NSW DEPARTMENT OF
PRIMARY INDUSTRIES

## Realistic Rations - Readers' Note

This document is part of a larger publication. The remaining parts and full version of the publication can be found at:

http://www.dpi.nsw.gov.au/agriculture/livestock/dairy-cattle/feed/publications/realistic-rations

Updated versions of this document can also be found at the above web address.

# Working out a ration

## Aims of this section

The nutrients in the dairy cow's diet must be in the right proportion to keep her healthy and support milk production, pregnancy and growth. Any imbalance in the ration can result in poor milk production or other signs of ill health. Remember that we are also feeding the cow's rumen as well as the cow.

To get the correct balance in the ration we must calculate the cow's requirements for maintenance, growth, milk production, pregnancy and overall activity, and then match these to the nutrients provided in the feedstuffs we intend to use to make up the ration.

In many cases, you can devise a basic ration using a pen, paper and calculator. There are also several computer packages that can help you formulate a cow's ration in more detail than by hand.

The computer packages are tools for helping with complex calculations; don't expect the computer to substitute for the knowledge you do not have.

A computer is only accurate when the information you give it is accurate—it can't make concessions for mistakes in feed analysis or estimations of cow feed intake.

In this section, you will:

- learn what information you need to collect before you start doing your calculations or using a computer package
- work out whether a sample ration is adequate.

### Knowledge level required

- completion of Sections 1 and 2 of this manual
- basic computing skills.

## Guidelines for feeding dairy cattle at different stages of lactation

Before you work out your ration you must get clear in your mind what your cows need at this moment . The dry matter intakes and energy requirements of dairy cattle vary according to their live weight, milk production, activity, body condition and stage of pregnancy. Methods for estimating these values have been given in section 1 under 'What nutrients does the cow need?'.

The guidelines in table 3.1 are based on cattle receiving a total mixed ration. Some figures (such as the crude protein figures) are higher than those normally quoted for pasture-fed cattle. The higher milk production of these cattle and the inclusion of nutrients such as fat in these diets make these higher requirements necessary. These rations are formulated to maximise the amount of microbial protein produced in the rumen by balancing the dietary carbohydrate and protein.

If you need to know the amount of a nutrient in grams per kg DM, multiply the percentage value by 10.

## What else do I need to know before I can balance a cow's diet?

### Important abbreviations

We discussed the following abbreviations in Section 1; refer back to this section if you don't remember what these measurement units mean.

DM Dry matter

***Table 3.1: Nutrient needs of dairy cattle at various stages of lactation***

| | Milking | | | Dry cow | |
|---|---|---|---|---|---|
| | Early | Mid | Late | Dry | Springer |
| **Protein** | | | | | |
| CP (%) | 17.5ñ19.5 | 15ñ17 | 14ñ15 | 12 | 14.5ñ15 |
| UDP (as % of CP) | 35ñ40 | 33ñ37 | 30ñ36 | 30ñ35 | 33ñ38 |
| **Carbohydrate** | | | | | |
| ADF (min. %) | 17ñ21 | 19ñ22 | 21ñ25 | 30ñ35 | 25ñ29 |
| NDF (min. %) | 28ñ31 | 28ñ33 | 34ñ40 | 42ñ50 | 37ñ43 |
| Min. forage NDF (%) | 18ñ23 | 19ñ23 | 21ñ25 | 35ñ38 | 31ñ34 |
| NSC (%) | 35ñ42 | 34ñ43 | 32ñ45 | 30ñ40 | 34ñ40 |
| Min. forage in diet (%) | 40ñ45 | 45ñ50 | 50ñ55 | 60 | 55 |
| **Energy** | | | | | |
| Average energy of ration (MJME) | 11.4 | 11.2 | 10.6 | 8.9 | 9.9 |
| Total fat (%) | 5ñ7 | 5ñ6 | 3ñ5 | 3ñ4 | 3ñ5 |
| **Macro-minerals (% of ration)** | | | | | |
| Calcium | 0.80ñ0.85 | 0.70ñ0.80 | 0.65ñ0.75 | 0.60ñ0.80 | 0.60ñ0.80 |
| Calcium if diet has added fat | 0.90ñ1.10 | 0.90ñ1.00 | 0.85ñ0.95 | ñ | ñ |
| Phosphorus | 0.48ñ0.55 | 0.43ñ0.47 | 0.38ñ0.42 | 0.30ñ0.36 | 0.34ñ0.40 |
| Magnesium | 0.32ñ0.40 | 0.28ñ0.35 | 0.25ñ0.30 | 0.18ñ0.20 | 0.20ñ0.25 |
| Potassium | 1.20ñ1.40 | 1.00ñ1.20 | 0.90ñ1.00 | 0.70ñ0.80 | 0.70ñ0.80 |
| Sodium | 0.20ñ0.30 | 0.18ñ0.25 | 0.18ñ0.25 | 0.10 | 0ñ0.10 |
| Chlorine | 0.25ñ0.30 | 0.25ñ0.30 | 0.25ñ0.30 | 0.20 | 0.20 |
| Salt | 0.25ñ0.50 | 0.25ñ0.50 | 0.25ñ0.50 | 0.22ñ0.25 | 0ñ0.25 |
| Sulphur | 0.20ñ0.25 | 0.20ñ0.25 | 0.20ñ0.22 | 0.16ñ0.20 | 0.16ñ0.20 |
| Nitrogen: sulphur ratio (N:S) | 11ñ13:1 | 11ñ13:1 | 10ñ12:1 | 10ñ13:1 | 5ñ12:1 |

