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# Forage brassicas for autumn/winter milk production

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There are several species of forage brassicas and their hybrids including, forage rape, (*Brassica napus*), leafy turnip (*B. campestris)*, turnips, kale and swedes. They are widely used as high quality forage for grazing livestock and their characteristics are outlined in detail in Agfact P2.1.13.

This Primefact relates specifically to the use of forage brassicas to provide autumn/winter feed for milk production. Although this Primefact mainly applies to dairying along the NSW coast, brassicas may also suit inland irrigated dairying areas where a March sowing is feasible.

Feed grown in autumn-early winter is most valuable as there is commonly a feed gap in the transition between summer forages and annual species such as ryegrass (*Lolium multiflorum*), sown for winter feed.

## ADVANTAGES IN USING FORAGE BRASSICAS

### High forage quality

Forage rape has very high nutritive value, with a metabolisable energy around 11.5 MJ /kg DM and a crude protein around 26%. However, the plant is low in fibre and, commonly, has a neutral detergent fibre (NDF) below 15%.

***Figure 1: Leafy turnip 40 days after sowing, with 3500 kg DM/ha on offer.***

### Rapid autumn growth rates

Forage brassicas germinate within 2 - 4 days of sowing in March - April, provided moisture conditions are favourable. This allows brassicas to be sown earlier than ryegrass, the most common alternative.

Therefore, forage brassicas present a significant opportunity to boost autumn feed supply, as shown in Figure 2 (next page) which shows the growth rate of forage rape compared to short rotation ryegrass over sown into a kikuyu stand.

When sown early, forage brassicas can achieve autumn growth rates between 80 - 100 kg DM/ha/day, considerably higher than ryegrass.

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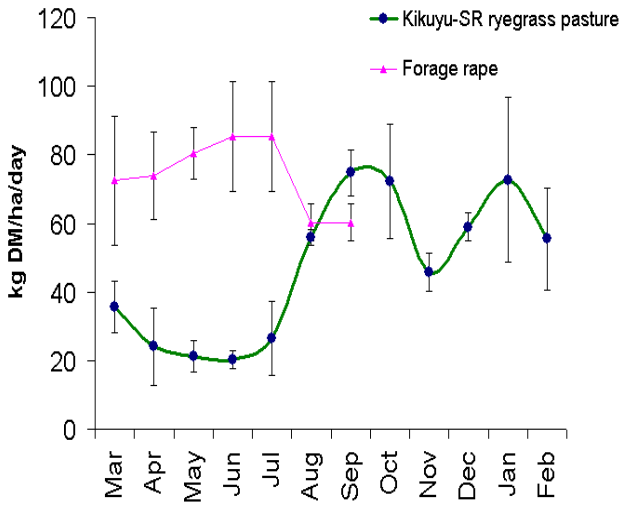


***Figure 2: The mean growth rate (kg DM/ha/day) of forage rape at Camden, NSW (over 3 years), sown in early March and then over-sown with short rotation (SR) ryegrass, compared to kikuyu oversown with SR ryegrass in mid-March.***

### Flexibility in time of harvesting

Forage brassicas maintain feed quality when grazing is delayed. They can be grazed on either a regular interval for "optimum regrowth", or delayed grazing until 5000 - 8000 kg DM/ha accumulates then grazed for "total removal". Therefore, they have a large harvest window which is particularly advantageous in a wet autumn.

### High Water Use Efficiency

In autumn, high water use efficiency (230 - 360 MJ ME/ha/mm) is achieved by a combination of high growth rate and the ability to delay grazing until over 4000 kg DM/ha has accumulated. This advantage declines through the winter as growth rates become more comparable to ryegrass.

### Part of a forage rotation

When brassicas are grown as a sole crop they provide a "break" crop for weeds and disease. When the debris of the brassica plants breaks down in the soil "glucosinolates'" are released. These products can "biofumigate" the soil, controlling some pathogenic fungi and nematodes. In fact, the brassica, Canola, is often grown as a break crop in cereal growing areas. It is for this reason brassicas are also commonly used as part of a pasture renovation program.

