Dairy Industry Network Data Standards

Animal Identification

Discussion Document

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16 April 2013

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1 Introduction

Pastoral farming is becoming a data rich activity. Most biophysical processes from soil nutrient management to cow performance have both paper based and more organised data bases recording status, productivity and intentions. There are a significant number of tools covering livestock, nutrition and financial management[1]. Most of these require the user to re-enter data from other sources and they overlap in functionality. It is probable that if data had been more accessible their design would have better focussed on the service they undertook to provide. Farmers will benefit from a highly innovative technology sector that delivers applications that are simple to use and access, which source the information they need without impedance and deliver value.

This document is part of a work stream focusing on Data Standards for interchanging Livestock (Animal) data. Work on this project commenced in late 2012, funded by DairyNZ and with contributions from FarmIQ Systems and Rezare Systems. A well-attended workshop on Animal Data Standards in February 2013 in Hamilton, New Zealand resolved that work should be carried out on three major themes:

- Animal Identification (unique identifiers for animals, land, and enterprises);
- Life Data (mostly static data that defines an animal); and
- Observations and Actions (measurements, health treatments, and records of management activities).

This discussion document focuses on animal identification, and briefly summarises the existing state before describing the forces impacting on identification decisions and providing some initial recommendations.

2 State of Animal Identification in New Zealand

There are a number of official, semi-official, and ad-hoc forms of animal identification in use in New Zealand. This ranges from the recently regulated[2] use of ISO 11784/11758 RFID for cattle (2012) and deer (2013), through current official recording and traceability programme identifiers (some regulated), to old breeding and recording scheme identifiers that are no longer actively used but which provide useful data or linkages between animals that need to be retained for future analysis.

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[1] Wolfert, S and Allen, J. Farming for the future: Towards better information-based decision-making and communication. 2011. A Report for the Centre of Excellence in Farm Business Management pp 27.
[2] NAIT Animal Identification and Tracing Act 2012 (http://www.legislation.govt.nz/act/public/2012/0002/latest/DLM3430220.html).

2.1 Electronic Identifiers

Identifier	Example	Comments
ISO 11784[3]	981-018285778231	The ISO 11784 codes are managed by the international committee for animal recording (ICAR[4]). There are several representations of the code: - Hexidecimal, which includes the entire code including flag bits - Decimal, which generally just shows the country or manufacturer code and animal number. In New Zealand, we use manufacturer codes where animal numbers are maintained uniquely by manufacturers. This is in contrast to (for instance) Europe, where a country-code is used, and each country maintains the unique set of animal numbers.
GS1 SGTIN	urn:epc:id:sgtin:3.0037 00.00542.77346595	Some trials with UHF RFID in deer[5] have used an SGTIN (Serialised Global Trade Item Number) issued by global standards organisation GS1[6], which functions much like a barcode identifies a category of products, but with the addition of a unique item number as well.

2.2 Official Recording Scheme Identifiers

Identifier	Example	Comments
AHB Birth ID	1234567-12-123	A tag issued by the Animal Health Board (AHB)[7] that includes herd number (7 digits), year born (2 digits) and an animal number that is unique within herd and year. The Hereford Prime HPid initiative, and Angus Pure Source and Trace use the AHB Birth ID.
AHB Sequence No	1234567-3123	A tag issued by AHB that includes just the herd and a sequence number within that herd.
Dairy Birth ID (MINDA)	ABDC-12-1234	The Dairy Birth ID format is used by both CRV and LIC, and includes a four-letter participant code, followed by a 2-digit year and then the animal number which is unique within the participant and year. This forms one of the Dairy Core Database fields defined in the herd testing standards[8].

[3] Specified in ISO 11784:1996 and referenced in ISO 14223-2:2010 (see http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=19982).
[4] International Committee for Animal Recording: www.icar.org
[5] The Use of EPC RFID Standards for Livestock and Meat Traceability, Gary Hartley, NZ RFID Pathfinder Group, January 2013 (http://www.rfid-pathfinder.org.nz/wp-content/uploads/2012/08/EPCIS-Final-Report5.pdf)
[6] GS1: http://www.gs1.org/epcglobal
[7] Animal Health Board (at www.tbfree.org.nz) and programme at http://tbfree.org.nz/Publications-news/Guidelines-SOPs-Manuals/National-ID-Programme
[8] NZS 8100, 2011 draft Herd Testing Standard (and earlier 2007 edition).

Identifier	Example	Comments
NAIT AHB TRAKA	981-018285778231-1234567	NAIT-compatible "Traka" tag issued by AHB. Traka tags[9] are typically used for replacements or tagging existing animals.
NAIT Dairy Traka	981-018285778231-ABDC	A NAIT compatible Dairy "Traka" tag is the same format as that issued by AHB, but has the dairy participant code instead of the AHB number.
NAIT Dairy Management Tag	981-018285778231-LMNO-123	A NAIT compatible Dairy Management Tag combines the current herd participant code, management number, and an ISO 11784 RFID number to make a unique identification for existing dairy cows, as an alternative to using Traka tags.
SIL (Sheep)	12345.12738.2012	SIL[10] is the industry performance recording scheme for sheep other than Merinos in New Zealand, and is also used to operate Deer Select. An official SIL identifier includes the flock code and tag (the latter a text string), and may optionally include the year born (by convention the year is often included in the tag number).
MerinoSelect	502302-2009-090736	Merino Select[11] is the Australian Merino performance recording system, which is used by NZ Merino stud breeders. Animal identification is in the form flock code, year born (4 digits), and animal number.