| | |
|---|---|
| CP | Crude protein |
| RDP | Rumen degradable protein |
| UDP | Undegraded protein |
| NPN | Non-protein nitrogen (such as urea) |
| ME | Metabolisable energy, expressed as megajoules of metabolisable energy per kilogram dry matter (or MJ of ME/ kg DM) |
| kg | kilogram |

***Table 3.1: Nutrient needs of dairy cattle at various stages of lactation*** *continued*

| | Milking | | | Dry cow | |
|---|---|---|---|---|---|
| | Early | Mid | Late | Dry | Springer |
| **Micro-minerals (mg/kg DM)** | | | | | |
| Cobalt | 0.5 | 0.4 | 0.3 | 0.3 | 0.4 |
| Copper | 20 | 15 | 12 | 12 | 20 |
| Iodine | 0.8 | 0.8 | 0.8 | 0.5 | 0.5 |
| Iron | 100 | 100 | 100 | 100 | 100 |
| Manganese | 70 | 60 | 50 | 60 | 70 |
| Selenium | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Zinc | 80 | 70 | 60 | 70 | 80 |
| **Vitamins** | | | | | |
| Vit A ◊ 1000 IU/day | 150ñ250 | 100ñ150 | 75ñ100 | 75ñ100 | 100ñ150 |
| Vit D ◊ 1000 IU/day | 40ñ60 | 30ñ50 | 25ñ35 | 25ñ30 | 25ñ35 |
| Vit E IU/day | 600ñ800 | 400ñ600 | 300ñ500 | 400ñ600 | 600ñ1000 |

## Information you must know before you formulate a ration

If we want to formulate a ration for cows, whether by using a pen, paper and calculator or a computer package, we need to know the following information:

### Average cow live weight (kg)

This can be assessed for the herd or it can be assessed for different lactation groups such as early lactation (up to 100 days), mid-lactation (100–200 days) and late lactation (over 200 days). If a ration is being formulated for heifers or dry cows, estimate their weights too.

### Live weight change (kg/day)

Cow live weights change throughout the lactation cycle. We can monitor these changes by **condition scoring**. We can estimate how much weight a cow needs to gain or how much she could lose by scoring changes in her condition.

Condition scoring is explained fully in section 4. Important information to remember is that one condition score change in:

- Holstein–Friesians equals 42 kg live weight
- Holstein–Jersey crosses equals 34 kg live weight
- Jerseys equals 26 kg live weight.

For Brown–Swiss and Australian Red breeds (Ayrshire, Illawarras) use the average Holstein–Friesian values. For Guernseys, depending on their size, use the Jersey values or the crossbred values.

**Example:** a Holstein–Friesian cow needs to put on one condition score between the third and the sixth month of lactation (from condition score 3.5 to condition score 4.5).She should remain at this condition for the next three months of lactation.

How much weight should she gain each day?

The cow needs to put on one condition score over the next three months. If the weight is to be gained slowly, the daily weight gain would be 42 kg divided by 90 days—or 0.5 kg/day.

