

CODE OF PRACTICE FOR THE TRADING OF PASTURE AND WHOLE CROP FORAGES



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Contributors recognised in Appendix 1

Foreword

The Code of Practice for the Trading of Pasture and Whole Crop Forages is a response by industry to issues raised about the fair trading of forage.

In 2004 the Forage Trading Development Group (FTDG) researched and developed a Code of Practice for the Trading of Maize Forage. This document was considered to be very valuable and consequently the industry set about repeating the process for Pasture and Whole Crop Forages.

In 2010 funding was confirmed from MPI Sustainable Farming Fund, DairyNZ, and Rural Contractors NZ. This was used for the purposes of researching techniques for sampling dry matter from Pasture and Whole Crop forages. The findings from this research are contained within this Code of Practice.

We would like to acknowledge the Code of Practice for the Trading of Maize Forage, from which this document was derived. Much of the content is shared between the documents.

Deane Carson
Editor

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Part 1: Overview

1.0 Introduction

The trading of forage crops involves several parties. Growers produce forage crops to sell. Contractors are engaged to harvest the crop and deliver it to the buyer. Buyers purchase the forage to feed to their livestock. In some cases, a broker sources crops and arranges harvest and delivery to buyers.

When forage is traded on a dry matter basis, all parties want to know the actual amount of dry matter involved. Growers want to know how well their crop has yielded. Contractors often purchase the standing crop, and sell it to their own buyers. Buyers purchase specified quantities to meet budgeted livestock feed requirements.

Forage trading involves significant financial transactions. For all parties, accurate measurement is essential for transactions to be 'fair'. If, for example, the crop dry matter percentage (DM%) is overestimated, the grower is paid more than they should, and the buyer is paying for dry matter that they did not receive.

In order to estimate the true forage dry matter, there are four important considerations.

- Obtaining accurate weights of each truck load harvested (wet weight), or bale,
- taking representative samples for analysis of DM% from truck loads, stacks, of bales
- reducing the volume of the samples, where there is too much to analyse (subsampling)
- having accurate laboratory tests to determine the DM% of those samples.

1.1 Purpose

The purpose of this document is to establish standard protocols for farmers, contractors, feed merchants and farm consultants to use for the trading and valuation of various forages.

1.2 Objectives

The aims of this Code of Practice are to:

- Educate those involved in forage trading about the key issues when trading forage on a dry matter basis.
- Outline current best practice for determining forage dry matter so that all parties involved have sound information and a fair basis for commercial transactions.
- Promote awareness of legal obligations in relation to weighing and measuring equipment, forage quality and fair trading.
- Promote standards of conduct for participants in the forage trading industry and recommend processes for resolution of any disputes.
- Ensure that the Code will be reviewed and updated so that it continues to be relevant to the issues of the forage trading industry.

1.3 Principles

In seeking to achieve its objectives, this Code relies on adherence to the following principles:

- All parties will carry out transactions in good faith and the basis of fair dealing.
- Implementation of the Code should not add significant additional cost to transactions.
- Recommendations are based on well-founded research.
- The Code will incorporate the requirements of relevant legislation.

1.4 Scope

This Code covers the trading of pasture and whole crop forage where it is sold on a dry matter basis. Research to date only involved pasture and whole crop silage, pasture baleage and hay. When using this code, the following considerations should be made:

- The sampling regimes outlined in this Code are specific to pasture and whole crop forage, which is a non-homogeneous material.
- For other forage products, further research is required to determine the sampling method and frequency required to achieve an acceptable level of accuracy.
- Legislative obligations and recommended contractual arrangements have application to forage trading in general, not just pasture and whole Crop forage.
- The laboratory DM% test described in this Code is a standard oven drying method that has been refined to improve accuracy when analysing forage. The principles outlined however, are applicable to achieving accurate DM% results for any forage material.

1.5 Using the Code

This document uses several terms that have a particular meaning in the context of forage trading. The definition of each term is shown in Table 1.

A number of documents and other publications are relevant with respect to the application and use of this document including legislation, national standards and user documents. These documents are listed in Appendix II.

Table 1: Interpretations and Glossary of Terminology

ACVM	Agricultural Compounds & Veterinary Medicines
Composite sample	A sample that is produced by combining several samples together to create one overall sample.
Dry matter (DM)	The weight of the forage after drying.
Dry matter percentage (DM%)	The percentage of the forage that does not contain moisture. If for example forage is 33% dry matter, then it has 67% moisture content.
Forage	The vegetative portion of plants suitable to feed to livestock.
IANZ	International Accreditation New Zealand
ISO	International Organisation for Standardisation
ILCP	Inter-Laboratory Comparison Program
TS	Trading Standards
MBIE	Ministry of Business Innovation and Employment
Sample	A representative quantity of forage material that is suitable for dry matter analysis.
Silage	Green forage that is chopped and compacted into a feed storage bag, stack or bunker to create an air-free environment where a bacterial acid fermentation retards spoilage.
Stack	A means of storing forage in bulk for the purpose of ensiling, including a stack formed on top of the ground, and a pit or bunker that has walls to contain the forage.

Sub-sampling	A process using a sample reduction device or one or more representative sub-samples are method where produced from an original sample or lot of samples.
Wet weight	The weight of a quantity of fresh forage including the moisture it naturally contains.
95% Confidence level	This reflects the inherent variability associated with a the range, which the result is likely to be in (usually expressed as +/- about a stated value), 95 times out of a hundred.

Part 2 Weighing

2.0 Weighing equipment

When forage is traded on a dry matter basis, the wet weight is multiplied by the dry matter percentage to provide the total dry matter content. There are several devices used to determine the weight of a truck or trailer load of forage including permanently installed weighbridges and portable weighbridges. Weighing devices must be accurate and when trading, there is a legal obligation to use approved equipment.

The Weights and Measures Act 1987 (the act) states that all weighing and measuring equipment used for trade must be of an approved type. The definition "use for trade" can be summarised as, "any weighing or measuring instrument that is used to determine a quantity, which is used to establish the basis for a financial transaction between two parties".

