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.

Fine-tuning your feeding

How do you measure the success of the ration you are feeding? The most obvious measure is milk production—but what if the cow is a growing heifer or dry? Then you must use condition scoring. Body condition scoring is an important tool for determining whether a ration is adequate for body maintenance at different stages of growth and lactation.

If the ration is imbalanced, the cow can show signs of ill-health. These conditions will often require veterinary treatment, but they can be prevented by using the proper ration.

This section will help you to understand these and other issues you need to know about if you are to fine-tune your rationing.

Aims of this section

In this section, you will:

- learn about and use body condition scoring
- learn to recognise the different metabolic diseases
- learn how changes in diet can affect milk composition
- gain a better knowledge of the role of macro minerals and micro minerals in a cow's ration
- learn about the use of transition rations for springer cows.

Knowledge level required

- sections 1, 2 and 3 of this manual
- general knowledge of dairy cows.

Body condition scoring

Why measure body condition?

It is normal for cows to use their body reserves and lose weight in early lactation. If a cow loses too much body weight at this time she will be much more prone to metabolic diseases such as ketosis or acetonaemia.

It is important to manage live weight loss by feeding correctly, so that there is no adverse effect on milk production or the ability to get in calf.

Cows that are thin at calving will preferentially gain weight after calving, when they should be putting all their energy into milk production.

Cows that lose more weight during early lactation for milk production are more prone to metabolic diseases such as ketosis and poorer fertility.

One body condition score equals:

- 42 kg live weight in a Holstein–Friesian
- 34 kg live weight in a Friesian–Jersey cross
- 26 kg live weight in a Jersey

At calving, one body condition score means an extra:

- 130 litres milk
- 10 kg butterfat
- 15% butterfat

during the first 20 weeks of lactation.

How does body condition scoring work?

Body condition scoring (BCS) tells us the amount of stored energy reserves in a cow's body. These reserves affects health, production and reproduction.

There is no one ideal BCS for a cow; instead, there is a range of desirable scores that can vary during lactation and the dry period. It is the change in BCS for individual cows over time that is important. Body condition score charts

available from some animal health companies will give you a good guide to what to look for.

By regularly evaluating the body condition of your cows and heifers you can fine-tune their feeding management. BCS is an essential tool for the progressive farmer. It can be masteredwith a little training and by using good observation skills.

In Australia we use BCS from 1–8. In the USA, BCS ranges from 1–5. To convert from the American system to the Australian system, simply multiply the BCS by 1.6 or multiply by 8 and divide by 5.

BCS 1—8 system hints

The BCS technique is subjective, so the same person needs to score the cows on a regular basis for the scores to be repeatable. However, on occasions you should get someone who does not see the cows every day to condition score the cows, just to keep you on track. Working with cows every day can make you less aware of changes in their condition.

Regular monitoring of first and last batches of cows through the dairy is all you need to do. However, you might want to condition score cows at different stages of lactation.

When is the best time to score the cows?

- at calving
- after calving
- at the time of mating (either natural mating or artificial insemination)
- when you are checking cows for pregnancy or at mid-lactation
- at drying-off
- during milking time, when the cows are in the yard.

What should the BCS be at different times?

Early lactation

In early lactation the cow's appetite is only 75% of her potential intake of dry matter. Her energy requirements for milk production exceed her appetite. Her body reserves are used to make up the deficit, so she will lose weight during the first 100 days.

Cows should calve at BCS between 5 and 6. These cows have a greater chance of reaching peak milk yields, and their peak yields and lactations persist longer **providing the ration is both adequate and balanced**.

They should lose a maximum of 1.5 condition scores during the first month after calving when they are in negative energy balance. If cows lose more condition it could be difficult to get them into calf.

Cows calving at lower BCS will have poor body energy reserves for peak lactation and reproduction. These cows will direct many of the nutrients in their diets into improving body condition. Milk production will suffer as a result. They may not start their heat cycles for more than 40 days after calving.