## Milk yield (litres)

You need to estimate the potential milk yield for each lactation group as a whole. Some cows may produce more, and some less, depending upon their breeding, health (mastitis history, milk fever episodes, lameness) and physiology (first calf heifer, pregnant cow). However, the average milk production for a group should be good enough for the purposes of your calculations.

## Milk composition (% butterfat, % protein)

The energy needed to produce a litre of milk differs depending on the composition of milk (see table 1.6). The cow uses more energy to produce a litre of milk with high butterfat and protein than a litre of milk with lesser composition.

Remember that there is a genetic influence over how much butterfat and protein a cow can produce. Even the best diet will not achieve good milk composition in a cow if she does not have the right genetics.

## Estimated feed intake of the cow (kg/day)

Calculate the estimated daily intake of a cow using the following equation:

(2.2 x live weight + 20 x daily milk production) / 100.

## DM values

Every feed analysis will give a dry matter percentage. Appendix 1 describes how you can determine the dry matter on your own pasture using a microwave or ordinary oven.

We need to know the dry matter content of the feed because this value determines how much feed the cow can eat. We should be able to convert the dry matter value to an **as fed** value so that we know the total volume of feed that has to be fed out or added to a mix.

## ME and CP value of feeds

The ME and CP values of feeds are two important measures for formulating a ration if you are doing the calculations yourself. You should also be aware of the fibre content (NDF and ADF), the types of proteins present in the feeds (RDP, UDP, NPN), the digestibility of the feed and the mineral and vitamin content. When you include these latter factors into the formulation, the calculations can become complex. Fortunately, there are a number of computer packages for ration formulation that not only do the calculations but also have databases containing information on the analysis of most of the common feeds we use in dairy cow rations.

**Example:** A cow in mid-lactation with an estimated feed intake of 15 kg is being offered a cereal grain – hay mix in a ration of 1 part grain to 2 parts hay. The dry matter content of the grain is 90% and the dry matter content of the hay is 75%. If we have 20 cows with these requirements, how much feed do we need each day?

The ration for a single cow will be 5 kg dry matter grain and 10 kg dry matter hay. We need to convert the dry matter values to **as fed** values. This means that we need to include the moisture content of the feed. The **as fed** amount is calculated by multiplying the dry matter amount in kg by the inverse of the dry matter percentage. Grain has a dry matter content of 90% or (90/100) so the inverse is (100/90).

So the total **as fed** amount is 5.6 kg grain (5 ∞ 100/90) and 13.3 kg hay (10 ∞ 100/75) for each cow.

For 20 cows we will need to supply 112 kg of grain and 266 kg hay.

## Handy hints

- One small bale of hay weighs 25–33 kg.
- One large bale of hay weighs 440–600 kg.

# Working out whether a ration is adequate: step by step example

Now that you have collected as much information about your cows and the feeds you intend to use, you should be ready to calculate whether the ration you are using is supplying all the needs of your herd.

The following example calculates the requirements and ration for a **550 kg cow in late lactation**.This is the same cow we calculated the energy requirements for in section 1 of this manual (see page 1.18 of section 1).

After the example you may be asking the question, 'Why aren't my cows producing more milk?' There are many reasons why cows do not reach a certain production level. The genetics of the herd is one main constraint that cannot be solved in the short term, but there are other causes that can be resolved—and the adequacy of the ration is one.

Now to fill in the charts. First work out the nutrient needs of your cow. You will need to refer to the tables mentioned in the charts to get some of the figures.

## Step 1: Work out your cow's daily needs

### Energy needed

**Use this chart to calculate how much energy one cow needs**:

### Protein needed

| | | |
|---|---|---|
| Cowís live weight | | 550 kg |
| Months pregnant | | 6 |
| Distance walked | | 4 km (flat terrain) |
| Weight gain needed | | 0.5 kg/day |
| Daily milk production | | 15 |
| Milk composition | Fat % | 3.8 |
| | Protein % | 3.2 |
| Predicted dry matter intake | | 15 kg |
| Energy needed for maintenance (table 1.4) | | 59 MJ |
| Energy needed for pregnancy (table 1.5) | | 8 MJ |
| Energy needed for activity | | 4 MJ |
| Energy needed for weight gain | | 17 MJ |
| Energy needed for milk production (table 1.6) | | 78 MJ |
| **Total energy needed (MJ of ME each day)** | | 166 MJ |