2.3 Other Animal Identifiers

Identifier	Example	Comments
Interbull	HOLNZLM000123456789	ICAR's Interbull[12] programme is used to compare bulls across multiple countries, and may be used to align national breeding schemes to allow comparison. The identifier contains: Breed (HOL, JEY, AYS…), Country (NZL, NDL), Sex (M), and a 12-character animal number.
Bull AB Code	102271	LIC currently issues AB Codes (6-digit numbers) for bulls used in the dairy industry. These codes are shorter to use on straws, catalogues, and forms, and are unique within NZ dairy bulls.
LIA Identification	L2-123456-1980-123	The LIA (Livestock Improvement Association) codes were used to identify dairy animals before 1985[8]. The code consists of LIA region (2 characters), herd code (6 digits), year (4 digits), and animal number (6 character string).
Breed Society Pedigree No	123456-JR	The dairy industry herd book ID[8] for pedigree dairy animals born before 1985 consists of the herd book number (6 characters), and a breed society identifier (technically 6 character string, but two characters used).

[9] For more about Traka tags, see the NAIT Visual Tag guidelines under http://www.nait.co.nz/news-and-publications/nait-user-guides-and-fact-sheets/tagging-requirements/
[10] SIL: Sheep Improvement Limited – a wholly owned subsidiary of Beef+Lamb NZ, www.sil.co.nz
[11] Merino Select: http://www.sheepgenetics.org.au/Breeding-services/MERINOSELECT-Home
[12] Interbull Guidelines at http://www-interbull.slu.se/jib/index.php?option=com_content&view=article&id=17&Itemid=173

3 Forces Influencing Animal Identification Decisions

There are a number of forces that influence decisions about animal identification, and some of these forces are in tension with one another. As a result some prioritisation and some compromise may be necessary.

1. The industry will gain the most benefits from ease of integration, ease of use, simplicity and error removal by standardising on a small number of clearly enunciated identification schemes – in an ideal world, just one!
2. However, the ability to flexibly define identification methods to best fit the immediate purpose is also of benefit. The example of a relatively simple AB code for dairy bulls is one example of this.
3. Existing recording systems and schemes may be constrained by legislation (that may be hard or slow to change), or by the weight of existing data. For instance, moving to RFID as the only identifier would strand large amounts of historic data in industry performance recording and breed society databases, stopping this from being exchanged.
4. Like it or not, many or even most animals will eventually have more than one identifier, in the simplest case an RFID and its official visual equivalent.
5. Many embedded and field ruggedised devices are based on computer architectures from ten to twenty years ago. These devices may have slower, simpler (and perhaps power-efficient) processors, and much less memory than modern devices. For the developers of these devices, supporting Internet lookups, multiple identifier formats and validation checking is difficult or perhaps even impossible.
6. Even developers of modern Internet-based systems, with substantially more processing and memory resources and access to pre-built support systems such as XML parsers may choose to minimise complexity by only supporting a subset of identification types – and they are likely to prefer schemes that can be implemented with minimal changes.

4 Recommendations

4.1 Namespaces

We recognise that unique RFID codes are not available for historic animals and that existing recording scheme identifiers exist and in some cases are regulated. These are likely to persist for some time, and offer benefits in terms of human-readable identification. Accordingly we propose:

1. That each official scheme or identification type shall be recognised with a unique “namespace”, within which identifiers are guaranteed unique;

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2. That when data is interchanged between systems, the namespace to which each identifier belongs is clearly identified;
3. That a registry of namespaces (identification schemes) is established, and that there is a process to maintain this registry, including adding new namespaces if this is absolutely necessary (we prefer to avoid proliferation of namespaces); and
4. That the registry makes available a web service interface by which a namespace can be confirmed and a regular expression to perform initial validation of that namespace's identifiers can be retrieved.

One possible method of namespace representation for data exchange (as distinct from data storage) might be the URI (Universal Resource Identifier) notation[13]. In our 2010 document[14] where we compared ISO 11784 and GS1 SGTIN identifiers we gave the following example:

ID
urn:epc:id:sgtin:3.003700.00542.77346595
urn:iso:std:iso:11784:982.009104636715

Of course this is just one approach, and other methods of identifying namespaces and associating them with identifiers might be more practical.

4.2 Devices

We recognise that many animal recording devices are low-power devices intended for field use, and that such devices may not have the processing power or network connectivity to parse, look up, and validate multiple identifiers. As a result we propose:

1. That embedded devices and other field data collection devices may only choose to support a subset of namespaces;
2. That such devices make it clear (preferably electronically) which namespaces are supported; and
3. That services or systems which interact with such devices must take responsibility for attaching namespaces to identifiers, validation, and transformation where required.

[13] URI is defined in RFC 3986 (http://tools.ietf.org/html/rfc3986)
[14] Use of UHF Tags in Deer and Sheep, a project report for NZTE et al, Rezare Systems (http://www.rezare.co.nz/Media/Default/uhf-tags/UHF-Tag-Assessment-Report-2010-02-09.pdf)