### Low cost of establishment

Sown at 3 kg/ha, the cost of a well grown forage brassica crop can be a cheaper source of feed than ryegrass. Brassica seed cost is about $30/ha, compared to ryegrass with seed costs as high as $180/ha.

### Cautions

Brassicas are not as tolerant as ryegrass to acid soil or waterlogging. Soil acidity may be ameliorated by applying lime. Brassicas may not perform as well as ryegrass in wet conditions and on poorly drained soils.

Brassicas can also have a range of animal health issues; these issues are discussed in detail later in this Primefact and in Agfact P2.1.13. Most problems are preventable if the recommended grazing practices are followed and the diet is balanced with appropriate supplements.

## SPECIES CHOICE

The two brassica species most suited for autumn/winter feed are:

1. Forage rape, which has a stem with the growing point at the stem apex and include the varieties Goliath and Winifred.
2. Leafy turnip, which does not have a stem with the growing point close to the ground and include the varieties Pasja, Appin, SF Pacer and Hunter

The choice of species will depend on how the brassica is to be grazed.

1. Either grazed on a regular rotation for optimum regrowth or,
2. Allowed to stand for 50 - 120 days for a one off grazing for total removal.

### When grazed for optimum regrowth

First grazing occurs about six weeks after sowing when close to 3000 kg DM/ha should be on-offer (Figure 3). Subsequent grazings are every 30 - 35 days as canopy closure occurs and 2000 - 4000 kg DM/ha is on-offer.

Using this grazing strategy utilised yields in the order of 8000 - 10000 kg DM/ha over 3 - 4 grazings are achievable. However, there is less flexibility in the time of grazing.

This strategy suits the stemless leafy turnip varieties. Forage rape varieties can also be managed this way, but greater care is needed in grazing to ensure adequate regrowth.

***Figure 3: Leafy turnips ready for the first grazing at 35 days post sowing, with 3000 kg DM/ha on offer. Two further grazings can be obtained.***

*When grazed for total removal*

In this case, grazing can occur any time from 50 to 120 days after sowing depending on time of sowing and need for feed. During this time forage rape can accumulate 4000 - 8000 kg DM/ha of utilisable forage, without losing quality. Subsequent regrowth, however, is poor.

This suits the stemmed forage rape varieties that can grow over 1 metre in height, without excessively shading of the lower leaves as shown in Figure 4.

This provides an extended harvest window enabling flexibility as to when grazing occurs. For example, brassicas can be left to stand when wet conditions prevent access or when feed is available from other sources.

***Figure 4: Forage rape sown 12th March, now 96 days after sowing on the 16 June with 11,900 kg DM/ha on offer.***

## ESTABLISHMENT

Rumen function is impaired by high nitrate levels and low fibre content when the intake of forage brassicas exceeds 5 kg DM/day/cow. This sets the limit to the maximum area that should be sown.

There is also a minimum area to be sown based on the requirement that at least 14 days of grazing are available to ensure adaptation of the rumen. This includes a 3-day adaption period by cows not previously exposed to brassicas.

Thus, the minimum area to sow to forage rape is about 2 ha/100 cows, while the maximum area is about 4 ha/100 cows. When sowing 4 ha/100 cows it is advisable to plan two sowings 10 - 14 days apart, to ensure a reasonably continuous supply of forage rape.

Alternatively, more continuous availability of forage can also be achieved by sowing an early leafy turnip (e.g. Hunter), and a later (e.g. Goliath) maturing variety of Brassica at the same time.

### Time of Sowing

Sow as 'early' as oats (1 - 15h March) if adequate soil moisture or irrigation water is available. If sown after March, forage rape begins to lose its advantage relative to ryegrass as feed for winter.

### Plant density and sowing rate

Recent trials (Table 1), and farmer experience, indicate that to optimize utilization of the forage by grazing animals, a plant density between 40 - 50 plants/$m^2$ is ideal. This is achieved with a sowing rate of 3 - 4 kg/ha.

