

Theme 3: Animal Nutrition and Feeding

ESTIMATING FEEDING VALUE OF FODDER AND FEED (Level 2)

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):

- How to estimate feeding value of fodder and feed in the farm.
 - What is feed quality?
 - How estimating/evaluating of feed quality is done?

- Know importance of feeding value in meeting animal nutrient requirements.



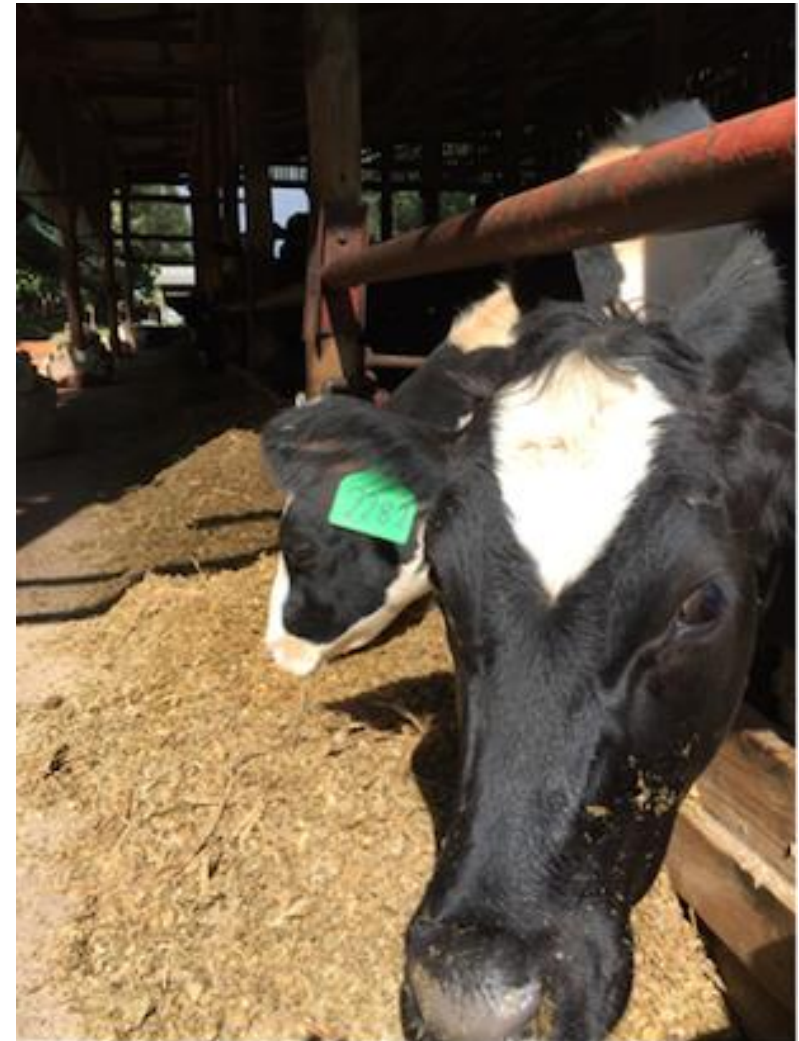
2. Introduction

- Reducing feeding cost is important for your dairy farm's profitability. However, a balanced ration is needed to feed cows efficiently.
- The nutrient composition in the total ration needs to meet daily nutritional needs of the cows.
- To accomplish a balanced ration, one needs to have information on the nutrient content of each of the feed ingredients in the ration.
- Tremendous variation exists in nutrient composition within and between different forages.



