Theme 3: Animal Nutrition and Feeding

ESTIMATING DRY MATTER INTAKE FOR VARIOUS BREEDS/AGE CATEGORIES OF DAIRY CATTLE IN THE TROPICS (Level 1)

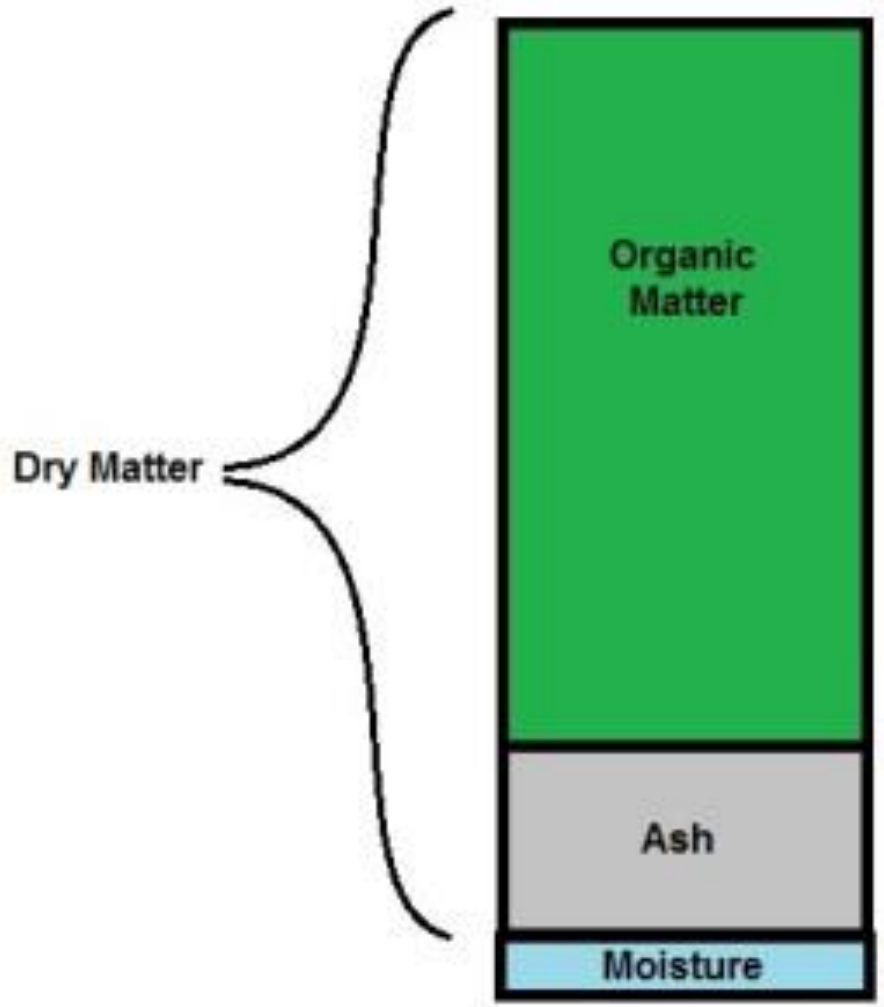
Topic	Training & information Content
3.1	Estimating feeding value of fodder & feed on dairy farms
3.2	Sampling feeds & forages/analysis interpretation
3.3	Estimating Dry Matter intake for various breeds/age categories of dairy cattle in the tropics
3.4	Reviewing feed intake, rumen fill, Body Condition 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):

- ❑ Meaning of dry matter (DM) in feeding.
- ❑ How to calculate dry matter intake (DMI).
- ❑ Dry matter intake requirement for cattle for different ages and breeds
- ❑ The factors affecting dry matter intake in dairy cows.