**Use this chart to calculate how much protein the cow needs:**

| | | |
|---|---|---|
| Cowís live weight | | 550 kg |
| Days in milk or stage of lactation (early, mid, late) | | late |
| Daily milk production | | 15 litres |
| Milk composition | Fat % | 3.8 |
| | Protein % | 3.2 |
| **Crude protein needed (g)** (tables 1.7 and 1.8) | | 460 + 1230 = 1690 g (12ñ14% of total diet) |
| **minimum RDP needed (g)** (table 1.9) | | 1168 |
| **minimum UDP needed (g)** (table 1.9) | | 209 |

### Fibre needed

The minimum fibre content in the diet should be 19–21% ADF. If NDF values were available for feed, then the NDF% should be from 25–30%.

### Calcium and phosphorus needed

The minimum amount of calcium and phosphorus required is 0.65% and 0.38% of ration dry matter respectively. (see Table 3.1). The ratio of calcium to phosphorus in the diet should be between 1.2:1 and 1.5:1.

## Step 2: Work out what the ration supplies

The ration to be fed in this example is a pasture/barley/lupins/hay mix. The estimated intake for each cow is **25 kg of pasture, 4 kg of barley, 2 kg of lupins and 5 kg of hay.**

You can get information on the feed composition of the diet from a number of sources:

- Feed composition tables in books, farming magazines or hand-outs
- Results from the analysis of the feed by a feed testing laboratory
- Analysis information from the label of a feed product or information from the company which supplies the feed.

The dry matter percentage of pastures can be calculated using the microwave method explained in Appendix 1.

Table 3.2 contains information on feed composition that is used in this exercise.

***Table 3.2: Feed composition data***

| | Composition of feeds on a dry matter basis | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | DM % | MJ of ME | CP (g) | RDP (g) | UDP (g) | Fibre (g) | Calcium (g) | Phosphorus (g) |
| Pasture | 20 | 11 | 271 | 190 | 81 | 130 | 7.3 | 3.2 |
| Barley | 90 | 13.7 | 120 | 96 | 24 | 53 | 0.8 | 3.7 |
| Lupins | 90 | 13.2 | 300 | 180 | 120 | 140 | 2.2 | 3.9 |
| Hay | 90 | 8.4 | 86 | 60 | 26 | 330 | 6.2 | 3.4 |

## Dry matter intake

kg dry matter eaten = kg eaten x dry matter percentage/100

**Use this chart to calculate how much dry matter the cow is getting:**

| | Dry matter percentage | kg eaten per cow | kg of dry matter eaten per cow |
|---|---|---|---|
| Pasture | 20 | 25 | 5 |
| Cereal grain or pellet (barley) | 90 | 4 | 3.6 |
| Hay | 90 | 5 | 4.5 |
| Silage | | | |
| Supplement 1(lupins) | 90 | 2 | 1.8 |
| Supplement 2 | | | |
| **Total dry matter intake per cow per day** | | | 14.9 kg |

## Energy intake

MJ of ME supplied to each cow = kg dry matter eaten x MJ of ME supplied per kg of dry matter**.**

**Use this chart to calculate how much energy the cow is getting**:

| | MJ of ME supplied per kg of dry matter | kg of dry matter eaten per cow (calculated in the previous chart) | MJ of ME supplied to each cow |
|---|---|---|---|
| Pasture | 11 | 5 | 55 |
| Cereal grain or pellet (barley) | 13.7 | 3.6 | 49.3 |
| Hay | 8.4 | 4.5 | 37.8 |
| Silage | | | |
| Supplement 1 (lupins) | 13.2 | 1.8 | 23.8 |
| Supplement 2 | | | |
| **Total energy intake per cow** | | | 165.9 MJ of ME |

## Protein intake

**Use this chart to calculate how much crude protein the cow is getting:**

| | % crude protein | g of crude protein per kg of dry matter | kg of dry matter eaten per cow (already calculated) | g of crude protein supplied to each cow |
|---|---|---|---|---|
| Pasture | 27.1% | 271 | 5 | 1355 |
| Cereal grain or pellet (barley) | 12.0% | 120 | 3.6 | 432 |
| Hay | 8.6% | 86 | 4.5 | 387 |
| Silage | | | | |
| Supplement 1 (lupins) | 30.0% | 300 | 1.8 | 540 |
| Supplement 2 | | | | |
| **Total crude protein intake per cow** | | | | 2714 g |