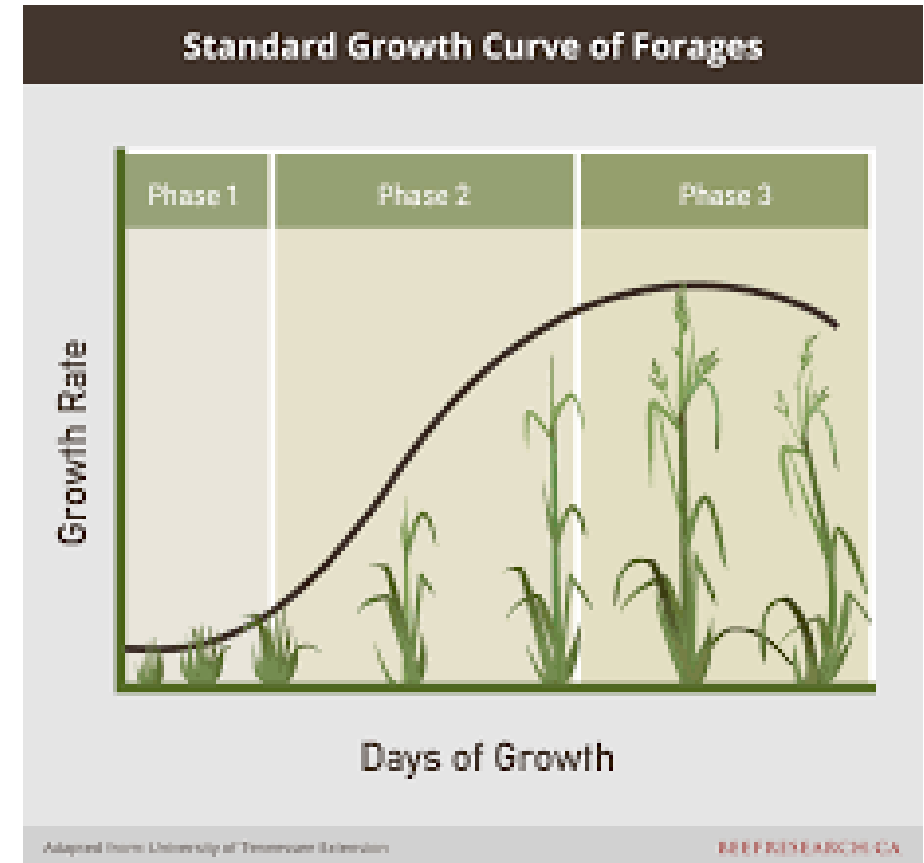
2.1 Introduction Cont'd...

- Feed nutritive value refers to the content of available energy (total digestible nutrients “TDN”) and crude protein in forages.
- Total digestible nutrients (TDN) is an indicator of concentration of available energy.
- TDN measures digestible proteins, fiber, carbohydrates and fats/lipids in a feedstuff.
- Forage quality entails forage intake as well as its nutritive.
- Forage quality influences animal performance directly.



