

# Summer Forage Crop Guide

Seed, fertiliser and  
agrochemicals

Growing your investment  
above and below ground



# Ravensdown's integrated approach

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**We all know, in nature nothing happens in isolation. It's the same with maximising forage production efficiency.**

It comes down to a combination of fertile soil, quality seed, weed and insect pest management, grazing management, smart thinking, attention to detail and hard work. They all interact with each other and that's where Ravensdown has invested. We have a team of specialist agronomists backing up your agri manager, whose sole purpose is to maximise forage production on your farm through nutrient, seed and agrochemical advice. In this brochure, you'll find some of the tools and assistance we've developed to help with all of these.

**Agrochemical  
advice and  
products**

**Seed advice  
and products**

**Fertiliser  
advice and  
products**

**RAVENS  
DOWN  
AGRONOMY**

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A photograph of a vast vineyard with rows of green grapevines stretching towards rolling hills in the distance. The hills are covered in green grass and some trees. The sky is not visible.

# 4 steps for investing wisely

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# STEP 1

## Get the highest return first

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**Why dilute your regressing resources across the whole farm when you can funnel them into the areas that need them most?**

### Soil test

Our ARL lab can do an array of soil tests to give you a clear picture of what inputs you'll need for optimum growth.

### Technology tools

HawkEye® is technology that helps you make smarter nutrient decisions for better economic and environmental outcomes. HawkEye combines three perspectives for a complete picture of optimal pasture production: integrating imagery from the sky; nutrient input and pasture quality on the ground; and advanced profiling in the soil.

### Lime

Use lime to alter soil pH if needed. Optimum levels are between 5.8 and 6.2.

### Paddock selection

It is vital to identify the worst performing paddocks and the reasons why the paddock isn't up to standard. For example, soil fertility or compaction, insect damage, weeds or pasture species present.

### Pasture condition

In combination with forage and animal production records for each paddock, a visual pasture condition score, just like you do for your stock is recommended.

Condition scoring every paddock on the farm will help determine your under-performing paddocks and identify those which may need to be renewed.



**HAWKEYE - MAP BASED SOFTWARE FOR SMARTER DECISION MAKING.**

[WWW.HAWKEYE.FARM](http://WWW.HAWKEYE.FARM)



**SOIL TESTING - CREATES A CLEAR PICTURE OF INPUTS NEEDED**

# Match your forage selection to your feed requirements



**You may have been using the same seed for years, but is it still the best available?**

## **Use our expertise**

Your regional agronomist has technical seed, fertiliser and chemical knowledge to offer while our innovative seed suppliers are constantly making breakthroughs in high performance.

The objective of the summer crop will largely influence the type of summer feed you sow. There is a huge range of products to choose from, your local agri manager and/or regional agronomist can provide a sounding board to discuss the best options for you.

## **Timing**

Ensuring the sown crop can be grazed at the right time and meets your expectations is very important. When it's time to sow your summer crop, matching the time you require the feed and stock classes to the right crop will significantly increase your success.

Just remember, although it can't always be avoided, monocropping encourages an increase in weeds, pests and diseases so paddock and / or crop rotation must be advised.

## **Forage crop species and cultivars**

There are a range of brassica species and cultivars with their own strengths and weaknesses. Making a well-informed decision on what to use is important for the best outcome. Knowing your requirements and limitations for maximum crop yields will help with the selection process and increase your success rate.

# Always identify your targets



**There are two main rivals for your summer crop production: insects and weeds.**

**You also have two main remedies for reducing their impact - our expertise and agrochemical treatments.**

## **Insects**

Insects are the curse of summer forage crops with attack occurring at establishment and then later on once the crop is established. Inspecting the crop paddock prior to drilling will give you an indication of the levels of insects present. Seed treatment and the

addition of companion insecticides to glyphosate, such as Toppel™ 500, in the spray-out will reduce the risk of insects affecting crop yields.

See page 17 to 21 for more details on the range of damaging insects and control options available to you.

## **Weeds**

Identifying your problem weeds will allow you to control any that will cause issues after sowing. Docks, buttercups, thistles, yarrow, ragwort and sheep sorrel are examples of some weeds that aren't fully controlled with just glyphosate. Using companion herbicides will

allow for more effective weed control (see opposite).

Weed and pest issues must be correctly identified, any underlying causes recognised and appropriate measures taken to ensure there are no negative effects on the establishment and performance of the newly sown forage crop.

# Paddock preparation

## STEP 4

**Good paddock preparation, regardless of the sowing / drilling method used, will allow your sown crop to get the best start, increasing the return on your investment.**

• **Weed and pest control** - starting with a flat, even and firm seedbed, that's free of weed and insect pressures will allow a consistent sowing depth and competition free establishment.

• **Sowing depth** - the sowing depth of seed is important for a rapid and even establishment. It is a balance between ensuring adequate seed / soil contact, moisture supply for germination, and allowing the smaller brassica and chicory seeds to establish. 10-15mm sowing depth is the target.

• **Soil temperature** - soil temperature is a major factor in determining germination speed. Soil temperatures above 10°C and rising are ideal for brassicas species, and 12°C is the target for chicory.

COMPANION HERBICIDES	GRANIT <sup>®</sup> (tribenuron-methyl)	BACKUP <sup>®</sup> (thifensulfuron-methyl)	DICAM 480 (dicamba)	MULTIPLE <sup>®</sup> (clopyralid)	PASTURE GUARD <sup>®</sup> 2,4-D 680 (2,4-D ester)
Extra weeds controlled	Clovers, sheep sorrel, thistles, ragwort, wireweed, yarrow	Buttercup, dock	Clovers, dandelion, dock, mallow, pennyroyal, mayweed, ragwort, sheep sorrel, thistles, wireweed	Clovers, dandelion, plantains, thistles, yarrow	Nettles, ragwort, storksbill, thistles
Plant-back period					
Grasses and cereals	14 days	14 days	0 days	0 days	10 days
Clovers	14 days	14 days	28 days	3-6 months	21 days
Chicory	14 days	14 days	28 days	3-6 months	X
Plantain	14 days	14 days	0 days	3-6 months	X
Brassicas	14 days	14 days	0 days	0 days	28 days
Fodder beet	X	X	X	0 days	X
X - not recommended to be used in a sprayout prior to sowing these crops.					

COMPANION INSECTICIDE	TOPPEL 500 (chlorpyrifos)						HALEX <sup>CS</sup> (lambda-cyhalothrin)
Insects Controlled	Springtails	Army caterpillar	Cutworm	Nysius fly	Argentine stem weevil	Porina caterpillar	Cutworm
	200ml/ha	500ml/ha	600ml/ha	1.25L/ha	1.25L/ha	1.25 - 1.7L/ha	40ml/ha



# Use our expertise

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## Jeremy Klingender

Product Manager - Seed

Jeremy joined Ravensdown in 2011 as an agrochemical technical manager. Jeremy has worked for many years in the field looking after forage crops, pastures and brassicas. His experience ranges from corporate farmers to lifestyle blocks, and summer dry areas like the East Coast to summer safe areas such as the Central Plateau.

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## George Kerse

Product Manager - Agrochemicals

George joined Ravensdown in 2010. He has more than 35 years' experience in the agrochemical and rural supply industry in New Zealand. Previous roles include; Product Development, Category Management and Sales Management with both agrochemical manufacturer and rural retail companies.