***Table 1: The effect of sowing rate on plant density and level of utilisation of forage rape at first grazing at Camden NSW (S. Farina and S. Garcia, Unpublished data).***

| Seed Rate (kg/ha) | 1st Grazing | | | 2nd Grazing |
|---|---|---|---|---|
| | Pre Grazing (kg DM/ha) | Utilised (kg DM/ha) | Plants/ $m^2$ | Plants/ $m^2$ |
| 1 | 5700 | 3307 | 13 | 11 |
| 2 | 6220 | 3701 | 28 | 9 |
| 4 | 5740 | 2927 | 102 | 13 |
| 6 | 5320 | 2836 | 145 | 19 |
| 8 | 5110 | 2871 | 136 | 21 |
| 10 | 4760 | 1893 | 201 | 27 |

At plant densities higher than 50 plants/$m^2$ the stems of forage rape are very thin as plants compete for sunlight. These thin stems can be damaged during grazing resulting in poor regrowth as well as plant death.

Conversely, when the plant density is less than 30 plants/$m^2$ before the first grazing, the canopy remains open longer and, as a consequence, weed infestation can be high.

It is important to measure the plant density after emergence to indentify if there are any pest problems affecting the brassica seedling.

In most situations it is advisable to use seed coated with insecticide, for example, imidacloprid. However, check the pest spectrum and withholding periods for grazing.

### Sowing into a prepared seed bed

Seed should be sown to a depth of 1 - 2 cm. Sowing below 2 cm will delay emergence by up to 14 days. Good seed to soil contact is essential.

One option to achieve shallow sowing is to set the fertiliser tynes or discs to about 5 -10 cm depth but allow the seed box hoses to hang free behind the tynes. A levelling bar behind the last row of tynes will enable an even sowing depth. This places the seed on top of the soil and then light harrows following will cover the seed to 1- 2 cm depth. Rolling can further improve emergence except if the soil is really wet.

If direct drilling into existing pasture, set the discs or tynes to sow at 1- 2 cm depth.

### Irrigation

Irrigation can provide a significant advantage by ensuring soil moisture for rapid germination, an even emergence and timely establishment.

Brassicas can be established with flood or spray irrigation by pre-irrigating and sowing into the moist soil. Alternatively, brassicas can be “irrigated up” successfully on non-crusting soil. Crusting can be minimised by:

- direct seeding with triple discs and, or,
- applying gypsum as the final seed bed preparation.
- applying an early second irrigation.

However, “irrigating-up” can lessen the effectiveness of pre-emergent herbicides, requiring a follow-up application with a post-emergent herbicide.

A late autumn irrigation should be avoided as this that may exacerbate wet soil conditions over winter.

***Figure 5: Forage rape sown on the 9th March, now 20 days after sowing, and 40 plants/$m^2$***

***Figure 6: The same field as Figure 5, now 30 days after sowing***

***Figure 7: The same field as Figure 5 and 6, ready to graze 35 days after sowing. Pre - grazing yield was 5,200 kg DM/ha, a growth rate of 150 kg DM/ha/day from sowing. After grazing 2,000 kg DM/ha remained.***

### Weed Control

There are a number of pre- and post-emergent herbicide options for grass weeds. However, herbicide options for broadleaf weeds are very limited, so a clean seedbed is preferable where possible.

### Sowing mixtures

Forage rape can be sown either alone or in a mix with ryegrass, oats or clover.

*Pure Forage Rape*

Pure stands of forage rape provide the advantages outlined earlier:

- higher early autumn growth rates than ryegrass
- flexible harvest window
- low cost of establishment

However, the stand will decline in density after three grazings, usually by August. This leaves a feed 'gap' in spring which can be filled by sowing winter forages such as Persian clover or annual ryegrass into the forage rape by either:

1. *Broadcast before the first grazing in April.*

This allows the cows to trample the seed into the ground whilst grazing and thereby improving seed/soil contact and germination. Sow in the afternoon or when the dew has gone from the leaves so the seed will fall to the ground rather than stick to the leaves. Sow either Persian clover at 4 - 10 kg/ha, or annual ryegrass at 20 kg/ha, or a mixture of 5 kg/ha Persian and 15 kg/ha ryegrass.

