Dairy Industry Network Data Standards

Animal Observations

Discussion Document

Andrew Cooke, Kim Saunders, Don Wilson
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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. 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 document focuses on observations and records of actions carried out on animals and groups of animals.

2 What is being observed?

In order to discuss observations and actions, we must first identify:

- What is an observation?
- What is being observed?

2.1 What is an observation?

The dictionary[1] describes observation as the act or instance of noticing or perceiving, or regarding attentively, and in our case as “an act or instance of viewing or noting a fact or occurrence for

[1] www.dictionary.com/browse/observation

some scientific or other special purpose". Thus an observation can include a note or record of an activity carried out, an event that has occurred, or a measurement taken.

The Open Geospatial Consortium describes observations[2] as involving "sampling of an ultimate feature of interest". Of course in geographic terms, many features can only be "sampled". However, with animals and particularly groups of animals, "sampling" is an important concept. It may be that only a sample of the animals in a mob is weighed, or that a device takes a sample of the fat or protein in milk at a moment in time.

The other distinction we make is that an observation itself does not represent "state". It is instead a sampling of the state of an animal at a point in time. As a result, an observation will not tell you when an animal lactated – only that at a point in time it was observed lactating, or that lactation was observed to begin. Our discussion document about animal attributes[3] gives some examples of animal state information. Changes to some of these states may be *triggered by* an observation, but the observation does not represent the state itself.

2.2 What is being observed

It is also important to identify what is being observed. This may be an individual animal, identified using one of the official animal identification schemes[4], or it may be a group of animals, either as a sample, or a record of an activity carried out on all the animals in the group (for example, sale, purchase, milking or shearing).

As a result, an essential part of recording and transmitting any observation must be an identification of the animal or animals to which it applies.

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[2] OGC: Observations and Measurements – www.opengeospatial.org/standards/om
[3] Animal Life Data Discussion Document, Rezare Systems 2013 - http://www.rezare.co.nz/Media/Default/data-standards/DINDS-Animal-Life-Data-Discussion-2013-05-21.pdf
[4] Animal Identification Discussion Document, Rezare Systems 2013 - http://www.rezare.co.nz/Media/Default/data-standards/DINDS-Animal-Identification-Discussion-2013-04-16.pdf

3 Observation Date, Time, and Subject

3.1 Subject Identification

Items in this table are used in some or all observations to identify the subject of the observation. Some observations only apply to individuals, while others may apply to a herd or group.

Item Name	Description	Cardinality	Type & Validation	Usage
Animal ID	The identification of a single animal (using an agreed animal identification scheme – see footnote 4).	1	Text, Identifier	Frequently called EID, Animal ID, Tag, Visual ID, or Official ID.
Herd ID	An identifier for a herd, enterprise, or other registered or official entity which represents a grouping of animals at a farm level.	1..n	Text, Identifier	May be called Participant Code, Herd Code, Herd ID, Flock No, Enterprise.
Group ID	An identifier for a management group of animals within a farm. Group identifiers do not typically form part of an official scheme, but are used frequently at the farm management level, and may be used to define contemporary groups.	0..n	Text, Identifier	Called Mob or Group.

3.2 Date and Time

All observations are recorded at a point within time, and must be accompanied by a date or date and time. For this reason, date and time is not listed separately for each observation in section 4 below.

Item Name	Description	Cardinality	Type & Validation	Usage
Observation Date	Date (and depending on observation, time) at which the observation was made. For some events, the time component of the observation is critical (for instance, Herd Testing). For others, (such as condition score), the rate of change is slow enough that time is irrelevant.	1	ISO 8601 date (and time)	

4 List of Observations

The following table lists the distinct types of observation we have identified (along with some of their alternative names or descriptions).