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## Will Waddell

National Agronomy Manager

Will joined Ravensdown in 2019 as an Agronomy Technical Manager.

Having grown up on a mixed cropping farm in Mid Canterbury, Will loved the integration of livestock with cropping.

Will graduated from Lincoln University with a B Comm Ag and his work experience prior to joining Ravensdown includes time working on a large cropping farm in Saskatchewan and 4 years as a farm systems and agronomy advisor with a leading proprietary seed company.

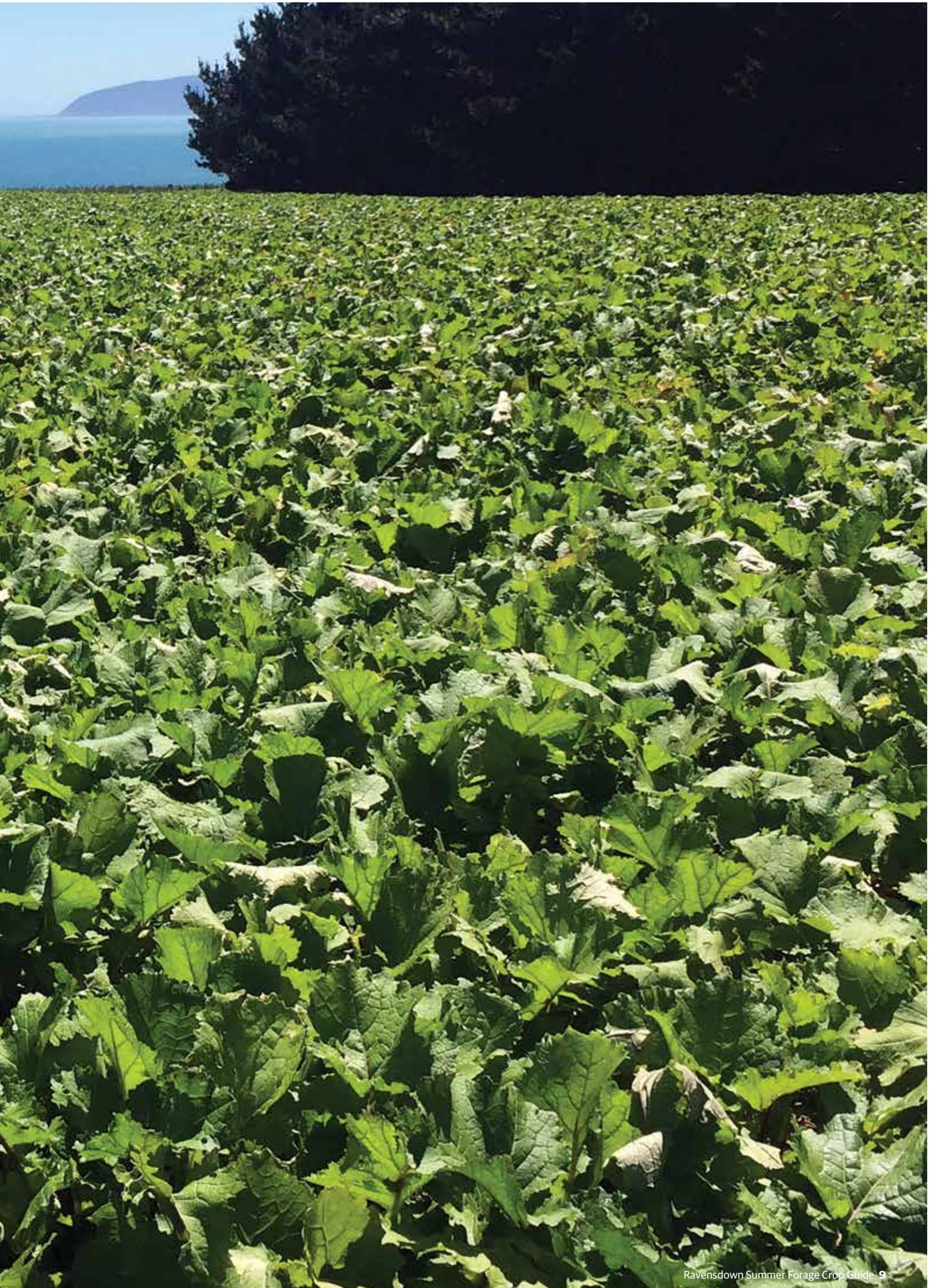
  
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# Brassicas

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# Cultivar descriptions



## Rape

Rape may be sown alone or in mixtures as a specialist summer to winter feed option. Rape can be sown from early spring to late summer and is generally ready to graze 12-16 weeks after sowing. Rape can be grown on lower soil fertility than most other brassicas and also soils with good soil fertility and moisture, yields of 8tDM/ha plus can be achieved. Do not grow in clubroot infected areas. Some care is required when grazing rape and it is best to allow the crop to fully mature before grazing and also gradually introduce rape into the diet to reduce the risk of animal health issues (see Grazing Brassicas on page 24).

**Rate:** Alone: 3-4, mix: 0.5-1kg/ha  
**Type:** High yielding, multi-graze, maturity 90-110 days

**General comments:** A fast establishing, high yielding multi-graze giant-type forage rape with strong regrowth potential, good aphid tolerance and disease resistance.

**Other options:** See table below.

### Key traits

- Very high yielding with good regrowth potential
- Very fast establishing
- Good disease resistance
- Can be spring or autumn sown
- Suitable for sheep, cattle and deer

CULTIVAR		SOWING RATE (kg/ha)		REGROWTH ABILITY	DAYS TO MATURITY	COMMENTS
		ALONE	MIX			
EARLY MATURITY	MAINSTAR RAPE	3-4	0.5-1	Good	70-90	Mainstar is a very versatile brassica, being suitable across a wide range of soil fertility and environmental conditions, stock classes and sowing times
	GREENLAND	3-4	0.5-1	Mod	70-90	Very late flowering, medium height rape. Good palatability with flexible multi-graze potential.
	TITAN	3-4	0.5-1	Good	70-90	High yielding early maturing cultivar of intermediate height. Titan has high aphid and virus tolerance and has good palatability.
	WINFRED	3-4	0.5-1	Mod	70-85	Winfred is an early maturing cultivar, with broad leaves, a high leaf to stem ratio, and good cold tolerance. High regrowth potential from multiple grazings.
LATE MATURITY	GOLIATH	3-4	0.5-1	Good	90-110	A giant type rape with high yield potential. Very good winter keeping potential and very good palatability.
	INTERVAL	3-4	0.5-1	Good	90-110	Interval is a tall, high producing rape with good tolerance to dry conditions and frost. It has good palatability and good regrowth.
	PILLAR	3-4	0.5-1	Good	90-110	A fast establishing, high yielding multi-graze giant-type forage rape with strong regrowth potential, good aphid tolerance and disease resistance.
	SPITFIRE	3-4	0.5-1	Good	90-110	Spitfire is a medium to tall rape with high dry matter yields and good tolerance to aphids. Its low DM stem gives it good palatability.

# Cultivar descriptions

## Bulb Turnip

Turnip varieties vary in yield potential, ploidy level, maturity, size of bulb, bulb keeping quality, and these factors considerably influence the choice and intended usage. October sowings produce summer feed, whilst later sowings through to early March produce autumn to winter feed. Turnips are generally susceptible to aphids, clubroot, dry rot, and virus. A highly digestible turnip bulb provides a good source of sugars which, combined with a high protein concentration in the turnip tops, stimulates good rumen function.

