecting the national herd, the economic and social impact of early intervention in stopping a disease outbreak and our focus on diseases of economic and zoonotic importance. These are serious economic issues that can be addressed by having a viable, fully-functional national program.

The USDA goals are divided into long-term and short-term categories. Over the long term, the USDA wants a 48-hour trace back from the time of discovery for diseases of concern. The NAIS in its most robust form would allow traceability to every premise inhabited by an animal during its life, and the ability to trace cohorts (contact animals). In a USDA-APHIS disease investigation, three basic questions need to be answered: 1) where has the infected animal been; 2) what other animals have been exposed; and 3) what additional premises and animals are at risk of being exposed? A system with deep producer participation might be able to address those questions. To reach this long-term goal, the USDA has established a three-year development process with milestones set at having 40% of young animals individually or group/lot identified, and 70% of all farms registered within the system by 2008. In the short term, the USDA wants every state and tribal authority to initiate and maintain a premises registration system. To date, all 50 states and five tribal nations have systems in place. The USDA has established another short-term goal of having 25% of approximately 1.6 million premises registered nationwide by January 1, 2007. As of November 2006, about 325,000 premises have been registered.

The crux of the current USDA NAIS concept is that it must remain a voluntary program, rather than mandating livestock producers' participation. Several states—Wisconsin, Indiana, Pennsylvania and Michigan—have gone beyond the USDA position by making premises registration mandatory. Under USDA control would be management of the premises identification number system (PIN allocation) and distribution of numbers for the unique 15-character animal numbering system (animal identification number - AIN# allocation). Actual distribution and maintenance of both PINs and AINs would be the responsibility of state/tribal authorities or private vendors. This scenario has evolved because of growing producer and some animal health authorities' concern about confidentiality of data main-

tained within a federally run system. Additionally, many producers, particularly small-scale operations, don't want to be forced into buying identification devices, such as electronic identification devices (EIDs). Without widespread adoption of both the premises registration system and the use of traceable identification devices in the majority of animals, NAIS proponents feel the system will not work, and therefore should be mandatory.

Fundamentally, the NAIS consists of three basic components: 1) premise identification; 2) animal identification (individual or group/lots); and 3) animal tracking.

Premise registration consists of providing producer contact information (name, physical address, telephone number, species managed and physical location (GPS or other reference data)) to state or tribal authorities. Animal health authorities will in turn provide the producer a seven-character alphanumeric identifier to be used to acquire animal identification tags and to report the movement or receipt of livestock.

The animal identification number is a 15-character number beginning with the US identifier code 840. The USDA emphasizes that all animal identification devices be technology-neutral with each species, via individual working groups to determine the most applicable technology for their respective species. The NAIS Cattle Working Group (CWG) has recommended radio frequency identification devices (RFID) as the basic means of identification. RFID tags can be used with alternate means of identification such as visible panel tags, biometrics (retinal scan, DNA) or bar code. Additionally, due to a number of official identification devices in use under current regulatory programs, the USDA will continue to accept any officially recognized animal identification device. The USDA has allowed distribution of tags to remain in private hands, however to secure official 840 devices for use on livestock a producer must provide a PIN to the retail outlet. The outlet will link the numbers on the tags to the producer's PIN. Three basic events trigger the need for official individual animal identification: 1) change of ownership; 2) interstate movement; and 3) multiple owners commingling their cattle.

Where would this information be stored?

The USDA recognizes state rights and obligations to monitor intrastate movements and federal government responsibility to monitor interstate movements and international trade. Trade is critical as the USDA seeks to maintain the United States position as a trusted trading partner. The USDA defined major accessible needs for querying the database as: 1) US Secretary of Agriculture or state Secretary of Agriculture declares an emergency; 2) foreign animal disease (FAD) incident;

3) need for trace back of a program disease; and 4) surveillance of domestic animal diseases (DADs) or emerging animal diseases (EADs), with other needs to include ability for ownership validation, compliance (movement restriction) and 24/7 access for state officials. However, the USDA has insisted upon establishment of a private or state database in an effort to protect the confidentiality of data following through any type of traceability system in the voluntary program outline. At issue over a public vs. a private database is that, as of fall 2005, 15 states have laws that would preclude transfer of data to a privately held database. Additionally, brand states already have confidentiality laws in place to protect the rights of livestock producers that would minimize the need for private database management. Organizations such as those representing state veterinarians tend to be non-supportive of a private database as they deem it their responsibility to protect their state herd, monitor animal movements and enforce regulations. This can best be done, in the groups' opinion, through an open-access public database linking state and federal systems.

In September 2005, US Secretary of Agriculture Mike Johannas issued a statement of support for a private database concept. At the October Kansas City meeting, the USDA defined areas of responsibility for the NAIS. Management of the overall NAIS program will remain with USDA to include PIN and AIN allocation and distribution. Animal movement monitoring and data transfer will reside in private databases or with states. USDA will certify private systems known as Animal Tracking Databases (ATDs) to meet USDA standards. ATDs record and store animal movement tracking information, but the private sector will have to certify providers of databases as to accuracy of data, security and performance. USDA wants to have access through one interface or portal known as the Animal Trace Processing System (ATPS). This metadata system would be maintained by USDA-APHIS, with integration of multiple private databases feeding into the system having fettered architecture and fettered searches. This system design enables state and federal animal health authorities to submit queries to the ATDs. Primary data stored by private or state ATDs would be the animal identification number, movement classification (as an event code), premise identification and date of the event, with secondary data to include species, date of birth, gender and any secondary identification numbers.