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
Registration	Register Identification	Also called "Tagging"; the act of applying an official tag. Applies to individual animals.	Tag Type	Enumeration: Ear Tag, Inject, Bolus, Tag Attachment, (Tag is a synonym for Ear Tag).
			ICAR Product Code	Integer: Product code from http://www.service-icar.com/manufacturer_complete.php
			Animal Identifier	URI – an animal identifier as per the Animal Identification proposal.
			Removing Tag	Boolean: True if the tag is being removed – the default is False.
	Change Identification	The act of replacing an official tag, also called "Retagging" and "Replacement". Applies to individual animals.	Previous Animal Identifier	Where known, the previous URI of the animal.
			Tag Type	Enumeration: Ear Tag, Inject, Bolus, Tag Attachment, (Tag is a synonym for Ear Tag).
			ICAR Product Code	Integer: Product code from http://www.service-icar.com/manufacturer_complete.php
			Animal Identifier	The new URI of the animal
			Retagging Reason	String – a textual explanation
	Change Fate	Records that the animal Fate (or Status) has changed. This typically occurs when an animal dies or leaves the enterprise (herd).	Fate Code	Enumeration: Alive, Culled, Dead, Sold, In Transit
			Fate Reason	
			Disposal Waybill	String - Waybill or disposal identifier

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Disposal Method	Enumeration: Home Kill, Disposed on site, Meat processor – human consumption, Meat processor – pet food, Rendering facility.
	Change Herd Membership	The act of changing from one "herd", "enterprise" or other official recording group to another. May comprise part of a movement. Applies to individuals or a group. Also called sale, purchase, transfer.	Source Enterprise Identifier	URI string – Enterprise identifier
			Source Enterprise Display Name	String – display name
			Destination Enterprise Identifier	URI string – Enterprise identifier
			Destination Enterprise Display Name	String – display name
	Change Ownership	Records a change of ownership of an animal, group, or herd. Often (but not always) associated with a movement between locations. This may also include a Lease (a change of ownership arrangements). Also called sale, purchase, transfer.	Previous Owner Identifier	URI string – Owner identifier
			Previous Owner Display Name	String – display name
			New Owner Identifier	URI string – Owner identifier
			New Owner Display Name	String – display name
			Previous Lessee Identifier	URI string – Owner identifier
			Previous Lessee Display Name	String – display name
			New Lessee Identifier	URI string – Owner identifier
			New Lessee Display Name	String – display name
			Tally	Integer – count of animals involved
	Change Location	A movement from one official location to another. We have called this "Change Location" rather than Movement to avoid	Source Location Identifier	URI string – location identifier
			Source Location Display Name	String – display name

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
		confusion with moves within a location (for instance, between paddocks). Also called movement, transfer, grazing, sale, or purchase. Recorded for individuals for cattle and deer because of NAIT requirements.	Destination Location Identifier	URI string – location identifier
			Destination Location Display Name	String – display name
			Transport Method	Enumeration – Herding, Road Transport, Rail Transport, Source Own Transport, Destination Own Transport
			Transport Operator	String – operator name
			Waybill	String – waybill or transaction ID
			Vehicle Identification	String – fleet number or licence plate
			Transit Time	ISO 8601 period (duration)
			Tally	Integer – count of animals involved
Reproduction	Run with Sires	Records that a female (or group of females) was run with one or more sires for the purpose of mating, but is not an observation of actual mating. The observation date is the start of running the sires and dams together.	Sire Identifier(s)	A list of URI animal identifiers for the sires, if these are known.
			Sire Tally	Integer: the number of sires
			Dam Tally	Integer: the number of dams
			Dam Ratio	Float: the ratio of dams per sire
			Teaser Used	Boolean: True if a teaser was used
			Intended Exit Date	ISO 8601 date of intended separation of sires and dams.
	Observed Mating	Record of a mating that was observed, which might include observed natural mating, artificial insemination, and AI with sexed semen (all differentiated by Mating Method).	Mating Method	Enumeration: Natural, AI, Sexed Semen AI
			Sire Identifier	URI animal identifier of sire
			Straw Identifier	String – identifier of the straw. ICAR identifier preferred.

