



Farm Data Standards

Pasture, Grazing and Feed Data Standard

Data Dictionary Version 1.2



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Contents

| | | |
|-----|--|----|
| 1 | Document Management..... | 5 |
| 1.1 | Referenced Documents | 5 |
| 1.2 | Related Documents | 5 |
| 1.1 | Latest Revisions | 5 |
| 1.2 | Version History | 6 |
| 1.3 | Review of Standards..... | 6 |
| 2 | Introduction..... | 7 |
| 2.1 | Overview..... | 7 |
| 2.2 | Outcome Statement | 7 |
| 2.3 | Scope and Application | 7 |
| 2.4 | Interpretation | 8 |
| 2.5 | Definitions and Abbreviations | 8 |
| 3 | Identification of Farm and Mobs | 8 |
| 4 | Pasture, Grazing and Feed Observations..... | 9 |
| 4.1 | Date and Time of an Observation..... | 9 |
| 4.2 | Supplementary feed | 10 |
| 4.3 | Grazing..... | 10 |
| 4.4 | Pasture..... | 10 |
| 4.5 | Pasture and Feed Analysis..... | 11 |
| | Appendix A Pasture, Grazing and Feed Data Dictionary (Normative) | 12 |
| A.1 | Supplementary Feed Observations | 12 |
| A.2 | Grazing Observations | 15 |
| A.3 | Pasture Attributes | 16 |
| A.4 | Pasture Observations | 18 |
| A.5 | Pasture and Feed Analysis Observations..... | 19 |
| | Appendix B Lists of Valid Values | 21 |
| B.1 | Crop Class | 21 |



| | | |
|-----|---------------------------------|----|
| B.2 | Feed Type | 21 |
| B.3 | Grazing System | 23 |
| B.4 | Pasture Type | 23 |
| B.5 | Pests..... | 24 |
| B.6 | Pest Monitoring Technique | 25 |
| B.7 | Nutrient | 25 |



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Ministry for Primary Industries
Manatū Ahu Matua





1 Document Management

1.1 Referenced Documents

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

Farm Data Standards - [Animal Data Standard](#)

EPCglobal SGLN and GLN – [GDSN Standards](#)

Massey University - [New Zealand Weeds Database](#)

AsureQuality - [AgriBase](#)

INSPIRE Feature Concept Register - <http://inspire.ec.europa.eu/featureconcept>

INSPIRE Data Specification on Administrative Units – Technical Guidelines
<https://inspire.ec.europa.eu/id/document/tg/au>

International System of Units - https://en.wikipedia.org/wiki/International_System_of_Units

1.2 Related Documents

Related Data Standard documents on the [Farm Data Standards website](#) include:

- [Animal data standard](#)
- [Stock Reconciliation data standard](#)
- [Land Application data standard](#)
- [Irrigation & Effluent data standard](#)

1.1 Latest Revisions

The users of this standard should ensure that their copies of the above-mentioned documents are the latest revisions. The latest version of this Standard will always be published at

www.farmdatastandards.org.nz.



1.2 Version History

| Date | Changes Made | Version # | Authors |
|------------------|--|-----------|---|
| 24 August 2018 | Update Referenced Documents section 1.1 Inclusion of Version History Section 1.2 Update measurement units for area to include m ² Rename of Grazing Effective Area to Grazeable Area | 1.2 | Don Wilson, Andrew Cooke, Sailee Patel |
| 6 December 2016 | Rename of Document from Grazing and Feed Data Standard to Pasture, Grazing and Feed Data Standard Rename of attribute Storage type to Structure type Rename of attribute Pasture Cover to Last Pasture Cover | 1.1.1 | Don Wilson, Andrew Cooke, Harry Tucker, |
| 15 December 2015 | Published version | 1.1 | Don Wilson, Andrew Cooke, Harry Tucker, |

1.3 Review of Standards

Suggestions for improvement of this document will be welcomed. Submit your comments using the feedback mechanisms at www.farmdatastandards.org.nz.



2 Introduction

2.1 Overview

Pastoral farming is becoming a data rich activity. Most biophysical processes from soil nutrient management to animal 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 land information for agriculture. Work on this project commenced in early 2013, funded by DairyNZ with contributions from FarmIQ Systems and Rezare Systems.