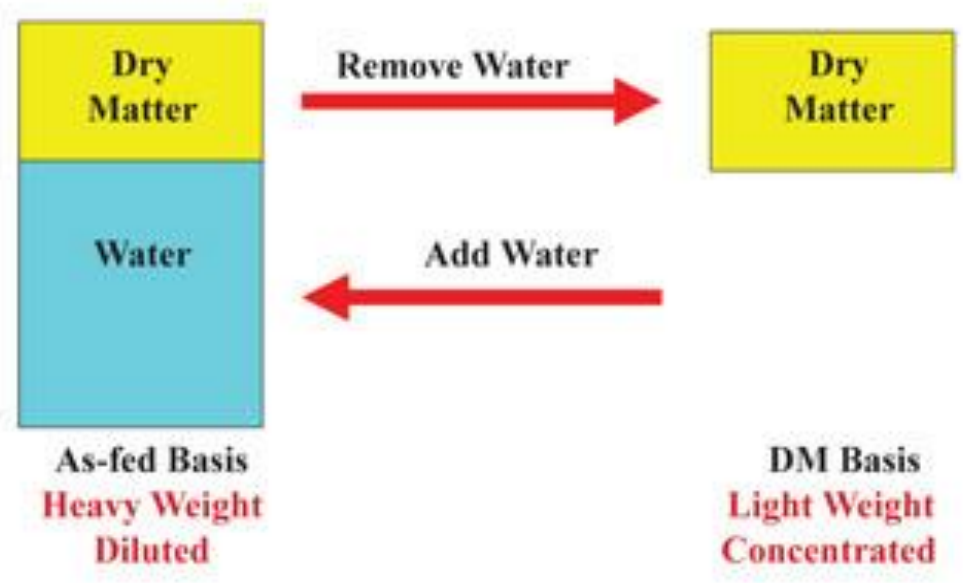
2. Background

- Dry matter intake (DMI) is the amount of feed a cow consumes on a moisture-free basis.
- The nutritive value of feeds and fodder is found in this dry matter part.



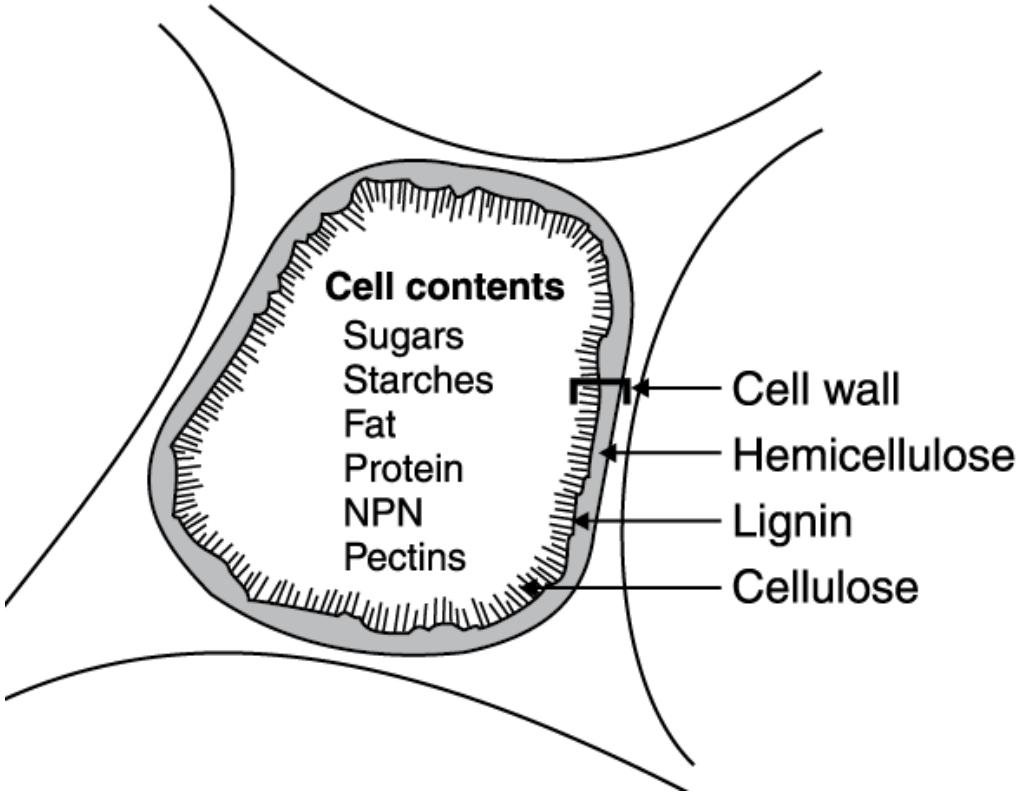
3. Dry matter intake (DMI)

- Underfeeding of nutrients restricts milk production and can affect the cow's health.
- Overfeeding increases feed costs and result in excessive excretion of nutrients.
- Nutritive value of feed can be estimated as 'per kilogram (Kg) of feed' or as 'per Kg DM of feed'.



