

Overview

Fodder beet is a specialised crop that can produce high yields of quality feed to be grazed or stored for dairy rations. Although most commonly grown in New Zealand and Europe, fodder beet has been recently trialled by the Department of Agriculture and Fisheries (DAF) at UQ Gatton research dairy and grown on farms in QLD.

Fodder beet has higher establishment costs than other crops, however it can deliver yields in excess of 25 – 30 t dry matter (DM) per hectare (ha). If grown and managed correctly, fodder beet can produce a cheap alternative, high quality feed to fill feed gaps.



Planning & Paddock Selection

Growing fodder beet in the subtropics is a relatively new concept, which is why clear feed planning and paddock preparation are essential.

The C4Milk team have successfully grown and grazed fodder beet crops in autumn to be grazed during spring. Summer crop establishment has proven to be difficult due to continuous attack from white cabbage moth and high humidity in the northern states. As fodder beet supplies a high yielding quality forage both in energy and protein, it has a place in PMR and pasture feeding systems during spring feed gaps.

Paddock selection is critical, as fodder beet is very sensitive to acidic soils (requires 6.0 – 7.0 pH) as well as low soil fertility. Paddock selection is critical as there are limited herbicides approved for use on fodder beet, making weed free paddocks a priority. Feed budgets and animal intake rates should be considered in your planning, as daily allocations will determine how much is planted and also the way the paddock may be planted for ease of grazing.

Soil Preparation & Sowing

When planting, a headland should be left vacant so cows can enter the paddock to graze without trampling the first rows of fodder beet. Fodder beet requires a fine, firm and constantly moist seed bed with good soil-seed contact to achieve uniform plant emergence and high yields. Pre-plant herbicide applications are essential, 24 hrs prior to planting as well as incorporation of pre-plant fertiliser. Precision drilling is highly recommended for grazed fodder beet, planted at 90 – 120 000 seeds/ha (allows for germination) on 40-50 cm row spacing's, allowing 18-22 cm between plants. Optimum sowing depth is around 2 cm.

Fertiliser & Water

To produce a high yielding fodder beet crop, large amounts of inputs are required. Different to other forage crops, fodder beet requires large amounts of potassium, magnesium and boron. Typical applications of the following nutrients should be split across an initial application pre-plant and post planting via fertigation or a single broadcast (and watered in) prior to canopy closure.

Table 1 – Nutrient requirements of fodder beet

**Note: these are nutrient requirements, not fertiliser*

Nutrient	Plant requirement (kg/ha)
Nitrogen	100-150
Phosphorus	30-80
Potassium	100-150
Magnesium	20-50
Sulphur	20-30
Boron	20-25

requirements. Rates will vary depending on product's chemical analysis.

Seedbed moisture is critical during seedling emergence and plant establishment phase. Applications of 5-10 mm per irrigation event occurred at the DAF dairy site every 2-3 days during establishment depending on rainfall and climatic conditions. An estimate of 2.7 ML of water was applied during the growing season of 6 months (Apr – Oct 2015). The key principle is to irrigate in smaller amounts more often dependent on resources. Over watering during the day in hot weather may increase disease risk.

Grazing vs lifting varieties

There are a number of fodder beet varieties on the market, but have two key differences: either lifting or grazing varieties. C4Milk has trialled the Suga and Brigadier varieties respectively, successfully grazing Brigadier during the spring feed gap. Lifting varieties can be stored for up to 12 months in NZ and Europe, and fed out as part of a TMR ration. Lifting and storage capability is yet to be investigated under subtropical conditions, and is not currently recommended.

Yields and Quality

Fodder beet can provide a flexible, high quality feed option with very good utilisation rates (>90%). Cows will graze leaves initially, which are higher in crude protein than bulbs but lower energy content. Cows will then consume the bulb, nudging it out of the ground. Bulb dry matter (DM) is the primary differentiating characteristic between variety's. Grazing varieties are often lower in DM% (<10%) but grow with a higher proportion of the beet out of the ground making them easier to graze. Lifting varieties are often higher in DM% (>20%) and yield.