2.2 Outcome Statement

Broad adoption of a common vocabulary and data dictionary for exchange of farm information will result in farmers and other industry parties entering data only once and having that data readily accessible for populating multiple decision-making systems. As a result, industry and individual farm businesses will be better placed to undertake systems analysis to inform management practice. More accurate and structured interchange of farm data will also support industry breeding objectives and other information system targets.

2.3 Scope and Application

This standard addresses the following areas:

- Harvesting, purchase, storage, utilisation and sale of supplementary feeds.
- Grazing observations and summaries of grazing off and grazing systems
- Pasture growth, pasture, and feed analysis
- Monitoring of pasture pests and weeds.

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.



2.4 Interpretation

For the purposes of this standard, the word 'shall' refers to requirements that are essential for compliance with the standard, while the word 'should' refers to practices that are advised or recommended.

The terms 'Normative' and 'Informative' have been used in this standard to define the application of the Appendix to which they apply. A 'Normative' Appendix is an integral part of a standard while an 'Informative' Appendix is only for information and guidance.

2.5 Definitions and Abbreviations

For the purposes of this standard, the following definitions shall apply:

| Term | Definition |
|------|--|
| DM | dry matter |
| ha | Hectare(s) Areas are to be specified in m ² for compliance with international standards ² . These measurements can be converted, for example to hectares and does not affect what end users will see. |
| kgDM | kilograms dry matter |
| MJ | Megajoules |
| MJME | Megajoules of Metabolisable Energy |

3 Identification of Farm and Mobs

The Animal Data Standard³ discusses in section 3.1 the identification of locations or farms. It specifies a number of identifiers that are accepted for property identification in New Zealand and supports the interchange of data using all of these mechanisms. This Grazing and Feed Data Standard adopts the same location identification.

A number of identifiers are accepted for property identification in New Zealand:

- Ministry of Primary Industry FarmsOnLine identifier;
- NAIT Location identifier (one or more FarmsOnLine identifiers registered with NAIT)
- AgriBase⁴ farm_id (based on a coordinate pair in lat/long, NZTM or NZMG coordinates)

² INSPIRE Feature Concept Register - <http://inspire.ec.europa.eu/featureconcept>

³ Animal Data Standard (<http://www.farmdatastandards.org.nz/animal-data/>)

⁴ AgriBase,ASUREQuality (<https://www.asurequality.com/our-solutions/agribase/>)



- EPCglobal Serialised Global Location Number⁵ (as used by the NZ Business Number system); and
- Herd Testing Location identifier using the NZMS1 (1939 to 1975) map grid reference.

For historic reasons it will be necessary to support the interchange of data utilising all of these mechanisms. This standard therefore requires that location identifiers shall be prefixed with a URN namespace identifier. Acceptable URN namespaces for use in New Zealand location identifiers shall be:

- urn:epc:id:sgln or
- a nzl: registered location namespace.

For specific interchanges agreed between two parties, the parties may agree to exchange identifiers within a single namespace only, and dispense with the namespace prefix.

The Animal Data Standard (see sections 5, 6.2 and Appendix A.4) refers to mobs in its discussion of groups of animals. The Grazing observation is defined in this Grazing and Feed Data Standard for mobs. A mob is identified by a group name. It is uniquely identified by a URN identifier and may have a non-unique display name.

4 Pasture, Grazing and Feed Observations

For the purpose of this Standard, an observation is the act or instance of viewing or noting a fact or occurrence for 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.

In this standard the subject of an observation may be a farm, a block of land or paddock on that farm, or a mob of animals grazing on the block or farm.

4.1 Date and Time of an Observation

All observations are observed or sampled at a point within time, so the record of an observation SHALL be accompanied by a date, or date and time. An Observation Date **may also describe a duration or period** (for example, the period of 12 months from a known date).

| Item Name | Description | Cardinality | Type & Validation |
|------------------|--|-------------|---|
| Observation Date | Date (and depending on observation, time) at which the observation was made. For some events, the time component of the observation is | 1 | ISO 8601 date (and time), and optionally duration |

⁵ EPCglobal SGLN and GLN are defined at <http://www.gs1.org/access-gdsn-standards>



| Item Name | Description | Cardinality | Type & Validation |
|-----------|--|-------------|-------------------|
| | critical; for others, the rate of change is slow enough that time is irrelevant. | | |

4.2 Supplementary feed

This section of the standard is concerned with supplementary feed and encompasses the harvesting, purchase, storage, consumption, and the sale of supplementary feed.