Tankard shaped turnips are grown for their fast growth, short maturity, and their flexible sowing time to fill any summer feed deficit. Round turnips generally take longer to grow and have a better keeping ability.



- Rate:** Alone: 3-4, mix: 0.5-1kg/ha
- Days to maturity:** 55-65
- General comments:** Marco is a tetraploid variety with a large seed. Sowing rates should be increased compared to diploid varieties. Very quick maturing, highly palatable, with a large bulb size. Can be used as a summer feed option if sown early, but is also widely used as an autumn winter feed option.
- Other Options:** See table below.

### Key traits

- Earliest maturing turnip available
- High yielding
- Very high quality (tetraploid)
- Large bulbs with high bulb: leaf ratio

CULTIVAR	SOWING RATE (kg/ha)		DAYS TO MATURITY	COMMENTS	
	ALONE	MIX			
TANKARD	BARKANT	1.5-2	0.75	60-90	Diploid, soft early maturing, summer turnip which produces more leaf than other traditional turnips with a tankard shaped bulb positioned to provide good utilisation.
	DYNAMO	1.5-2	0.75	60-80	Early maturing soft turnip suited to summer feed crops producing high bulb content.
	MARCO	3-4	0.5-1	55-65	Marco is a tetraploid variety with a large seed. Sowing rates should be increased compared to diploid varieties. Very quick maturing, highly palatable, with a large bulb size.
	RIVAL	1.5-2.5	0.75	60-80	Diploid, soft early maturing, elongated stubble turnip approximately 70% of dry matter above ground level. 50:50 ratio leaf to bulb and good resistance to bolting.
	SF ENVY	2-3	1	60-90	Fast establishing high energy crop, excellent leaf: bulb ratio. Tankard shape, good utilisation.
ROUND	GREEN GLOBE	0.75	0.5	80-120	A slower growing, longer maturing, hardy, white firm fleshed, green skinned variety. Rounded bulbs keep well into the winter and will yield well if sown early.
	HT BULB TURNIP	1.5-2	0.5	90-120	Seed of HT™ brassica cultivars are bred to be tolerant to the chlorsulfuron herbicide.
	NEW YORK	0.75	0.5	60-80	An early-mid season, white soft fleshed, purple skinned variety.
	SF G2	0.8-1.5	0.5	110+	A diploid, green skinned, white fleshed turnip, the latest globe type, recently bred to replace Green Globe, this variety holds on well in cool climates
	SF WHITE STAR	1-3	0.5	90-110	White skinned, round bulbs with a high leaf component. It has large bulbs and is suited to all classes of livestock.
	YORK GLOBE	0.75	0.5	60-80	York Globe is an early-mid season maturity, soft white fleshed, purple skinned variety. It has low top yields, and mid-sized round bulbs with good keeping quality.

# Cultivar descriptions

## Leaf Turnip

Leaf Turnips are multi-graze summer brassicas for use in areas with good summer rainfall / irrigation for high yield and quality forage. Leaf Turnips can be mixed with other high energy forages such as red clover, chicory and plantain to increase both yield and

quality of the summer crop; however potential weed issues must be addressed prior to doing this as herbicide options may become limited with the addition of some other species. They are often referred to as Hunter / Pasja rather than Leaf Turnips.

CULTIVAR	SOWING RATE (kg/ha)		REGROWTH ABILITY	DAYS TO 1st GRAZING	COMMENTS
	ALONE	MIX			
HT LEAFY TURNIP	3-5	1-2	V.High	45-65	Seed of HT™ brassica cultivars are bred to be tolerant to the chlorsulfuron herbicide.
HUNTER	3-5	1-2	V. High	45-65	Hunter is fast maturing, high feed quality with a high yielding ability. Reduced bolting tendency.
PASJA 2	3-5	1-2	V. High	45-65	Pasja 2 is early maturing, producing large amounts of leaf. Pasja 2 is very productive and can produce up to 9t DM/ha during the summer - autumn period.
SF PACER	3-5	1-2	V. High	45-65	Like Pasja 2 and Hunter, Pacer is fast to establish and has vigorous regrowth.

## Paddock selection

**The total area will be determined by feed requirements and can be part of a long-term crop sequence or regrassing plan.**

Often the 'worst' paddocks are chosen, given this, they are likely to need extra attention.

Monocropping encourages an increase in weeds, pests and diseases so paddock and / or crop rotation must be advised. However there are many paddocks that are cropped year after year and have no issues, nevertheless the more monocropping done, the higher the risk for weeds, pests and diseases affecting yields and feed quality.

## Soil Testing

Soil testing should occur early; 6-12 months prior to the crop being sown so deficiencies can be rectified.

**Optimum nutrient status for brassicas:**

SOIL PH	OLSEN P	QT POTASSIUM	SULPHATE-S	QT MAGNESIUM
5.8 - 6.2	25 - 30 (sedimentary & ash) 40 - 50 (pumice & peat)	5 - 8	3 - 8	8 - 10

## Fertiliser Requirements

The current soil fertility, prior history and desired crop species and yield will determine the fertiliser programme for individual crops. Ask your Ravensdown agri manager for a fertiliser recommendation programme which may include a combination of

capital applications (of lime or phosphate fertiliser), base fertiliser dressing (prior to sowing), starter fertiliser (at sowing) and one or more side dressings.

# Paddock selection

## Nitrogen

The amount of nitrogen (N) required will depend on the paddock history and soil type. A soil N test (mineralisable N) will provide a guide to the soil N supply. Alternatively, the following information can be used as a general guide:

- Following good pasture: require starter N only (20-30kg N)
- Following run-out pasture/development phase: starter N plus several N-Protect® side dressings. This will ensure there is no shortage of N due to temporary immobilisation of N by the decomposing organic matter. Confine side dressings to 90-100kg/ha. In total, up to 200-250kg N may be required for kale, swedes and turnip crops sown into paddocks with a very low soil N status
- Second year crops: starter N, plus the option of one side dressing

- Longer term cropping: starter N plus the option of two side dressings

The first side dressing is typically applied 4-6 weeks after sowing. Excessive N can do two things, it may change the ratio to leaf from bulb, or it could run the risk of increasing nitrate levels. Avoid late N application unless growth is likely to continue for some time and wean stock onto the crop. The more N that is required the earlier side dressing should commence. If in doubt complete an herbage test.

### Deficiency symptoms

N deficiency symptoms are pale yellow leaves with purpling edges of older leaves.

## Phosphorus

Brassicas respond well to phosphorus (P) and in many instances P is often a limiting growth nutrient for crops. Ideally Olsen P status should be 25+ for sedimentary and ash soils, and 40+ for pumice and peat soils. P inputs as low as 20-30kg should only be used in good fertility situations and for short-term crops.

If paddocks have Olsen P levels of 10-15, capital P inputs are required to ensure the crop performs. Aim to raise the Olsen P status to 20+. Research by Crop & Food confirms brassicas to be highly responsive to P fertiliser. Where soil fertility is around Olsen P 15, recommended rates of P for various brassica types are:

- Rape: 20-35kg P
- Bulb Turnips and Leafy Turnips: 40-60kg P
- Kale: 80-90kg P
- Swedes: 50-80kg P

Remember that, on average, 10kg P will lift soil Olsen P by 1 unit to 15cm depth for sedimentary soils. At a 15cm soil depth, use 22kg P to lift the Olsen P by 1 on volcanic soils, and 14kg P for every Olsen P unit on pumice soils.