Cows calving at higher BCS may have difficulty at calving because fat in the birth canal can prevent normal birth. Fat cows are prone to a number of metabolic diseases, such as ketosis, where the by-product of fat metabolism builds up in the blood stream, affecting normal liver function. The liver is important in converting chemicals absorbed from the rumen into energy (glucose) and body fat (triglycerides). It is also important in removing toxins from the blood. In serious cases, the by-products can give an 'acetone' smell to the breath.

Mid-lactation

In mid-lactation the cow is able to eat more dry matter, and this enables her to meet the demand for milk production and early pregnancy without using her body reserves. This means no major weight loss or gain during this second 100 days. Cows may reach BCS 4 at this time.

Late lactation

In late lactation a cow's appetite exceeds her requirement for energy, so she puts the nutrients in her feed towards gaining body condition over the 100 days in order to prepare herself for the next lactation. The cow needs to be at BCS 5 by drying-off time.

Dry period

A cow puts on weight more efficiently during late lactation than when she is dry. If the cow dries off at BCS 5 she needs to be maintained only at that score during the dry period. This helps stop her getting over-fat and having calving problems, or developing metabolic disorders in the next lactation.

About 1500 MJ of ME are required for each BCS unit gained by a lactating cow. About 2000 MJ of ME are required for each BCS unit gained by a dry cow. This means that more feed will be needed for each BCS unit if the cow is to put on condition when she is dry.

Understanding the metabolic and nutritional diseases of dairy cows

There are four main metabolic diseases that you need to know about if your cows are to stay healthy and make good weight gains:

- hypocalcaemia (milk fever)
- hypomagnesaemia (grass tetany)
- ketosis (acetonaemia)
- acidosis (grain poisoning).

Milk fever

Cause

This is a common disease in high producing dairy cows. It occurs when there is a rapid fall in blood calcium level, usually at about the time of calving. The fall in calcium is caused by a reduced absorption of calcium from the gut and an inability of the cow to mobilise calcium from her skeleton, the main reserve of calcium in the body. This fall occurs at a time when there is a huge demand for calcium with the onset of milk production. Most cases of milk fever occur within 3 days of calving.

A daily milk yield of 30 litres contains about 36 g of calcium. This is about four times the level of calcium in the blood. The cow must mobilise the calcium from her skeleton very rapidly to maintain the blood calcium level.

Predisposing factors

Milk fever is more common in third and fourth lactation cows. Older cows have a greater demand for calcium because of their higher milk production. The cows at risk are usually high producers in good body condition. Milk fever is more likely to occur in cows milked out completely within the first 48 hours after calving than in those cows left with their calves. (However, other problems, such as mastitis, can arise if high producing cows are not milked out during this time.)

Milk fever can increase when the environmental conditions are cold and wet. Under these conditions cows may graze less, so that their calcium intake decreases.

Jersey breed cows are more susceptible to milk fever than other dairy breeds.

Signs

Milk fever is commonly seen within 3–4 days after calving when milk production is increasing. Cows with milk fever at calving can often have another episode 3–4 days later.

A cow with milk fever can be excited, off her feed, show trembling in the muscles and grind her teeth. Most cows will lie down and appear drowsy, with their heads to the side. The muzzle is dry. The cow often does not pass any faeces.

The cow will be unable to stand, and she is if untreated she will become comatose and have loose limbs. Once she is lying flat on the ground she will quickly bloat and often die from inhaling regurgitated rumen contents.

Diagnosis

Milk fever must be differentiated from calving paralysis (from a difficult delivery) as well as acute infections of the gut, udder (black mastitis) and uterus—any of these diseases may occur at the same time.

A blood test for calcium may help the vet to reach a diagnosis. The blood sample should betaken before any treatment is given.

Treatment

It is essential to increase the cow's blood calcium level by giving prompt treatment with a solution containing calcium If the cow is still standing, the calcium solution can be given subcutaneously (under the skin). Cows that are lying down can be given the calcium solution subcutaneously, although in some it will need to be given into a vein (intravenously). This treatment should be given by a veterinarian because the calcium solution can be fatal if it is given too fast into the vein.