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
	Embryo Transfer	The act of implanting a fertilised embryo, typically from another donor.	Donor Dam Identifier	URI animal identifier of the dam from whom oocytes were harvested.
			Sire Identifier	URI animal identifier of the sire.
			Embryo Identifier	String – identifier of the embryo.
	Egg Collection	The act of collecting oocytes or eggs from a donor dam.	Collection Identifier	String – collection identifier
			Collection Centre Identifier	String – identifies the collection centre
			Oestrous Day	Integer – day within oestrous cycle
	Pregnancy Scan	Also called “scanning” (although that term could refer to other scans), this is the process of determining pregnancy, and possibly the number of foetuses and foetal age. In the case of sheep, short scanning identifies empty, single, and multiple, rather than counting all multiple embryos.	Scan type	Enumeration – Short, Long
			Equipment Model	String – make and model of equipment used
			Foetus Count	Integer – number of foetuses (may be zero).
			Foetal age	Integer – gestation age in days where estimated.
	Semen Collection	The act of collecting semen from a sire.	Collection Identifier	String – collection identifier
			Collection Centre Identifier	String – identifies the collection centre
			Semen pH	Float: values between 3 and 9
			Semen Volume	Float: The volume of semen in millilitres (ml)
			Semen Motility	Float:
			Forward Progression	String: score from 0 to 4, with + or – postfix.
			Semen Concentration	Float: expressed as 10^6/ml

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Semen Morphology	Float: Percentage of sperm with normal morphology
			White Blood Cell Count	Float: expressed as 10^6/ml
	Parturition	Also called Birthing, this is a cross-species term for calving, lambing, or fawning.	Abnormal Birth Indicator	Enumeration: Aborted, Induced, Premature
			Assistance Indicator	Integer score: 0 = not reported, 1 = reported no assistance, 2 = assistance given.
			Progeny Number	Integer: Ascending number allocated to each progeny recorded within a parturition observation.
			Fate of Progeny	Enumeration: Reared, Sold, Died, Bobbied (for each progeny recorded within a parturition observation)
			Progeny Animal ID	URI animal identification of each progeny where this has been recorded during a parturition observation
			Progeny Sex	Enumeration: Male, Female (for each progeny recorded within a parturition observation)
Feed and Growth	Liveweight	A weight recorded on a live animal (as opposed to dead weight). Abbreviated “Weight” in many on-farm tools.	Weight	Float: Weight in kg
			Equipment Model	String: Make, model, version used
			Precision	
			Coefficient of Variation	Float: Percentage (for a group)
			Maximum Weight	Float: Weight in kg (for a group)
			Mean Weight	Float: Weight in kg (for a group)

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Minimum Weight	Float: Weight in kg (for a group)
			Standard Deviation	Float: in kg (for a group)
			Time off feed	ISO 8601 period (hours/minutes)
	Condition Score	A category scale score of the fatness or condition of an animal.	Condition Score	Float: Score 1 to 10 (standard 1-5) with 0.5 half-scores
	Weaning	The act of removing young animals from being able to access milk. This causes a change in diet.	Pre-weaning Group	
	Feed Regime Change	Records a change in a feed regime (for instance, onto or off a forage, or use of a supplementary feed). Often recorded for a group of animals.	Feed Category	String – Feed Category from register
			Feed Name	String – Feed Name from register
			Metabolisable Energy	Float: MJ ME/kg DM
			Feed Allowance Per Head	Float: kg DM per head
	Change Paddock	Also called “internal move” or “grazing” by some systems, this is a record of movement of an animal or group from one internal farm location (a paddock) to another. This is often recorded for a group of animals.	Source Paddock	String, Identifier of the paddock from which animals were being moved
			Residual Pasture Cover	Float: kg DM/hectare remaining in source paddock
			Destination Paddock	String, Identifier of the paddock into which animals were being placed
			Destination Pasture Cover	Float: kg DM/hectare in destination paddock when animals are changed
			Tally	Integer – count of animals involved
	Draft	Records that an animal was drafted in a certain direction (out a gate) or moved to another group.	Gate or Group	
	Body Measurements	Records miscellaneous measurements made on an animal	Measurement Type	Enumeration: Hip Height, Scrotal Circumference