If soil fertility is low, use Triple Super to raise P levels. DAP is a good way to provide P to brassicas.

Where the P status is very low (Olsen P <12) put some P (as serpentine super) down the spout with the seed.

The benefit of banding will diminish as the soil P levels increase. If using DAP down the spout, keep rates less than 100kg DAP and broadcast the balance to avoid the risk of the fertiliser burning the seed.

At low P levels you may also wish to lift the P status, although some farmers will prefer to do this when they go back into permanent pasture. Triple Super is a good way to lift P status during the brassica phase. Early purpling usually means a P deficiency, but can also be due to poor P uptake in cool weather.

Where paddocks have high Olsen P levels (eg 30), it is very unlikely that crops such as kale will respond to P fertiliser.

### Deficiency symptoms

Purpling, stunted and erect growing leaves. However this can be similar to symptoms for plant stress so a plant test is highly advised.

## Boron

Brassicas respond well to boron (B), mainly for crop quality, however the rates may vary from zero with small leafy type brassicas to >25kg Borate 46 with high rainfall swede crops. Some soils have adequate B levels, thus will not require B fertiliser.

- As a general rule use 10-15kg/ha Borate 46 on most crops
- 20-25kg/ha of Borate 46 in wetter areas (split applications due to risk of boron leaching)
- Swedes are the crop most prone to brown heart, followed by kales and turnips. Leaf Turnips (eg Hunter, Pasja) are unlikely to require additional B

- If you are unsure as to whether a brassica crop such as kale or leafy brassica requires B, a B soil test may help.
- Don't put B fertiliser down the spout with seed
- B sprays complement rather than replace solid B, so verify whether spraying is warranted by herbage sampling

### Deficiency symptoms

B deficiency symptoms are 'brown heart' of bulb brassicas and browning of stems in kale and rape. Symptoms are usually seen too late for any treatment so ensuring adequate B supply in the early to mid-stages of growth is recommended.

## Potassium

Potassium (K) is usually not required unless soils have a low K status, eg West Coast soils and some soils in Taranaki / Manawatu. When a soil test indicates a deficiency (QT K<5), apply 50-100kg K/ha if following a potash-deficient pasture. Cropmaster 13 or Cropmaster 15 is a good way to provide this unless potash supers are used as a development phase for the paddock.

### Deficiency symptoms

K deficiency symptoms are plants with yellow or purple leaf-tints with browning at the edge of the leaf. Wilting of older leaves may occur with a scorched look. Initially older leaves show signs of deficiency as dying leaf tips, then symptoms spread.

# Paddock selection

## Sulphur

It is not necessary to use sulphur (S) on brassicas unless S levels are low (2-3), as S-methyl-cysteine sulphoxide (SMCO) compounds may be formed which reduce intake and weight gain. If S levels are >8 you are probably going to be susceptible to SMCO issues.

Research on kale has shown that the synthesis of SMCO is stimulated by the addition of N when soil sulphate-S is high (>10 ppm). Interestingly, addition of S-containing fertilisers (eg superphosphate) under high soil sulphate-S levels did not increase SMCO levels.

However, under low soil sulphate-S levels (4 ppm), application of S-containing fertilisers do increase the SMCO level. And when N is also applied, the kale leaf SMCO levels increase further (but the stem levels remain unchanged). Where no S fertiliser is applied, addition of N decreases the SMCO level in the stems, but leaf levels remain unchanged.

Don't get hung up on this issue, simply avoid high rates of sulphur (sulphur supers). Kale is more prone to the SMCO problem. Crop & Food research has shown no response to S fertiliser, even at sulphate levels around 3ppm.

## Magnesium

If soil magnesium (Mg) levels are 7 or less, then consider applying 20-30kg Mg/ha. If in the optimum soil Mg range, then no Mg should be required.

### Deficiency symptoms

Deficiency symptoms are interveinal yellowing, sometimes with reddish brown tints and early leaf fall.

## Soil pH

Although brassicas can tolerate a range of pH, preferably lift pH to >5.5, liming will increase soil molybdenum availability. Preferably work lime into the soil.

On soils that are known to be low in molybdenum (with no previous molybdenum topdressing history), apply 100g/ha of sodium molybdate.

## Trace Elements

Apply if the chosen paddock is known for particular trace element deficiencies, otherwise rely on herbage sampling.

## Sowing Method

1. Direct drilling (or no-till) requires good weed control using ideally two applications of appropriate herbicide(s). If soils are of low fertility, it is important to put some fertiliser down the spout with seed for direct drilled crops
  - First spray is based on Glyphosate G360™ (6L/ha), Glyphosate 540™ (4L/ha) or Glyphosate 680™ Dry (3Kg/ha) with Accelerate™ at 100ml per 100L of water and with a suitable companion herbicide (refer to companion herbicide table, page 5)
  - Second spray Glyphosate G360 (3L/ha), Glyphosate 540 (2L/ha) or Glyphosate 680 Dry 1.5Kg/ha with Accelerate at 100ml per 100L of water. Add Toppel 500™ insecticide at the required rate (see table, page 5)
  - Place an Endure slug mat or damp sack in the sprayed out paddock to check the slug population. If slug numbers are above four per sack, then it is recommended to apply Endure® slug bait at 4-8kg/ha as close to sowing as possible. Continual monitoring is recommended as slug populations may vary depending on environmental conditions
2. Conventional cultivation is the most traditional method, where corrective soil status fertiliser is broadcast and worked into the soil prior to sowing. At sowing, additional fertiliser (eg DAP) may be applied with the seed
  - Spray at least 1 day prior to cultivation for annual weeds or three days for perennial weeds using Glyphosate G360 (6L/ha), Glyphosate 540 (4L/ha) or Glyphosate 680 Dry (3Kg/ha) with Accelerate at 100ml per 100L of water and with a suitable companion herbicide (refer to companion herbicide table, page 5)

- Incorporate Triflow® 480 at 1.7L/ha for soil with 0-4% organic matter, or 2.5L/ha for soil 5-8% organic matter into soil as a pre-emergent herbicide just prior to sowing. If organic matter of soil is over 8% results may be inconsistent.
  - Refer to section on Triflow 480
- 3. Broadcasting fertiliser with seed is popular in some areas, however it is important to minimise the contact time of the fertiliser and seed. Higher sowing rates (eg 20-25% more) are recommended due to the increased risk of poor germination due to both fertiliser injury and poor soil contact
- Spray at least 1 day prior to cultivation for annual weeds or three days for perennial weeds using Glyphosate G360 (6L/ha), Glyphosate 540 (4L/ha) or Glyphosate 680 Dry (3Kg/ha) with Accelerate at 100ml per 100L water and with a suitable companion herbicide (refer to companion herbicide table, page 5)
- Incorporate Triflow 480 at 1.7L/ha for soil with 0-4% organic matter, or 2.5L/ha for soil 5-8% organic matter into soil as a pre-emergent herbicide just prior to sowing. If organic matter of soil is over 8% results may be inconsistent
  - Refer to section on Triflow 480

For both conventional and broadcast sowing methods, the ground preparation will significantly affect the establishment success. Ensure the seedbed is fine, firm and even to allow consistent sowing depth allowing for a quicker, more even establishment.

