Balancing the diet

Technical Note N06

Balance the dairy cow diet to achieve milk production, body condition and reproduction targets. Dry matter (DM), fibre, starch, sugar and protein are the major factors to consider. Keep the diet consistent to optimise microbial production (more rumen microbes = more milk) and to achieve the desired milk composition targets.

Diet targets – rules of thumb

Dry matter (DM) intake:

- Minimum daily intake equivalent to at least 3% of body weight, 4% for higher-producing cows (>30 L/day). (Refer to Technical Note N03: Feed intake.)

Neutral detergent fibre (NDF) intake:

- Maximum daily intake equivalent to 1.2% (1.3% for high producers) of body weight in total diet.
- Maximum 1% of body weight from forage. (Refer to Technical Note N04: Factors affecting feed intake.)

NDF content of the total diet:

- 28–32% NDF in diet DM for cows producing >9000 L.
- 30–34% NDF for late lactation/medium production.
- 34–40% NDF for cows producing <6000 L on tropical pastures.

Effective NDF (eNDF):

- Minimum 20% of total NDF as eNDF (forage length 2–5 cm).

Non fibrous carbohydrate (NFC):

- 35–40% of diet DM at peak/high production.
- 32–37% at late lactation/low production.

Starch:

- 22–25% of diet DM.

Sugar:

- 3–6% of diet DM. Up to 10% sugar tolerated on mature tropical grass/molasses diets.

Crude protein (CP):

- Minimum 16% of diet DM at peak/high production.
- Minimum 13% at late lactation/low production.

Rumen degradable protein (RDP):

- 66–72% of the CP content of the diet at peak lactation/high production.
- 70–76% of the CP content of the diet at late lactation/low production.

Rumen undegradable protein (RUP):

- Formulate to supply lysine and methionine at a 3:1 ratio.

Fat:

- Maximum 5–6% of diet DM.

Minerals and vitamins:

Macro-minerals	Micro-minerals	Vitamins
Calcium (2% of diet DM)	Copper	A
Phosphorus	Cobalt	D
Potassium	Zinc	E
Sodium	Manganese	K
Magnesium	Selenium	
Chloride	Iodine	
Sulphur	Iron	

Nutrient content of feeds

In order to balance the diet correctly, it is essential to check the DM content and nutrient composition of all feeds that you currently use and any alternative feeds that may be available. There are two main ways of obtaining the DM% and nutrient composition of your feeds:

1. Determine the DM% and analyse the nutrient composition of your feeds on a regular basis. (Refer to Technical Note N22: Feed sampling and testing.)
2. Use DM and nutrient composition values from feed analysis tables (Refer to the Feed Plu$ CD or the Protein Plu$ checkbook.)

Meeting intake and nutrient targets

1. Determine DM intake (kg)

If total DM intake is unknown, use the rules of thumb for DM intake and maximum NDF% from the list above.

Example:
A 600 kg cow will need at least:
600 kg × 3%= 18 kg DM/day.
(Refer to Technical Note N03: Feed intake and Technical Note N04: Factors affecting feed intake.)

2. Estimate or calculate daily DM intake of individual feeds (kg)

The DM intake of some feeds (such as grain, molasses, hay and silage) can be calculated by weighing the amount offered per cow, and then use their DM% to calculate the DM intake of each feed. To estimate pasture intake, subtract the known intakes of concentrates, hay and silages from estimated total DM intake.

Example:
600 kg cow fed 6.7 kg grain as-fed (90% DM), 13.3 kg maize silage as-fed (30% DM) and kikuyu pasture.

Grain DM intake
= 6.7 kg as-fed x (90% DM ÷ 100)
= 6 kg DM/day.

Silage DM intake
= 13.3 kg as-fed x (30% DM ÷ 100)
= 4 kg DM/day.

3. Calculate daily nutrient intake

For each feed, use the DM intake of each feed (calculated in step 2), plus their nutrient values (from your own analysis or feed tables), to calculate the intake of each nutrient from that feed in kg. Add the nutrient intakes from each feed to calculate total daily intake for each nutrient.

Example:
600 kg cow fed grain, maize silage and kikuyu pasture.
Crude protein in feed DM:
12% grain; 8.6% maize silage; 23.2% kikuyu.
CP intake of individual feeds:
grain = (12% ÷ 100) x 6 kg DM intake
= 0.72 kg CP from grain

Repeat for all feeds in the diet.

Total diet CP intake
+ 0.72 kg from grain
+ 0.34 kg from silage
+ 1.86 kg from kikuyu
= 2.92 kg CP/day.

Repeat this calculation for all nutrients.

4. Check if the ration meets diet targets

For each nutrient, divide the total daily intake (kg) of that nutrient (calculated in step 3) by total diet DM intake (from step 1), then multiply by 100 to calculate the nutrient % in the total diet. Then check your values against the target values listed above.

Example:
600 kg cow on grain, maize silage and kikuyu pasture.

CP intake = 2.92 kg and total DM intake = 18 kg.

CP% in diet: 2.92 ÷ 18 × 100
= 16.2% CP in total diet

Diet target: minimum 16% of diet DM for high production.

Repeat for each nutrient.

Further information

Contact the DAFF Customer Service Centre by
Phone 13 25 23, or
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More technical notes can be found at:
www.dairyinfo.biz

Protein Plu$ checkbook (Published 2006 by DPI&F Qld)

Feed Plu$ CD v4.0 (Published 2008 by DPI&F Qld)

Condition magician booklet (Published 2003 by DPI Vic)

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