The response to the injection is usually fast, and cows may be standing and appearing 'normal' within 10 minutes of treatment. If the cow does not respond quickly, she should be checked by a veterinarian. She may need another treatment, or she may not have milk fever, or she may have milk fever complicated by another disease.

Prevention

Currently there is a debate about the best way to prevent milk fever. Traditionally rations that are low in calcium are fed before calving. Theoretically this treatment will stimulate the cow to mobilise calcium from her body reserves. Diets high in calcium (like lush pastures or hays rich in clover and lucerne) are avoided.

Feeding rations low in 'positive' ions such as potassium and sodium helps to create a slightly 'negative' environment in the cow's body; this stimulates the cow to mobilise calcium. Normal feed additives such as salt (sodium chloride), sodium bicarbonate and lime (calcium carbonate) supply 'positive' ions to the diet and should not be fed to springers. Neither should causmag or magnesium oxide. Special springer rations can be formulated; they contain 'anionic salts' to help create the 'negative' environment. One anionic salt that is commonly used is magnesium sulphate. The anionic balance of the entire ration (including the contribution of the positive and negative ions in any pasture or forage that is fed) has to be calculated. The calcium content of these diets can be variable—either low or high. Because of the specialist knowledge needed for the use of anionic salts, all rations containing these salts should be formulated by a nutritional consultant.

An injection of 250 mg Vitamin D 2–8 days before calving can help. The date of calving should be accurate.

Calcium gels can be given orally 24 hours before and after calving to cows that may be at risk of milk fever. You can use a urine test to detect these cows. The test measures the urine pH.

Adding 70% cereal hay to the springer ration can reduce the occurrence of milk fever by reducing calcium intake and encouraging rumination.

Summary

- reduce sodium and potassium levels in rations
- remove bicarb, lime and salt from rations
- avoid high legume pastures and hays
- provide shelter from bad weather
- avoid long periods of limited feed access
- use vitamin D injections for high risk cows

Grass tetany

Cause

Grass tetany occurs when there is a rapid fall in blood magnesium. It is commonly seen in high-producing dairy cows, particularly in the spring.

Cows cannot store much magnesium in their bodies and require a daily intake of magnesium in the diet. a cow producing 30 litres will be losing about 30 g of magnesium in her milk each day.

Pastures can have very variable amounts of available magnesium.

Predisposing factors

Grass tetany is more likely to be seen in spring when lush pastures are low in magnesium. These pasture usually have a high ammonia content, which depresses the amount of magnesium available. High levels of calcium in the soil can reduce the uptake of magnesium by the pasture. The use of potash (potassium) fertilisers can reduce the levels of available magnesium in the pasture.

Stress is a major factor in the development of grass tetany in cows. It is more likely to be seen when there is wet and cold weather. Newly calved, over-fat cows are more at risk of developing tetany.

Signs

The main clinical signs of grass tetany are caused by excitation of the nervous system. The cow can show twitching of the muscles (especially in the face), the gait can be staggery and the demeanour excitable. A normally quiet cow may try to charge. The cow may collapse, convulse then die.

Diagnosis

A blood test will show if the body magnesium is low. Low blood calcium may also be present and may precipitate tetany.

Not all cows with low blood magnesium will show tetany. Any stress such as yarding, movement or feed deprivation can bring on tetany in these cows.

Treatment

Cows with obvious signs of grass tetany should be treated with an intravenous injection of magnesium salts. These infusions are usually combined with calcium, and they are given very slowly to avoid cardiac arrest.

Prevention

Magnesium oxide (causmag) can be supplemented in the feed at about 60 g per cow per day. Alternatively, magnesium bullets can be placed in the rumen, or the pasture can be dusted with magnesium oxide at the rate of 125 kg a hectare.

Since an excess of ammonia in the pasture can be a problem, energy

supplements can be fed to balance the excess. There should be limited use of potash-based fertilisers.