If sowing after mid - April, better growth will be achieved by using ryegrass or a winter cereal rather than Persian clover.

2. *Sowing after the first grazing.*

Sowing after grazing can also provide a good establishment, although in dry conditions it is less reliable than sowing before grazing.

***Figure 8: Persian clover and ryegrass germinating in grazed brassica stubble. Picture taken on the 11th June, three weeks after broadcasting in mid May.***

***Figure 9: Ryegrass and clover with 4900 kg DM/ha on offer on 19th August after being oversown into brassica on 13th May.***

In both cases the Persian clover or ryegrass will germinate and sit beneath the forage crop until spring. Once the forage rape is grazed hard for the last time, the Persian clover or ryegrass plants will dominate the sward (Figure 9). Successful establishment of clover and ryegrass will only be achieved if little trash has been left after each grazing. Heavy trash levels can smother the seedlings.

Sowing "after grazing" suits when forage rape is grazed for total removal. In this case Persian clover or ryegrass can be broadcast or direct drilled into the forage rape stubble.

*Leafy Turnip in mixtures with ryegrass*

Leafy turnip can be sown with 20 - 30 kg/ha short rotation ryegrass and a low rate of 1 kg/ha brassica to avoid the brassicas shading the ryegrass seedlings. The rapid early growth of leafy turnip increases the forage available at the first grazing compared to ryegrass pasture. This option is best suited to a prepared seedbed sowing where only brassicas, ryegrass and clovers are sown.

Leafy turnips also provide an advantage when sowing after 1 May as they are more tolerant of cooler conditions.

***Figure 10: Leafy turnips sown with ryegrass.***

### Sowing into summer grass (kikuyu or paspalum) pastures

Forage rape can be sown alone into kikuyu or paspalum pastures. Suppression of the summer grass prior to sowing using either glyphosate or gramoxone may be required if sowing before the end of March on the North coast or before mid March on the South coast of NSW.

Grass herbicides are available for post - emergent application if needed. These are normally a more expensive option, but they do offer a safety net if the kikuyu is dominating the establishing brassica seedling.

## NUTRITION

### Soil tests

Brassica crops need a high soil nutrient status to achieve their potential. Soil test targets are indicated in Table 2. Where soil nutrients are at target levels, apply appropriate levels of fertiliser to replace the nutrients removed by grazing. For soil tests below target levels, additional fertiliser will be required to improve soil fertility.

Apply lime where soil $pH_{Ca}$ is below 5.3. The amount required will depend on the existing pH and the soil cation exchange capacity (CEC). Local advice should be sought.

Where soil $pH_{Ca}$ is below 5.5 and lime has not been applied, molybdenum is also required. It can be applied as molybdenum superphosphate or, if molybdenum has not been recently applied, as a seed coating.

***Table 2: Soil Test Targets for forage brassicas***

| Nutrient | Units* | Test | Target |
|---|---|---|---|
| Phosphorus | mg/kg<br>mg/kg | Olsen<br>Colwell | >25<br>100** |
| Potassium | meq/100g<br>mg/kg | Amm-acet<br>Colwell | >0.5<br>>300 |
| Sulfur | mg/kg | $KCl_{40}$ | >15 |
| $pH_{Ca}$ | | $CaCl_2$ | >5.3 |

**Note: mg/kg is equivalent to ppm*

***Targets for Colwell phosphorus depend on the soil's Phosphorus Buffering Index (PBI)*

### Calculating nutrient requirements

Maintenance fertiliser requirements are related to nutrient removal. Table 3 shows the expected nutrient removal at a yield of 8 t DM/ha. As cows are generally strip grazed on brassicas then moved to another area, it is estimated that up to 90% of the nutrients are removed from the paddock, with only 10% returned in urine and dung. Thus, the fertiliser requirement to replace these nutrients is assumed to be 90% of that removed by grazing, except for nitrogen where soil reserves may supply 20 to 50 % of requirements.