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Measurement	Floating:
			Measurement Units	Enumeration: mm, cm, m, g, kg, °C, …
Animal Health	Diagnosis	The diagnosis of a health condition. ICAR provides a detailed document about diagnosis of health conditions.	Diagnosed By	Enumeration: Veterinarian, Farmer, Technician
			Affected Part	Enumeration: Body part or system affected, coded using the ICAR draft diagnosis coding system.
			Disease Category	Enumeration: organ diseases; reproduction disorders in females; reproduction disorders in males; infectious diseases; parasitoses; metabolic diseases and deficiencies; poisoning; behavioural disorders and general findings; and health-related information not representing diagnoses
			Disease	String: name of the disease
			Disease Code	Enumeration: using ICAR draft diagnosis coding system (or DairyNZ CauseOffFateType)
			Disease Strain	Enumeration: using the ICAR draft diagnosis coding system
	Treatment	A record of a health treatment applied (for instance, medication, vaccination, drenching or dipping).	Treated By	String: operator who applied the health treatment
			Health Product	String: trade name of the health product
			Registration Number	String: ACVM registration number of product

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			SKU	Integer: stock keeping code (barcode)
			Organic Approved Remedy	Boolean: True if organic approved – the default is False.
			Treatment Method	Enumeration: Capsule, Dip, Drench, Pour-on, Topical, Vaccine, Feed additive
			Batch Number	String: batch number of product used
			Expiry Date	Date: Expiry date of batch
			Dose Rate	Float: dose that was administered
			Dose Units	Enumeration: ml, mg; units of the amount administered
			Withholding Period Meat	Integer: days
			Withholding Period Milk	Integer: days
			Export Slaughter Interval	Integer: days; minimum time between treatment and slaughter for export markets
			Hormone Indicator	Flag (True/False): indicates that the product applied contains a hormone growth promotant
	Farming Procedure	A record of a routine farming procedure performed (for instance, dehorning, disbudding or castration)	Procedure Type	Enumeration: Dehorning, Disbudding, Castration, Branding
			Procedure Method	String:
	Surgery	A record of surgery performed, especially for major surgery	Surgery Procedure	Enumeration:
			Surgery Part	Enumeration: Body part or system affected, coded using the ICAR draft diagnosis coding system.

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Surgery Outcome	String:
	Injury	Records an injury event	Injury Type	Enumeration: Accident, Misadventure
			Affected Part	Enumeration: Body part or system affected, coded using the ICAR draft diagnosis coding system.
			Injury Comment	String: description of injury
Tests (excluding Herd Tests)	Blood tests	Records details of blood tests	Blood Test Type	Enumeration: β-hydroxybutyrate, glucose, non-esterified fatty acid, urea-nitrogen, albumin, globulin, magnesium, inorganic phosphate, copper, GSHPx, calcium, thyroxine T4, vitamin A, vitamin B12, vitamin E, leptospira, BVD, IBR antibodies, PII
			Blood Test Result	Floating:
			Blood Test Units	Enumeration: %, $x10^3/\mu L$, $x10^6/\mu L$, $x10^9/\mu L$, mg/dL, g/dL, g/L
	Liver Biopsy	Records details of liver tests	Liver test type	Enumeration: alanine transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALKP), total bilirubin (Tot BILI), albumin (ALB), blood-urea-nitrogen (BUN), copper, cobalt, selenium
			Liver Test Result	Floating:
			Liver Test Units	Enumeration: U/L, mg/dL, g/dL
	CT-scan	Records details of CT-scan		
	MIR	Records details of MIR scan		

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
	Gene sample	Records details of DNA tests	DNA Test Type	Enumeration: pedigree verification, sire/dam match, DNA match, Identity, A2, BVD, marker-assisted selection, Carrier of Recessive Gene
			DNA Test Sample Type	Enumeration: easiTrace, hair, semen, blood, tissue, milk
			Recessive Gene condition	Enumeration: BLAD, citrullinemia, Factor XI, DUMPS, milk protein variants, coat colour, horned/polled genes, spider syndrome, Booroola gene, Inverdale gene
			DNA Test Result	String:
	Ultrasound	Records details of Ultrasound scanning	Ultrasound Test Type	Enumeration: Pregnancy
			Ultrasound Test Outcome	
Dairy Production	Milking	Records that an animal was present at milking and was milked.	Present at milking	Flag (True/False)
			Milked	Flag (True/False)
	Milk Yield	Records the yield of milk from an animal at a single milking.	Measurement Method	Enumeration: device or process used to measure milk yield
			Yield Precision	Float: degree of precision of the measurement
			Yield (Litres)	Float: milk yield in litres
	Drying Off	Also called “End Lactation”, this marks the point from which an animal will no longer be milked in the current lactation. It may also be accompanied by animal health treatments.	Drying Off Reason	
	Milk Characteristics		Milk Measurement Method	Enumeration:

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
		Captures characteristics of an animal's milk (for instance, from a herd test or inline). Recorded against individuals.	Sample Identifier	String: identifier of sample sent away for processing
			Laboratory Identifier	String: unique identifier for the laboratory that processed the sample
			Fat Percentage	Float: percentage of fat in milk
			Protein Percentage	Float: percentage of protein in milk
			Lactose Percentage	Float: percentage of lactose in milk
			Somatic Cell Count	Float: recorded in thousands of cells per ml of milk and is taken at each herd test (i.e., actual cell count divided by 1000)
			Conductivity	Float: Conductivity of the milk in mS/cm
	Herd Test	Records that a milking monitored as part of an occasional (batch or DSM) herd test occurred. Must be recorded against individuals.	Milking Number	Integer: indicates the number of the milking within the herd test (for instance, the first or second milking)
			AM/PM Indicator	Enumeration: am, pm; Indicates whether the milking measured represents a morning or afternoon milking using traditional batch milking methodology
			Previous Milking Time	ISO 8601 date (and time): the date and time of the immediate previous milking, in herd tests

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			24 Hour Average Number of Milkings	Float: average number of times that an animal is milked expressed in terms of a 24-hour period at the time of the herd test sample milking
			Abnormal Test Code	Enumeration: Insufficient Sample, Farm anomaly, In season, Held milk, Herd tester processing anomaly, Run with calves, Sick, Contaminated sample
			Sample Identifier	String: Identifier of sample sent away for processing
Meat Production	Dead Weight	Weight of an animal before cutting	Weight	Float: weight of an animal in kg before cutting
	Carcass Characteristics	Grading, carcass weight, and other characteristics.	Hot Carcass Weight	Float: carcass weight in kg of an animal prior to boning out in a hot boning plant, or prior to chilling
			GR Fat Depth	Float: depth of fat in mm at the GR measurement site
			Fat Grade	Enumeration: species-specific coding of fat grade at plant
			Conformation Grade	
			Faults	Enumeration: processor fault codes*] x array of attributes w Locations*
			Fault Locations	Enumeration: Body part or system affected, coded using the ICAR draft diagnosis coding system.

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Meat Colour	Enumeration: Light cherry red, Light cherry red, Slightly dark red, Moderately dark red, Dark red, Very dark red, Black
			Fat Colour	Enumeration:
			EMA Ultra Sound	Float: Eye Muscle Area Ultra Sound; in cm^2
			Carcass Eye Muscle Area	Float: average in cm^2
			Eye Muscle Length	Float: Eye muscle length (mm)
			pH	Float: pH measurement
			Processor	Enumeration: code of meat processor
			Plant	Enumeration: code of plant where animal is killed
			Mob ID	String: unique identifier that represents the line of animals being killed
			Carcass ID	String: identifier assigned to carcass by processor
			Dentition	Enumeration: Lamb, Hogget, Two-tooth, Four-tooth, Six-Tooth, Full mouth; sheep only
Fibre Production	Shearing	Record of the fact that an animal was shorn, and optionally, fleece weight and lab sample ID.	Fleece Weight	Float: weight of the shorn fleece in kilograms
			Sample Identifier	String: identifier of sample sent away for processing
	Fibre Measurements	Laboratory measured fibre characteristics.	Sample Identifier	String: identifier of sample