Yields can be deceptive when visually comparing the grazed or lifting varieties, as the larger bulbs of the grazing varieties can appear to present higher yields (remembering to compare on a dry matter basis). This was found at the DAF Dairy site, where the lifting variety Suga out yielded the grazing variety Brigadier, 22% DM (24t/ DM) compared to 7% DM (22t DM/ha) respectively at the start of grazing. Grazing varieties under irrigation have been reported to produce yields as high as 30 t DM/ha (Gibbs, 2014).

Fodder beet is known for its high sugar levels, with typical ME values ranging from 11-15 MJ/ kg DM. A typical crop plant will be 20-25% DM of leaf and 75-80% DM of bulb with the breakdown of nutritional characteristics shown in the table below.

Table 2 - Typical fodder beet nutritional characteristics from UQ Gatton crops (total plant).

DM (%)	8 - 11
Yield (t DM/ha)	15 - 27
ME (MJ/kg DM)	7 - 12
CP (% DM)	14 - 27
Starch (% DM)	0 - 1.5
NDF (% DM)	15 - 28
Sugars(% DM)	2 - 16

Grazing management

As palatability is so high and the beet can be so rapidly fermented in the rumen, extreme care is required in transitioning cows onto the feed to avoid acidosis issues. Also given that the ME of the beet is so high, balancing the ration and managing other high ME feeds in the diet is critical.

The crop should be striped grazed with a fresh break (row) being provided to cows on a daily basis. During the initial transition phase (10- 14 days) cows should be fed 1 kg DM/day (first week) moving onto 2 kg DM/day (second week) allocated behind a hot wire (Image 1). During this time, cows should not graze on empty rumsens to prevent over consumption and adequate fibre should be fed as part of their ration. As the cows transition, intake can be increased up to 6-7 kg DM/day assuming a balanced diet.

Most fodder beet feeding issues usually occur during the transition period – intensive management is required.

As mentioned, paddock setup is key to grazing management, where long strips of fodder beet planted (see Figure 1) allow for ease of grazing, moving the hot wire back one fodder beet row per day to allow for calculated allocation of 1 kg DM/cow/day. Assuming a 20 t DM/ha crop, this equates to 2 kg DM per square metre, which would be an allocation for two cows per day during the initial transition phase. Utilisation of the forage is usually >90%.

Weeds, pests and diseases

Fodder beet varieties are generally slow to establish and struggle to compete with early weed and pest pressure. Planting into a clean paddock, and ensuring a thorough herbicide program is followed including knock down of all weeds 24 hours prior to planting, and again post plant for broad leaf weeds is critical. There are minimal in-crop herbicides to be used – please follow up with local agronomist and check milk withhold periods. Pest and disease damage can be a problem, so paddocks should be inspected weekly during



Figure 1 - UQ dairy herd grazing a single row of fodder beet behind a hot wire.

early growth. Cutworm and slugs are the main pests and rust and mildews can cause leaf loss, however re-growth should occur. When spraying, ensure high water rates are used and a fine spray to ensure even coverage, as young plants are sensitive to chemicals.

Growing costs

As research studies continue on how the beet grows in varying climates, more consistent and higher yielding crops are being produced in northern Australia. Current minimum target yields for grazing varieties under irrigation are 20 – 25 t DM/ha which has a significant effect on the dilution of total feed cost.

Typical New Zealand growing costs despite yield, have been quoted as \$1700-2300/ha or 5-10c/kg DM (Gibbs, 2014). The C4Milk team have suggested similar growing costs at UQ Gatton research dairy including 2.7 ML of irrigation. However in producing slightly higher yields of 25+ t DM/ha, the costs could be further reduced to 7-8c/kg DM.

Table 3 - Fodder beet growing costs

Total Growing Costs \$/ha	\$1697
Total yield <i>Brigadier</i> (t DM/ha)	20
Feed utilisation (t DM/ha)	18
Cost of feed (\$/kg DM)	\$0.09
Cost of feed (\$/tonne DM)	\$90.00
*Total growing costs includes irrigation.	



Scan this QR code for links to C4Milk financial analysis.

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The project is funded and supported by the Department of Agriculture and Fisheries and Dairy Australia.

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