***Table 3: Nutrient requirements when 8000 kg DM/ha of forage brassicas has been utilised by grazing***

| kg/ha | N | P | K | S |
|---|---|---|---|---|
| Removed | 307 | 22 | 144 | 40 |
| Required | 215 | 20 | 130 | 36 |

The existing soil reserves of phosphorus and potassium are also important. For example, forage rape may be a useful crop to lower soil fertility in effluent disposal areas.

### Fertiliser application

Prior to sowing is the most practical time to apply the high levels of fertiliser as this will avoid crop damage. For example, apply 80% N, P & K pre-plant, then use DAP at sowing, banded near the seed (Table 4). Apply N as urea after each grazing.

***Table 4: Suggested fertiliser strategy***

| | N | P | K | S | Fertiliser (kg/ha) |
|---|---|---|---|---|---|
| Pre-sow | 140 | 20 | 150 | 22 | 100 Mo* Super**<br>600 (23-0-25) |
| Sowing | 18 | 22 | | | 100 DAP |
| After grazing | 46 | | | | 100 Urea |

** Molybdenum super need only be applied when $pH_{Ca}$ is below 5.3 and then once every 4 to 5 years. Applying lime to increase soil pH is preferred as a longer term solution.*

***Some soils may require a higher input of sulphur.*

## GRAZING MANAGEMENT

There are a number of ways to graze forage rape and the best option will depend on when the feed is required and the labour resources available. The examples below provide a starting point for establishing an efficient grazing system.

### Grazing to optimise regrowth

To optimise regrowth of **forage rape**, graze when plants are at least 50 cm high. This is usually about 6 to 7 weeks after sowing. At this stage, the plant should have more than 8 mature leaves. Cows should only remove the leaves and petioles from the forage rape, leaving the active (apical) growing point at the top of the stem intact to ensure maximum regrowth (see Figure 11).

If cows are allowed prolonged access to the crop they will graze the rosettes at the top of the stem which contain the active growing points. If this happens, the plant has to wait until the 'dormant' buds on the stem burst (Figure 11), setting back regrowth by several weeks. Regrowth is also set back as more of the stem is removed which contain plant reserves (water soluble carbohydrates), required for early regrowth.

To optimise regrowth of the **leafy turnips**, the cows should graze to leave a stubble residue height of 7 - 10 cm (Figure 12). With the leafy turnip varieties, there is less risk of overgrazing high as the growing point is at ground level.

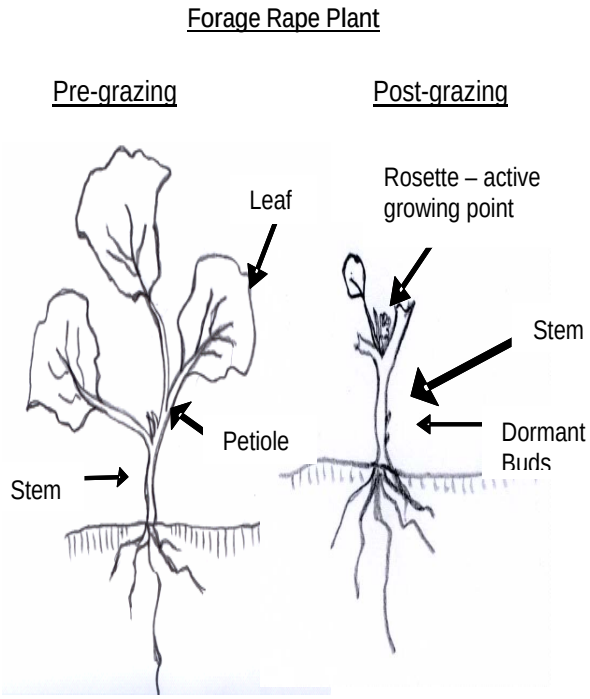


***Figure 11: Forage rape before and after grazing to the recommended level, removing all leaf and petiole but leaving the growing point at the top of the stem.***


***Figure 12: Leafy turnips grazed to a stubble height of 7 - 10 cm***

***Figure 13: After grazing leafy turnip regrowth comes from the growing point at ground level.***

Remove the cows after the desirable residue has been achieved, usually within 1-1 ½ hours. Leaving them longer will lead to overgrazing and to re-grazing previously grazed areas. To prevent re-grazing back fence every 2-3 days.