The Ministry of Business Innovation and Employment (MBIE) enforces the rules set out by the Act and associated Regulations. Equipment approvals are carried out by the Trading Standards (TS). The weighing system used in forage trading is the weighbridge either as a fixed installation, or as a portable system.

In this section, the term "trader" is used to describe a person or organisation who is either selling forage by weight, or buying forage by weight for the purpose of resale.

2.1 Approval of weighing equipment

Traders must use weighing equipment of an approved type (approved by Trading Standards). A pattern approval means that the equipment meets New Zealand's technical and performance requirements. It is then issued with a unique number.

2.2 Verification of weighing equipment

Once a type of weighing equipment has been approved, each new or repaired individual weighing device must undergo a test called

verification to ensure it meets the requirements of the approval certificate and is accurate and suitable for its intended purpose.

Each weighing device must have the mark of verification stamped on it. The mark of verification is a crown or the letters 'AP' followed by a number. It is issued by Trading Standards or by an Accredited Person approved for the purpose under the Weights and Measures Act.

2.3 Certificate of accuracy

Trading Standards strongly recommend that weighbridges are tested annually and issued with a Certificate of Accuracy. Testing is carried out by an Accredited Person. An Accredited Person is a company or individual who has been approved by the Ministry to test weighing and measuring equipment in compliance with Weights and Measures legislation. A Certificate of Accuracy is valid for 12 months from the date of the test and assures buyers that the weighbridge has been independently tested.

EXAMPLES OF MARKINGS:

Mark of Verification

Mark of
Verification
AP

Or

MOV AP X.x

Crown stamp



Certificate of Accuracy

CERTIFICATE OF ACCURACY

Company X
LOGO X

Examined and tested by an
Accredited person.
Complies with the requirements
of Regulation 20 of the
Weights and Measures Regulations 1999.

The Certificate of Accuracy
Expires on
XX/XX/XXXX

Personal Identifier of the person
issuing the certificate:
AP X.x

2.4 Using weighbridges

The following rules apply to the use of weighbridges:

- Weighbridges are approved with several conditions regarding their use. Users must set up and use the weighbridge as outlined in the certificate of approval and the manufacturer's instruction manual in order to comply with those conditions.
- Portable weighbridges must be set up on a compacted, flat and level surface that will maintain the instrument in a level condition throughout its use.
- The indicator (e.g. digital readout) must be positioned so the operator can see the load receptor (weighing platform) and the indicator during the weighing procedure.
- Ensure the indicator displays a zero figure before and after use. Throughout the day you may need to re-zero the instrument by pressing the "Zero button".
- When weighing a truck and trailer unit, the trailer unit must be disconnected when weighing to provide an accurate reading.
- Weighbridges must be kept free of mud and other debris.
- All weights must be the net weight (i.e. excluding the vehicle tare weights).
- When a product is sold by weight or measure, the sale must be made in units of the metric system, e.g. kilograms, tonnes etc.
- Altering division sizes or capacities of weighing instruments will render the instrument to be unstamped and illegal for trade use



Trading Standards Officers hold a certificate of appointment as an Inspector of Weights and Measures. They conduct random inspections of equipment. Penalties may apply if traders use or have in their possession, unstamped weighing or measuring equipment, or equipment which is incorrect. The Certificate of Accuracy in certain circumstances may provide a defense for users if they are prosecuted for short weight.

2.5 Invoice or Delivery Note

Where forage is delivered to a purchaser at a location other than the seller's premises, then an invoice or delivery note must be accompanied. Forage that is weighed in front of the purchaser at the purchaser's premises, are exempted from this requirement.

The invoice or delivery note must be sent as soon as possible to the purchaser and detail the net quantity delivered, along with the address, telephone number and email address (if any) of the seller (For forage, this means that the trader will need to provide not just the dry matter, but also the individual load wet weights or the total wet weight).

Where a person sells forage and the weight is determined by someone other than the seller, the person who makes the determination will send a written statement of the true net weight.

2.6 Failure to comply with the Act

An offence is created under the Act:

- Where the purchaser has determined the weight of the forage and has not provided the true net weight to the seller.
- When an invoice or delivery note or a written statement detailing the true net weight is not provided when required.
- Where a seller delivers or causes to be delivered to the purchaser a lesser quantity of forage than corresponds with the price charged.
- Using unapproved or unverified weighing equipment.
- Using or possessing false or unjust weighing equipment.

2.7 Further information

The information provided in this document is not a substitute for legal advice and should be used as guidance only. Trading Standards can be contacted with any queries. They can advise on which weighing equipment has been approved and have contact details for Accredited Persons.

tradingstandards@mbie.govt.nz 0508 627 774

Part 3 Field Sampling

3.0 General principles

This document describes the sampling of trucks (a truck or trailer load of forage), stacks (a stack or bunker made up of several loads) and bales for estimation of DM%. Achieving accurate results requires attention to the following principles:

- Samples need to be taken using an appropriate method which is used consistently so that the sample represents the material it has been taken from.
- Enough samples need to be taken to produce statistically valid results. A statistically valid result is one where there is reasonable confidence that the DM% test result is close to the true DM% of the forage.
- Samples need to be handled so there is no loss of material and no significant changes in moisture between being taken in the field and tested at the laboratory.

Some sampling regimes can produce significant numbers of samples. For economic and logistical reasons, it may be desirable to reduce the number of samples submitted for analysis. This means combining the original field samples, and obtaining representative sub-samples (sample reduction). If sample reduction is carried out, the equipment used must produce a representative sample, and the procedure must be carried out in suitable conditions by competent personnel.

The sampling information outlined in this section is for chopped forage only. In addition, the sampling methods described are for dry matter testing only and are not necessarily the best methods to use when other forage attributes need to be analysed.

3.1 Stack sampling

When sampling stacks, the method of core sampling can be used.

3.1.1 Core samples from stacks

The corer tested is a commercially available item purchased from Hill Laboratories. It has a tube approximately 1.0 m in length and 45 mm in diameter.