All of these observations will be identified by the farm concerned and the type of feed. Each observation includes one or more fields that specify the quantity or weight of the feed and the units concerned. There is a table in Appendix A.1 that defines the information associated with the units specified.

The harvest may also include a block or paddock identifier and the date it was harvested. Details of the harvesting include the feed type grown, the weight harvested and how it is packaged.

Storage of feed will include a time period identifier. Data stored includes the storage condition and the type of storage, the total feed in the inventory and the change in the amount on hand from the beginning to the end of the period.

The Consume observation will include the time period that the consumption pertains to. It describes the use of the feed including the amount fed out and the feed consumed.

The Purchase and Sale observations include the date the supplement was purchased or sold respectively and the quantity.

4.3 Grazing

The Grazing section provides a grazing event observation and summaries for grazing off and the grazing system employed on the farm or block.

The grazing observation specifies the amount of pasture consumed and its utilisation percentage.

4.4 Pasture

Pasture data are identified by a farm, block, and time period.

The Pasture Cover observation defines the type of pasture and the level of cover. The Pasture Growth observation defines the growth rate, the clover level, and the number of tillers.



Observations of the monitoring in pasture and crops of insects and other pests and monitoring of weeds are defined. Massey University has created a database of over 70 of the more troublesome weeds found in New Zealand agriculture and horticulture.⁶

4.5 Pasture and Feed Analysis

Pasture and feed analysis data describe the characteristics and nutrient analysis of the pasture and supplementary feed.

⁶ New Zealand Weeds, Dr Kerry Harrington, Massey University.
(http://www.massey.ac.nz/massey/learning/colleges/college-of-sciences/clinics-and-services/weeds-database/weeds-database_home.cfm)

Appendix A Pasture, Grazing and Feed Data Dictionary (Normative)

A.1 Supplementary Feed Observations

Characteristics of the units referenced in the Supplementary Feed observations

| Attributes | Data Types and Notes |
|-----------------|---|
| Units | Enumeration: tonnes, tonnes DM, bales, big bales, m ³ , litres |
| Unit wet weight | Float: kg per unit |
| Unit dry weight | Float: kg per unit |
| Unit volume | Enumeration: m ³ , litres |

The following table defines observations we have categorised as **supplementary feed** and relates to all supplementary feed on farm.

| Category | Notes and other names | Attributes | Data Types and Notes |
|----------|-------------------------|-----------------------------------|---|
| Harvest | On-farm harvest of feed | Crop Class | Enumeration: <i>see Appendix B.1</i> |
| | | Supplementary feed type harvested | Enumeration: <i>see Appendix B.2</i> |
| | | Paddock ID | String: area ID on farm being harvested for supplementary feed |
| | | Dry weight | Float: total dry weight of a supplementary feed; tonnes of dry matter |
| | | Harvest units | See Error! Reference source not found. above |
| | | Dry matter % | Float: % |

| Category | Notes and other names | Attributes | Data Types and Notes |
|----------|---|------------------------------------|---|
| | | Packaging type | Enumeration: way a bale has been packaged; square, round, wrapped |
| Purchase | Purchase of supplementary feed | Supplementary feed type purchased | Enumeration: <i>see Appendix B.2</i> |
| | | Total supplementary feed purchased | Float: amount of supplementary feed which has been bought |
| | | Purchase units | <i>See Error! Reference source not found. a bove</i> |
| | | Dry matter % | Float: % |
| | | Supplementary feed cost | Integer: cost of feed which has been bought; dollars (\$), dollars/year (\$/year) |
| Store | Storage of feed | Supplementary feed type stored | Enumeration: <i>see Appendix B.2</i> |
| | | Total supplementary feed stored | Integer: amount of supplementary feed which is stored |
| | | Change in inventory | Integer: Difference between total feed on hand at the start of the period, and feed on hand at the end of the period |
| | | Storage units | <i>See table above</i> |
| | | Storage condition | String: conditions of the supplementary feed storage |
| | | Structure type | Enumeration: type of storage of feed supplement; See Farm Features & Attributes C.1 for full enumeration list |
| Consume | Change in inventory from consumption and loss | Supplementary feed type consumed | Enumeration: <i>see Appendix B.2</i> |