# Crop establishment

## Triflow® 480

**Selective pre-emergence soil incorporated herbicide for the control of certain annual grasses and broadleaf weeds in field and vegetable brassicas, lucerne, peas and specific vegetable crops**

- For pre-plant weed control in brassicas, lucerne and certain other crops
- Controls a range of grass and broadleaf weeds
- Good residual activity for weed control during establishment



**ACTIVE INGREDIENT:** trifluralin 480g/L  
**PACK SIZE:** 20L



## Sowing

### Seed treatment

The use of seed treatment is highly recommended for all brassica seed to reduce the impact damaging insects may have on establishment.

Crop monitoring is still required as brassica seedlings can still suffer damage when there are a high number of insects. Insects

are controlled by ingesting the chemical from biting the plant, therefore with high numbers of insects there may be enough one-off bites to cause plant damage.

### Sowing date

The sowing date depends on the maturity of the crop and the time of grazing. Once the grazing requirements and reason for the crop is understood, the type of brassica and sowing date can be easily worked out.

### Sowing depth

Sowing depth for all brassicas should be around 10-15mm.

# 0-6 weeks post sowing

## Other pre-emergence herbicides used in forage brassicas include;

Active ingredient	Brands	Comments
Clomazone	Magister®CS	For control of grass and broadleaf weeds, one of the few herbicides that can give good control of shepherds purse
Alachlor	Merit®	A tank mix partner for clomazone to improve the spectrum of weeds controlled
Clomazone + alachlor	Ombre®	Herbicide combination used for control of grass and a wide range of broadleaf weeds
Dimethanamid-P	Frontier®-P	Used for control of a range of grass and broadleaf weeds, often tank mixed with clomazone

## Other herbicides used post-emergence in forage brassicas include;

Active ingredient	Brands	Comments
Oxyfluorfen + picloram	Pycus™	For control of black nightshade, seedling docks, fathen, nettles, redroot (amaranthus) and thistles
Aminopyralid	T-Max™	For control of a range of broadleaf weeds including seedling docks and willow weed
Aminopyralid + clopyralid	Milestone*	For the control of a range of broadleaf weeds including seedling docks, fumitory, nightshades, thistles, willow weed and wireweed
Halauxifen-methyl + clopyralid	Korvetto™	For control of black nightshade, fathen, fumitory, hairy nightshade and shepherds purse in forage brassicas

# 0-6 weeks post sowing

## Crop monitoring

**Crop monitoring is vital for reducing the potential impacts of insects, weeds and any nutritional deficiencies affecting brassica establishment and growth.**

The newly sown paddock should be checked one to two times a week looking for insects or signs of insect damage. Seed treatment will give six weeks control of insects in the vast majority of cases, however if insect numbers are very high, damage can still occur.

## Herbicides

Weeds need to be assessed while crop monitoring. The weeds present will determine the specific herbicides to use.

Please refer to the label for further application information

### Dicam 480™

**A selective herbicide for control of certain hard to kill broadleaf weeds in conservation tillage programmes and in cereals, maize, some forage brassicas, waste areas and spot treatment in pastures**

- Effective companion herbicide with glyphosate for a cleaner spray-out
- No plant-back period for brassicas, grasses, maize, cereals and some other crops
- Useful for post-emergence broadleaf weed control in many crops



**ACTIVE INGREDIENT:** dicamba 480g/L  
**PACK SIZE:** 5L, 20L



### Multiple®

**A selective herbicide used to control clovers, yarrow, plantains, californian and other thistles in a range of crops, forestry and pre-cultivation**

- A grass friendly herbicide ideal for control of thistles and other broadleaf weeds
- The best option for weed wiping californian thistles
- Can be used with glyphosate prior to beets, brassicas, grasses, cereals and maize



**ACTIVE INGREDIENT:** clopyralid 300g/L  
**PACK SIZE:** 5L, 20L



### Purge

**A selective herbicide for the control of certain broadleaf weeds in forage brassica crops**

- For broadleaf weed control in all fodder brassica crops, including bulb crops
- Use with Collaborate(TM) Oil for best results
- Can be mixed with certain other herbicides and insecticides



**ACTIVE INGREDIENT:** picloram 150g/L and clopyralid 225g/L  
**PACK SIZE:** 5L



# 0-6 weeks post sowing

## Damaging insects

### Springtails (*Bourletiella spp.*)

- Brown to black in colour
- Up to 1mm long
- Chewing mouthparts

#### Damage symptoms:

- Damaged cotyledons and emerging growing points, causing damage up to the fourth leaf stage
- Half-moon notches seen in emerging leaves and pinpricks on the underside of the leaf
- Very difficult to see insects on the bare soil
- Place card or hanky on ground and tap, looking for insects 'springing' onto the hanky

- Multiple generations may be seen in one year

#### Cultural control:

- Reduce trash in seed bed

#### Chemical options:

- Cropcote Plus™ Seed Treatment
- Toppel 500 at 200ml/ha with Widespread® 1000 at 25ml/100L water, ideally in 200L of water per hectare



### Nysius or wheat bug (*Nysius huttoni*)

- Adults are about 4mm long
- Pale green colour maturing to brownish-grey
- Camouflage appearance with silvery triangle at the end of the tail

#### Damage symptoms:

- Damages seedlings at ground level
- Causes ring-barking effect
- Increasing the risk of fungal or environmental (wind, snow) damage
- May kill the plant

#### Cultural control:

- Reduce trash in seed bed

#### Chemical options:

- Cropcote Plus™ Seed Treatment
- Toppel 500 at 1.25L/ha with Widespread 1000 at 25ml/100L water, ideally in 200L of water per hectare



### Slugs (*Deroceras reticulatum muller*)

#### Damage symptoms:

- Damage to establishing brassica crops particularly in direct drilled situations
- Chewing and rasping of cotyledons and leaves
- Nocturnal feeders

#### Cultural control:

- Reduce initial populations via
  - Heavy rolling
  - Cultivation
  - Mob stocking
- Reduce trash in seedbed

- Monitor slug numbers through the use of damp sacks

#### Chemical options:

- Endure® at 4-8kg/ha
- Endure® Mini at 3-4kg/ha (for drilling with seed)



### Greasy cutworm (*Agrotis ipsilon*)

- Brown to greyish brown moths
- Larvae are greasy, going from light grey to dark brown
- 50mm long at maturity
- Nocturnal feeders
- Shelter in the soil profile during day time

#### Damage symptoms:

- Larvae eat young seedlings at or just below ground level
- Plant wilting
- Plants 'cut-down' found