The sample from one core is approximately 0.5 kg in weight. When using a corer, the person carrying out the sampling must:

- Sample the stack as soon as possible after all compaction is finished (and preferably no more than 8 hours after the stack is completed as the DM% decreases as ensiling progresses).
- Core samples should be down the centre line (spine) of the stack, and at equal spacing over the entire length of the stack. If the stack is wider than 15m, the same number of samples should be taken down 2 spines.
- Remove the top 150 to 200 mm of forage before taking a sample. (Depending on weather conditions, silage on the stack surface will lose water from evaporation.) Core down with the full length of the corer unless there is insufficient depth of stack (for example at the ends).
- Ensure that there is no loss of forage material from the sample bags as they are removed from the corer.
- Label the sample containers to clearly identify the stack that they have been taken from. It is recommended that sample containers are labeled prior to being filled.
- Ensure the corer is operated safely.

- If the pit is treated with additives that add significant volumes of water, or the pit site contains soil which is likely to significantly contaminate the pit, truck samples are recommended as the alternative sampling regime.
- If a silage pit is likely to be over 3m in height it is recommended that a corer longer than 1.5m is used or truck samples are taken.
- Where a silage source is added to an existing pit, it is recommended that truck samples are taken to avoid dry matter contamination by the existing pit.
- Up to 5kg of material can be collected by this technique which may require further sub-sampling. Ensure Chilly bins are large enough to contain the sample.

3.1.2 Sample Number from pit core samples

Pasture Silage - Minimum of **8** pit core samples

Whole Crop Silage - Minimum of **4** pit core samples

Where contract requirements state otherwise, Figure 1 can be used to determine appropriate sample numbers.

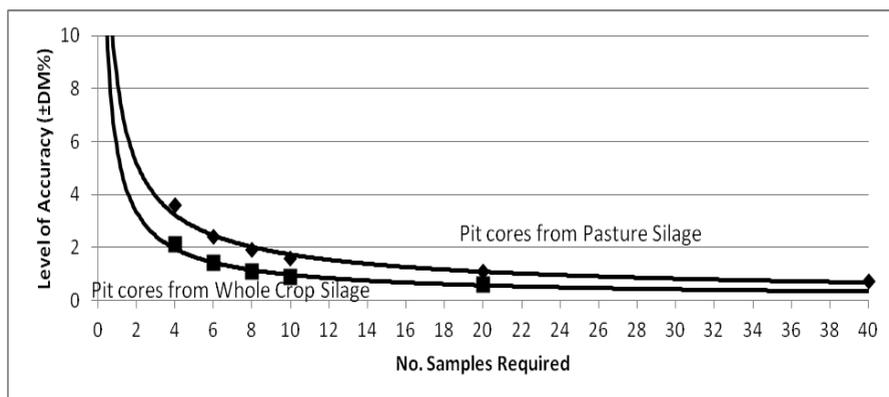


Figure 1. Change in level of Dry matter accuracy with change in sample numbers for Pit silage and core sampling.

3.1.3 Hand grab samples from stacks

Hand grab or scoop samples from the stack are not recommended as they tend to be taken from the top of the pit and stack variability occurs from the top to the bottom of the pit.

3.2 Truck sampling

Truck samples are taken from the top of the load on the truck, from a hole in bin of the truck or from the load once it has been tipped off using the hand grab method. The top layer (150-200mm) of material should be removed before the sample is taken.

Samples from trucks should be evenly spaced out over all the loads going to the stack. For example, if there are 40 loads in total, and 20 being sampled, then every second truck would be sampled.

Alternatively if harvesting will last for 5 hours, samples should be taken every 15 minutes.

There are hazards associated with truck sampling that need to be identified and controlled. If sampling trucks in transit, the person taking the sample may need to climb up the truck or trailer to access the load. Sampling the tipped load is hazardous if other vehicles (trucks, stack tractors etc) are working in the vicinity. Additional hazards are introduced when sampling activities are carried out at night. A safe working procedure for all sampling operations must be implemented by those responsible. If a safe environment cannot be achieved, pit coring is recommended.

3.2.1 Hand grab samples from trucks

When sampling trucks using the hand grab method, the person carrying out the sampling must:

- Remove the top 150 to 200 mm of forage before taking a sample from the top of a truck or a hole in the side as significant drying of the load surface can occur in transit.
- Each grab sample should represent a full handful taken in a scooping manner so to reduce the amount of fine material lost.
- Do not be selective in the forage material that is removed.

- Ensure that all sample material taken is placed in air tight sample containers, preferably a chilly bin in a cool location.
- Up to 10kg of material can be collected by this technique requiring further sub-sampling. Ensure Chilly bins are large enough to contain the sample.

3.2.2 Sample Number from truck grab samples

Pasture Silage - Minimum of **20** grab samples from **20** trucks,

Whole Crop Silage - Minimum of **10** grab samples from **10** trucks

All grab samples should represent a **full handful** of forage.

In the event that a harvest results in less than the truck numbers above, multiple samples per truck need to be taken to make up the required number. e.g. 2 samples per truck from 10 trucks.

Where contract requirements state otherwise, Figure 2 can be used to determine appropriate sample numbers.

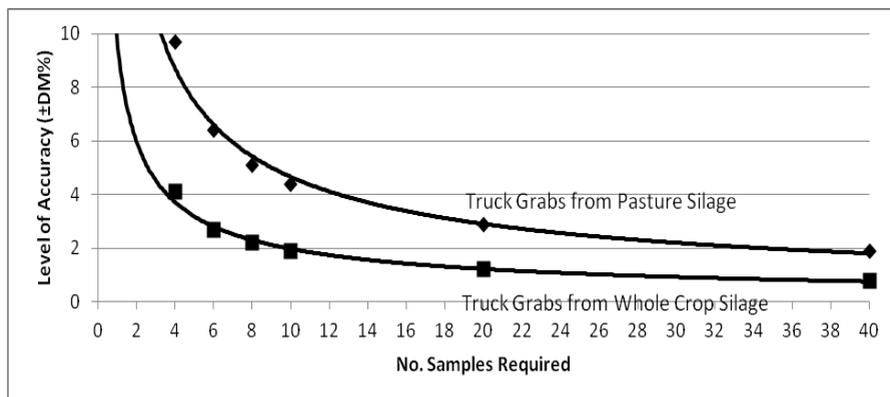


Figure 2. Change in level of Dry matter accuracy with change in sample numbers for truck silage and grab sampling.