| Category | Notes and other names | Attributes | Data Types and Notes |
|----------|----------------------------|--|---|
| | | Total fed out | Float: total amount of feed which has been fed out for date or period |
| | | Total feed consumed | Float: amount of feed which has been consumed |
| | | Consume units | <i>See Error! Reference source not found. above</i> |
| | | Fed out per stock unit | Float: amount of feed which has been fed out per SU per day; (kgDM/SU/day) |
| | | Feed consumed per stock unit | Float: amount consumed per SU per day kgDM/SU/day |
| | | Percentage of feed consumed | Float: amount of feed eaten over the total amount of feed fed out; % |
| | | Crude protein | Float: amount of total protein which can be metabolised from consuming the feed; kilograms of protein/kilograms of dry matter (kg/kgDM) |
| | | Metabolisable energy | Float: amount of energy which can be metabolised from consuming the feed; megajoules of metabolisable energy/kilogram of dry matter (MJ/kgDM) |
| | | Average utilisation of purchased supplements | Float: weighted average of all feed imported; % |
| Sale | Sale of supplementary feed | Supplementary feed type sold | Enumeration: <i>see Appendix B.2</i> |
| | | Feed Sold | Float: amount of feed sold |
| | | Sale units | <i>See table above</i> |

A.2 Grazing Observations

The following table defines items we have categorised as **grazing**. Grazing observations are typically of short duration (hours, a few days, or potentially weeks).

| Category | Notes and other names | Attributes | Data Types and Notes |
|---------------|--|--|--|
| Grazing event | Animals grazing a paddock, block or area | Paddock name | String: name or identifier of paddock, block or area |
| | | Mob ID | String: mob Identifier of animals currently grazing |
| | | Total pasture consumed | Float: amount of pasture which has been consumed; tonnes of dry matter/hectare; tDM/ha |
| | | Pasture consumed per mm of water applied | Float: amount of pasture consumed per millimetre of water applied by rain and irrigation; kgDM/ha/mm |
| | | Pasture utilisation | Float: percentage of total pasture grown that is eaten by animals in the period; % |

The following table defines grazing summaries. In contrast to grazing events, a grazing summary describes a longer duration grazing interaction between mobs of animals and a farm or block, which may summarise multiple individual grazing events. A grazing summary requires both a date and duration (which may be specified in the Observation Date).

| Category | Notes and other names | Attributes | Data Types and Notes |
|-------------|------------------------------|------------|--|
| Grazing off | Summary of grazing off event | Farm ID | String: identifier of farm where animals are currently grazing |
| | | Mob ID | String: mob Identifier of animals currently grazing |

| Category | Notes and other names | Attributes | Data Types and Notes |
|----------------|--|---------------------|---|
| | | Animals grazing off | Integer: number of animals being grazed off |
| Grazing system | Summary of grazing system for the farm or block for a period | Grazing System | Enumeration: <i>see Appendix B.3</i> |
| | | Rotation Length | Integer: number of days |
| | | Grazeable Area | Float: size of the area being grazed (net of bush, swamps, etc); in m ² (SI unit) or hectares (ha, accepted non-SI unit). Implementations must clearly specify which unit is used, and ensure consistent use. For spatial data interchange m ² should be used. ⁷ |

A.3 Pasture Attributes

The following table defines items we have categorised as **pasture**.

| Category | Notes and other names | Attributes | Data Types and Notes |
|----------|--|------------------|--|
| Pasture | The type of pasture and level of cover | Pasture type | Enumeration: <i>see Appendix B.4</i> |
| | | Years in pasture | Integer: amount of time a block has been in pasture since the last regrassing |
| | | Clover level | Enumeration: Annual average clover content (as a proportion of pasture dry matter) where fertiliser N inputs are not |

⁷ See section 6.1.3 at <https://inspire.ec.europa.eu/id/document/tg/au>

| Category | Notes and other names | Attributes | Data Types and Notes |
|----------|-----------------------|------------|---|
| | | | applied; Very low, Low, Medium, High, Very high |