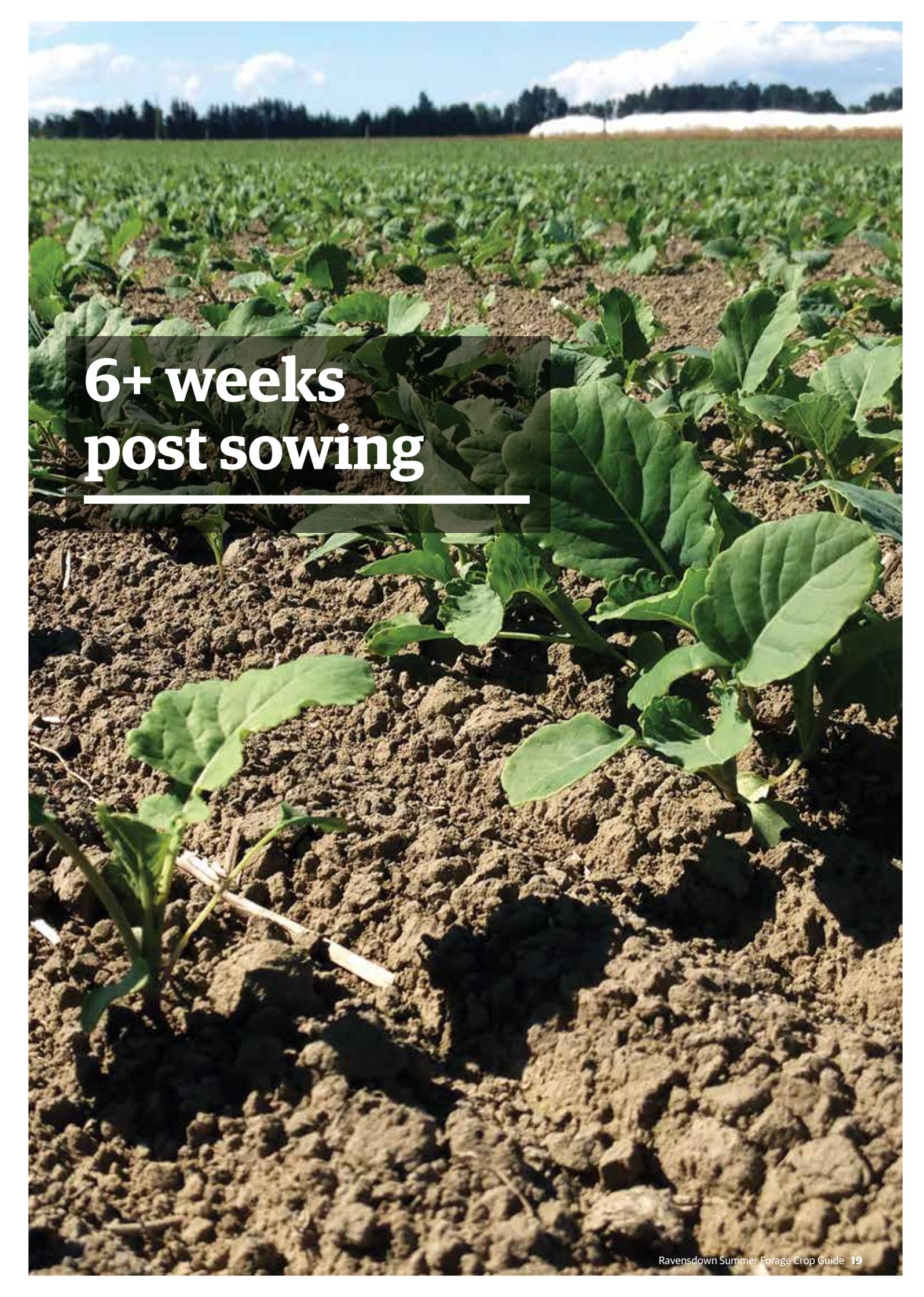
#### Cultural control:

- Cultivation

#### Chemical options:

- Halex<sup>cs</sup> at 40ml/ha with Widespread 1000 at 25ml/100L water, ideally in 200-300L of water per hectare





**6+ weeks  
post sowing**

# 6+ weeks post sowing

## Crop monitoring

Crop monitoring should be continued but at a less frequent interval. A weekly crop walk will identify any potential insect issues that may be occurring or about to occur. A seed treatment

only lasts up to six weeks, therefore chemical application will be required to control any insects present.

## Fertiliser

Side dressing(s) of coated urea should be applied depending on soil available nitrogen (N), crop type and yield expectations. N-Protect® should be applied at a minimum of 100kg/ha onto crops that have adequate soil moisture for growth. Further

applications may be warranted for kale, up to the end of March. Keep in mind nitrate poisoning in high N soils. Do not apply closer than six weeks to planned grazing.

## Damaging Insects

### Diamondback moth (*Plutella xylostella*)

- Adult moth is a small, slender, grey insect with a wingspan of 7-10mm. They do not cause damage
- Larvae are up to 7mm long and cause the damage
- Pupae are enclosed in loosely woven cocoons often found on the underside of leaves in the crop
- When disturbed larvae drop off leaves attached to a silk thread

#### Damage symptoms:

- Young larvae feed on internal leaf tissue causing white markings on leaves
- Older larvae feed underneath leaf surface
- Leaf has 'shotgun' appearance

#### Cultural control:

- None

#### Chemical options:

- Halex<sup>cs</sup> at 40ml/ha with Widespread 1000 at 25ml/100L of water, ideally in 200-300L of water per hectare

Repeat applications may be required if populations are high.



### Leaf miner (many species)

- Larvae are small, yellowish-green
- Similar to maggots in look

#### Damage symptoms:

- Larvae cause tunnels within the leaf tissue
- May reduce amount of photosynthesis carried out by the plant, hence yields are likely to be affected

#### Cultural control:

- Turnips are the most susceptible, however, only high damage is detrimental to yield
- Often the use of N in the autumn will encourage plant to grow through the damage

#### Chemical options:

- Refer to your agri manager for further information
- Often other insects need to be controlled at the same time, choose a suitable option from the table on page 21



# 6+ weeks post sowing

## Aphids (many species)

- Around 2mm long
- Can be yellow to dark green or grey
- Some are winged others are wingless
- Aphids will reduce crop yields and cause secondary virus infection as they are vectors (carriers) of brassica diseases

### Damage symptoms:

- Infest brassicas in large numbers
- Suck the sap reducing the plants available energy for growth
- Crop wilting
- Seen most during times of plant stress

### Cultural control:

- Some modern cultivars are more resistant to aphids

### Chemical options:

- Toppel 500 at 300-400ml/ha with Widespread 1000 at 25ml/100L water, ideally in 200-300L water/ha can give a useful clean up early in the crop
- Otherwise use predator friendly aphicides where possible, such as pirimicarb or sulfoxaflor



## Cabbage white butterfly (*Pieris rapae*)

- Caterpillars are dull green with small hairs
- 2-30mm in length

### Damage symptoms:

- Larvae feed on leaf leaving behind a skeletonised leaf with ribs remaining
- Flights of the adult white butterfly are warning signs for crop damage

### Cultural control:

- None

### Chemical options:

- Halex<sup>CS</sup> at 40ml/ha with Widespread 1000 at 25ml/100L water, ideally in 200-300L of water per hectare

Repeat applications may be required if populations are high.



## Other insecticides commonly used in forage and other crops.

Active ingredient	Brands	Mode of action group(s)	Comments
Permethrin + pirimiphos-methyl	Ambush™, Attack®	Group 1 + Group 3	Broad spectrum insecticide for control of a wide range of pests including; aphids, caterpillars, nysius and springtails in forage brassicas and other crops
Chlorantraniliprole + lambda-cyhalothrin	Ampligo®	Group 3 + Group 28	Broad spectrum insecticide for control of aphids, caterpillars, leaf miner and nysius in forage brassicas and other crops
Cyantraniliprole	Exirel®	Group 28 insecticide	For control of caterpillars, leaf miner and suppression of grey cabbage aphid in forage brassicas
Cyantraniliprole + pymetrozine	Minecto™ Star	Group 9 + Group 28 insecticide	For control of cabbage aphid, leaf miner, caterpillars and nysius in forage brassicas
Pirimicarb	Prohive™, Piritek®, Pirimor®	Group 1 insecticide	Carbamate insecticide for control of aphids in a range of crops
Spinetoram	Sparta™	Group 5	For control of springtails, nysius, caterpillars and leaf miner in forage brassicas and certain pests in other crops
Sulfoxaflor	Transform™	Group 4c insecticide	Predator friendly aphicide for aphid control and virus protection in a range of crops

A close-up photograph of a man with short brown hair, wearing a black jacket, looking down at a large, vibrant green leaf. He is wearing a black watch on his left wrist. The background is a field of similar green plants, slightly out of focus. The text "12+ weeks post sowing" is overlaid in white on a dark grey rectangular background in the upper left corner.

