

The Transition Cow

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A Farm Advice Sheet from **SowtheSeed**

What is the transition period?

The three weeks before and after calving when the cow changes her metabolic state from being dry to lactating is considered the transition period. There are a large number of changes that occur to the cow during this phase. These include decreased intakes of energy, protein and minerals prior to calving resulting in challenges to the cow's resistance to disease. Further, the natural stress of calving plus hormonal changes all result in increased risk of metabolic disease such as milk fever and ketosis. Complications of these diseases can result in further disorders including retained membranes, uterine infections, hoof problems, mastitis and reduced conception rates. The cow must be fed properly during this time so she is better adapted to lactation, minimising these disorders.

So what are the issues?

- **Intake and energy requirements:**

As the cow gets close to calving there is a high demand for both protein and energy. For example, to maintain weight the demand for a 500 kg Friesian cow will increase from 70 MJ two months pre-calving to over 100 MJ at calving. This means that, assuming an average of 11 MJ ME /kg DM, we have to increase the amount of pasture from approximately 6.5 kg DM to 9.5 kg DM. That is before adding any energy requirements for inclement weather.

Energy required for Maintenance & Pregnancy – MJ ME

| Kg LWT | | Weeks Pre-calving | | | |
|--------|-----|-------------------|----|----|-----|
| | | 12 | 8 | 4 | 2 |
| J | 400 | 60 | 68 | 74 | 82 |
| JxF | 450 | 66 | 76 | 83 | 92 |
| Fr | 500 | 73 | 84 | 92 | 103 |
| Fr | 550 | 80 | 91 | 99 | 110 |

So if we assume the cows are being fed a diet with an average energy concentration of 11 MJME, then they will require the following:

Maintenance & Pregnancy requirements – kg DM

| Kg LWT | | Weeks Pre-calving | | | |
|--------|-----|-------------------|-----|-----|------|
| | | 12 | 8 | 4 | 2 |
| J | 400 | 5.5 | 6.2 | 6.7 | 7.5 |
| JxF | 450 | 6.0 | 6.9 | 7.5 | 8.4 |
| Fr | 500 | 6.6 | 7.6 | 8.4 | 9.4 |
| Fr | 550 | 7.3 | 8.3 | 9.0 | 10.0 |

These figures indicate what the cow needs to consume for maintenance only. Extra feed is required to gain weight and to allow for feed wastage and

pasture utilization. This will vary depending on weather conditions. Pasture utilisation typically could be around 85% but in bad weather and in some situations it will be a lot higher.

Energy requirement is further complicated by the fact that in the two weeks prior to calving the voluntary intake of the cow drops. It is estimated that cows can only eat 1.75% and heifers around 1.6% of their bodyweight. Therefore if the diet has a lower energy value the cow will not be able to maintain body weight.

Failure to meet the cow's energy requirements may result in ketosis. This results in further appetite depression.

In the dry cow, rumen papilla shrink reducing the surface area that the rumen has to absorb nutrients. Starch will promote the papilla growth. Including starch such as maize silage, in the diet before calving should be beneficial.

After calving the cow's energy requirements rise even faster than her intake so it is inevitable the cow is in a period of negative energy balance. The sooner we get her intake up and back into a positive energy balance the less weight she will lose. It has been shown that cows underfed during the period prior to calving have lower intakes after calving and produce 15 –20% less.

- **Protein:**

A diet containing 14% crude protein should be adequate before calving. As protein is absorbed in the small intestine as microbial protein we have to be sure we have enough energy in the rumen for the microbes to grow. Inadequate protein to meet the high demands of the calf has been shown to reduce milk protein. This is likely to result in inadequate protein for some of the cow's functions such as hoof growth.