4. Components of Dry matter

- Includes;
  i. Neutral Detergent Fiber (NDF)
  ii. Effective NDF (eNDF)
  iii. Non-fibrous carbohydrate (NFC)
  iv. Starch (carbohydrate)
  v. Sugar (carbohydrate)
  vi. Crude protein (CP)
  vii. Fats
  viii. Ash: All of the minerals in the feed.



5. Dry matter (DM) contents fed to cows

- DM content is what remains after all the moisture is removed from a feed.
- Fresh pasture has high water content and will have a lower percentage of dry matter content.
- DM is an indicator of the amount of nutrients that are available to the animal in a particular feed.

6. Dry Matter content in different feeds & forage

- DM is important in determining how forage will preserve when stored by baling or ensiling.
- Farmers are advised to reduce the moisture content in forage before preservation. This can be done by wilting forages (silage making), sun drying (hay) or artificial drying (Lucerne pellets).

7. Calculating Dry Matter Intake

- Depending on data available, DMI is equated to;

DMI = 3 % of animal live weight

Example:
A 600 kg cow will need at least 18 kg of DM per day.

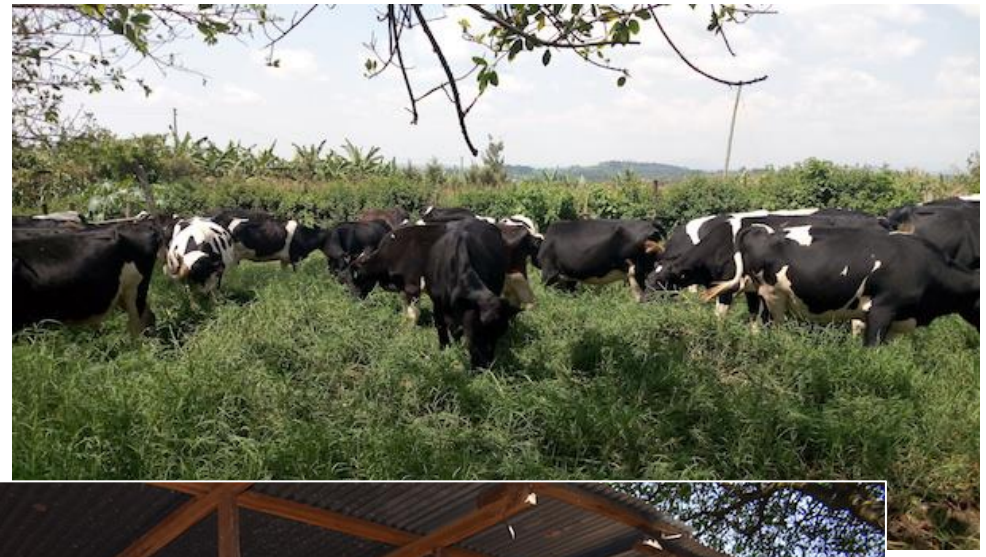
that is;
Daily DM intake: 600 kg × (3% ÷ 100) = 18 kg DM/day

- Determining DMI (kg) helps meet DMI and nutrient targets for cattle.

8. Factors affecting Dry matter intake in cows

i. Animal factors
   - Breed of the cow
   - Weight
   - Age
   - Stage of lactation and milk production levels
   - Health of the cow
   - Cow behaviour and eating habits

ii. Environmental factors, e.g. that causes heat stress.



8.1 Factors affecting DMI of the cows Cont'd…

iii. Feed factors and Farm management;

- Feeds access/availability to the cow
- Feed quality
- Moisture content in the feed
- Neutral detergent fiber (NDF) percentage in the feed
- Feeding frequency and sequence
- Forage to concentrate ratio in the ration
- Water quality and accessibility.

9. Different DM requirements for various breeds of cows

- DMI vary in various breeds due to the following components;
  - Average milk production levels
  - Average butter fat content in milk
  - Average protein content in their milk
  - Average mature weight
  - Different physiological status

- Due to these, every breed has different DMI requirements.

