

SAMPLING FEEDS & FORAGES/ANALYSIS

INTERPRETATION (Level 1)

Topic	Training & information Content
3.1	Estimating feeding value of fodder & feed on dairy farms
3.2	Sampling feeds & forages/analysis interpretation
3.3	Estimating Dry Matter intake for various breeds/age categories of dairy cattle in the tropics
3.4	Reviewing feed intake, rumen fill, Body Condition Scoring (BCS)
3.5	Life weight estimation of cows
3.6	Rumen fermentation
3.7	Mineral & vitamin requirement, guidelines
3.8	Manure scoring and evaluation
3.9	Guidelines for ration calculations for various breeds, heifers, lactation stage (Rumen8)
3.10	Use of Rumen8 software for ration calculation
3.11	Optimization of ration with Rumen8
3.12	Feeding management guidelines
3.13	Feeding management of dry cows/close up
3.14	Feeding systems
3.15	Metabolic disorders
3.16	Scoring locomotion and hoof condition
3.17	Mycotoxin in dairy cattle nutrition
3.18	Heat stress in dairy cattle nutrition
3.19	Monitoring feeding management, using KPIs (based on Rumen8)



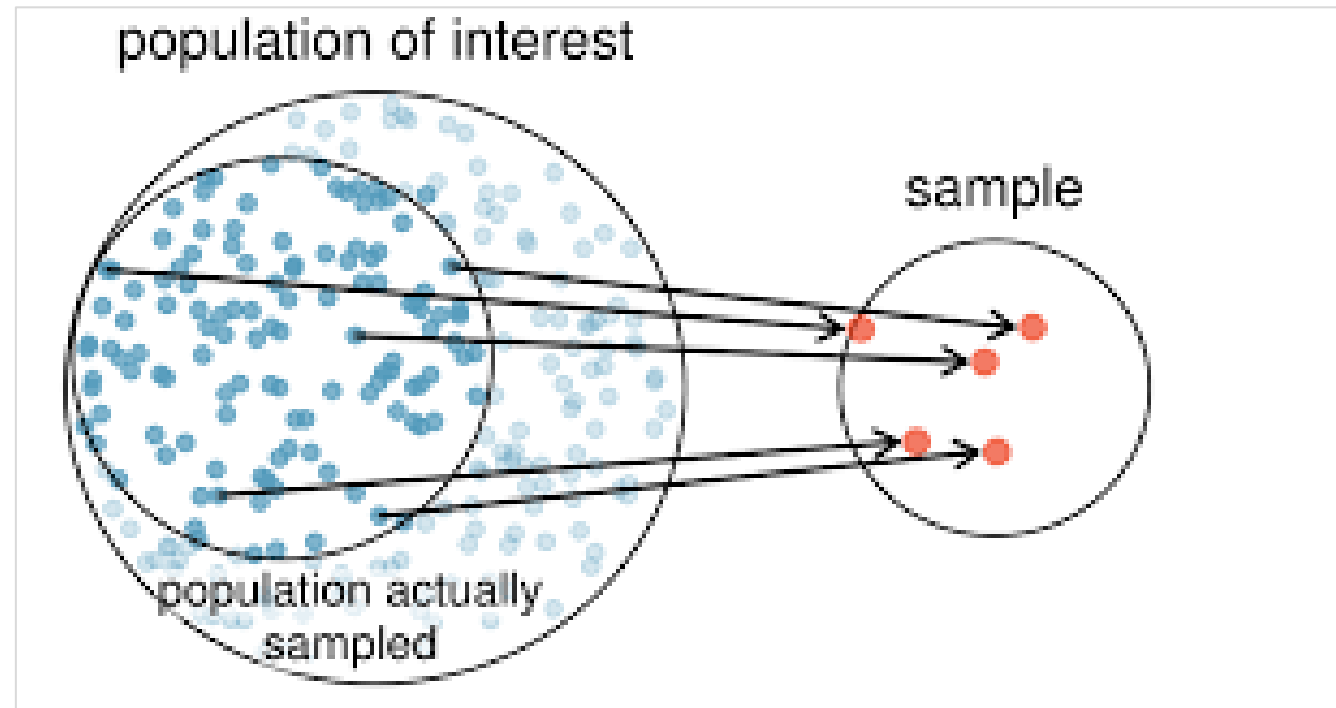
1. You will learn about (learning objectives):

- Importance of feed sampling.
- How to carry out sampling in a farm.
- Tests made on feed & forage samples.
- How to interpret feed & forage analysis results.



