

# Fodder crops for winter feed

## Benefits of crops

Forage crops can be used to cost-effectively produce large amounts of bulk feed when traditional grass/clover pastures are not growing. This allows pastures to be spelled and for pasture covers to build for early spring feeding of priority stock.

Winter feed crops are usually brassicas, beets or cereals. There is a wide range of brassica forages including bulbs (swede, turnip), leafy (rape), swollen stem (marrow stem kale) and long stem (kale).

Fodder beet is the main beet forage. It is related to sugar beet, silver beet, beetroot and the mangel. Cereals like oats and triticale can be used as winter forages, as can annual clover crops (late winter).

All these crops have high nutritional value, but to provide a balanced diet, they may need to be fed with supplements.

Deer intake is naturally lower during the short daylight months. In late winter and into spring, intake naturally increases so providing fodder crops of high quality at this time will help deer grow to their potential.

## Establishment

The *Forage Rotation Planner* for deer can help farmers plan which paddocks are to be sown into a winter crop and show how they fit into a pasture renewal plan (see the DINZ Deer Hub >> [www.deernz.org/deerhub/feeding](http://www.deernz.org/deerhub/feeding)).

## Key points

- Crops can be a cost-effective way to fill winter feed gaps while protecting and conserving pastures.
- Do your research when choosing the best crop for a particular stock class, soil type, location and climate.
- Bulb brassicas such as swedes or turnips have adequate protein but are best supplemented with fibre. Leafy kale with its higher crude protein level and palatability is a good option for deer in many locations.
- Fodder beet can provide bulk feed from a small area but is best supplemented with a high protein feed.
- Test brassicas before grazing, to ensure toxic levels of nitrates are not present.
- To minimise soil run-off, sow crops across the slope and adopt environmental best practice when grazing.

## Plant selection

Identify the classes of stock that require winter feeding.

The best crop for a farm will be influenced by the climate, soil type and the stock classes being fed. Seek advice from



Photo: Dave Mackie

## Fodder beet with a view

Fodder beet can produce high quantities of cost-effective feed from a small area. Taking care to establish the crop properly pays dividends

other deer farmers and agronomists who have experience with crops in your district.

Deer of all classes and ages can be grazed on winter forage crops, but some crops are better than others. For example, leafy kale with soft stems is a better option for deer than taller, harder stem kale, as it has a higher crude protein level and is more palatable.

Deer can lose their appetites if they are fed on one crop for a prolonged period. To avoid this, provide more than one forage type, so mobs can start winter on one crop type (say kale) and move to another later (say fodder beet).

Consider planting fodder beet after swedes or kale. But bear in mind that fodder beet does not tolerate compacted soils.

## Site selection

A free draining site will suit most crops. Avoid soils that are prone to pugging or blocks that have waterways running through them. Choose a block with a stock water source that can be moved or connect a portable trough, so deer can be back-fenced off vulnerable areas.

## Pre-sowing

Consider direct drilling or minimal tillage rather than cultivation for brassica crops, to minimise nitrogen and carbon losses. Fodder beet is best established following cultivation.

Weed control before sowing is very important. Note that some brassica herbicides have long-lasting residual effects

**Table A: Some winter crop options for deer**

	Ideal Climate	Plant date	Establishment method	Typical feed grown: Tonnes dry matter per hectare (T DM/ ha)	Energy (MJME/kg DM) and dry matter %
Swedes	Temperate. Doesn't like hot summers. Prefers moist but not water logged soils.	Nov and Dec in areas with cold winters and moist summer.	Methods include cultivate/broadcast/harrow, or cultivate/drill or cultivate and sow on ridges, or spray and direct drill. Considered a first crop option and must not follow a brassica.	8-18 T (30% leaf 70% bulb) maturing in 150-250 days. Early varieties have soft yellow bulbs but are more prone to disease and yield less. Late maturity types have harder bulbs and higher yield potential but are often less palatable early in the season.	Consistent high energy (12.5 MJME) DM 9-12%
Winter bulb turnips		Dec to Feb.	All methods including spray and oversow.	Shorter growing period and shorter maturity than swedes. Often preferred in lower fertility or short growing season situations including sowing into seedbeds that have had a spring-early summer fallow to accumulate moisture. Sometimes added to autumn sown pasture to add winter bulk.	High energy with around 12 MJME. Higher protein than swedes.
Leafy turnips	Tolerates many conditions.	Mid- late spring.	Short maturity date around 40-70 days.	Mainly produces leaf from a small bulb with lots of growing points. Leaf has high ME and protein. Yield 6-12 T. Sometimes clover and grasses added to avoid resowing as crop runs out.	11-12 MJME 18-20% protein DM 11-15%
Kale	Tolerates range of soil types and growing conditions but not waterlogged soils. Higher fertility best.	Oct to Feb.	Suitable for most establishment techniques. Can follow another brassica. Springtails and aphids key pests.	12-18 T depending on cultivar and sowing time. Yields at 150-220 days. Utilisation can be very high in dry conditions. Significant cultivar differences in growth habits, yield and palatability.	12.5 MJME leaf and top stem but lower stem much less. DM 11-15%
Fodder beet	pH must be at least 6 (6.2 ideal) and crop has a high requirement for potassium.	Oct to Dec.	Cultivate to fine tilth. Very sensitive to pre-sow chemicals and weed competition during establishment. Precision drill. Watch for springtail damage. Needs high yield to be economic.	NZ average yield around 18 T with a huge range from 15 T to over 30 T. Good dryland commonly 20 T (usually made up of 5 T leaf/15 T bulb) although variety affects this. Irrigated crops can grow 25 T+. Significant cultivar differences in DM% and proportion of bulb below ground.	DM 10-20% Bulbs 8-11% protein. Leaves 19-23% protein.
Oats	Tolerant of many soils.	Late Feb to May.	On own or with ryegrass for a second graze in late winter or early spring.	4-8 T. Single graze crop generally.	

