

## Lesson 10: Feeding cows in tough times.

Refer to the teaching notes under the lesson plan to gain an overview about how cow needs and feed can vary.

<b>Starter</b>	Open PowerPoint presentation “L10_Feeding Cows in Tough Times”. The first slide is the ‘starter’ and gets students to think about what we can feed cows.  - You may want to print off the CNN article that is linked in the PowerPoint.
<b>Teach + Activity</b>	Go through PowerPoint presentation “L10_Feeding Cows in Tough Times” and complete the tasks within it. This presentation goes through how there is seasonal surpluses and deficits in pasture throughout the year and introduces some of the options farmers have to feed cows and gets students to evaluate those options.  <b>Note:</b> If you have one period then there will not be enough time for students to do the ‘graphing exercise’ and the ‘feed evaluation activity’. You can chose the activity that will suit your students learning or spread it across two periods.  - <b>Graphing Exercise:</b> You will need graph paper or print the “L10_Blank Graph Template” and hand it out to students. This activity involves graphing pasture growth and cow needs to see that there is a deficit in pasture at specific times in the year.  <b>Note:</b> Conceptually it is quite hard to envision 1 hectare. It could be worthwhile to get students to measure out 1 hectare or using google maps and common landmarks you could show 1 hectare on a map  - <b>Feed Evaluation Activity:</b> Students will need a set of ‘feed cards’ and a copy of the “L10_Feed Evaluation_Student” worksheet. Teacher notes have been supplied for this activity. Refer to the “Feed Evaluation Supplementary Notes” document.  .
<b>Close</b>	The last two slides of the PowerPoint have pictures of the different feed type see if students can name the pictures.



**The dairy cow and why her needs vary...**

A dairy cow has a lot of demands placed on her in regards to producing large quantities of milk solids and growing calves.

Breed plays an important part in regards to a cows energy requirements. Frisians, the black and white cows, are bigger animals and therefore need greater feed for maintenance. Jerseys, the caramel coloured cows, have a smaller build so require less feed compared to Frisians, while the Kiwi Cross is a mixture of the two. Weight has an important role in determining feed requirements, production, reproduction and potential for pugging.

Breed	Average Weight (kg)
Jersey	423
Kiwi Cross	467
Frisians	499

It is important to provide the right feed to ensure that she doesn't lose weight, this is referred to as losing 'condition'. Body condition covers more than weight as the same 'weight' could have very different implications depending on the size of the animal and stage of life. Ideally you want to maintain her body condition throughout the year as it is better for the animal, ensures good milk supply over the milking season and it increases the probability of her getting in calve. It also takes a lot more feed to put weight back on, then it is to maintain it.

A cows needs change over the year depending on if they are milking, personal growth, size of the animal, if they are in calf or if they are 'carry overs' (cows with no calves that are worth holding onto for the following milking season). Pregnancy lasts for 38-44 weeks and does increase the amount of feed a cow needs. There is a significant increase in the third trimester which is factored into the feed budget.

\*Pregnancy requirements: Requirements for different stages of pregnancy based on calf born at a weight of 30 kg. 1705 total MJME for pregnancy (assumes 11 MJME).

Weeks before calving	-12	-8	-6	-4	-2	0 (due date)
KgDM/cow/day	0.6	1.0	1.4	1.7	2.3	3.1

Source: Dairy NZ accessed 12/02/2021, <https://www.dairynz.co.nz/animal/heifers/heifer-feeding-and-nutrition/>

Animals that have had their first calf are referred to as cows. Before their first calving they are referred to as heifers. Heifers are first mated around a year old when they reach appropriate weight targets, 43% -47% of their mature live weight. They calve the following spring when they are 2 years old. The feed requirements are high for this class of stock because they have personal growth and calf growth that they need to cover. They often take a priority and have access to more feed or high quality (higher energy) feed to ensure good health.



Environmental conditions can also change cow's needs with cold weather resulting in energy being used to keep warm or topography like hills requiring more energy for grazing. Often milking sheds are set in the middle of the farm to minimise the amount of walking cows do to and from the dairy shed as it costs feed and energy which could be going into milk. There is also opportunity costs because cows are busy walking and not eating so you are limiting feed intake and losing potential milk solids. This is why farms are experimenting with milking in the morning and afternoon for one day and then one milking the following day (referred to as three in two milking) without a significant drop in milk solids.