3.3 Baleage and Hay Sampling

3.3.1 Bale drymatter determination

Where baleage and hay is sold on a drymatter basis, accurate drymatter samples must be taken.

Due to the nature of bale variability, core sampling is the recommended technique for sampling bales. Hand grabs from bales are difficult to take and achieving enough representative sample is often impractical.

Coring bales can also be a challenge. Even the sharpest core sampler can be difficult to push into bales. Consequently various different tools can be made to help obtain core samples.

These include:

- Auger Cores
- Tow ball core brackets (Appendix V)
- Bucket core brackets



Figure 3. Corer and bracket fixed to a 4WD. Design appendix V

Care needs to be taken when using such implements to ensure safe use of this equipment.

When core sampling bales, the person carrying out the sampling must:

- Sample to a depth of at least 80cm
- Remove any plastic or netting from the sample
- Core through the centre of the bale through layers
- Take only one sample per bale
- Ensure random selection of bales is cored at even intervals of harvest
- If samples are stacked prior to sampling, bales should be tested in a random fashion making sure to sample across the entire stack
- Sample round bales on flat side when using a vehicle driven corer. Sampling whilst sitting on the round side causes damage to equipment
- Research indicates significant drymatter is not lost during ensiling. A test at harvest is expected to be accurate for at least 2 months.

3.3.2 Sample Number from Bale Core Samples

Baleage - Minimum of **10** individual bales cored

It is recommended, where large numbers of baleage bales are traded (>200), **at least 20 individual bales are cored.**

Hay - Minimum of **4** individual bales cored

Where contract requirements state otherwise, Figure 4 can be used to determine appropriate sample numbers.

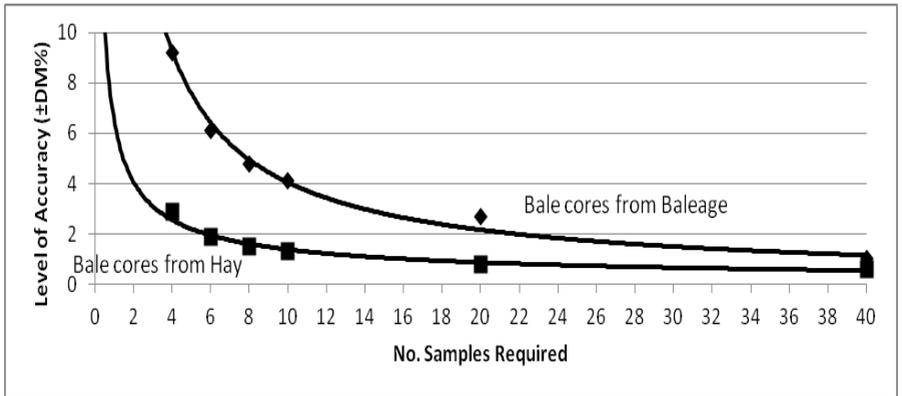


Figure 4. Change in level of dry matter accuracy with change in sample numbers for truck silage and grab sampling.

3.3.3 Bale wet weights

The Weights and Measures Act 1987 does not require bales to be sold by any particular method, therefore they can be sold by weight, volume, number, a load, or a paddocks worth. Both parties have to agree on the method of sale and it is always recommended that this is in writing.

The recommend procedure for establishing the true weight of the weighing bales of hay and baleage is to weigh the entire traded volume as per section two. However there are times that it is simply not practical to weigh all bales due to the locality of the bales or distance required to access a weigh bridge.

Under these conditions it may be suitable to weigh a subsample of bales traded.

When weighing a subsample of bales the person carrying out the weights must:

- Check both trading parties agree that a subsample is appropriate
- Chose a random selection of bales selected at even intervals of harvest

- If samples are stacked prior to sampling, select bales in a random fashion making sure to sample across the entire stack

3.3.4 Sample Number from Bale wet weights

Recommended for Baleage and Hay - Entire quantity of bales

If it is agreed between trading parties that only a subsample of bales should be weighed, the following is a guide to determine the number required:

Baleage - Minimum of **20** bales weighed

Hay - Minimum of **10** bales of hay weighed

Where contract requirements state otherwise, Figure 5 can be used to determine appropriate sample numbers.

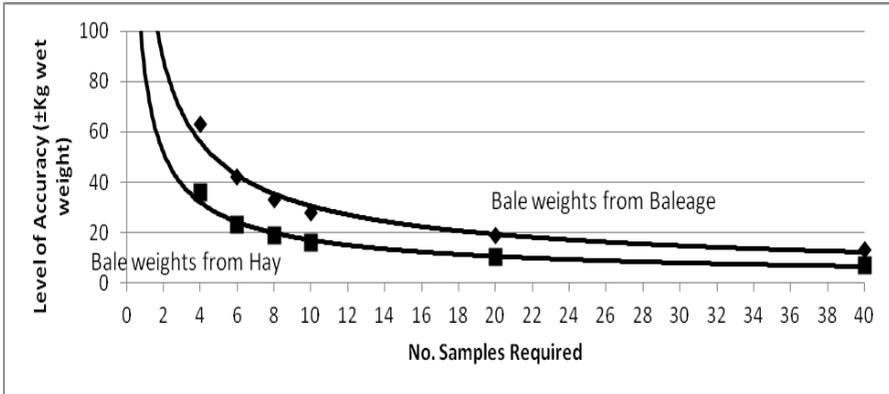


Figure 5. Change in level of bale wet weight accuracy with change in sample numbers for baleage and hay sampling.

3.4 Sample reduction (Sub-sampling)

3.4.1 Techniques

Sub-sampling is the procedure by which a large sample is reduced down to an acceptable size for delivery or drying.