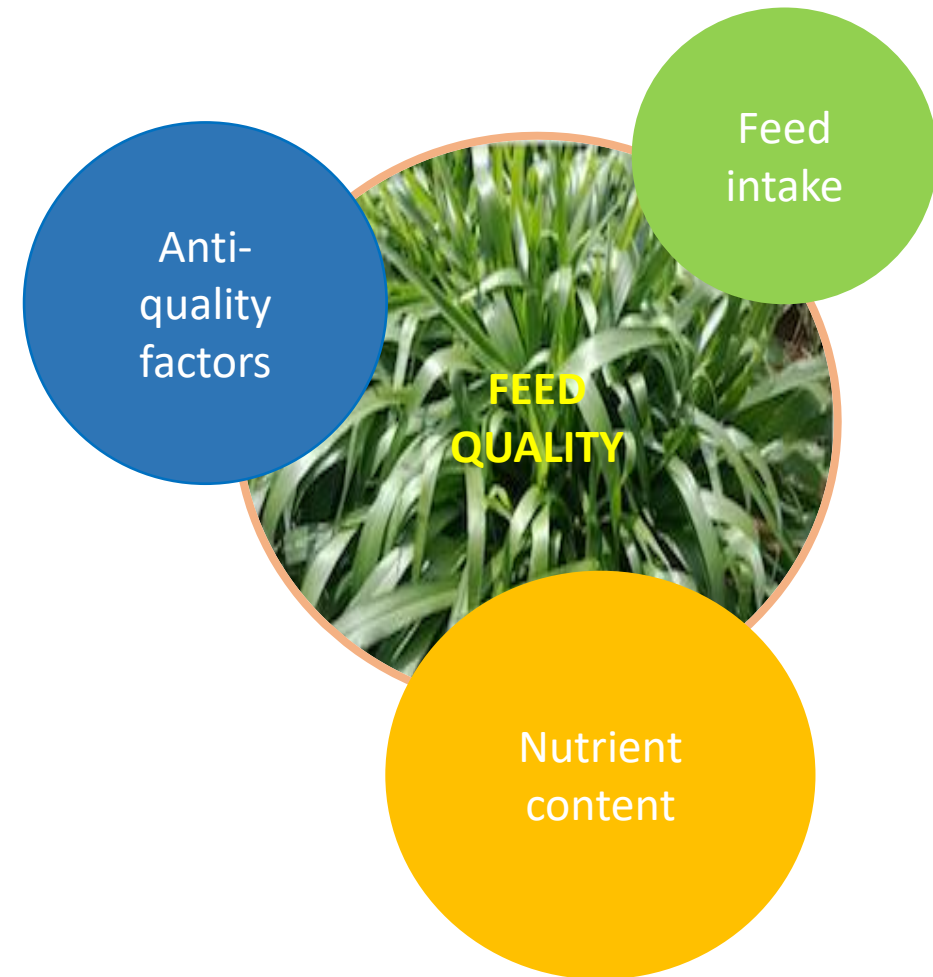
3. Importance of knowing forage quality

- Low quality forages such as overgrown (mature) grasses, often in the generative (seeding) stage have low levels of nutrients.
- Imbalanced rations with low quality forages cannot meet the expected animal performance (milk production, growth rate and health).



4. Determinants of quality forage

- Forage quality includes;
 - i. Feed intake
 - ii. Anti-quality factors
 - iii. Nutrient content/value e.g.:
 - Dry matter content
 - Digestibility
 - Fiber content
 - Crude protein (CP)
- The availability of nutrients is directly related to the total feed intake.



5. Factors affecting forage quality

- Forage quality and feeding value vary much with;
 - i. Varieties/species
 - ii. Age/maturity of forage
 - iii. Nutrient and water supply (soil fertility)
 - iv. Temperature
 - v. Harvesting stage/cutting interval
 - vi. Storage technology
 - vii. Parts of the plants used



6. Primary evaluation of forages/feed

Physical tests

- i. **Visual assessment (color)**; gives a sense of the condition of the feed i.e. maturity and soil fertility issues.
- ii. **Smell**; can indicate whether feed is contaminated or type of fermentation.
- iii. **Touch/feel**; one can identify high moisture content in feed or dryness.
- iv. **Size(quantity)**; gives details on growth conditions.
- v. **Homogeneity**; identifies feeds that are adulterated/presence of other unwanted materials.



6.1 Primary evaluation of forages/feed

Cont'd: Color

Fresh forages

- Colours go from brown via yellow to light green, green and dark green.
- For "live"/fresh forages, a darker green colour indicates a higher protein content than light green colour.
- Dark green colour of leaves in particular indicates higher protein content, low fibre contents and higher digestibility.
- Yellow or even a grey/brown colour from dead leaves/stems indicate low protein content.



6.2 Primary evaluation of forages/feed

Cont'd: Color

Silage

- Colour between greenish-light brown or golden is an indicator of good silage.
- Dark brown to grey-black colour is an indicator of spoilt silage.
- This colour is possibly due to exposure to air or poor fermentation while in storage (pit/silo/clump).



6.3 Primary evaluation of forages/feed

Cont'd: Touch/feel

Fresh forages

- Softer more fleshy stems indicate lower fiber contents and higher digestibility.
- Leaf ratio should be more than stems; leaves contain more nutrients.
- Crops with rough stems, usually deep yellow to brown in colour with few/ dead leaves exhibit forage with high fibre content.
- Stems in crop are more than amount of leaves.
- Crops with high fibre content have low digestibility and low nutritive content.