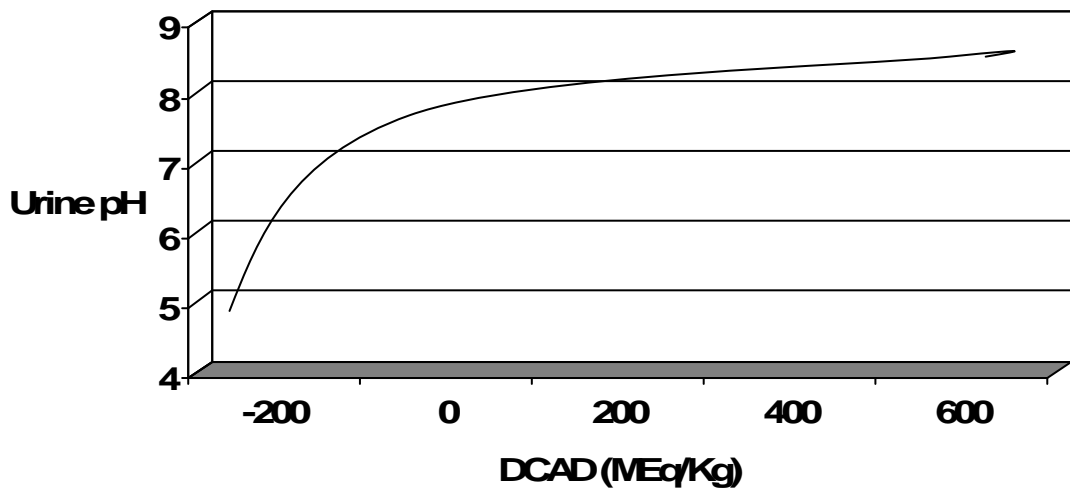
- **Calcium:**

The demand for calcium increases dramatically as the cow calves. To compound this further, voluntary intake falls around calving especially in well conditioned or fat cows leading to a potential temporary calcium deficit. Blood calcium levels are controlled by a gland in the cow's neck called the parathyroid which secretes a hormone that increases the calcium absorption from the bones and the gut in an attempt to counter this deficit. In some cows, especially after calving the response is too slow and the blood calcium levels drop. If the drop is steep and deep enough then the cow may develop clinical milk fever. A less steep/deep drop may result in sub clinical hypocalcaemia (low blood calcium with poor muscle contraction of the internal muscles such as the muscles of the uterus and the rumen). The result of this is often called the Sad Cow Syndrome which includes increased retained membranes, increased calving problems, lower conception rates, and decreased milk production.

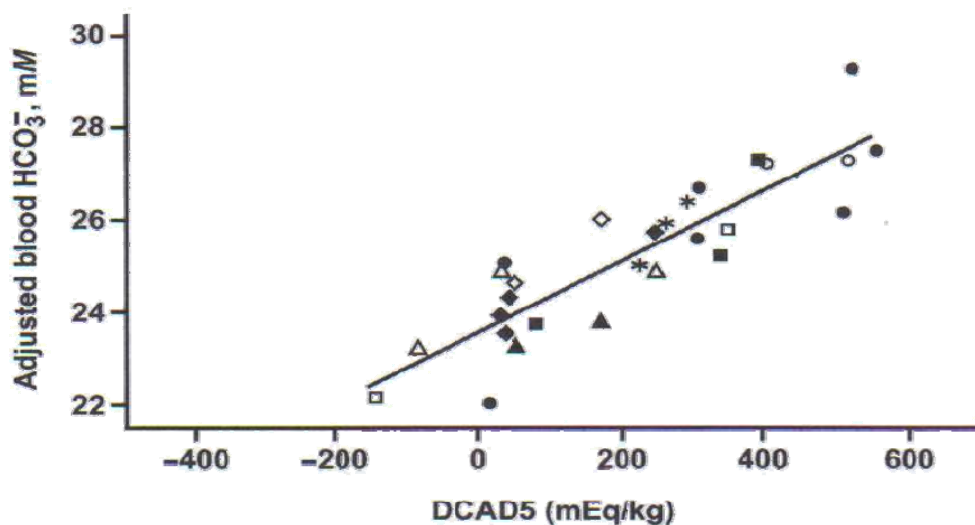
Increasing acidity of the blood will increase the absorption of calcium from the bone. Blood acidity is affected by the DCAD, which stands for **Dietary**

Anion Cation Difference. This is the balance of the cations (positively charged ions) in particular potassium and sodium, compared to the anions (negatively charged ions) - sulphate and chloride, in the diet. The acidity of the diet can most easily be determined by measuring the pH of the urine. The aim for the springing animals, i.e. animals in their last 2-3 weeks before calving, is to have the pH less than 6.5 for Friesians and 6 for Jerseys. This is equivalent to a DCAD of 150-200. The way this works is that magnesium (a positive ion) is only partly absorbed from the gut, whereas chloride and sulphate (negative ions) are absorbed more completely. The animal can't put up with getting electrically charged of course, so extra negative ions are being dragged along with the sulphate and chloride ions to ensure electrical neutrality. The most readily available and transportable positive ions from the gut content happen to be hydrogen ions (H^+) and as these H^+ ions are the working part of any acid, the blood ends up getting an acid challenge.

RELATIONSHIP BETWEEN URINE pH AND DCAD



EFFECT OF DCAD ON BLOOD BICARBONATE



As potassium is present in high levels in pasture and many other feeds, our cow diets tend to have high DCAD's (often over 500). Maize silage, palm kernel, straws and hay have lower DCAD's so including these in the diet helps reduce the

DCAD. This plus the addition of anionic salts in the diet such as magnesium chloride and magnesium sulphate can reduce the DCAD to the target levels.