A.4 Pasture Observations

The following table defines items we have categorised as **pasture**.

| Category | Notes and other names | Attributes | Data Types and Notes |
|-----------------|--|-------------------------|--|
| Pasture | The type of pasture and level of cover | Last Pasture Cover | Float: amount of pasture dry matter per hectare; kilograms of dry matter/hectare (kgDM/ha) |
| | | Last Pasture Cover Date | Date: previous pasture cover measurement |
| | | Pasture growth | Float: rate of growth of pasture; kilograms of dry matter/hectare/day (kgDM/ha/day) |
| | | Tiller Number | Integer: number of tillers/m ² |
| Pest monitoring | Monitoring of insects and other pests in pasture and crops | Pest | Enumeration: <i>see Appendix 0</i> |
| | | Pest population | Integer: number/m ² |
| | | Insect size | Integer: average insect size; mm |
| | | Sampling technique | Enumeration: <i>see Appendix 0</i> |
| Weed Monitoring | Monitoring of weeds in pasture and crops | Weeds | Enumeration: <i>see New Zealand Weeds</i> ⁸ |

⁸ New Zealand Weeds, Dr Kerry Harrington, Massey University. (http://www.massey.ac.nz/massey/learning/colleges/college-of-sciences/clinics-and-services/weeds-database/weeds-database_home.cfm)

A.5 Pasture and Feed Analysis Observations

The following table defines items we have categorised as analysis of pasture and supplementary feed.

| Category | Notes and other names | Attributes | Data Types and Notes |
|-----------------------------|---|---------------------------------|---|
| Feed characteristics | Properties of the pasture or supplementary feed | Dry matter | Float: %DM |
| | | Crude protein | Float: amount of total protein which can be metabolised from consuming the feed; kilograms/kilograms of dry matter |
| | | Crude fat | Float: crude fat content; %DM |
| | | Ash | Float: ash content; %DM |
| | | Acid detergent fibre | Float: cellulose and lignin fraction in forages; %DM |
| | | Neutral detergent fibre | Float: fraction containing hemicelluloses, cellulose and lignin in forages; %DM |
| | | Soluble sugars | Float: soluble sugars content; %DM |
| | | Starch | Float: starch content; %DM |
| | | Digestibility | The percentage of feed that is able to be digested |
| | | Metabolisable energy | Float: amount of energy which can be metabolised from consuming the feed; mega joules/kilograms of dry matter (MJ/kgDM) |
| | | Dietary cation anion difference | Integer: mEq (milliequivalents) / 100g DM |
| | | pH | Float: |
| Volatile Fatty Acid Profile | Float: % | | |

| | | | |
|---------------|--|------------------------|--|
| | | Ammonium N:Total N | Float: % |
| | | Nitrate-Nitrogen level | Float: % |
| Feed minerals | Mineral composition of the pasture or supplementary feed | Mineral | Enumeration: <i>see Appendix B.7</i> |
| | | Mineral concentration | Float: % for N, P, K, S, Ca, Mg, Na, Cl; Integer: mg/kg for Fe, Mn, Zn, Cu, B, Mo, Co, Se |



Appendix B Lists of Valid Values

B.1 Crop Class

Crop Class is used in the **Supplementary Feed** category. See the [Farm Features and Attributes Data Standard](#) Appendix C.2 for a list of plot activity values for crops and grazing.

Valid values for **Crop Class** are:

| |
|-------------------|
| Pasture Conserved |
| Cash Crop |
| Harvested Crop |
| Forage Crop |

B.2 Feed Type

Feed Type is used in the **Supplementary Feed** observations.

Valid values for **Feed Type** are:

| Category | Attributes |
|-------------|--|
| Grains | <ul style="list-style-type: none"> Barley grain Maize grain Oats grain Pea Soya Bean Meal Triticale grain Wheat grain |
| Green feeds | <ul style="list-style-type: none"> Annual ryegrass Japanese millet Kale Lucerne Maize greenfeed Oats leafy Oats milky dough Pasture Rape Rye corn Sorghum |



| | |
|-----------|--|
| | Sulla Swedes Triticale Turnips |
| Hay | Lucerne hay Pasture hay |
| Silage | Baleage Barley milky dough silage Cereal silage Lucerne silage Maize silage Pasture silage Sweetcorn silage Triticale silage |
| Straws | Barley Straw Corn stover Oat straw Pea Straw Ryegrass straw Wheat Straw |
| Processed | Avonfeed Bran Broll Brewers grain Canola Copra Corn grits (Hominy) Cottonseed meal Fishmeal Lucerne meal Molasses Palm Kernel Extract Pollard Proliq Tallow Tapioca |



| | Urea |
|-----------------|--|
| Vegetable/Fruit | Apple pomace Apples Cabbage Carrots Citrus pulp Grape pomace Kiwifruit Onions Potato Squash |