At the times of the year when grass tetany could occur, try to avoid stresses like yarding.

Ketosis

Cause

In early lactation, cows can be in a negative energy balance where they cannot eat enough to supply their needs for maintenance and milk production. As a result they will be mobilising their body fat.

Ketosis can occur if the mobilisation of body fat is excessive, especially if the cows are being underfed. Stress resulting from cold, wet conditions can precipitate ketosis in early lactation cows because of their increased energy requirements for maintaining body heat.

Cows that calve in too good a condition (BCS 6 or higher) can develop ketosis.

Predisposing factors

Cows that carry too much fat at calving and cows that are underfed after calving can develop ketosis. The liver cells accumulate fat, which impairs the ability of the liver to make the glucose that the cow needs for energy.

Over-conditioned cows that lose weight during the dry period can also accumulate fat in their livers and be prone to ketosis at the next calving.

Other factors include feeding high levels of concentrates twice daily and feeding poorly fermented or rancid silage that contains high levels of butyric acid.

When cows have reduced appetites because of other illnesses or because they have restricted access to feed, a disorder similar to ketosis can develop. The main cause of this disorder is weight loss following reduction in intake.

Signs

Affected cows lose weight and look dull and gaunt. Their breath may have a sweet smell similar to that of acetone. There is a drop in milk production, but the milk fat percentage of the milk increases. The cow may be constipated and show changes in behaviour. She may selectively eat roughages.

Diagnosis

Blood samples can indicate low blood glucose and raised betahydroxybutyrate (blood ketone) levels. Ketones or betahydroxybutyrate can be detected in the urine. Acetone is found in the blood when any condition causes a loss of appetite.

Treatment

Glucose can be given intravenously (500–800 mL of a 40% solution), followed by 600 mL of glycerine twice daily for the next 2–3 days. An injection of cortisone may be used if the cows are affected by stress.

Other treatments include drenching with Ketol® or propylene glycol for 7–10 days before calving, and feeding good quality hay.

Prevention

The appetite of the cow should be maintained by supplying adequate feed to meet her dry matter intake and by providing high quality roughage. The cow should not be allowed to calve in poor body condition or in too-fat body condition. Assess her body condition score during late lactation to make sure she dries off in BCS of about 5. The dry cow should be fed to maintain this body condition score until calving. Before calving, the cow should receive a springer ration, which helps to increase her dry

matter intake. Rumensin® added to the feed at a rate of 200–250 mg per cow per day can help prevent ketosis.

Acidosis

Cause

There are three important causes of acidosis:

- lack of adequate long fibre in the diet
- feeding too much rapidly fermentable carbohydrate (such as starchy grains or pellets)
- feeding too many kilograms of concentrates in one feed, or rapidly introducing grain into a cow's ration.

Predisposing factors

Predisposing factors are:

- feeding high levels of grains in the dairy bail ('slug' feeding)
- sudden changes in diet and not using feed buffers (such as sodium bicarbonate)
- grain feeding, in combination with feeding young lush fibre with a low NDF % and not feeding hay or silage when increased dietary fibre is needed.

Feeding low pH silages can cause digestive upsets similar to acidosis.

Signs

The first sign of acidosis in a herd is a lowered milk fat percentage. The affected cow can show a slight drop in milk production and will go off her feed. She scours, with sweet, sludgy faeces. She can stop ruminating and might show abdominal pain by having a tucked appearance. Cows with severe cases of acidosis can develop lameness in all four feet, and some may die following severe damage to the wall of the rumen.

Treatment

Drench affected cows with sodium bicarbonate. Feed sodium bicarbonate at the rate of 200 g per cow per day.

Reduce the level of concentrates in the diet and increase the percentage of good hay in the ration.

In some cases, a veterinarian has to open up the rumen and remove the grain. The contents are replaced with hay, water and rumen liquor from another cow to help 'kick-start' healthy rumination.