Different breeds of cattle

9.1 Different DM requirements for various breeds of cows Cont'd…

i. Friesian breed – of 650 kg

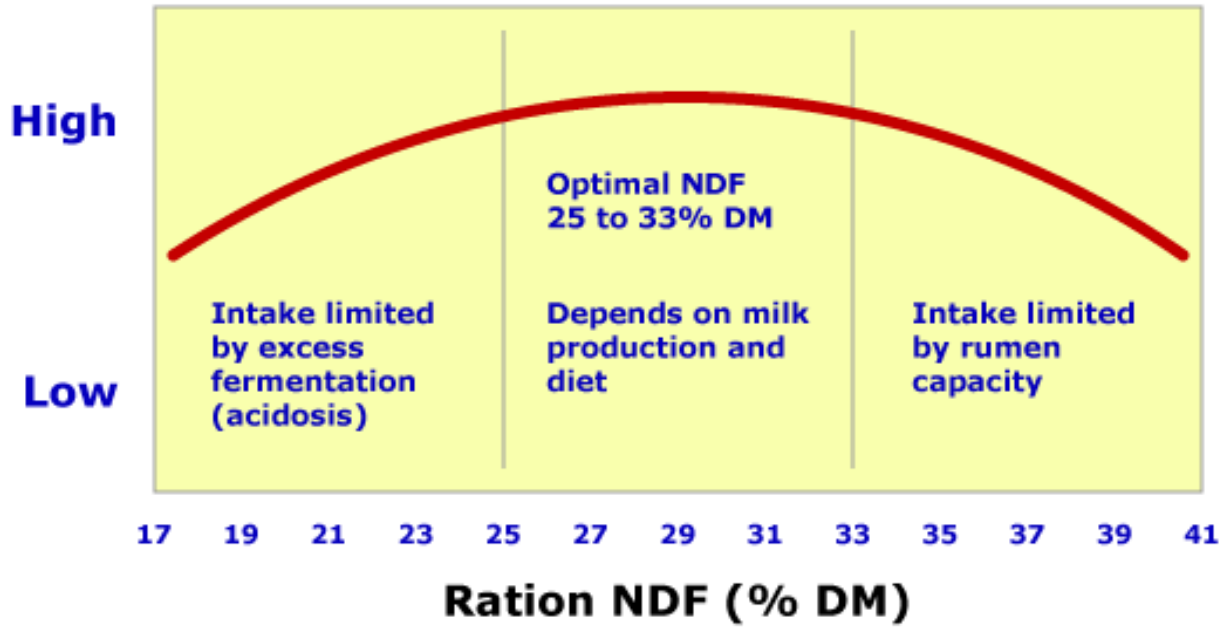
DMI = 3% of animal live weight
= 3% of 650kg for mature Friesian cattle
= 19.5kg of DMI

ii. Jersey breed – of 350 kg

DMI = 3% of animal live weight
= 3% of 350kg for mature Jersey cattle
= 10.5kg of DMI

10. How Neutral detergent fibre (NDF) affects DMI

- NDF in forages and the total ration influence DMI.
- Basically the more fibrous the less the intake since the cow's rumen gets full fast.
- Rations need to be balanced i.e. to contain sufficient and effective NDF for healthy rumen function.