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Laboratory Identifier	String: unique identifier for the laboratory which processed a sample
			Yield Percentage	Float: yield of clean fibre
			Staple Length	Integer: the length of wool staple in mm from a wool laboratory test
			Mean Fibre Diameter	Float: mean diameter of fibres in the sample in micrometres (microns)
			Fibre Diameter Standard Deviation	Float: the standard deviation of diameter of fibres in the sample
			Fibre Diameter Coefficient of Variation	Float: the coefficient of variation of diameter of fibres in the sample
			Spinning Fineness	Integer: measure or score of the fineness of wool for spinning, from a lab test
			Prickle Factor	Integer: measurement or score of the prickle factor of wool, from a lab test
			Comfort Factor	Integer: score of the comfort level of a wool from a testing laboratory
Velvet Production	Velvet Measurements	Record of velvet production measurements	Velvet ID	String: velvet identification tag
			Velvet Weight	Float: total velvet weight in kg;
			Velvet Circumference	Float: the lesser measurement of the circumference of the beam measured on the clear beam: immediately above the trez tyne; and midway between the top of the stick and the top of the inside cut; in cms

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Velvet Top Length	Float: Measured between top of the stick and bottom of the fork where the trez meets the beam; in cms
			Velvet Overall Length	Float: measured from the top of the stick to the top of the inside cut; in cms
			Velvet Category	Enumeration: Super A, Short, Medium, Long Top, Overgrown, Regrowth, Hard Velvet, Hard Antler, Spiker, Taiwan, Damaged, Manufacturing
			Velvet Grade	Enumeration: SA, A, B, C, D, E, OG1, OG2, OG3, RG, HV, HA, SP, TW, Dam, Manufacturing
Scores	Condition		Condition Score	Integer: score 1-5;
			Condition Score Event	Enumeration: mating, weaning, not specific
	Conformation		Conformation Score	Integer: score 1-5;
	Footrot		Footrot Score	Integer: score 1-5;
	Teeth		Teeth Score	Integer: score 1-5;
	Daggy		Daggy Score	Integer: score 1-5;
	Mothering		Mothering Score	Integer: score 1-5;
	Vigour		Vigour Score	Integer: score 1-5;
	Udder		Udder Score	Integer: score 1-5;
	Farmer Opinion Traits	Traits relating to their adaptability to milking, shed temperament, milk speed and overall opinion of two-year-old heifers	Adaptability to milking	Integer: score 1-9; how soon the heifer settled into the milking routine after calving (Slowly to Quickly)

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Shed temperament	Integer: score 1-9; temperament of the heifer in the farm dairy while being handled (Nervous to Placid)
			Milking speed	Integer: score 1-9; milking speed of the heifer (Slow to Fast)
			Overall opinion	Integer: score 1-9; farmer's overall acceptance of the heifer as a herd member (Undesirable to Desirable)
	Conformation	Traits relating to the physical conformation of two-year-old heifers	Stature	Integer: score 1-9; height of cow at the shoulders (Short to Tall)
			Capacity	Integer: score 1-9; depth and width of chest and body in relation to the physical size of the heifer (Frail to Capacious)
			Rump angle	Integer: score 1-9; angle between the centre of the hips and the top of the pins (Pins high to Pins low)
			Rump width	Integer: score 1-9; width of pins, hips and thurls relative to the size of the heifer (Narrow to Wide)
			Legs	Integer: score 1-9; straightness or curvature of the back legs while the heifer is walking (Straight to Very Curved)
	Udder Conformation	Traits relating to the udder conformation of two-year-old heifers	Udder support	Integer: score 1-9; strength of the suspensory ligament and the udder depth relative to the hocks (Weak to Strong)

Category	Observation	Notes and other names	Attributes or Fields	Data Types and Notes
			Front udder	Integer: score 1-9; attachment of the front udder to the body wall (Loose to Strong)
			Rear udder	Integer: score 1-9; height and width of the rear udder attachment (Low to High)
			Front teat Placement	Integer: score 1-9; placement of the front teats relative to the centre of the quarters (Wide to Close)
			Rear teat Placement	Integer: score 1-9; placement of the rear teats relative to the centre of the quarters (Wide to Close)
			Udder overall	Integer: score 1-9; desirability of all traits related to the udder (Undesirable to Desirable)
			Dairy conformation	Integer: score 1-9; desirability of all traits pertaining to dairy conformation (Undesirable to Desirable)
Animal events	Operational events	Records animal events	Event Type	Enumeration: shearing, crutching
			Event description	String: description of operational event