2. Background

- Sampling involves collecting a set of items for example a portion of grass from a field (population).
- Items for example grass, collected are taken be a representation of the grass in the field.
- Analysis involves studying structure of an item (sample) to get deeper understanding of what it contains.



3. Importance of forage sampling & analysis

- i. Identify the nutritive value and mineral composition of feeds and forages.
- ii. Shows safety of feeds for animal intake.
- iii. Helps to formulate and balance rations for different animal categories.



4. Guidelines for sampling feed/forages

- Identify feeds and forages to be tested.
- Take many small samples from different batches of feeds; representative of the total batch.
- Package appropriately, label and record samples before sending to the laboratory.
- Deliver samples to the laboratory as fast as possible preferably same day.



SAMPLE

Mat _____

Lot No _____

PN _____

Amt _____ Date _____

By _____

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5. Tools and equipment for sampling



Forage probe



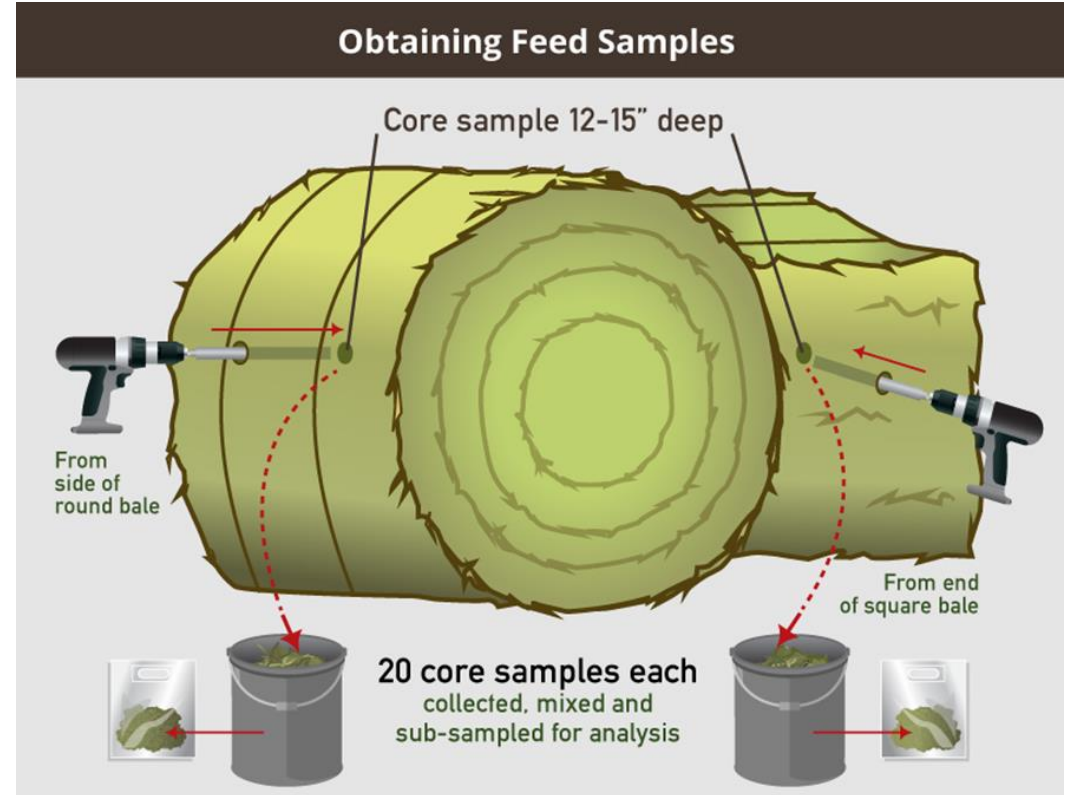
Grain probe



Bag with zip lock

6. Actual sampling

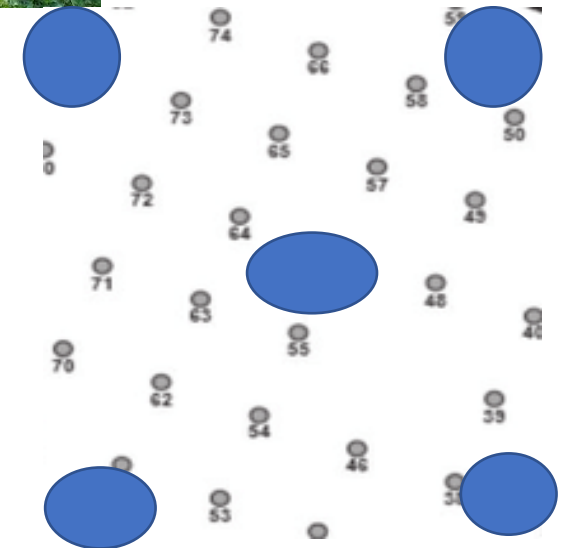
- The first step of chemical evaluation or analysis of fodder & feed is taking samples.
- Appropriate sampling needs to be done to get accurate results on the feed analysis report.
- Use suitable and appropriate sample equipment.
- Most samples are taken during loading and offloading or while in storage for example: silage silo/clamp, hay stack.
- Sampling procedures vary depending on the type of feed/forage.



7. Collecting samples of fresh pasture grass

- Cut one meter square sampling area at random in the plot to be harvested.
- Weigh all the grass within the meter square that is cut.
- Repeat the same procedure from various places going through the pasture in an 'X' or 'Z' pattern.
- Take a total grass samples of about 1kg from various areas and package.
- Samples after packaging needs to be well sealed, labelled and recorded before sending to the lab.