Prevention

Ensure the diet contains adequate fibre (see 'What nutrients does the cow need?' in section 1).

Feed buffers (such as sodium bicarbonate) in the ration (see 'What feeds supply these nutrients?' in section 1). If you are feeding high-starch cereal grains (such as wheat or triticale) you must use buffers.

If you must feed a high percentage of concentrate, it is better to give the concentrate in many small feeds rather than two 'slugs'. The rumen bacteria can handle the smaller amounts of grain better.

Changing milk composition by changing the ration

Introduction

It is important to know the nutritional factors affecting milk composition. These include the type of feed and the level of intake. These interact, however, with a number of non-nutritional factors, such as breed, disease, stage of lactation and climate.

The effects of feeding on composition are complex; while theories provide useful

predictions they cannot produce absolute recipes for improving milk composition.

If most of the herd is calved at a certain time of year, then 2–3 months afterwards, milk fat and protein levels will be at their lowest. If a spring flush occurs at the same time, then milk fat will drop further because of the low fibre levels in the pasture.

After a further 2–3 months milk fat and protein slowly increase until drying-off.

Factors affecting milk fat content

Milk fat is most sensitive to dietary changes. Milk fat composition may fall abruptly when dairy cows are fed high levels of digestible carbohydrates and low levels of fibre, when unsaturated fats are included in the diet, or simply when cows are underfed.

Areas to consider include:

Roughage to concentrate ratio

The primary factor affecting miik fat percentage is the level of fibre in the diet. Milk fat composition drops once concentrates reach 50 per cent of the diet or crude fibre levels drop below 17 per cent.

Carbohydrate type

In high grain – low forage diets the type of grains and the degree of processing have an effect on milk composition. Finely ground wheat can cause the greatest falls in milk fat percentage.

Level of feeding

At adequate levels of feeding, changes in milk composition depend on diet composition. With underfeeding, the fat percentage rises and milk production is reduced. Continued underfeeding, however, reduces fat content. The degree of reduction depends on the duration of underfeeding and is related to the body condition of the cow.

Added fat

Production responses to the addition of fat have been variable and influenced by the type of fat. Unsaturated fats (for example, vegetable oils) may depress fat levels, while saturated fats can improve the fat test. Protected fats have increased milk production, but with variable results on milk fat content.

Whole oilseeds can elevate fat tests due to the slow release of fat in the rumen. Recent dry fat products have improved the fat test and milk yield.

Dietary protein

In general, protein has a small effect on the fat content of milk, although in low roughage/high grain diets, fat levels are often increased with additional protein in the diet.

Factors affecting milk protein levels

Ways to increase protein levels in milk due to nutrition are less apparent than changes in fat levels, since the genetic scope to increase protein is less.

Level of feeding

Underfeeding reduces protein levels, and diets with insufficient energy can depress milk protein levels by 0.3 per cent. Conversely, increasing the feeding levels of underfed cows raises milk protein levels (see Figure 4.1).

Energy intake

Increased energy intake can increase milk protein levels, but responses vary because of a number of factors:

- the level and duration of underfeeding has a variable effect as mentioned above

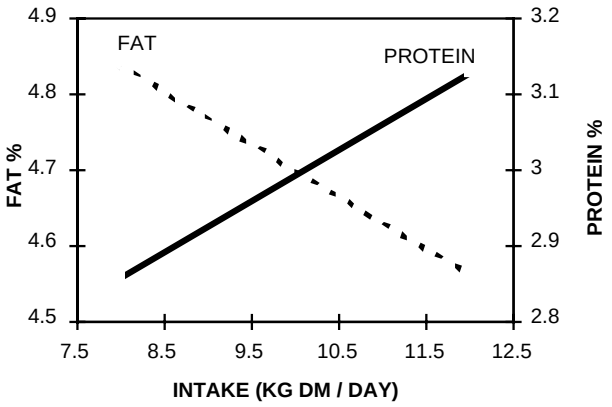

Figure 1: Effect of intake of pasture on milk composition (Ellinbank trials)