If brassicas are grazed too early palatability is low due to low dry matter content and high nitrate levels. For example, dry matter changes from 5% at 4 weeks to 7% at 7 weeks after sowing. The nitrate content is highest at the first grazing with values of 1.5 - 2% compared to less than 0.1% for ryegrass (Table 6). Although the nitrate content falls to below 0.5% in the second grazing, it is still higher compared to ryegrass. However, the nitrate content is also influenced by nitrogen fertiliser application.

The maximum amount of forage rape will be utilised and least damage done to the plants, if the cows are given 8 - 10 $m^2$/cow and the total area allocated is nearer to a square-shape. Giving a larger area, or a long narrow strip, will encourage cows to be more selective and explore more. In the process their treading (trampling) will do more damage to the crop.

### Grazing for total removal in late autumn

Forage rape types are grown for 60 - 120 days when up to 5 - 7 t DM/ha is available. They are then grazed to “ground level” for the next 4 - 6 weeks.

### Grazing for both optimal regrowth and total removal

If the whole area is sown early, the first half is grazed over a 14 - 18 day period beginning at 35 days after sowing with 1.5 - 3 t DM/ha available. By the time the second half is ready to graze the feed available may exceed 5 t DM/ha. This may be grazed to ground level over a period of 20 - 25 days in which the entire crop is utilised.

***Figure 14: Forage rape with 8,800 kg DM/ha pregrazing, on the 18th May, 70 days after sowing. At this grazing 4900 kg DM/ha was utilised leaving a post grazing residue of 3,900 kg DM/ha.***

The first half can be ready to be grazed again after a regrowth period of 35 - 40 days. This grazing strategy allows for a longer period of consistent brassica forage in the diet.

### Choosing the best grazing option

The attractions of the last 2 grazing options are:

- most of the forage can be utilised in autumn;
- the level of utilization can be a lot higher; and
- the management is simpler in that you can leave cows on the forage rape without fear of damaging plants or causing illness in cows.

On the other hand, grazing to optimise regrowth maximises the total yield and extends feed over the winter. However, grazing management is more complex.

### Adaptation to forage brassicas

If dairy stock have never grazed brassica crops they may need 2 - 3 days to adapt to the new feed. This is best achieved by confining animals onto a small area (less than adequate allocation) for 1 - 2 hours. By day three they should all be grazing.

Some cows may develop a real preference for forage rape and eat to excess, leading to sick cows or even death from nitrate toxicity. However, the risk can be greatly reduced by grazing an allocated area, and for only 1 - 2 hours.

### Time of day to graze forage rape

Apart from the need to balance the ration on a daily basis, it is also important to balance the ration within the day.

Forage brassicas should be grazed after milking only (never before milking) to ensure there is no taint in the milk.

Furthermore, cows will graze forage rape better after the afternoon milking than the morning milking because the nitrate content is lower and water soluble carbohydrates (sugars) are higher. The sugars are higher in the afternoon because the plants photosynthesise during the day producing sugars to provide energy. In this process they also make protein, using nitrates, which decline by late afternoon.

However, it is often inconvenient to graze forage rape after the afternoon milking as cows have to be removed late at night.

Feeding fibre supplements to complement the low levels in forage rape can be done at any time of day.

***Figure 15: Forage rape 60 days after sowing with 6400 kg DM/ha on offer, grazed for total removal, leaving 1700 kg DM/ha on the left and 2400 kg DM/ha on the next days grazing to the right.***

### To calculate the strip of forage rape to be grazed by the herd

To calculate the width of the strip to be grazed when managing for **optimum regrowth**:

Step 1. Hand harvest an area 1 m by 1 m from a typical area of forage rape. Take only the leaves and petioles leaving the rosette (growing point) at the top of the stem intact. This effectively simulates what you want the cows to eat.

Step 2. Weigh the leaves and petioles using a spring balance.

Step 3. Multiply this figure by the width (m) of the field.