Several methods have been investigated for sub sampling. These include quartering, and using a riffle box. The riffle box and

quartering process proved to be similarly accurate for pasture and whole crop forages.

Where forage length exceeds 750mm it recommended that the quartering technique is used, as samples will not easily pass through a riffle box.

3.4.2 Environment

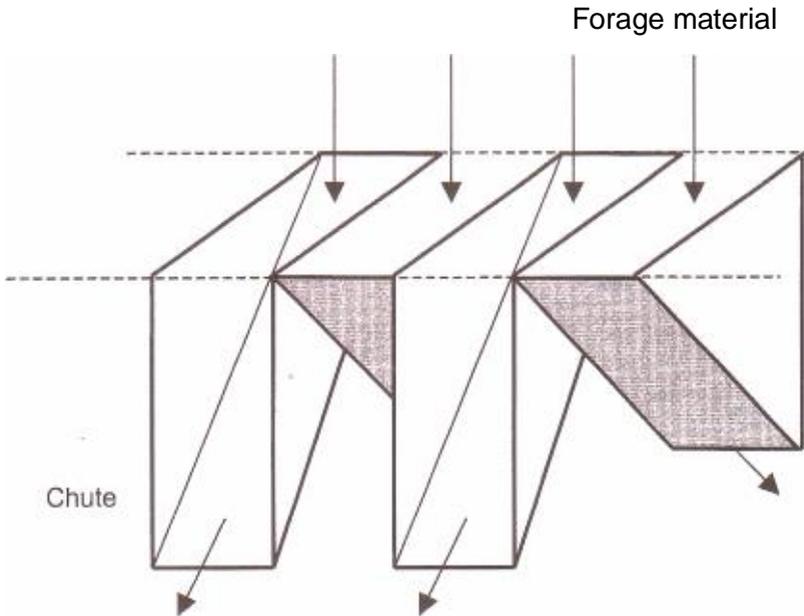
Sample reduction should be carried out in a suitable environment and by competent personnel. This situation is typically found in a laboratory, however field sub-sampling is possible provided good practices are adhered to. It is recommended that where sub-sampling is carried out, the following should be in place:

- Exposure of the sample to the environment should be minimised throughout the process (i.e. minimise the effect of heating in the sun or drying from wind).
- The area should be kept clean to prevent contamination of samples from other forage material.
- There should be adequate space available for sample storage and handling.
- Procedures need to be in place to ensure sample integrity. This means that samples from different lots cannot be accidentally mixed, and that sub-samples can be traced to the original field samples.
- Sub-samples should be placed in new sample containers and handled as outlined in Section 3.5.
- Personnel carrying out sample splitting should be competent in the recommended procedure and familiar with potential sources of error.

3.4.3 Riffle box sample splitter

With a standard riffle box, the forage is poured into a dividing head made up of a series of chutes that alternately run in opposite directions into two or more collecting trays (see Figure 6). The operation can be repeated as many times as necessary until the required sub-sample size has been obtained.

Figure 6: Riffle box dividing head



- The riffle box reduces several samples down to one or more sub-samples. As fewer sub-samples are submitted for analysis the accuracy of the stack or truck DM% reduces. It is recommended that if only one sample is sent for analysis, another sub-sample is retained and frozen in case a further DM test is required.
- Prior to using the riffle box samples should be mixed thoroughly in the bag to ensure any clumps of feed are separated. This is particularly important for pasture forages which may clump.
- When using a riffle box, the samples must be evenly spread over the entire width of the dividing head. If the forage does not pour evenly from sample containers, they should be emptied into a larger container and then run into the riffle box.
- The complete sub-sample obtained must be submitted for analysis.
- The riffle box must be cleaned (brushed out) between each lot of samples.

While riffle boxes are commercially available, it is possible to fabricate a riffle box that is suitable. With any riffle sample splitter, the following aspects are important:

- There must be an even number of chutes (at least 6), and the chutes must be of equal size and shape.
- The width of each chute should be at least three times the size of the largest component in the forage. For chopped pasture and whole crop forage, the chute width should be around 75 mm.
- The sample must be spread evenly over all chutes. One way to achieve this is to have a hopper large enough to contain all sample material when it is combined. The hopper can then tip or release the forage material into the dividing head.
- Each collecting tray needs to contain at least half the original volume. A third (spare) tray is useful if several passes are required to achieve the required sub-sample size.



Figure 7. Ply wood manufactured riffle box

3.4.4 Quartering

Quartering is the process of reducing a sample on a large flat clean area or on a large plastic tray. The recommended procedure is as follows:

- Empty the sample onto a clean flat surface or large plastic tray.
- Mix the sample thoroughly, making sure any large clumps are separated
- Split into quarters
- Return diagonally opposite quarters to the sample bag.
- Remix the remaining two quarters and ensure the sample is evenly spread in the tray.
- Repeat the quartering sample reduction procedure to obtain a sub-sample of the required size.
- It is recommended that if only one sample is sent for analysis, another sub-sample is retained and frozen in case a further DM test is required.

3.5 Sample Handling

The key issues are sample integrity (the sample came from the stack on the label), and sample quality (ensuring there are no significant changes in DM% between sampling and when analysed at the laboratory).

Respiration of the forage material can lead to significant changes in DM%. To address these issues, the following procedures must be followed:

- Samples are to be placed in containers, packed tightly and have as much air removed from the container as possible before sealing. Plastic bags that are durable and able to be sealed are the preferred option for sample containers.
- Sample containers are to be labeled legibly so that the information cannot be lost from the bag, and so that the sample can be traced to the point of origin and the date of sampling. If labels are placed in the sample container, they should be a nonporous type that will not absorb moisture.

- Samples are to be placed in storage as soon as possible after they have been taken where they will be protected from damage and sunlight, and kept cool ($< 10\text{ }^{\circ}\text{C}$).
- If samples are not going to be analysed within 24 hours of being taken, they must be thoroughly chilled or frozen.
- Any specific instructions on sample handling and submission from the testing laboratory must be adhered to.

