Defining UHF Tag Data Standards for USDA Identification Devices

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Background

Radio frequency identification (RFID) technology has been available in the livestock industry for many years. Standardization of the RFID technology used in the identification devices has been and will remain critical to ensure compatibility of devices across manufacturers.

Most common in the market place has been low frequency identification devices operating at 134.2 kHz. Standards for low frequency RFID devices used for livestock were established in the 1990's through a Working Group of the International Organization for Standardization (ISO/TC23/SC19/WG3). Two primary standards were defined: one standard on the code structure in the transponder, and the other on the technology for the communication between reader and transponder. These standards are referenced below.

- ISO 11784. Agricultural Electronics—Radio Frequency Identification of Animals—Code Structure. International Organization for Standardization.
- ISO 11785. Radio Frequency Identification of Animals—Technical Concept. International Organization for Standardization.

USDA has required conformance to these standards for official identification devices that utilize low frequency RFID technology.

More recently, RFID identification devices using ultra high frequency (UHF) technology have become available on the market. USDA has approved several eartags that incorporate UHF technology based on EPC Gen 2 (v1.2.0) ISO/IEC 18000-6C RFID UHF 840-960MHz. While this standard addresses the communication protocol between the reader and the UHF tag, there is no standard for a common encoding scheme, or Tag Data Standard (TDS), for translating USDA animal numbering systems in UHF identification devices. A global standard is needed and highly preferred by USDA. However, as of this date, no standard has been defined and no standard appears to be on the horizon anytime soon.

Objective

In lieu of an established global standard for the encoding of animal identification numbers in UHF tags, USDA plans to define an interim standard that would achieve uniformity across manufacturers authorized to encode USDA animal numbers into UHF identification devices.

This action is warranted to ensure technical standardization is achieved as timely as possible across manufacturers providing USDA animal identification devices utilizing UHF.

Regardless of the standards adopted at this time by USDA, transition to a global standard(s) is anticipated in the future. Therefore, USDA acknowledges that the standards currently being defined will be for interim use until global standards evolve. When such standards are available, USDA will work with approved manufacturers of official UHF identification devices to establish a timeline to transition to the recognized global standard.

A UHF TDS will be defined for all USDA official animal identification numbers, specifically the 840 Animal Identification Number, the National Uniform Animal Identification Numbering System (NUES), and the Flock and Group/Lot-based Identification Numbers. Additionally, a TDS will be defined for the number format used in USDA Approved Backtags. (The table on page three provides more details on these numbering systems.) From a timeline perspective, the development of a TDS for the 840 AIN is the priority, but such standards are to be defined for the other USDA numbering systems as timely as possible.

Considerations for Interim Standards

It is preferred to use GS1 Electronic Product Codes (EPC) tag data standards to establish uniform methods for encoding animal identification numbers into UHF-based animal identification devices. However, if such standards do not adequately cover the needs of the USDA numbering system, the development of "informal" standards will be considered. While this is not the desired solution or long-term end result, it does provide timely options that could be used as an interim "informal" standard until a global standard is available. In that the livestock management environments are rather isolated from other UHF devices, such a solution may provide adequate standardization in the early adoption of the newer RF technology eartags.

Additionally, the following points are noted to help direct the development of the interim standard:

- The entire animal number must be embedded in the transponder.
- The standard may cover more than one animal number format, but if necessary, a standard may be established specific to one animal number format.
- The 96 bit UHF tags that provide 128 bit capacity are readily available and most commonly used to date in animal identification devices.
- Allowing space to store a "herd management ID" in UHF 840 AIN tags is desirable.
- The designation of "animal type" is not warranted from a USDA perspective as such data is best maintained on data base / information systems. Additionally, it is felt that encoding such information on the transponder potentially increases the cost and administrative complexities for the distribution of the identification devices.

USDA animal numbering systems

Number	Format of Animal Number	Number Examples
Animal identification number (AIN)	15 digits (fixed) - 840 are the first three digits (numeric code for USA)	840 003 123 456 789
National Uniform Eartagging System (NUES) - 9	9 alpha/numeric (fixed) - 2 State or Tribal[1] code - 3 alpha series - 4 digits in a sequential numerical series	23 ELV 4574 PA ELV 4574
National Uniform Eartagging System (NUES) - 8	8 alpha/numeric (fixed) - Swine and other species (except sheep and goats) o 2 numeric State or Tribal code o 2 alphabetical series o 4 digits in a numerical series	23 AB 4574
	- Sheep and goats (exclusive to scrapie program) o 2 alpha postal abbreviation o 2 alphabetical or alphanumeric series o 4 digits in a numerical series	PA AB 4574 or PA A2 4574
Flock-based number *with herd management number*	15 alpha/numeric (variable) - Flock identification number (maximum of 9 characters prefixed with State's postal abbreviation) with a unique herd management number (up to 6 characters). Does not include I, O, or Q except as part of a postal abbreviation.	MN0456 4275
Location-based number[2] *With the herd management number*	14 Alpha/numeric (variable) - Either a premises identification number (PIN) or location identification number (LID) with a unique herd management number PINs have 7 characters; LIDs may have 6, 7, or 8 characters; and the herd management number may have up to 6 characters.	006ER2A 4275
USDA Approved Backtag	8 Alpha/numeric (fixed) - 2 digit State numeric code - 2 alpha (2) - 4 digits	006ER2A 4275

Participant List of USDA UHF Tag standarisation group;

[1] Tribal alpha and numeric codes are assigned by APHIS when requested by a Tribe (see ADT General Standards for listing: http://www.aphis.usda.gov/traceability/downloads/ADT_standards.pdf).

[2] Location identifiers include both the premises identification number (PIN) issued through the PIN allocator and the Location Identification (LID) numbers administered by the State or Tribe.

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