Step 4. Multiply the number of cows grazing by 63.

Step 5. Divide Step 4 by the answer to Step 3 to give the width of the strip (m) to be grazed that day.

$$\textbf{Strip width of forage rape (m)} = \frac{\textbf{Number of cows x 63}}{\textbf{Sample weight (kg) x paddock width (m)}}$$

The following is an example of an allocation for 250 milkers. Weight of sample was 3 kg (i.e. 2,400 kg DM/ha available) and the paddock width was 100 m.

$$\text{Strip width of forage rape (m)} = \frac{\text{250 milkers x 63}}{\text{3 kg sample x 100m paddock width}}$$

$$= 15750 / 300$$

$$= 53 \text{ m}$$

In this case, the cows would need a strip of 53 m wide to allocate 5 kg DM/cow/day. With a width of 100 metres this gives a grazing area of 0.53 ha. You probably only need to do this every 3 - 4 days and you may adjust the strip width depending on how well they graze.

When managing for **total removal** follow the same steps, except the hand harvest should include the leaf, petiole and the stem to just below the growing point. It is unlikely that cows will graze the thick stems and so they will be left as the residual.

## SUPPLEMENTS

When grazing brassicas, it is essential to:

- limit intake of the brassica to less than 5 kg DM/cow/day and then;
- Provide supplements or pastures that are high in fibre to balance the diet and avoid acidosis. High fibre options include hay, maize silage, and tropical grasses such as kikuyu, setaria or paspalum. They need to be fed to cows before or after forage rape.

The rations described in the Table 5 are typical autumn rations for dairy cows. The first is well balanced and the second will give the cows a "stomach ache" from acidosis. The ration is formulated to give 20 L milk/day cow in an all year round calving herd.

The worst case feeding regime is where cows are fed grain in the dairy, and grazed on ryegrass, then followed by brassicas. All these feeds are high in energy but low in fibre.

***Table 5: Ration comparison for daily fibre intake***

| Daily Intake | Ideal | Well Balanced* | Low Fibre** |
|---|---|---|---|
| **Intake (kg DM/cow/day)** | 18 | 18 | 18 |
| **ME (MJ/kg DM)** | 10.8 | 10.9 | 11.1 |
| **ADF (%)** | ≥19 | 18 | 11.6 |
| **NDF (%)** | <40 | 33 | 28 |
| **Protein (%)** | 16 | 20 | 22 |

**Well balanced ration: 4 kg forage rape, 7 kg ryegrass, 3 kg maize silage, 4 kg conc. (16%protein).*

***Low Fibre ration: 4 kg forage rape, 8 kg ryegrass, 6 kg conc.(16% protein)*

*(all on DM/cow/day basis)*

### Symptoms of an unbalanced diet after grazing forage rape

Health problems are largely avoided by following the guidelines outlined in this Primefact. However, it is important to be aware of symptoms in the event that the amount of brassica fed is miscalculated or

cows gain access to the brassica without proper supervision.

### Acidosis

Cows with acidosis are listless and do not eat when given fresh pasture or other feeds. The rumen is static and cows have very loose faeces that are often bubbly.

### Nitrate toxicity

If cows have severe nitrate toxicity, they will be gasping for breath and will go down rapidly. The condition may be fatal.

### Red Water

Compounds in flowering forage rape plants can cause digestive upsets leading to loss of appetite, ill thrift and passing of red urine. Do not graze flowering forage rape crops.

### Rape scald or photosensitization

Photosensitisation in cows grazing Brassicas is rare. Symptoms include reddening and swelling of the skin on the face and sometimes the udder. Affected animals are agitated and will seek shade. The risk is greater when immature rape crops are grazed (less than 8 leaves/plant).

## DISEASES

Brassicas are susceptible to diseases, the most prevalent of which is commonly known as blackleg caused by the fungus *Leptosphaeria maculans*. Damage can occur from the seedling to mature stage, attacking leaves but more importantly the base of the stem resulting in wilting and plant death.

Blackleg will be found at low levels in first year crops. However, over summer the disease spores remain on stubble residues and infect the second year's crop, the disease will build up in the crop. By the third year the crop on the same area will suffer severe losses.