A form suitable for recording samples taken and sub-samples produced is provided in Appendix IV (Forage Sampling Record).

Part 4 Dry Matter Testing

4.0 Laboratory dry matter analysis

While determination of dry matter in the laboratory is a relatively simple process, several issues can affect accuracy and reproducibility of results. In order to produce a standard method, work has been completed (Hill & Ballinger, 2004) to examine the effect of the following variables:

- The amount of sample analysed.
- Drying time required to achieve a constant weight (affected by drying tray size, thickness of sample layer, oven loading and efficiency of air movement in the oven).
- The method of sample reduction used (given that samples submitted to the laboratory are around 1 kg, and only 500g is required for the test).

In developing the method, practical constraints also had to be considered, such as the drying capacity of laboratories. The method needed to use the smallest amount of sub-sample possible, while maintaining good analytical precision and accuracy, and then drying it for the shortest possible time (so ovens can be emptied and re-used for the next set of samples).

The recommended dry matter test procedure is shown in Appendix III.



4.1 Laboratory quality control

Testing laboratories need appropriate controls in place to ensure that test results are accurate and repeatable. Forage buyers and sellers need to have confidence in laboratory results, and should preferably use a laboratory that has either IANZ accreditation or ISO 9000 certification. If not, there should be specific quality controls in place for dry matter testing.

4.1.1 IANZ accreditation

- Competence and experience of staff.
- Integrity and traceability of equipment and materials.
- Technical validity of methods.
- Validity and suitability of results.
- Compliance with ISO management systems standards.

4.1.2 ISO 9000 certification

ISO 9000 is a series of international standards for quality management and assurance. These standards cover design, procurement, production, quality assurance, and delivery processes for products and services. To achieve certification, the laboratory's quality management system is audited by a third party certification organisation and assessed against the ISO standard.

4.1.3 Quality control

Some laboratories will not have accreditation or certification. As a minimum, laboratories carrying out dry matter tests should have the following quality controls in place:

- Balances used should be calibrated against traceable standards.
- The drying oven should be checked to ensure the internal temperature is correct, and is constant throughout the oven drying space.
- Documented procedures should be available for sub-sampling and the dry matter test.
- The laboratory should have documented systems to ensure that samples are identified and tracked throughout the process.

4.1.4 Inter laboratory comparison programs

Since direct traceability to a standard (reference material) is not possible for moisture tests, an Inter-Laboratory Comparison Program (ILCP) will help laboratories to check their performance. This involves dividing a bulk sample into a number of equivalent samples, and sending one sub-sample to each participating laboratory. The dry matter results are reported back, and collated for all laboratories.

While it is not a specific requirement of this document, laboratories would benefit from participating in an ILCP to confirm satisfactory performance by comparison with other laboratories.

4.2 Dry matter calculations

The total dry matter is calculated using the wet weight of the forage and the DM% results.

- A. Add up all the wet weights of the loads that relate to the stack or paddock to get a total wet weight (in kilograms or tonnes).

- B. Calculate the average DM% result for the stack or paddock. The average calculated by adding all results together and dividing by the number of samples.
- C. Multiply the average DM% by the total wet weight and divide by 100 to obtain the total dry matter for the stack or paddock (in kilograms or tonnes).

$$\text{Total Dry Matter} = \text{Total Wet Weight} \times \text{DM\%} / 100$$

Part 5 Fair Trading

When forage is traded, a contract (formal or informal) is established between two parties. The agreement creates a legal relationship of rights and duties. If the agreement is broken, then the law provides certain remedies. There are several aspects to trading that is fair.

- The quantities supplied should be correct (through accurate measurement).
- The forage should be fit for purpose (e.g. not harm the animals it is fed to or contain harmful residues).
- Trading activities should be conducted with honesty and good faith.
- There need to be procedures in place so that any problems with arrangements can be addressed.

5.0 Forage trading contracts

It is recommended that a formal contract be established for forage trading arrangements. Setting up a contract means that all relevant issues have been discussed and agreed upon and the interests of both buyers and sellers are protected. It is recommended that legal assistance is obtained to prepare the final contract document. The following is a list (not exhaustive) of issues that should be considered.

Quantity of forage	The kilograms of dry matter (or area to be harvested) and how the dry matter at harvest (or area) will be measured. Compliance to this Code should be included. Note that it is not possible to contract out of the Weights & Measures Act 1987.
Purchase price	Price per kg DM (or hectare) and who pays for the cost of harvest, trucking, weighing, and dry matter assessment.
Payment terms	Timing and amount of deposits and final payments, and penalties for late payment.

Harvest details	Target harvest DM%, option of early harvest, and specific requirements, e.g. use of inoculants.
Quality parameters	Defining what constitutes acceptable quality, for example, permissible levels of undesirable weeds.
Inability to supply	Arrangement where the grower or seller is unable to supply the contracted quantity (due to factors beyond their control).
Termination	The ability of either party to terminate the contract.
Mediation & Arbitration	The process for resolution of any disputes
Risk management	Ownership of the crop, the need for crop insurance, ability to assign the contract to someone else, and limitations of liability.

5.1 Forage quality

Growers and sellers of forage have ethical and statutory obligations to ensure that forage meets certain quality requirements at the time of delivery. The Agricultural Compounds & Veterinary Medicines Act 1997 and associated regulations, are administered by the ACVM Group of The New Zealand Food Safety Authority. Under this legislation, feed commodities are known as "oral nutritional compounds" and as such they must be fit for the purpose of feeding to the animals that they are intended for.

Animal feeds are fit for their purpose only if they are used as recommended and do not do any of the following:

- Produce residues in primary produce that fail to comply with applicable food residue standards set in or under any enactment.
- Result in toxic reactions causing pain or distress in the animal.
- Result in malnutrition causing pain or distress in the animal.

- Contain pathogenic micro-organisms at levels that could cause disease resulting in pain and distress.
- Contain foreign objects that could cause physical harm to the animal.