Meter square sample area



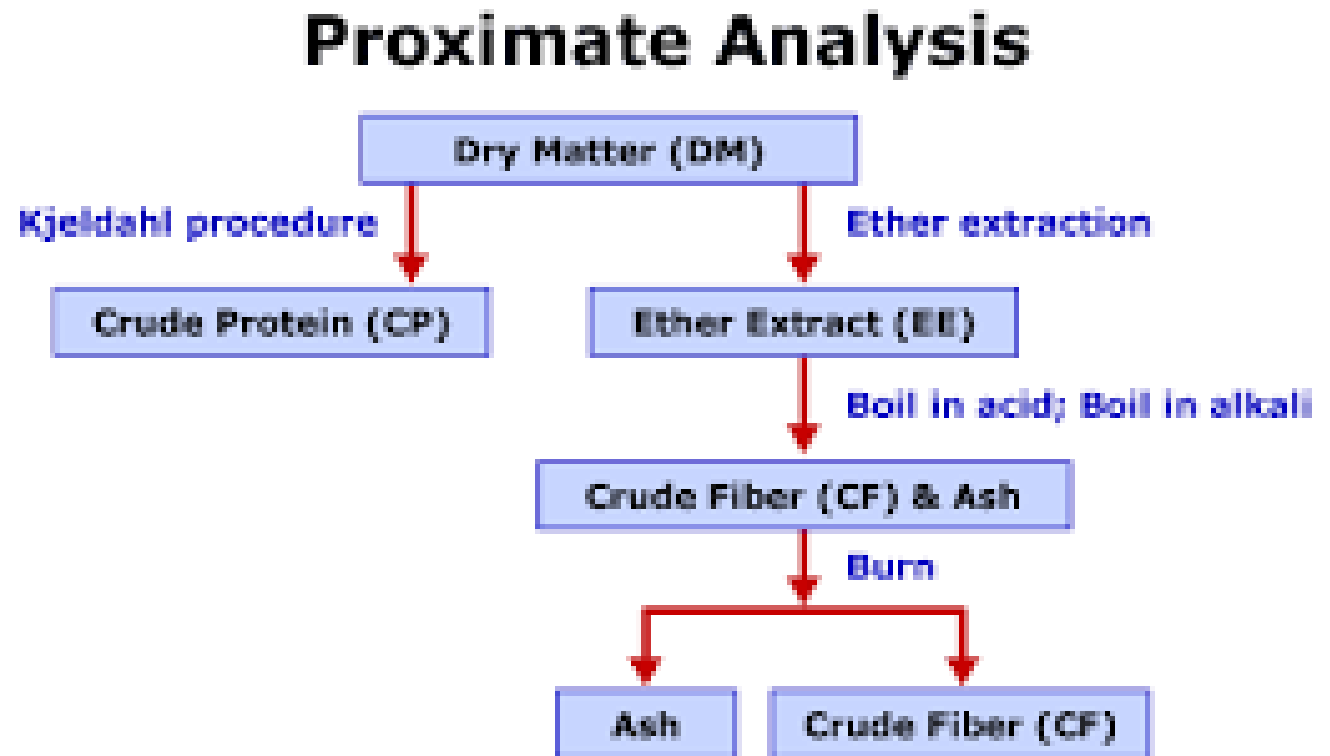
8. Collecting samples from bagged feeds

- Pick sub-samples of the feed from different bags in the batch.
- Mix the different sub-samples thoroughly for example in a clean bucket.
- Collect approximately 1kg of the mixed sub-samples for analysis.
- Put the 1 kg sample in a paper bag/plastic bag (if the sample is dry). If the sample is moist, a plastic zip-lock bag is preferred.
- The sample after packing needs to be well sealed, labelled and recorded before sending it to the laboratory for analysis.



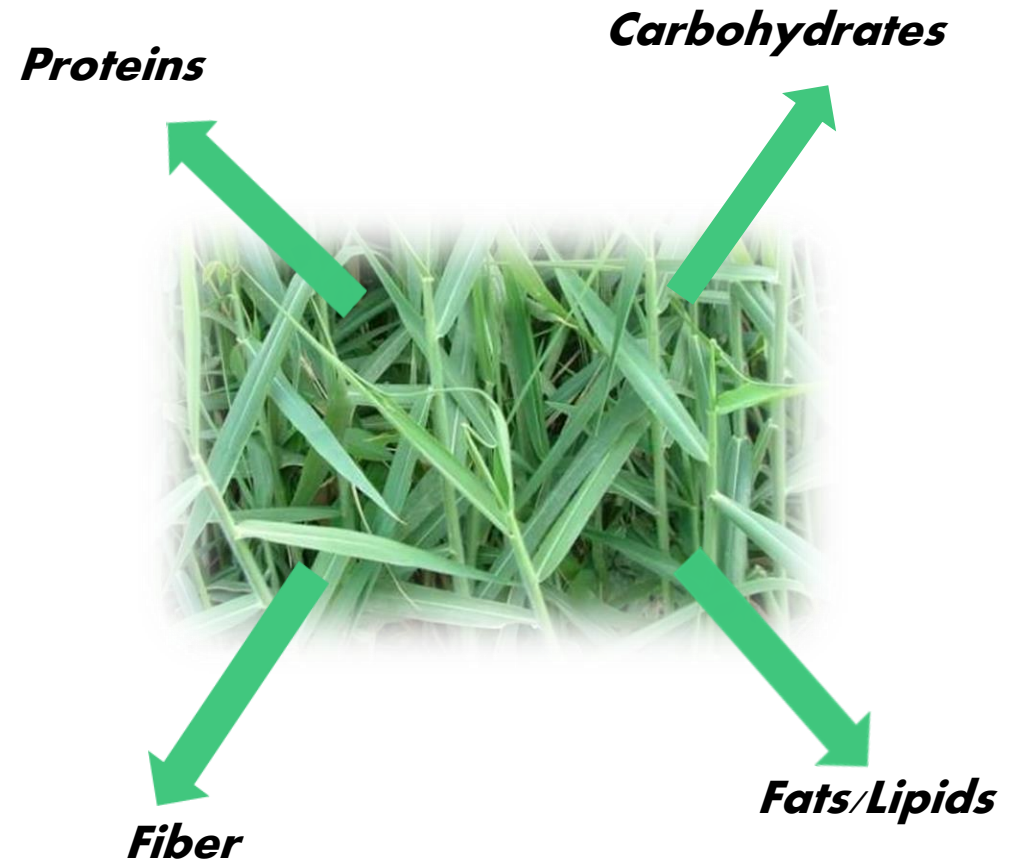
12. Proximate analysis in the lab

- This is the common and basic system used in most laboratories for testing feedstuffs.
- The analysis evaluates:
 - Dry matter content (DM)
 - Crude protein (CP)
 - Crude fiber (CF)
 - Fats/Ether extract (EE)
 - Ash
 - Starch
 - Sugar
 - Digestibility



14. Tests made on feeds & forages

1. **Energy** - Shows the amount of energy that the cow can get from the feed for various body functions. Energy in feeds & forages is mathematically calculated from other tests.
2. **Crude fiber** - measures the total fiber contents in forages.
3. **Crude protein** - Measures the protein content in feeds and is also provides energy.
4. **Crude fat/Ether extract (EE)** - Measures fat content of feedstuff.