The most important controls are to:

- Avoid growing brassicas on the same area for more than two consecutive years.
- Allow a two or three year break before growing forage rape again.
- Avoid growing new crops within 500 meters from old areas as wind borne spores can spread to neighbouring areas.

None of the currently available brassica varieties are resistant to blackleg. Although chemical options are available in the form of seed dressing and soil treatment for grazing canola they are not yet registered for forage brassicas. Withholding periods of these products are not compatible with early grazing.

***Table 6: Nutrient content (% DM), metabolisable energy of forage rape and perennial ryegrass in the vegetative stage.***

| Nutrient (% DM) | Forage rape | Perennial Ryegrass | Cow [a] |
|---|---|---|---|
| **ME (MJ/kgDM)** | 11.5 | 11.4 | 10.3 |
| **Nitrogen %** | 4.3 | 3.9 | 2.4 |
| **Non-protein N %** | 3.5 | 0.9 | |
| **Nitrate N %** | 1.2 | 0.1 | 0.14b |
| **Crude Protein %** | 25 | 24.3 | 15 |
| **Acid Detergent Fibre%** | 18 | 23 | 18 |
| **Neutral Detergent Fibre%** | 19 | 49 | 45 |
| **Water Soluble Carbohydrate** | 15 | 7.8 | |
| **Calcium %** | 0.9 | 0.53 | 0.51 |
| **Phosphorus %** | 0.3 | 0.22 | 0.33 |
| **Potassium %** | 2.5 | 2.2 | 0.9 |
| **Magnesium %** | 0.27 | 0.28 | 0.22 |
| **Sodium %** | 0.51 | | 0.18 |
| **Chloride %** | 2.2 | 0.1 | |
| **Sulphur %** | 0.5 | 0.43 | 0.2 |
| **Bypass protein (% total protein)** | 30 | 42 | |

a – requirements for a 600 kg Holstein - Friesian cow producing 20 L milk/day

b – maximum content

## PESTS

Brassicas are susceptible to a wide range of pests, Cabbage White butterfly (*Pieris rapae)* and Diamondback moth (*Plutella xylostella*) are the two main insect pests on the NSW coast. The impact can be severe, particularly, in warm conditions before the first autumn grazing

These two pests can also be controlled with insecticides. However, diamond back moth can be resistant to many of the currently registered chemicals. The threshold level for spraying is one grub on every second leaf.

Insecticide seed dressing such as imidacloprid provides protection against a wide range of insect

pests including red-legged earth mite, blue oat mite and lucerne flea which are common pests of seedlings in inland areas.

For further details on pests and diseases refer to Agfact P2.1.13, and the appropriate references listed below.


### Acknowledgements

The knowledge on managing forage brassicas has been gained from various research projects, including FutureDairy and from the experience dairy farmers and agronomists who have willingly shared their knowledge on the agronomy of forage brassicas.


### References


Ayres L. and Clements B. (2002). Forage brassicas – quality crops for livestock production AgFact 2.1.13 http://www.dpi.nsw.gov.au/agriculture/field/field-crops/forage-fodder/crops/forage-brassicas

Fulkerson W. J., Neal, J. S., *et al*. (2007). "Nutritive value of forage species grown in the warm temperate climate of Australia for dairy cows: Grasses and legumes." *Livestock Science* 107(2-3): 253-264.

GRDC (2009). Canola best practice management guide for south-eastern Australia. Edited by: McCaffery D., Potter T., Marcroft S., Pritchard F., www.grdc.com

Neal J.S. (2009). Yield rather than water use, is the primary determinant of water use efficiency of irrigated forages. PhD Thesis, University of Sydney, Camden.

Walden K. *et al* (2010). Diamondback Moth in Canola. GRDC Fact Sheet. www.grdc.com





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Job number




PASTURE IMPROVEMENT CAUTIONS

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

The *Native Vegetation Act 2003* restricts some pasture improvement practices where existing pasture contains native species. Inquire through your office of the Department of Natural Resources for further details.