5.2 Fair trading

Trading arrangements should be fair to all parties. The information in this document is intended only to make traders aware of their obligations, and make buyers aware of laws that exist to afford some protection. If further or specific advice is required, the appropriate government organisation should be contacted, and/or legal assistance obtained.



5.2.1 Fair Trading Act 1986

The Fair Trading Act 1986 protects buyers against being misled or treated unfairly by traders. The Act applies to all people in trade and it cannot be contracted out of.

In particular, the Act prohibits certain types of false and misleading representations about goods and services, including false claims that goods or services are of a particular price, standard, quality, grade, quantity, origin or history, or that they have particular uses or benefits, or that they have any particular endorsement or approval.

The Act also prohibits specific unfair trade practices. An unfair practice is a selling method which is misleading or unfair. Examples are: advertising goods at a specified price without intending to supply them at that price; intending to supply different goods or services to those ordered; or, accepting payment without believing the goods or services can be supplied in a specified time.

The Fair Trading Act is administered by the Ministry of Business Innovation and Employment's Trading Standards and the Commerce Commission enforces it (including prosecution of traders and asking the court to order certain remedies).

5.2.2 Sale of Goods Act 1908

The Consumer Guarantees Act 1993, sets minimum guarantees about quality and fitness of goods, and standards of service. However, the Act does not apply to goods bought for commercial use. The Sale of Goods Act 1908 applies to goods sold that do not fall within the Consumer Guarantees Act. It gives buyers the right to a refund if the goods are faulty, not fit for the purpose intended, or not the same as those shown at the time the sale was made. A right to compensation exists where there is loss or damage to the buyer from these causes.

A seller can contract out of the Sale of Goods Act and the rights of the buyer would be limited to whatever is provided in the contract. This could mean for example that the seller's liability is limited to the forage itself and not to any other damage or loss caused by the fault.

5.3 Disputes

5.3.1 Avoiding disputes

Avoiding disputes costs less in terms of time and money for both parties than a dispute resolution process. Disputes are less likely when:

- All parties adhere to the practices recommended in this document.
- There are documented contracts, which are based on prior discussion of all the issues involved.
- All parties communicate effectively and regularly with each other during the crop growing and harvesting periods.
- Any problems that do occur are resolved quickly, rather than letting them drag on to become disputes.

5.3.2 Dispute resolution

With any dispute, the initial approach should be to communicate with the other party (either in writing or verbally) and try to negotiate a resolution. It may be useful to obtain professional help, e.g. a farm consultant, to help with this process.

Disputes should be dealt with under the contract between the parties. Contracts should state that any dispute is to be referred to mediation and/or arbitration. If a dispute occurs and there is no written contract, the parties may still agree to refer their dispute to mediation and/or arbitration.

With mediation, a mediator guides the process to define the issues and explore possible options. For a dispute to be resolved by mediation, both parties need to agree on the outcome. Arbitration differs in that the arbitrator makes a decision settling the dispute after considering each party's point of view. The arbitrator's decision is normally final and binding on the parties.

The Disputes Tribunal is another option. A Tribunal hearing is held by a Tribunal Referee in private with each party. The Referee helps both parties try to reach an agreement. The Tribunals are administered by the Ministry of Justice and can deal with claims up to \$15,000 (or up to \$20,000 if both parties agree). Information on

the Disputes Tribunal process can be obtained from the local District Court.

As a last resort if negotiation, mediation or arbitration has failed (and the amounts involved are over \$20,000), proceedings can be filed with a Court. Where the issues concern fraud or criminal intent, the Courts are the only venue.

Part 6 Code Administration

6.0 Forage Trading Steering Group

The Forage Trading Steering Group is an industry group. Members include growers, forage users, agricultural contractors, researchers, and suppliers. The group is responsible for the implementation of the document and its ongoing operation. Apart from its administrative functions, the group organises appropriate funding for the operation of the Code.

6.1 Publicity and education

The Forage Trading Steering Group carries out various activities to ensure that forage buyers and industry are aware of the Code.

In addition to publicising and promoting the Code, the group makes information and training available to industry so that users understand the obligations, and are able to effectively carry out the activities recommended. For further information, contact:

The Forage Trading Steering Group
C/- Deane Carson
Agribusiness Consultants Ltd
PO Box 1739
Invercargill 9840

6.2 Monitoring and review

It is important that this document is effective. The Forage Trading Steering Group is responsible for organising monitoring, which look at compliance, the types of non-compliance, and the nature of complaints or disputes that have occurred.

The Group will organise a review of the Code three years after it commences operation, and at periodic intervals thereafter. The purpose of each review is to find out what is happening in the industry and whether or not the Code meets its objectives. The results of the review will determine whether the document needs amending.

This document can be updated or amended at any time after consultation with relevant government, industry and forage user organisations.

Code Contributors

In addition to funders and sponsors, this document has been produced with input and assistance from many people including:

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Related Documents

Legislation

Agricultural Compounds and Veterinary Medicines Act 1997
Agricultural Compounds and Veterinary Medicines Regulations
2001

Consumer Guarantees Act 1993

Fair Trading Act 1986

Sale of Goods Act 1908

Weights and Measures Act 1987

Weights and Measures Regulations 1999

Publications

Ministry of Business Innovation and Employment Factsheet -
Trading silage by weight (March 2004)

Trade Weighing and Measuring Equipment (March 2004)

Pattern approval for weighing and measuring equipment (March
2004) Weighbridges (March 2004)

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trading of Maize forage.

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Development of a maize forage sampling system to accurately
determine dry matter percentage. *Proceedings of the Agronomy
Society of New Zealand*, 34,191-202.

Hill, R.J., Ballinger, S., (2004). Development of a laboratory
procedure to determine dry matter in maize forage. *Proceedings of
the Agronomy Society of New Zealand*, 34,109-116.

Oven Dry Matter for Pasture and Whole Crop Forage

A. Principles of Tests

1. Dry matter is determined by drying a sub sample at 105 °C to constant weight (see Note 1).
2. This method assumes the sample has been collected immediately after being harvested with precision chopping.

