



Dairy Industry Network Data Standards

Animal Life Data

Discussion Document



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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 management¹. 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 “life data”, and provides a data dictionary and some initial recommendations. In preparing this document, Rezare Systems staff reviewed:

- The Dairy industry Herd Test Regulations, 46 core fields and proposed data interchange for the new Dairy Industry Good Animal Database (DIGAD);
- ICAR Guidelines and Interbull standards (ICAR);
- NAIT (National Animal Identification and Tracing) documentation of data models and interchange specifications (NAIT);
- The model used in the Sheep Improvement Limited database used to record sheep and deer (SIL);
- Animal attributes stored in the FarmIQ pilot database (FARMIQ); and
- Work carried out by Gallagher Group and TruTest on draft XML “Animal Data Interchange” schema for interchanging animal information between devices and systems (ADI).

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 Types of Life Data

When people talk about “life data” or “static data” for animals they mean information other than trait, event, or observation data (such as measurements). Typically this means unchanging or static attributes of the animals themselves. However, some of this data does change over time, so “static” data may be a misleading term, and we prefer the term “life data” which has been well used and doesn’t have the same connotation of unchanging data.

We organise life data into four categories:

1. **Animal identification**, which defines how an animal is identified by people, and by devices and systems. An animal may have more than one form of identification (for instance, a machine-readable RFID or barcode, an official recording scheme unique identifier, and a short and easily memorable but non-unique management tag). Animal identification may also change over time as tags are replaced or animals move to a different farm or owner. We cover animal identification in more detail in our discussion document on Animal Identification².
2. **Animal Attributes**, which are non-changing attributes of an animal such as species and breed. In practice, this information may be gathered over the lifetime of the animal, but that is a function of animal recording rather than the animal itself.
3. **Animal State**, which is the set of information that changes in response to events or management activities carried out on the animal. There are a variety of animal states, including what is traditionally called “status” (whether the animal is dead or alive), as well as pregnancy and lactation states, sex (which can change from male to neuter) and perhaps current location, mob, and health status. One viewpoint might be that such state information should simply be represented by the stream of events that capture the changes in state for each animal. This is a valid data model, but in practice many systems need to exchange state information without building it from scratch from all historical data.
4. **Group Membership**, which is a set of management groups to which an animal belongs. This information may or may not be driven by events, but is frequently used for drafting animals, reporting, and recording events for a group of animals.

We note that the life data in this document won’t cover every possible application-specific field. We recommend that a data interchange schema based on this data dictionary should also support user or specific purpose defined extensions.

² See <http://www.rezare.co.nz/Media/Default/data-standards/DINDS-Animal-Identification-Discussion-2013-04-16.pdf>

3 Data Dictionary – Animal Attributes

The following table defines items we have categorised as **Animal Attributes** that do not change over the lifetime of the animal.

Item Name	Description	Cardinality	Type & Validation	Usage
Birth Date	The date on which an animal was born (also abbreviated DOB – date of birth). Note that birth date may or may not be known with precision. Therefore we propose a Birth Date Confidence Indicator.	0..1	Date Usually nullable	ADI: DOB DIGAD: Birth Date FarmIQ: Birth Date NAIT: Date of Birth SIL: Birth Date
Birth Date Confidence	The degree of precision to which the birth date is known. We propose the list of values “Unknown”, “Year”, “Month”, “Day”, “Actual” to describe the degree of reliability and precision. Actual means observed, while others are estimates/inferred.	1	Enumeration (Unknown, Year, Month, Day, Actual)	DIGAD: DOB Confidence Indicator (Estimated/Actual)
Birth Location	Location identifier that distinguishes the location at which the animal was born.	0..1	Nullable. Data type to be determined, most likely NAIT Location.	ADI: Original Location ID DIGAD: May be obtained from Herd/Location history for the animal. FarmIQ: May be obtained from historic Enterprise membership and Location NAIT: NAIT Number of Birth Place SIL: Birth Flock
Birth Rank	A value describing the number of progeny born to the same dam in the same birth event; values are 1 if the animal is a singleton, 2 if it is one of twins, etc.	0..1	Positive Integer, Nullable. Values 1 to 5 (typically 1 and occasionally 2 for cattle).	FarmIQ: Birth Rank SIL: Birth Rank, DNA Birth Rank
Birth Season	The <i>contemporary group</i> or <i>cohort</i> that describes the season (spring/autumn) within the birth year into which animals are categorised, calculated from the Birth Date where available.	0..1		DIGAD: Season Born SIL: Birth Period