## Protein intake as RDP

**Use this chart to work out the cow's RDP intake:**

| | % RDP in feed | g of RDP per kg of dry matter | kg of dry matter eaten per cow (already calculated) | g of RDP supplied to each cow |
|---|---|---|---|---|
| Pasture | 70 | 190 | 5 | 950 |
| Cereal grain or pellet (barley) | 80 | 96 | 3.6 | 346 |
| Hay | 70 | 60 | 4.5 | 270 |
| Silage | | | | |
| Supplement 1 (lupins) | 60 | 180 | 1.8 | 324 |
| Supplement 2 | | | | |
| **Total RDP intake per cow** | | | | 1890 g |

## Protein intake as UDP

**Use this chart to work out the cow's UDP intake:**

| | % UDP | g of UDP per kg of dry matter | kg of dry matter eaten per cow (already calculated) | g of UDP supplied to each cow |
|---|---|---|---|---|
| Pasture | 30 | 81 | 5 | 405 |
| Cereal grain or pellet (barley) | 20 | 24 | 3.6 | 86 |
| Hay | 30 | 26 | 4.5 | 117 |
| Silage | | | | |
| Supplement 1 (lupins) | 40 | 120 | 1.8 | 216 |
| Supplement 2 | | | | |
| **Total UDP intake per cow** | | | | 824 g |

## Fibre intake

**Use this chart to calculate how much ADF the cow is getting:**

| | Fibre (% ADF) | g of fibre per kg of dry matter | kg of dry matter eaten per cow (already calculated) | g of fibre supplied to each cow |
|---|---|---|---|---|
| Pasture | 13.0 | 130 | 5 | 650 |
| Cereal grain or pellet | 5.3 | 53 | 3.6 | 191 |
| Hay | 33.0 | 330 | 4.5 | 1485 |
| Silage | | | | |
| Supplement 1 | 14.0 | 140 | 1.8 | 252 |
| Supplement 2 | | | | |
| **Total ADF intake per cow** | | | | 2578 g |

## Calcium intake

**Use this chart to calculate how much calcium the cow is getting:**

| | Calcium (%) | g of calcium per kg of dry matter | kg of dry matter eaten per cow (already calculated) | g of calcium supplied to each cow |
|---|---|---|---|---|
| Pasture | 0.073 | 7.3 | 5 | 36.5 |
| Cereal grain or pellet | 0.008 | 0.8 | 3.6 | 2.9 |
| Hay | 0.062 | 6.2 | 4.5 | 27.9 |
| Silage | | | | |
| Supplement 1 | 0.022 | 2.2 | 1.8 | 4 |
| Supplement 2 | | | | |
| **Total calcium intake per cow** | | | | 71.3 g |

## Phosphorus intake

**Use this chart to calculate how much phosphorus the cow is getting:**

| | Phosphorus % | g of phosphorus per kg of dry matter | kg of dry matter eaten per cow (already calculated) | g of phosphorus supplied to each cow |
|---|---|---|---|---|
| Pasture | 0.032 | 3.2 | 5 | 16 |
| Cereal grain or pellet | 0.037 | 3.7 | 3.6 | 13.3 |
| Hay | 0.034 | 3.4 | 4.5 | 15.3 |
| Silage | | | | |
| Supplement 1 | 0.039 | 3.9 | 1.8 | 7 |
| Supplement 2 | | | | |
| **Total phosphorus intake per cow** | | | | 51.6 g |

## Step 3: Put it all together

### Summary of cow's daily requirements

**Use this chart to summarise the cow's daily needs:**

| | |
|---|---|
| Predicted dry matter intake per cow | 15 kg |
| Total energy needed for the cow (MJ of ME/day) | 166 kg |
| Crude protein needed | 1690 g |
| minimum RDP needed | 1169 g |
| minimum UDP needed | 209 g |
| minimum calcium needed | 97.5 g |
| minimum phosphorus needed | 57 g |

### Summary of cow's daily ration

**Use this chart to summarise the cow's daily intake:**

| | |
|---|---|
| Total dry matter intake per cow | 14.9 kg |
| Total energy intake | 165.9 MJ of ME |
| Crude protein intake | 2714 g |
| Crude protein percentage | 18.2% |
| RDP intake | 1890 g |
| UDP intake | 824 g |
| Total fibre intake | 2578 g |
| Total fibre percentage | 17.3% |
| Total calcium intake | 71.3 g |
| Total phosphorus intake | 51.6 g |
| Calcium to phosphorus ratio | 1.38: 1 |

Now you have all the figures written down in the charts, study them carefully. Does the ration have sufficient energy, protein and fibre to supply the cow's requirement for maintenance, pregnancy, activity, milk production and weight gain?