on fodder beet so seek professional advice if you plan to follow brassicas in the rotation with fodder beet.

Sow crops across the slope, to trap runoff.

### Feeding the crop

Assess the crop before feeding to determine:

- Dry matter yield (bulb and leaf separately)
- Any nitrate risks.

### Measuring the crop

**Quality:** Seed merchants provide tables comparing the expected energy and protein levels of different crop varieties. For a more accurate measure, send samples (bulb, leaf, stem etc) to a lab for testing.

**Quantity:** Assessing the yield before grazing enables you to calculate the feed available versus the expected demand from the mob. Modifications can be made e.g. changing the amount of baleage fed or altering the size of the mob.

See the Crop Measurement 'After the field day' fact sheet. This shows how to measure kale, swedes and fodder beet >> <https://deernz.org/deerhub/tools/pasture-and-cropping-tools/crop-measurement>

Growth rates will depend on intake and the value of the feed (in particular metabolisable energy and digestible protein). If stock are pushed to clean up stalky residual, growth rates will slow.

### Nitrates in the crop

Check nitrate levels of all crops before grazing, to ensure there is no risk of nitrate poisoning.

Brassicas, oats and short-rotation ryegrasses can all end up with potentially dangerous levels of nitrate in their leaves, particularly when rapidly growing plants are affected by cold frosty weather.

Surplus N gets stored in the leaves because of the plant's inability to utilise it for growth.

You can test the level of nitrate in the crop yourself, using a commercial test kit, or you can send samples away to a lab for analysis. Either way you'll get a reasonably quick answer as to the status of your crop. If in doubt seek advice.

Don't put hungry stock onto a crop with elevated nitrate levels without giving them something else to eat first, like hay or silage. That way they won't eat so much of the crop, and they will also eat it more slowly.

**Nitrate poisoning:** The onset of clinical signs is rapid. Animals may gasp for breath and stagger,



Photo: Richard Hilson

*Kale can be a good winter crop for deer. Leafy kale with soft stems is a better option than taller, harder stem kale, as it has a higher crude protein level and is more palatable.*

and hinds may abort. Severe nitrate poisoning may result in collapse and death.

### How much to feed?

The *DeerFeed Intake Calculator* can be used to determine how much feed is needed for different performance levels. The results can then be entered into the *DeerFeed Allocation Calculator* to show the quantities of crop and supplements that should be fed over winter (see [www.deernz.org/Deer Hub/Feeding](http://www.deernz.org/Deer Hub/Feeding)).

For weaners, especially, it is important to weigh the deer before feeding crops, so they get the right allowance.

**Table B: Red deer feed requirements during winter**

Age of deer	Sex	Kg DM/day/head
Red weaner <75kg LW	Both sexes	2 – 2.8 stag 1.8 – 2.7 hind
Yearling	Hind	2.2
Adult	Hind	2 – 2.7
Yearling spiker	Stag	2.6
Adult (velvet)	Stag	3

### Assumptions

- + Feed energy: 10.5 MJME/kg (typical of turnips)
- + Quantities are for feed consumed. Allow extra for wastage

### Adjust daily allowances to the conditions

The feed requirements in Table B need to be adjusted upward to allow for the weather and the amount of feed that is wasted. The maintenance feed requirements of deer are highest in cold wet windy weather or when the mob is nervous and is pacing a lot. Under these conditions, feed is trampled and soiled by the deer, increasing the levels of wastage.

In severe conditions, it may be necessary to significantly increase – perhaps double – the feed allowance.

### Supplements

Supplements need to be fed alongside most winter fodder crops, to provide fibre or to boost protein. Test your crop before feeding so you know the energy and protein levels.

Bear in mind that the nutritional value of crops can change as the season progresses. Consider doing a second set of tests in late winter.

For better growth rates and rumen health while deer are on bulb brassica crops, provide a fibre source such as straw, hay or medium-quality baleage (made from herbage

## Grazing

Stock grazing root crops need sound teeth to make effective use of them. Long narrow breaks are best. 3-5 day breaks probably require supplementation with good quality hay or silage.

Intake may be reduced if bulbs freeze during prolonged hard frosts. Provide additional baleage or use kale instead.