Item Name	Description	Cardinality	Type & Validation	Usage
Birth Year	The <i>contemporary group</i> or <i>cohort</i> for the year of birth into which animals are categorised. Known as Year Born in many systems. Note that in some occasional circumstances, this may be different by 1 from the year component of the birth date (e.g. an animal born early in the northern hemisphere or late in the southern hemisphere).	0..1	Integer year (1900 to 2100 or a subset thereof).	DIGAD: Year Born FarmIQ: Year Born SIL: Birth Year
Breed	The primary breed by which an animal is known or described. In many systems this is simply called “Breed”. There is no internationally recognised master list of livestock breeds. ICAR mandates a list of codes for bovine semen straws ³ , and Oklahoma State University publishes a useful list of livestock breeds ⁴ .	0..1	Enumeration	ADI: Breed (Text) FarmIQ: Breed (Enumeration) NAIT: relates to Species Type in deer DIGAD: Up to 4 breeds x 16ths SIL: Multiple breeds x percentages
Breed Proportions	An array of breed identifiers and proportions (for instance, an animal might be $\frac{3}{4}$ Jersey and $\frac{1}{4}$ Holstein Friesian, which might be represented in 16ths, 64ths, percentages, or some other fraction in various systems).	0..5	Breed (enumerations) and breed proportion (integers totalling 16 or 100)	DIGAD: Up to 4 breeds x 16ths SIL: Multiple breeds x percentages
Colour	The colour of the animal	0..1	Text	ADI: Colour
Dam ID Birth	Normally recorded dam of the animal	0..1	Animal ID. Nullable.	ADI: Dam DIGAD: Birth Dam ID SIL: Birth Dam
Dam ID Donor	Embryo transplant donor dam	0..1	Animal ID. Nullable.	DIGAD: Genetic Dam ID SIL: Genetic Dam
Dam ID DNA	Dam identification as confirmed by DNA parentage analysis	0..1	Animal ID. Nullable.	SIL: DNA Dam
Dam ID Rearing	Dam that reared the animal, if different from the birth dam	0..1	Animal ID. Nullable.	SIL: Rearing Dam

³ ICAR Guidelines 2012, *Section 8 Annex 1, Breed Codes on Bovine Semen Straws for International Trade assigned by ICAR Sub-committee Interbull*, International Committee for Animal Recording.

⁴ Oklahoma State University Livestock Breeds, <http://www.ansi.okstate.edu/breeds/> retrieved 8 May 2013.

Item Name	Description	Cardinality	Type & Validation	Usage
Dam Age	The calculated age of the dam of the animal in years at the time at which the animal was born (based on the birth date or birth year of the animal and the birth date or birth year of the dam).	0..1	Integer Unknown or values 1 to 12	SIL: Age of Dam and DNA Age of Dam
Sex	The gender or sex of the animal. This may be combined with the Neutered animal state to indicate a neutered male.	1	Enumeration (values are Male, Female, but may be species-specific variants e.g. Bull)	ADI: Sex DIGAD: Sex FarmIQ: Gender NAIT: Gender SIL: Sex
Sire ID	Sire identification	0..n	Animal ID. Nullable	DIGAD: Sire ID SIL: All Sires (multiple if actual is unknown).
Sire Confidence	The degree of confidence with which sire is known – manually recorded, derived from mating information, or DNA parentage tested. There may need to be discussion about more fine grained representation here (for instance, probability).		Enumeration (Manual, Derived, DNA)	DIGAD: Sire Official Indicator
Sire ID DNA	Sire identification as confirmed by DNA parentage analysis	0..2	Animal ID. Nullable	DIGAD: Sire ID SIL: DNA Sire, DNA Alt Sire
Species	Enumeration of species (Cattle, Deer, Goats, Sheep). Presumably this enumeration could grow based on other recognised species of domestically farmed and recorded livestock.	1	Enumeration (Cattle, Deer, Goats, Sheep)	FarmIQ: Species NAIT:
Species Sub-type	Enumeration – beef cattle, dairy cattle, red deer, wapiti deer <i>This seems to be a limited use field, could be left as a specific purpose extension.</i>	0..1		FarmIQ: Enterprise Type NAIT: Species Type
Production Type	Enumeration – beef, dairy, venison, velvet <i>This seems to be a limited use field, could be left as a specific purpose extension.</i>	0..1		NAIT: Production Type

It may be useful to add further DNA parentage information as optional fields in the above table. This might include quality, reliability, and probability indicators.