14.1 Tests made on feeds & forages Cont'd...

5. Ash - Determines the content of inorganic components in the feed, identifies possible contamination by soil.
6. Starch - Measures starch content and is a readily available source of energy to cows.
7. Sugar - Measures sugar content in feeds and forages.
8. Dry matter (DM) - Measures what remains after water is removed from feed/forage.

Parameter		Unit	Result	Method
Energy	E	MJ/Kg	9.63	Calculated
Protein	Protein	%	13.4	ISO 5983-2
Fibre	Fibre	%	31.9	ISO 6865
Fat	Fat	%	3.88	Gafta 3
Total Ash	Ash	%	11.7	ISO 5984
Starch	Starch	%	< 0.10	NIR
Acid detergent fibre	ADF	%	42.5	NIR
Neutral Detergent Fibre	NDF	%	63.0	NIR
Sugar	Sugar	%	< 0.50	NIR
Digestibility (NCGD)	NCGD	%	60.2	NIR
Dry matter	DM	%	89.8	ISO 6496

14. Feed analysis report

Logo

- Found at the top of the report.
- Address of laboratory can also be found here or at the bottom of the report.

Type of analysis

- Kind of analysis done is indicated at the top near the logo.

Report reference

- Client/customer detail i.e. contact and address
- Detail of sample and reason for test.
- Date i.e. when sample was received and analyzed.

Feed Analysis Report
Proximate Analysis on Dry Feed (NIR)

Report Ref#: CN-91241 TL/21

Customer: [Redacted] Comments: Date Received: 08-Jun-21
Address: [Redacted] Condition: Hay Analysis Date: 11-Jun-21
Farm Name: [Redacted] Ruminant Report Date: 11-Jun-21
Contact Person: [Redacted] Sample ID: CS303AF0002

Sample Name : Sample 1 Voi

Parameter	Unit	Result	Method	
Energy	E	MJ/Kg	9.11	Calculated
Protein	Protein	%	10.6	ISO 5983-2
Fibre	Fibre	%	32.3	ISO 6865
Fat	Fat	%	3.19	Gaifa 3
Total Ash	Ash	%	10.1	ISO 5984
Starch	Starch	%	< 0.10	NIR
Acid detergent fibre	ADF	%	42.1	NIR
Neutral Detergent Fibre	NDF	%	64.7	NIR
Sugar	Sugar	%	2.69	NIR
Digestibility (NCGD)	NCGD	%	56.9	NIR
Dry matter	DM	%	88.6	ISO 6496

25. Utilizing forage analysis report

- Results of feed analysis can be easily used to balanced feed rations for cows.
- Guides farmers and nutritionists when supplementation should be considered .
- Cows have different requirements depending on stage of lactation, production and weight of the animal.
- Farmers can either use;
 - i. Manual calculation,
 - ii. Excel spreadsheet, or
 - iii. Computer programs for example Rumen8.



The screenshot displays the Rumen8 software interface with the following sections:

- Input Parameters:** A list of 15 feed items with columns for 'DM' and 'As Fed' values, all currently set to 0.00.
- Animal Settings:** Dairy cow, Holstein breed, Live weight (kg) 600, Live weight change (kg/d) 0.00, Days in milk 60, Days pregnant 0, Number of cows in herd 1.
- Milk Production:** Milk yield (l/d) 25.0, Milk fat (%m/v) 4.00, Milk true protein (%m/v) 3.00, Fat:Protein ratio 1.33.
- Energy and Protein:** Fat. Protein. F+P (kg/d) 1.00 0.75 1.75, Energy corrected milk 24.6 kg/d.
- Other Settings:** DMI estimation method (Conventional selected), Farm terrain (Flat selected), Distance walked (km/d) 5.0.
- Summary Table:**

Feed costs	Milk income	Feed efficiency	Margin
KES/t DM	KES/L raw milk	kg ECM/kg DM	KES/cow/d
KES/MJ ME	KES/kg ECM	g F+P/kg DM	KES/herd/d
KES/kg CP	KES/kg F+P	KES Milk/KES Feed	Feed % income
KES/cow/d	KES/cow/d		Milk yield (l/d) 25.0