- energy is first used to meet maintenance requirements, then production functions (for example, liveweight, milk yield and milk composition). Responses to supplements by underfed cows can subsequently be slow (3-4 weeks)
- cows in early lactation respond differently to cows in mid to late lactation due to the differing physiological drive to produce milk
- immediate responses to grain can be low with well fed cows; however, in the long term high levels of milk of high composition are produced
- cows that are continuously well fed may be close to their genetic limit for milk composition (particularly protein)
- high levels of feeding of well conditioned cows support high levels of milk production and composition
- the benefits of full feeding are carried from one lactation to the next
- only minor differences have been reported in response to the type of grain and degree of processing in pasture-based diets. That is, 30 per cent concentrates)
- there is often a substitution effect when large proportions of grain are fed, and this compounds the problems of predicting responses.

Various feeding studies have shown that:

increased availability of high quality tropical or temperate pastures increases protein levels

clover is a superior feed for production and composition

milk protein responses to the inclusion of grain depend on the type and levels of pasture intake

at high levels of grain feeding (for example, 7 kg/day), particularly with low quality roughages, including protein (i.e. 18–20% CP in the concentrate) increases the milk protein content

- attempts to manipulate protein in milk by feeding low levels of grain and protected protein have been highly variable. The most consistent results have been achieved with formaldehyde casein. Formaldehyde-treated and heat-treated vegetable meals have generally resulted in increased milk yield but increases in protein content have been very inconsistent.

Note: The other main component of solids not fat (s.n.f.) is lactose. Studies show that grain fed to underfed cows increases lactose levels and subsequently raises s.n.f. At adequate levels of feeding, lactose is normally unaffected by changes in feeding.

Summary

In summary, the nutritional factors affecting milk composition are:

- Cows have a genetic milk composition potential and proper feeding allows them to reach their potential milk yield.
- With variations in composition the milk protein test generally follows milk fat levels unless feeding is abnormal.
- Genetic selection is the long-term

method of improving the composition of milk, but feeding is the main factor in the short term.

- Feed the right amounts of fermentable carbohydrates to increase milk protein composition.
- High ration digestibility increases milk composition.
- Poor quality forage limits protein test and yield.
- Underfeeding reduces protein test and yield.
- Oils and fats depress protein test and yield.
- Various additives (e.g. buffers) give variable results and should be carefully evaluated if considered at all.
- Responses to supplements depend on the level of feeding, plane of nutrition, stage of lactation and the period of underfeeding.
- It is very difficuit to provide short-term recipes to absolute levels of milk composition due to the complex interaction involved.
- Proper feeding from one lactation to the next is the simplest and most economic way to achieve high yield and composition levels in milk—after all, this is the road to high levels of profitable production.

Transition feeding

What is transition feeding?

Transition feeding is when we feed the dairy cow from three weeks before she starts lactation to up to three weeks after she has commenced milking. During this period, the cow has progressed from a heavily pregnant dry cow on pasture or other forages to a fully productive milking cow consuming a ration which can include cereal grains and other additives in addition to the forage.

What changes does the cow undergo during this period?

- The cow will have a change in ration from a pasture or forage based diet with no supplement to a ration which could contain cereal grains and other additives.
- The cow will calve; this causes physical trauma and many hormonal changes, which can affect the cow's ability to fight infection and mobilise her body reserves of minerals.
- The beginning of lactation will create a demand for greater energy, protein and calcium requirements by the cow's metabolism. This demand can be twice or more than that needed before the start of lactation.
- The dry matter intake of the cow will begin to decrease about two weeks before calving because of the increasing size of the calf in the abdominal cavity compressing the rumen. The decreased dry matter intake will continue for at least two to three weeks after calving.

How important is the transition period?

Dry cows are usually considered the uneconomic members of the dairy herd. In the past, they have been grazed on the poorest pasture and are 'forgotten' by the farmer until they calve and start paying their way again.