4 Data Dictionary – Animal State

The following table defines items we have categorised as **Animal State** that may change over the lifetime of the animal.

Item Name	Description	Cardinality	Type & Validation	Usage
Current Location	Location identifier that describes the current location at which the animal is living, or the last location at which it was alive.	1	Data type to be determined, most likely NAIT Location.	ADI: Location Farm/Property DIGAD: Herd Location FarmIQ: Enterprise Location NAIT: NAIT Number of Current Location SIL: Current Flock
Disposal Method	Indicates the disposal method for an animal that is dead.	0..1	Enumeration, Nullable. Values: Home Kill, Disposed at NAIT Location, Meat processor – human consumption, Meat processor – pet food, Rendering facility.	NAIT: Disposal Method
Lactating	Indicates whether the animal is lactating at the time of data transfer. Note that this state may change a number of times over an animal's lifetime.	0..1	Boolean, Nullable: True or False.	DIGAD: May be derived from events FarmIQ: May be derived from events
Neutered	Indicates whether a male animal has been partly or fully neutered. For instance, a neutered cattle male is a Steer, a neutered sheep male is a Wether. An infertile male by comparison still has testes and responds as a male, and is frequently used as a “teaser”.	0..1	Enumeration, Nullable. Values are Not-Neutered, Cryptorchid, Infertile, Neutered)	ADI: Can be derived from Sex FarmIQ: Can be derived from Gender SIL: Can be derived from Sex

Item Name	Description	Cardinality	Type & Validation	Usage
Pregnant	Indicates whether the animal is pregnant at the time of data transfer. Note that this state may change a number of times over an animal's lifetime.	0..1	Boolean, Nullable: True or False.	DIGAD: May be derived from events FarmIQ: May be derived from events
Rearing Rank	Rearing rank is used to indicate the number of progeny reared by the same dam during the same lactation as this has an influence on weights and growth rates. For example, an animal reared as a twin will have a rearing rank of 2.	0..1	Integer, Nullable. Values 0 to 5.	SIL: Rearing Rank, DNA Rearing Rank
Status	Also called "Fate", this field is typically used to describe if the animal is Alive or Dead, sometimes with other variants such as Culled and Sold, although these may be more problematic if exchanging details between systems (for instance, sold on one system, but arriving and alive on another system).	1	Enumeration, values include Alive, Dead.	ADI: Status (Text) DIGAD: Fate (1 char) FarmIQ: Status (Text) NAIT: implied from Date of Death, etc. SIL: CurrentStatus (Integer)
Status Date	Date the status or fate last changed	0..1	Date, Nullable	DIGAD: can be derived from various Herd Membership dates. SIL: Status Date
Withholding Date Meat	Due to health treatments, the animal may not enter the food supply chain until this date. Derived from health treatment events.	0..1	Date, Nullable.	FarmIQ: Withholding Date
Withholding Date Milk	Due to health treatments, milk from the animal may not enter the food supply chain until this date. Derived from health treatment events.	0..1	Date, Nullable.	
Withholding Date Export	Date resulting from export slaughter interval of a treatment.	0..1	Date, Nullable.	

5 Data Dictionary – Group Membership

The following table defines **Group Membership**, which allows management or organisation of animals in groups. We recommend that only current group memberships are interchanged as animal data, and that historical uses of groups (for instance, mobs) should be reflected in animal observations and events.

Item Name	Description	Cardinality	Type & Validation	Usage
Group Location	Location identifier to which the group belongs. An animal that is grazing off at another farm may have groups on both the owning and grazing farms.	0..n	Data type to be determined, most likely NAIT Location.	FarmIQ: Current Enterprise or Owing Enterprise
Group Name	Name of the group within the location.	0..n	Text	ADI: Group FarmIQ: Mob Name or Group Name SIL: Pre-birth Mob, and Post-birth Mob
Group Type	Distinguishes between a physical management group (a mob of some sort) and other sorts of groupings.	0..n	Enumeration, nullable, Values to be defined?	FarmIQ: Mob or Group

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