Shorter maturity also means completing grazing by end of winter to avoid plants bolting.

Bred to provide repeat grazing. Useful for providing high quality feed over summer and autumn for lactating hinds or any young growing deer. Better regrowth than rape but not as tolerant of very dry conditions.

Varieties with thinner stems like Sovereign are preferred by deer. Often tricky to break fence. Check nitrates before grazing.

Mangel types e.g. Brigadier, are more palatable to deer than others. Possibly easier to break fence than kale. Lift and store and feed out is an option. Severe frost damage can turn bulbs to mush, and render inedible. Low protein content means supply high quality baleage as a supplement for growing animals.

Key advantage is it maintains feed quality through to the end of October, two months longer than brassicas.

Can be strip-grazed, but should be grazed before stems harden and utilisation decreases. Best grazed early- to mid-winter.

including stems/seed stalks).

Baleage/silage typically has an ME of 9.5-11/kg DM which may need to be boosted by supplements like peas which offer higher energy (13 ME/kg DM) as well as additional protein. Your test results will tell you how much supplement is needed.

Kale has a higher DM% than other brassicas and there is less need for fibre.

Fodder beet needs to be supplemented with a protein source like grass, lucerne silage or peas for sustained growth (aim for at least 16% crude protein in the diet). This is particularly important when grazing young growing stock on fodder beet, or when other classes of stock are being fed on the crop for more than 60 days. Again, be guided by crop test results.

**For R3 velvetting stags** it is not cost-effective to feed high protein feed when they have low intake and growth (mid-winter). Start feeding protein supplements three weeks before button drop and continue during early velvet growth (mid-August).



**Swedes grow well in areas with moist summers and colder winters.**

*They are a good feed for deer, but for better growth rates and rumen health, they need to be supplemented with a fibre source such as straw, hay or medium-quality baleage (2004 photo)*

### Deer losing their appetites?

Sometimes deer will tire of being on one crop type over winter, leading to a drop in their feed intakes. To avoid this risk, start on one crop type (say kale) and move to another (say fodder beet). This can easily be done by swapping crops between mobs half-way through the season.

### Animal health on winter crops

Introduce full animals, not hungry animals, to the new crop. This helps prevent gorging and potential health problems, including the risk of nitrate poisoning (see 'Nitrates in the crop' above).

### Brassicas

By gradually introducing deer to the crop, the microbes in their rumen have time to adjust. Otherwise low growth rates can result. The same applies in the spring when the deer are moved off fodder crops and back to pasture.

The grazing time per day, and the number of days to reach 100% intake of crop, depends on the forage type. Providing a pasture-based run-off for 7-10 days is usually a long

enough transition for brassicas.

Swedes can be a high-risk feed for hinds in late spring/early summer when glucosinolate plant chemicals may reach toxic levels, particularly when plants have begun to bolt (start flowering) or when plants are affected by drought (see *Deer Fact*, A successful pregnancy: preventing foetal losses).

### Fodder beet

Unlike cattle, deer rarely suffer rumen acidosis from overeating fodder beet when they are introduced to the crop. As a result, transition to the crop is rapid. In practical terms this usually means simply running them on and off the crop for a few hours a day for a few days, then locking them on.

It takes about a week for deer to achieve full fodder beet intakes.

Teeth are not an issue for deer on fodder beet, and even the hardest bulbs available in NZ (SUGA: 30% DM) can be readily eaten. Older stags can be an exception: a lack of teeth will limit their intakes of harder varieties.

### Environmental management

Use buffer strips to impede runoff from winter crops during grazing. Most regions now require buffer strips of at least 2 metres wide alongside streams. Also, fence off any marshy hollows ('swales').

Strip graze across the hillside, starting at the top and working your way down the slope. Use the 'last bite' method to quickly graze the last piece alongside the buffer zone. Do not hold deer on this area.

These techniques can reduce phosphorous losses to waterways by 60-70%.

To reduce crop wastage, feed long narrow breaks rather than short wide ones. Fence off an area creating a lane to gateways. Back fence stock off land that has been grazed. Replant the bare soil as soon as possible to use up nitrogen in the soil.

### Yield and return on investment

In 2014, best practice fodder beet agronomy resulted in yields of up to 30 T DM/ha at a cost of \$1700-2100/ha, or \$0.06/kg DM produced. With poor agronomy you may grow 17 T/ha at \$2300/ha, or a cost of \$0.135 c/kg DM.

If you are not experienced in growing fodder crops, it pays to seek advice on what works in your district.

#### More >>

*Forages for Deer: A Review.* By D.R. Stevens, M.J. Casey, AgResearch, 2013, available here >> <http://bit.ly/DeerForages>

*Deer Fact:* Feeding for optimal velvet production.

For information on brassica diseases and pests >> [www.pestweb.co.nz](http://www.pestweb.co.nz)

For more details on crop options see the feeding section on the DINZ Deer Hub >> [www.deernz.org/deerhub/feeding](http://www.deernz.org/deerhub/feeding)