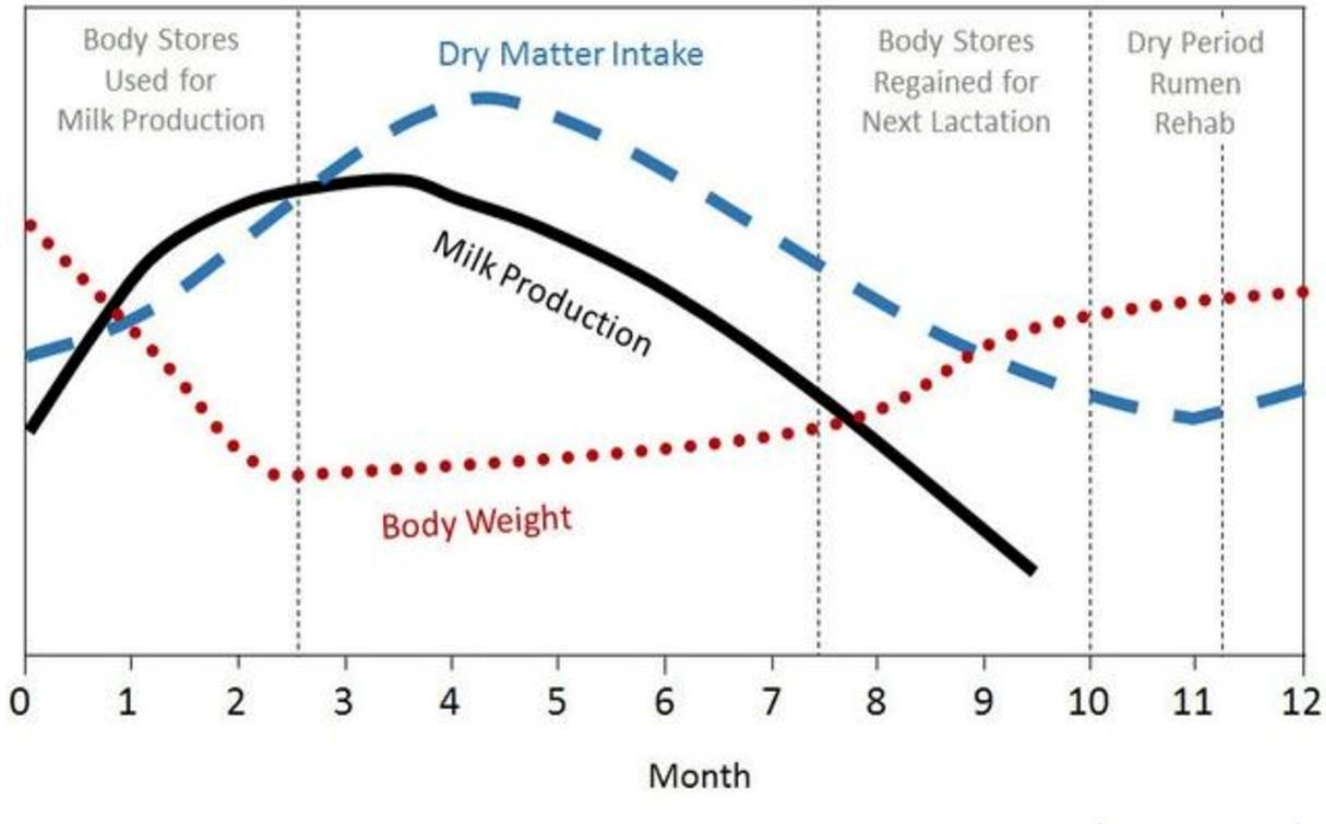


11. Age factor in estimation of DMI

- Young stock feed requirement is calculated differently compared to mature cow.
- As heifers grow, their requirements change the feeding levels.
- Matching the type of feed and its composition to a heifer's nutritional requirements is key to meeting growth targets.

12. Stage of lactation and level of milk production in DMI

- Cows consume feeds (DMI) to meet their nutrient requirement (energy, protein etc).
- Milk production (energy use) is highest 4 to 8 weeks after calving.
- Highest DMI (energy intake) occurs from 10 to 14 weeks after giving birth.



13. Health of the cow in determining DMI

- Animal's health status is often associated with changes in feeding behavior.
- When DMI is not enough over longer time (underfeeding) the cow’s health declines.
- Illnesses affect DMI by reducing feed intake.

14. Feed & farm management factors affecting DMI

- Cows should have free access and adequate time for eating to maximize DMI.
- Behavior at the feed bunk is often affected by social dominance affecting intake in some cows.
- Feeding method; Feeding total mixed ration (TMR) is recommended over individual/single ingredient feeding.

14.1 Feed & farm management factors affecting DMI Cont'd…

- Increasing the frequency of offering feeds to cows increases DMI per day.
- Feed quality and palatability; These are affected by the freshness, molds, spoilage, taste, moisture and temperature of the feeds.
- The moisture content in the feeds may affect the feed intake of the cow.

15. Other environmental factors affecting DMI

- The DMI (especially of lactating cows) decreases when ambient temperature exceeds 25°C, cattle experiences heat stress.
- Heat stress causes low DMI, 10 to 35% reduction in milk production and metabolic disorders.
- Providing clean water, shade and proper ventilation are critical in lowering incidences of heat stress.

Further reference: Module on Heat stress in dairy cattle nutrition.

16. Water intake affecting DMI

- Water quality and accessibility determines water and feed intake.
- Low water intake discourages feed intake and affect DMI.

17. Importance of meeting the cow's DMI requirement

i. It minimizes metabolic disorders, weight loss and improves reproductive performance.
ii. A dairy cows tends to improve milk production, have stable health and body condition.
iii. Helps a farmer to meet his/her target in the dairy enterprise hence profitability.

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