**12+ weeks  
post sowing**

# 12+ weeks post sowing

## Fertiliser

There may be a need / desire to apply another 100kg/ha of N-Protect 12 weeks post establishment. This will depend on the crop type, yield objectives and available soil N (known by soil test).

Whether or not N-Protect was applied at 12 weeks, it is highly advisable to apply the last side dressing of 100kg/ha of N-Protect 18 weeks post establishment (early to mid-March) for leaf brassica crops (ie kale). Excess N on bulb crops may change growth

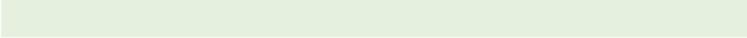
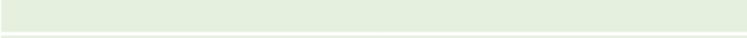
priority from bulb to leaf. An N application will set leaf crops up for winter and encourage one final accumulation of yield prior to the temperature cooling down.

Do not apply if grazing is commencing within six weeks after N application.

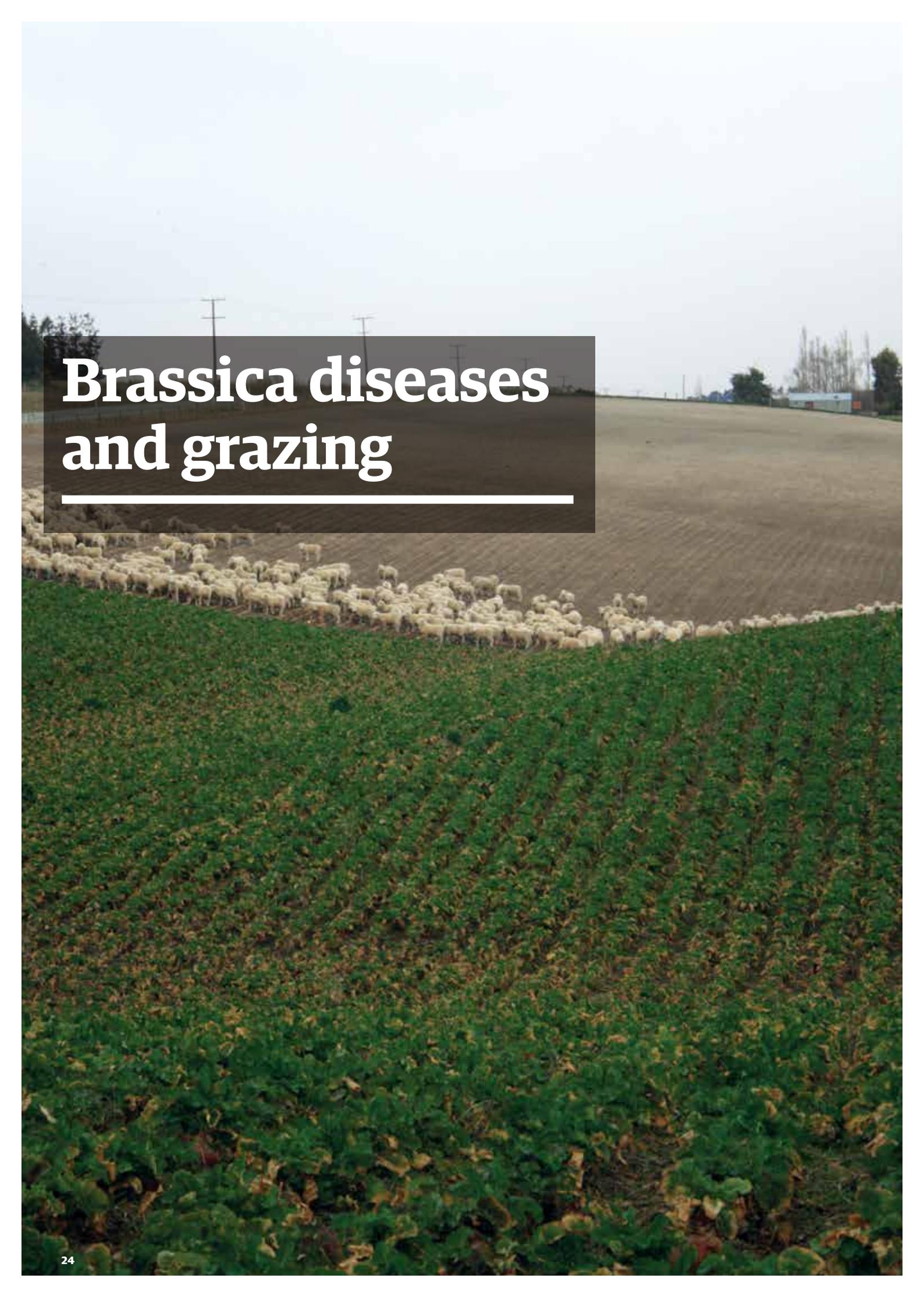
## Damaging Insects

Crop monitoring for insects is still required as insect numbers can rapidly rise to damaging levels if conditions are right (warm and dry).

Refer to the previous chemical options for insect control (see table below).

PEST(S) AND TREATMENT	SEEDLING TO YOUNG PLANT	MATURE PLANT OR REGROWTH
APHIDS - TOPPEL 500 AT 300-400ML/HA OR A PREDATOR FRIENDLY APHICIDE SUCH AS PIRIMICARB OR SULFOXAFLOR		
CATERPILLARS AND APHIDS; TANK MIX AN EFFECTIVE APHICIDE WITH HALEX <sup>CS</sup> OR SELECT A PRODUCT FROM THE TABLE ON PAGE 21		
CATERPILLARS AND LEAF MINER OR CATERPILLARS, APHIDS AND LEAF MINER SELECT A PRODUCT FROM THE TABLE ON PAGE 21 TALK TO YOUR RAVENSDOWN AGRI MANAGER		
DIAMONDBACK MOTH AND WHITE BUTTERFLY HALEX <sup>CS</sup> AT 40ML/HA		
LEAF MINER, OR APHIDS AND LEAF MINER SELECT A PRODUCT FROM THE TABLE ON PAGE 21 OR TALK TO YOUR RAVENSDOWN AGRI MANAGER		

The inclusion of Widespread 1000 at 25ml per 100L of water for all insecticide application is recommended to increase effectiveness.