The period around calving is when many farmers see most of the common disease problems in their herd. These diseases include:

- downer cows
- calving difficulties or dystocia

- milk fever
- ketosis
- laminitis (lame cows)
- retained afterbirths
- clinical mastitis
- udder oedema ('slaking' of the udder)

In many cases, it is the best producers in the herd which are the worst affected. This group of cows may also be the most difficult group to breed and the last cows to become pregnant.

Many of the above problems can be prevented by proper management and feeding of the dry cow, especially during the transition period. It has already been discussed in the Body Condition Scoring section that cow should be dried off at a condition score of 5 and be fed to retain this condition score till calving. This means a change in philosophy for many farmers. The ration of the dry cow has to be formulated with the same care as that of the milking herd.

What is involved in transition feeding?

- The decreased dry matter intake 2 weeks before calving means that the cow will need her energy, protein and mineral requirements in a more nutrient dense ration (greater dry matter percentage). This aim may not be a major problem to achieve in the dry cow before calving because of her lower requirements but it will pose a challenge after the cow has calved and has began producing milk. The early lactation cow may not reach full appetite until 6 to10 weeks into lactation.
- UDP should be added to the early lactation ration and has been shown that added protein containing 36 to 40% of UDP to the ration of the heavily pregnant cow could result in an increase in milk production of up to 10% in the next lactation. The extra UDP replaces the need for the cow's protein reserves to be used for her growth and her fetus's growth needs.
- The dry cow should be introduced gradually to the milking cow ration starting about three weeks before calving. This ration should not contain any additive such as buffers (sodium bicarbonate, magnesium oxide). It will take approximately three weeks for the rumen microbes to adapt to the change in the ration. There will be less digestive upsets, resulting in a further decline in dry matter intake, and better feed digestion when the cow starts eating the milking cow ration after calving.
- The precalving ration should be low in calcium. The cow will be able to mobilise calcium from her skeleton after calving when her demand for calcium increases with the onset of milk production. If the cow was fed a diet high in calcium, she is less able to readily mobilise her calcium reserves and could develop low blood calcium and 'droopy' or 'sad' cow syndrome or else be a downer cow with clinical milk fever.
- Feeding a ration which promotes a slight metabolic acidosis in the blood can also enable the cow to mobilise calcium from her skeleton when she needs it. The metabolic acidosis is created by increasing the number of negative ions in the ration. The minerals in the ration have both positive and negative changes. The balance between the positive and negative charges in the ration is called the **dietary cation-anion balance** or **DCAB**. Sodium and potassium provide most of the positive charges whilst

chlorine and sulphur provide most of the negative charges.

The DCAB of a ration is calculated as:

(% sodium/0.023) + (%potassium/0.039) – (%chlorine/0.035) + (%sulphur/0.016)

The percentage of these minerals in all components of the ration, including pasture, other forages and all supplements, have to be calculated to determine this balance. It is not sufficient to just look at the supplements.

Pastures that have been fertilised with potash will contain high percentages of positive charges such as potassium. When using these rations, the slight negative balance is created by the addition of anionic salts to the ration. The anionic salts include magnesium sulphate (epsom salts), ammonium sulphate, ammonium chloride, calciumchloride and calcium sulphate. One major disadvantage in feeding anionic salts is that cows usually find them unpalatable.

Several feed companies have developed specific transition cow rations which are in the correct DCAB to prevent many of the disease problems which occur around calving. The advantage of these rations is that they are ready to feed without the need for extensive testing of rations for mineral content, which can be difficult if pasture forms part of the ration. The disadvantages of using these rations include the cost of the ration which would be in excess of traditional dry cow rations and the change in management necessary to feed the ration. The dry cows may need to be separated into different groups so that the 'close-up' cows are able to be fed the ration. This may involve the separation of existing paddock and the provision of feed troughs and hay feeders. However, the reduction in disease problem in the early lactation period, especially milk fever and retained afterbirth, would result in reduced treatment costs and reduced labour costs, which are normally required to manage the affected cows.