B.3 Grazing System

Grazing System is used in the **Pasture Use** observation.

Valid values for **Grazing System** are:

| |
|---------------|
| rotational |
| cell |
| set stocking |
| break feeding |

B.4 Pasture Type

Pasture Type is used in the **Pasture** category.

Valid values for **Pasture Type** include:

| | |
|-------------------------------|---------------------|
| White clover/Ryegrass | Lucerne |
| Browntop | Lucerne / grass mix |
| Unimproved/tussock grasslands | Grass only |
| Summer C4 (paspalum) pastures | Irrigated pastures |
| C4 (Kikuyu) pastures | Clover |
| Chicory | Plantain / clover |



B.5 Pests

Pests are used in the **Insect and Pest Monitoring** observation.

Valid values for **Pests** include:

| Common Name | Scientific Name |
|---|---|
| Argentine stem weevil | <i>Listronotus bonariensis</i> |
| Black field cricket | <i>Teleogryllus commodus</i> |
| Black beetle | <i>Heteroncyclus arator</i> |
| Brassica aphid, cabbage aphid, grey cabbage aphid | <i>Brevicoryne brassicae</i> |
| Brassica springtail, common springtail | <i>Bourletiella hortensis</i> |
| Clover flea, clover springtail, lucerne flea | <i>Sminthurus viridis</i> |
| Clover root weevil | <i>Sitona lepidus</i> |
| Cosmopolitan armyworm | <i>Mythimna separata</i> |
| Diamondback moth | <i>Plutella xylostella</i> |
| Field slug, grey field slug | <i>Deroceras reticulatum</i> |
| Grass grub | <i>Costelytra zealandica</i> |
| Greasy cutworm | <i>Agrotis ipsilon</i> |
| Great white butterfly | <i>Pieris brassicae</i> |
| Lucerne weevil | <i>Sitona discoideus</i> |
| Manuka beetle | <i>Pyronota spp</i> |
| Nysius, wheat bug | <i>Nysius huttoni</i> |
| Plantain moth | <i>Scopula rubraria and Epyaxa rosearia</i> |
| Porina moth | <i>Wiseana cervinata</i> |
| Striped chafer | <i>Odontria striata</i> |
| Tasmanian grass grub | <i>Acrossidius tasmaniae</i> |
| Tropical armyworm | <i>Spodoptera litura</i> |
| Tropical grass webworm | <i>Herpetogramma licarsisalis</i> |
| White butterfly, cabbage white butterfly | <i>Pieris rapae</i> |
| White fringed weevil | <i>Naupactus leucoloma</i> |
| Rabbit | <i>Oryctolagus cuniculus</i> |



B.6 Pest Monitoring Technique

Technique used for monitoring insects in the **Insect and Pest Monitoring** observation.

Valid values for **Pest Monitoring Technique** include:

| |
|-----------------------|
| Beat sheet |
| Visual checking |
| Sweep net sampling |
| Suction sampling |
| Pheromone trap |
| Volatile trap |
| Light trap |
| Spade sampling |
| Germinating seed bait |
| Night count |

B.7 Nutrient

Nutrient is used in the **Pasture Analysis** observation.

Valid values for **Nutrient** are:

| | |
|----------------|----------------|
| Nitrogen (N) | Nitrogen (N) |
| Phosphorus (P) | Phosphorus (P) |
| Potassium (K) | Potassium (K) |
| Sulphur (S) | Sulphur (S) |
| Calcium (Ca) | Calcium (Ca) |
| Magnesium (Mg) | Magnesium (Mg) |
| Sodium (Na) | Sodium (Na) |
| Iron (Fe) | Iron (Fe) |



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