In the implementation plan detailed by the USDA, several operational milestones are listed for the system to be fully operational. Key among these are:

- August 2005 – premises registration system to be operational
- April 2006 – AIN management system in place
- June 2006 – Agreements for private/state ATDs initiated

- January 2007 – 25% of all premises registered
- February 2007 – Private/state ATDs and ATPs operational
- January 2009 – 100% of premises registered, 100% of cattle born the previous year identified with an AIN, and 80% of those animals' movements reported.

USDA concerns for the actual identification system technology relate to cost and effectiveness. USDA emphatically wants producers to have choices in the actual technology they use on their animals. The USDA defines this as "technology neutral," allowing for bar code, biometrics, visible or electronic means to be primary or secondary identifiers. The NAIS CWG, on the other hand, recommends visible, tamper-evident RFID (radio frequency identification) technology be used for the program. The CWG feels that RFID technology more reliably fits with the speed of commerce, as measured through livestock markets or harvest processing facilities. At present, RFID technology recommended by the CWG is based upon the International Organization for Standardization (ISO) recommendations ISO 11784 (Radio Frequency Identification of Animals: code structure) and ISO 11785 (Radio Frequency Identification of Animals: Technical concept). This places the RFID transponder technology performing in the radio frequency band width of 125-134 KHz (low frequency) using either full duplex (simultaneous two-way signal transmission) or half duplex (one-way at a time signal transmission) technologies. To be ISO-compliant, readers must be able to accommodate both types of technologies. These passive technologies require no internal battery and are designed to be lightweight, less expensive and possess virtually unlimited operational life.

Of concern to end-users of RFID technology is its cost and performance. Cost appears to be market driven, with an anticipated decrease in price as competition within the marketplace increases. Current electronic identification tags (EID) range in price from \$2.00 for a single button-type tag to over \$4.00 for combination button and panel tags containing the AIN on both pieces. Performance of these low frequency devices is influenced by physical form, operational environment, read range and contention (competition with other devices by a single reader). The CWG recommended visible tags placed in the middle third of the left ear. In addition to being tamper-evident they are to be non-toxic, have a high retention rate and not subject to deterioration in cattle environments. Current systems' performance has come under much debate. Most centers on the limitations of low frequency RFID technology and the emergence of higher frequency technologies. No frequencies of RFID tags and readers are without their problems, whether due to power source, antenna configuration, environmental influences or read ranges. The CWG

recommends a minimum read range of 24 inches for ISO-compliant tags. Recent work performed at Kansas State University (Bryant *et al*, Performance variation of electronic ear tags and readers, Beef Cattle Research Report of Progress 959; 2006:33-37) found that in eight ISO-compliant RFID tags currently commercially available and three ISO-compliant fixed antenna stationary readers, average read ranges differed among all tag designs, with significant differences in performance ranges among the readers. The lowest read range was eight inches, with the greatest at 40 inches. This study supports the concept that minimum performance standards need to be adopted by the USDA when accepting ISO-compliant 840 series tags into the NAIS.

Where do veterinarians fit into the NAIS?

At every level! Practitioners have the opportunity to facilitate the process by getting their clients to obtain PINs. The USDA wants electronic certificates of veterinary inspection for intrastate, interstate and international movement. Electronic certificates are intended to replace paper health certificates by 2009. Veterinarians can become AIN managers, with responsibility for distribution of ID devices to producers. This will be much like the responsibilities for current regulatory programs, such as brucellosis or tuberculosis. Veterinarians will be placed in position to record and transfer AIN and PIN information into the national database, whether a state or private system, to record animal movements. Veterinarians will have the oppor-

tunity to use AINs in age, source and process verification programs for their clients to provide value-added marketing opportunities for their livestock. While value-added programs falling under quality systems assessment (QSA) or process verified programs (PVP) may co-opt AINs and PINs, they are outside the scope and control of USDA-APHIS as they fall under USDA Agricultural Marketing Service (AMS) programs, which are governed by different regulations. Veterinarians will have to work closely with their clients to capture value, as the simple placement of an EID tag in the ear of an animal will not insure increased return. Producers will have to aggressively market their animals to find and capture value. Veterinarians can help facilitate this process by participating in several sponsored programs, such as the Schering-Plough Animal Health Tri-Merit Program. All these venues will require a fundamental shifting of veterinary business procedures within the profession from hard copy to electronic, internet accessible computing systems.

Conclusion

The USDA-APHIS NAIS program offers the livestock industry a vehicle to address animal disease traceability in a cost-efficient, scientific manner. It is a trust-building program for end-users of livestock agricultural derived products, whether those products are used for domestic consumption or as an export commodity. It can only be a successful if all phases of the livestock industry embrace the value of such a system.

Abstract

Infertility in Dairy Cattle: What Have We Learned From Embryo Transfer?

Hasler J.F.

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There is increasing evidence that dairy herds in many countries are experiencing a rather steady decline in reproductive performance. The traditional bias in sire selection toward milk production at the expense of reproductive traits may be largely responsible, but the unfortunate outcome is poor conception rates in lactating cows. Recovery of embryos from cattle provides a measure of fertilization rates and the normalcy of

early embryonic development. The transfer of embryos can be utilized to determine the suitability of recipients for maintaining pregnancy following fertilization and early embryonic development. Sperm concentration, motility, defects and other variables can be related to various female variables such as follicle size, hormone levels the timing of insemination rates and embryonic normalcy can be determined following embryo recovery.