6.4 Primary evaluation of forages/feed Cont'd: Visual assessment

Feed classes	% CP	% CP	% OMD	% OMD	ME (MJ)	Examples feeds and comments
Forages	average	variation	average	variation		
1. Harder yellow brown	5	3 to 7	50	40 to 55	6.9	Poor grain stover
2. Softer yellow green	5	3 to 7	60	55 to 65	8.2	Poor tropical grass
3. Harder light green	9	7 to 11	50	40 to 55	6.7	Legume stover
4. Soft hard light green	9	7 to 11	60	55 to 65	8.0	Medium quality tropical grass
						Medium/high quality tropical
5. Soft light green	9	7 to 11	70	65 to 85	9.2	grass
6. Harder green	14	11 to 17	60	55 to 65	7.8	Grass/legume mixtures
7. Softer green	14	11 to 17	70	65 to 85	9.0	High quality tropical grass
8. Soft dark green	20	17 to 30	70	65 to 85	8.9	High quality legumes

6.5 Primary evaluation of forages/feed

Cont'd: Squeeze/grab test

- This test is done to know the possible moisture/Dry Matter (DM) content of maize silage.
 - Take a handful of silage and place in your hands.
 - Squeeze the portion of silage as tight as possible for about a minute and release your grip of the silage portion.
 - Juice expelled during squeezing and moisture on the hand is used to assess moisture content/DM content of silage.
 - If the hand is slightly/not moist at all and upon releasing the silage in the hand springs up and falls apart indicates low moisture/high DM content of silage.



6.6 Results of the Squeeze/grab test

- If juice is released between the fingers while squeezing and a ball is formed upon releasing the silage and maintains a ball-shape even after releasing, this indicates high moisture content or low %DM (60-65% moisture content).
- Cow has to take more/extra silage if moisture content is high/%DM is low in order to get nutrients needed from amount of silage recommended.
- Extra feed compensates water in the silage.
- Moist hand after squeezing with little to no juice in the hand represents average-good dry matter content of about 30%-35% (recommended).



6.7 Primary evaluation of forages/feed

Cont'd: Smell

Fresh forages

- Good quality forage will have a fresh mowed grass odor.
- Low quality grass has a musty or moldy odor due to poor storage conditions.

Silage

- Bad smell of silage affects feeding by cows.
- Silage smells generally different depending on the cause or exposure of the silage during storage.

Note: Forage especially chopped hay/straws are mixed with molasses to increase feed intake and palatability.



6.8 Primary evaluation of forages/feed Cont'd: **Homogeneity**

- Refers to uniformity in composition, checks the pureness of a feed ingredient.
- Feeds should be as pure as possible.
- Look for the presence and amount of objects (wire, stones etc.), weeds, molds or poisonous plants.
- Foreign objects/materials tampers with quality of feeds and feed intake, for example; mould presence in feeds.
- Cows are selective feeders hence instances of causing selective grazing and feeding should be avoided.



6.9 Primary evaluation of forages/feed

Cont'd: **Size**

i. Grasses

- Size of forage & feed gives information on growth.
- Overgrown forage tend to have more stems than leaves hence low nutritive content and high fiber content.
- Forages should be harvested at the right stage to avoid losing nutritive value of feed.
- Chopping forage reduces selection by cows while feeding while encouraging feed intake.



6.10 Primary evaluation of forages/feed Cont'd: **Size**

ii. Silage

- Poorly chopped silage affects intake by cows.
- Silage should be harvested well, presence of full grain in silage pits is not a good sign.
- Full grain in silage when consumed by cows will be excreted through feces this can be observed through manure/dung assessment. This is also observed with rations composing of full grain components.
- Therefore maize grain should be crushed to make it available to cows for better utilization and reduce wastage.