B. Interferences

1. No interferences are known. However, as the samples are quite coarse and heterogeneous in nature, special attention must be given to the sub-sampling technique used. Taking a large enough sub-sample also helps to minimise this variability.
2. Samples should be held in sealed plastic bags, and kept cool. They should be processed as quickly as possible to minimise moisture loss or sample deterioration.

C. Quality Control

1. The balance used for this test should be calibrated against traceable standards.
2. The drying oven used should be checked to ensure the internal temperature is correct, and for spatial variability within the oven.
3. It is not appropriate to have an in-house QC sample for the dry matter test, because of sample stability problems.

D. Equipment

1. Forced air convection oven. An oven that is capable of maintaining an internal temperature of 105 ± 2 °C.

2. Electronic balance. Capable of weighing to at least 1 kg, with a readability of at least 0.1g.
3. Aluminium trays (approx. 200 x 300 x 50 mm), or similar. These are to be used for holding the sample during oven drying.
4. Plastic tray (approx. 500 x 500 x 100 mm) or similar, for reduction of the sample by the quartering technique.
5. Riffle box suitable for sample reduction if required.

E. Procedure

1. Weigh numbered (or otherwise identified) aluminium trays. Record the weights of each tray on an appropriate worksheet.
2. Prepare a sub sample that is approximately 500 g from each field sample by quartering or using a riffle box (see Notes 2 and 7).

Quartering: Empty the whole field sample into the plastic tray. Mix the sample thoroughly, then split into quarters. Return diagonally opposite quarters to the sample bag. Remix the remaining two quarters and ensure the sample is evenly spread in the tray. Repeat the quartering sample reduction procedure to obtain a sub sample of the required size.

Riffle box: Pour the whole field sample evenly across the riffle box. Each tray in the riffle box will contain approximately half of the original sample. Either sub sample can be used for analysis.

3. Transfer this sub-sample to the pre-weighed aluminium tray.
4. Immediately record the weight of the tray plus fresh sample.
5. Place the tray in the 105 °C oven for at least 24 hours (see Notes 1, 4 and 5).
6. Remove the tray from the oven and allow it to cool for 10 minutes.

F. Calculations

1. Weight of fresh sample (W_1) = Weight of tray plus fresh sample - Weight of tray

Weight of dried sample (W_2) = Weight of tray plus dried sample - Weight of tray

2. Dry Matter (%) = $W_2 / W_1 * 100$
3. Report the result to 1 decimal place.

G. Notes

1. Complete removal of moisture is achieved when the sample weight remains constant with further drying. This will depend on the depth of the sample in the drying tray, the amount of sample taken for drying, and the loading of samples in the oven.

It is suggested that the laboratory establishes what drying time is required for their equipment and circumstances, and then routinely dry for that period. Twenty-four hours drying may be sufficient, but it will be dependent upon individual conditions, and would require confirmation.

2. There is a risk that moisture will be lost from the sample while being handled in the laboratory. Consequently, the preliminary sub-sampling procedure should be performed as quickly as possible, to avoid such losses.
3. If there is some concern as to whether the sample is wholly dry, it can be returned to the oven for a further two hours, and then removed, allowed to cool, and reweighed. No change in weight on further drying indicates that the sample is completely dried.
4. Ensure the trays are uncovered while in the oven and air flow is not impeded. As well as maintaining the temperature, the total loading of moisture to be removed may also affect the efficiency of the oven.
5. A 500g sample is the recommended minimum sample size. Smaller samples will have correspondingly higher potential

error associated with the result. Although larger weights will have a lower potential error, laboratories will need to minimise oven loading, and possibly maximise the number of samples able to be processed. For these reasons, it is suggested sample weights taken are approximately 500g, or slightly greater.

7. Sub-sampling can be performed using either a riffle box or the quartering technique.

Appendix IV

Forage Sampling Record

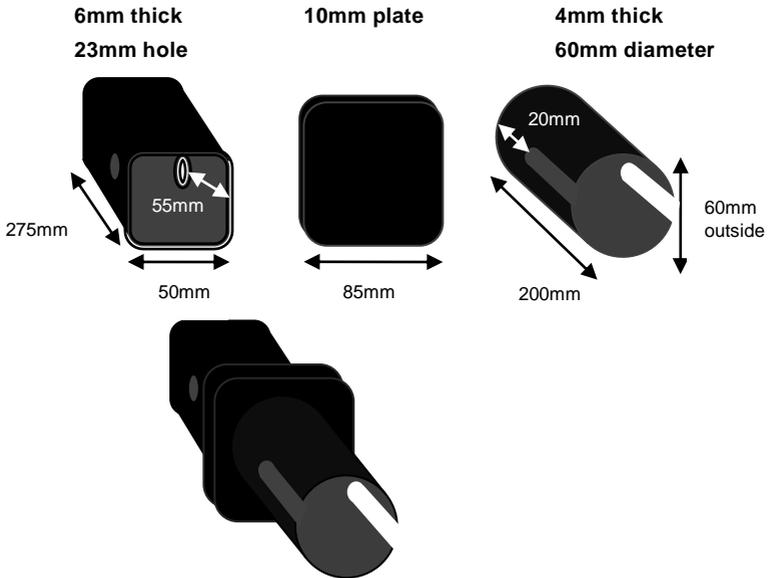
The form shown on the next page may be copied for recording samples taken in the field.

Forage Sampling Record

Date:	Forage Type:	Page		of
Supplied From:			Delivered To:	
Sampled By (Name): Company:				
Circle One		Hand Grab Core sample	Riffle Box Sub-sampling: Yes / No Sub-sampling Location:	
No.	Stack ID or Truck ID	Sampling Time	Sample ID	Sub-sample ID
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
Notes:				
Samples Frozen: Yes / No			Time of Dispatch to Laboratory:	

Appendix V

Corer bracket design



A short chain looped around handles and attached to the vehicle tow system with D shackles enables easy corer extraction from the bale. Bales should only be cored on a flat surface with the flat side of the bale down.