## Variability of Feed

Ideal growing conditions and proper management maximises growth. Pests, diseases, water stress, water logging (too much water) and lack of nutrients will all stunt plant growth and force the feed plan to change.

Feed can vary significantly depending on the stage of growth, breed and environmental conditions. In general the more mature the feed is the higher the Dry Matter (DM = quantity) but the lower the energy (quality). This is because the plant starts to direct energy into seed heads rather than new leaf growth. Seed heads and old growth have a higher DM content which means it takes longer for the animal to digest which requires more energy and it takes up room in the rumen (stomach) which can limit feed consumption. New growth has a lower DM content but high energy availability so can be processed quickly meaning cows can consume more feed and more energy. A human analogy would be that it is easier to consume a cup (250ml) of orange juice compared to the equivalent of 500g of carrots.

When introducing or changing feeds, time must be taken to ensure animal health. Cows are ruminants and the food they eat feeds the microbes in their gut. If you change a large proportion of their diet too quickly they will not have the right microbes in the right quantities to process the feed and get the most energy and nutrients in from it.

There are a wide range of grasses and crops that can be incorporated into a feed plan. Each has their advantages and disadvantages that can impact the environment, animal wellbeing and the economics of the business. Each plant has a range of breeds that suit different environmental conditions (weather, soil type, water requirements, and pest resistance) and a lot of research is being done around plant species, breeding new cultivators and manipulation of management practices.

## Minimising Environmental Impacts of Feed.

### Plant Selection:

- The integration of plantain in the pasture can reduce nitrogen leaching by 58%, compared to ryegrass pasture. However 30% of the pasture must be plantain for it to have an impact on nitrogen leaching and sustaining in the pasture past two years is proving difficult. More research is being done in this space.
- Plantain is a diuretic and contains more water. This causes cows to urinate more frequently with lower nitrogen concentrations.
- By choosing specific cultivators that suit the local climate, nitrate leaching can be reduced further. Italian rye grass still grows in the southern winter, so it can absorb nitrogen in the period when leaching is most likely to occur. Perennial rye grass goes dormant so there is more leaching.
- Clover takes nitrogen from the air and holds it. With more diversity in the pasture there is less clover which means less nitrogen entering the system.
- Nitrogen has a negative charge. Organic matter and clay have a positive charge. By increasing the amount of organic matter you can decrease the amount of leaching.
- If there are shallow clay pans that stop water infiltration the use of plants with tap roots can help.

### Management Practices

- Instead of grazing stock on a crop or pasture during winter, managers can choose to cut and carry the crop/ feed to a concrete feed pad or a standing pad (an area where cows stay). Feed pads and standing pads (made out of more comfortable materials) are areas where cows stay and the effluent is collected and held until conditions are favourable for effluent application. Depending on a farms nitrogen plan (using the computer modelling software called Overseer) some areas of the farm may not be grazed and only cut and carry is used.
- Standing pads and feed pads prevent urination, which is high in nitrogen, on bare earth (after cows have eaten a crop) and are not pugging the soil. Minimisation of pugging results in better soil structure, better plant growth and is less likely to lead to sedimentation and run-off.
- With cut and carry there is an increase in emissions due to vehicle use. Tractors are heavy so soil compaction can occur where the tyres make contact with the earth. If weather conditions are not favourable then this could lead to further soil damage.
- Generally there is a perception from the general public that cows should be on grass paddocks. The alternative is a smaller space like a feed-pad, stand-off pad or raceway (laneways), which is sometimes viewed as a step towards factory farming.
- When cows are eating crops they can get quite muddy and can cause pugging. The feed tends to be nutrient dense, so it is often break feed (feed in strips) as the cows do not require a large volume of feed. Many people don't understand farming systems and think the cows are in those spaces and conditions all day, rather than the few hours that they need to access the high value feed. Extended periods in these conditions have negative outcomes on the animals and the environment which is why industry bodies provide feed recommendations.