Power-Start, Sure-Fire and Starch-Pro Dry (pre calving supplements) have high levels of anionic salts and are useful in high risk situations. Including vitamin D3 in the diet before calving by using SourceNZ Close Up will also enhance the effectiveness of the anionic salts by increasing calcium mobilization. It takes some time to get these hormones active within the cow so it is necessary to feed anionic salts for 2-3 weeks pre-calving. However the cows should not be held on anionic salts longer than this as calcium levels in the bones will become depleted.

A cow producing 10 litres of colostrum will lose 23 grams of calcium in one milking - 9 times the amount of calcium in her blood - so it is essential she can quickly draw on calcium in the diet and in her reserves. Supplementing colostrum cows with readily absorbable calcium, such as calcium enriched molasses or fine lime flour, will help restore the deficit.

Typical Feed Analysis

| | DM% | MJ | CP | NDF | Ca | K | P | Mg | DCAD |
|------------------|-------|---------|-------|-------|---------|-----|---------|---------|-------------------|
| Pasture | 11-12 | 11-12.5 | 20-30 | 35-45 | 0.2-1.5 | 3-5 | 0.2-0.6 | 0.1-0.4 | High |
| Brassica | 13 | 12 | 18 | 12-18 | 0.6 | 3-4 | 0.3 | 0.2 | High |
| Oats | 15-18 | 10-12 | 10-14 | 40-60 | 0.3 | 4-5 | 0.3 | 0.15 | High |
| Triticale Silage | 40-50 | 9-10.5 | 7-8 | 50-60 | 0.15 | 0.8 | 0.12 | 0.1 | High but can vary |
| Barley Silage | 40-50 | 9-10.5 | 7-8 | 50-60 | 0.11 | 1.6 | 0.33 | 0.1 | High but can vary |
| Maize Silage | 30-40 | 10-10.5 | 6-8 | 45-50 | 0.28 | 1.2 | 0.26 | 0.17 | Low |
| Grass Silage | 25-35 | 9-11 | 12-25 | 45-55 | 0.8 | 2-3 | 0.3 | 0.2 | Medium |
| Fodder beet | 12-19 | 12-13.5 | 12-13 | 11-12 | - | 4-5 | - | 0.3 | High |
| Straw | 80-90 | 6-7 | 4-5 | 80 | 0.3 | 2.3 | 0.07 | 0.23 | Medium |
| Palm Kernel | 90 | 11 | 16-18 | 70 | 0.45 | 0.8 | 0.6 | 0.3 | Low |
| Potato | 25 | 13 | 10-11 | 8-10 | 0.05 | 1-2 | 0.24 | 0.15 | Medium |
| Kiwifruit | 15 | 12-12.5 | 5 | 18-25 | 0.2 | 2.5 | 0.26 | 0.2 | Med-High |

- **Magnesium:**

Magnesium is important in the prevention of milk fever as it is required by the parathyroid gland to produce parathyroid hormone. As well as pastures being low in magnesium, the high pasture potassium levels interfere with magnesium absorption in the cow. Magnesium has been a major factor in reducing milkfever and it is essential that an effective supplemental magnesium be used. Magnesium chloride and sulphate provide magnesium and acidify the diet. These are the preferred salts for springer cows. However, these salts only contain 10-12 % magnesium compared with 50 % magnesium in calcined magnesite. They therefore need to be fed at higher rates.

- **Trace elements:**

Copper and selenium are essential elements in the immune functions of the cow. It is important then that an effective supplementation programme is in place so that the cow has adequate status prior to calving.

What can be done on your farm?

- Ensure adequate intake for the springers, colostrum cows and freshly calved cows. Using more concentrated feeds like grain and palm kernel will help increase springer intakes because they occupy less space in the rumen, which is being pushed in by the growing calf.
- Make sure you keep the diet as low as possible in potassium by:
 - Applying no, or minimal, potash in the autumn or early spring.
 - Include other feeds in our springer diets such as maize silage and hay or straw, thereby minimising pasture intake.
 - Avoiding putting springers and colostrum cows on effluent paddocks.
- Balance the DCAD so that it is under 200 by using low DCAD feeds, such as maize silage and palm kernel, and then supplement with anionic salts. Magnesium chloride and magnesium sulphate are the preferred magnesium sources as they acidify the cow, whereas magnesium oxide tends to alkalize the cow.
- Make sure magnesium supplement is adequate. Aim to get 20 gm per day of magnesium down the throat of springers after allowing for wastage. This is equivalent to 80 gm magnesium chloride plus 80 gram magnesium sulphate or 40 gm magnesium oxide.
- In high risk situations, drench cows after calving with a starter drench which should include calcium and a readily available energy source such as monopropylene glycol.
- Continue to supplement with extra calcium (e.g. limeflour at 100-150 gram per cow per day) in early lactation as well as 10-20 gram of magnesium (20-40 gram magnesium oxide or 70-100 gram magnesium chloride).

If you have any further questions please contact your Intelact consultant or call Intelact Head Office on 0800 735 588.