- For this cow, she is eating to capacity and there is adequate energy supplied in the ration for her needs.
- These is too much crude protein.
- Fibre intake is borderline.
- Even though the calcium to phosphorus ratio is in the correct range, the ration is deficient in both calcium and phosphorus.

Adding calcium and phosphorus to the diet would be the major change. Adding dicalcium phosphate (310 g calcium per kg DM; 130 g phosphorus per kg DM) at the rate of 0.08 kg per

cow per day would increase the calcium content of the ration by 24.8 g and the phosphorus content by 10.4 g.

Removing the lupins from the diet and increasing the barley and hay content may be a solution if the excessive protein and marginal fibre are considered detrimental to the cow's production. Hay has less RDP and more fibre; although it has less energy it is sufficient.

Note that adding hay and grain would slightly change the calcium and phosphorus intake.

The ration should be formulated to suit the majority of cows in the herd. The cows' requirements will change during lactation and the dry period (see Table 3.1). In some cases a single ration will not be suitable. If the dairy herd is large, it could be separated into 'strings' (groups of cows at the same stage of lactation) that can be fed rations of different energy, protein and UDP levels. Some farmers may opt to feed different amount of concentrate in the milking bails to achieve the same result. The downside with the latter method of feeding is that some cows may be receiving too large a 'slug' of high energy – low fibre feed, such as cereal grain, which would upset the activity of the microbes in the rumen. A balanced bail feed such as formulated pellets may decrease the chance of these upsets occurring.

## Can I use a computer for ration balancing?

Teaching the use of a computer package for developing a ration for a herd is beyond the scope of this manual. There are a number of computer packages available and training courses for use of these packages are available. You may already have a nutritional adviser who uses a computer package.

With any computer program, the value of the output from the program depends on the quality of the information entered and how the information which is produced is interpreted. Never assume that the computer is always right. There is an old computer term, 'GIGO', which means 'garbage in—garbage out'.

Consider the computer and any software package as a 'dumb slave'. The computer will do all the complex calculations needed to determine the value of a ration for your herd. It will calculate the amount of milk that could be produced. It will show the adequacy of the ration for all nutrients (including minerals) and for maintaining or increasing body condition. One further calculation that can be done is the total cost of feeding your cows for each litre of milk produced.

One feed ration computer program for dairy farmers is CAMDAIRY. Before you use this program, you will need the following information about your farm, your herd and the feeds you intend using.

### Milk production details

- peak milk production (the amount of milk the average cow should produce 6–10 weeks after calving)
- average milk fat percentage
- average milk protein percentage
- total weekly milk production for market milk (quota) and price received per litre
- total weekly milk production for manufacturing and price received per litre.

### Herd details

- breed of cow
- number of cows in milk
- average adult live weight
- average condition score of the cows (degree of fatness)
- percentage of heifers in the herd
- average heifer live weight
- average heifer condition score
- average number of weeks since calving (average 'days in milk') for the herd

- average number of weeks pregnant
- activity level of the herd. The amount of walking the cows have to do each day depends on the terrain of the farm and the feeding system used. The cows may be kept in a feedlot, on abundant pasture, sparse pasture or very hilly terrain. The amount of energy above maintenance needed in the diet to compensate for this activity is calculated by the farmer.

The dairy herd may be separated into different groups for milking or for feeding. The information above can be redone for each group of cows in the herd—for example, early lactation cows are fed a separate ration from mid- and late lactation cows.

## Feed information

List all feeds in the ration, including the type and stage of maturity of pasture. Estimate the amount of each feed fed to an individual cow on an ‘as fed’ or ‘dry matter’ basis. Estimate the cost of each feed per tonne (including the cost of producing pasture).

The computer program has a database where the information on most feeds are stored. If you are using a feed or pasture that is not in the database, you can enter information on its nutrient content into the program if you have the feed analysis results for that feed. If you are missing different information on a feed (such as its NDF or mineral content), then the overall analysis of the ration generated by the computer will be deficient in these nutrients.

3.14