# Brassica diseases and grazing

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# Brassica diseases

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## Clubroot (*Plasmodiophora spp.*)

- A fungal disease
- There are several strains of clubroot which are normally found on heavy soils

### Damage symptoms:

- Irregular swelling of the root systems
- Plants often appear wilted and stunted
- Leaves sometimes purple through plant stress

### Cultural control:

- Crop rotation and hygiene
- Clubroot is hosted on brassica species
- A non-brassica interval of at least six years is required once damage has been found
- The clubroot disease can be transferred through machinery, stock and water
- Tolerant brassica cultivars are available, however new strains of the disease develop quicker than plant breeding and may overcome tolerance

**Chemical options:** None



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## Dry rot (*Leptosphaeria maculans*)

- A fungal disease

### Damage symptoms:

- Brown lesions on bulbs normally around the neck region
- Leads to bulb rotting
- Can be seen in kale (Black Leg)
- Black lesions / spots on kale stem

### Cultural control:

- Crop rotation and hygiene
- If pressure was high in the previous year consider other forage options or more tolerant brassicas such as kale
- Non-brassica forages are recommended for six years post infection
- If paddocks become infested consider grazing first / early to realise crop yield prior to the bulbs dissolving from the rot

**Chemical options:** None



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## Powdery Mildew (*Erysiphe cruciferarum*)

### Damage symptoms:

- Extensive growth of white, powdery fungus on the upper and lower leaf surfaces
- Often more prolific in times of plant stress

### Cultural control:

- Crop rotation and hygiene
- Reduce crop debris
- Water and N

**Chemical options:** None

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**Please note:** Be careful not to confuse powdery mildew with downy mildew. Downy mildew cannot be controlled by tritfloxystrobin or cyproconazole fungicides. Phosphite can offer protection if applied early.



# Grazing brassicas

## Transition is vital

**It is always best practice to transition animals onto a diet if there is a significant change. Depending on the type of crop this could be over several days or up to two weeks.**

Animals should be introduced to brassicas and given adequate access to a fibre source such as mature pasture, hay, or straw. Ensuring animals are not hungry when they are put onto brassica crops will reduce the risk of gorging and subsequent health issues. Ensure stock have adequate levels of trace elements before grazing brassica crops; otherwise supplement them at an appropriate time during grazing.

Transitioning off brassicas is not as critical as transitioning onto brassicas, but doing this gradually is still best practice. This is not always easy to manage given grazing blocks are often mostly all crop, but just a few days transitioning would be sufficient. Feeding pregnant stock who are due to calve / lamb on brassica crops can lead to metabolic problems, so ideally transition back to a grass diet two weeks before calving / lambing.

As with crop establishment, close monitoring is required to ensure any animal health issues are noticed and treated prior to long-term damage occurring.

## Brassica nutritional analysis

The table below shows the average feed value of different types of brassicas.

Table 1: All values are expressed as percentage of dry matter. DM% = dry matter percentage; MJ ME = mega joules of metabolisable energy; DOMD = digestibility; CP = crude protein; ADF = acid detergent fibre; NDF = neutral detergent fibre; WSC = water soluble carbohydrate.

BRASSICA	DM%	MJ ME	DOMD	CP	ADF	NDF	WSC	LIPID	ASH	LEAF %	STEM / BULB %
BULB TURNIP	10.1	11.7	89	14.2	18.9	22.5	27	NA	10.4	55.4	44.6
KALE	17.3	11.2	77	9.7	23.5	28	33.4	2.1	7	28.7	71.3
LEAF TURNIP (1ST CUT)	13.7	13	86.7	22.6	13.5	15.6	19.2	4.8	11.1	72	28
RAPE	14.3	12.9	88.1	10.8	20.3	23.2	27.3	2.9	9.1	67.2	32.8
SWEDE	10.3	13.8	93.5	13.7	13.9	15.2	49.8	1.8	6.1	25	75

Adapted from: Westwood, C.T; Mulcock, H, 2012. Nutritional evaluation of five species of forage brassica, Proceedings of the New Zealand Grassland Association 74

## Potential animal health issues

### Nitrate / nitrite poisoning

#### Background

Excess nitrate levels can accumulate in the plant if growth and photosynthesis is reduced under certain climatic conditions (ie overcast / warm conditions often after a drought).

In the rumen, nitrate is normally converted through to nitrite, ammonia and ultimately to microbial protein. Nitrate poisoning occurs when excess nitrite causes a sudden and drastic reduction in the oxygen-carrying capacity of the blood (by converting haemoglobin to methaemoglobin).

#### Symptoms

Animals will start panting and gasping for air and will die very quickly (within hours) if not given emergency veterinary assistance. The likelihood of this disease can be reduced by letting the crop mature (and preferably test it) before feeding out.

#### Risk reduction

Introduce animals onto the crop gradually at short grazing periods initially, and feed an additional fibre source. Don't let hungry animals onto suspect feed and again, be vigilant.

# Grazing brassicas

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## Brassica Red-Water (also called SMCO poisoning, nutritional haemoglobinuria or kale anaemia)

### Background

Brassicas contain a sulphur-containing substance called S-Methyl Cysteine Sulphoxide (SMCO), which has the potential to damage animals' red blood cells. In general, the SMCO concentration increases as the plant matures, with rapid increases during flowering.

### Symptoms

Mild cases (SMCO intakes of 0.10-0.15g/kg live-weight per day) show a loss of appetite, poor growth rates, mild anaemia and digestive upsets. Severe cases (SMCO intakes of 0.18-0.35g/kg live-weight per day) have life-threatening anaemia, marked growth suppression, red-coloured urine ('red-water') and even death.

### Risk reduction

Affected animals should be removed from the crop, placed on pasture and if required, involve your local vet.

Limit nitrogen and sulphur fertiliser to what the crop requires. Also introduce stock onto the crop gradually, graze for limited periods initially, and feed an additional fibre source (eg hay, silage or straw). Do not feed flowering brassicas to animals unless they are accustomed to it and always be vigilant while they are on the crop.

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## Goitre (induced / secondary iodine deficiency)

### Background

Brassicas are typically low in iodine and contain substances called goitrogens (glucosinates) that block the uptake of iodine by the animal. Both factors can result in stock becoming iodine deficient, the most common symptom is offspring from these animals being born with enlarged thyroid glands in the neck.

### Symptoms

In sheep particularly, severe cases can result in lambing problems, with many stillborn or weak (and occasionally hairless) lambs and a poor lamb survival rate. Iodine deficiency can also cause subclinical reproductive losses.

### Risk reduction

Because iodine-amended fertilisers are of very little value due to poor plant uptake, ensure animals have sufficient iodine before grazing and supplement pregnant stock with iodine while on the crop.

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## Rape Scald

### Background

Rape Scald is usually seen in lambs being fed on immature or second growth rape or Leaf Turnip, but is also occasionally seen in dairy cows, and can affect any brassica crops. As a result, animals become severely sun burnt on exposed areas of skin (usually the face) following normal doses of sunlight. Occurrence is sporadic and unpredictable.

The exact cause is still uncertain, but an unknown substance (historically thought to be similar to SMCO) from the plant accumulates in the skin and causes the skin to become overly sensitised to ultraviolet light.

### Symptoms

Symptoms include swollen ears / face, shaking and rubbing at face, seeking shade. Occasionally red-water is seen. There is no specific treatment, but 'nursing' care and provision of shade is important. Rapid recovery is seen on withdrawal from crop.

### Risk reduction

The management of grazing rape paddocks is similar to that for prevention of SMCO.

1. Ensure rape has ripened with purpled edges on leaves
2. Limit nitrogen application to 20-40kg/ha at sowing time; use a follow up fertiliser if needed but do not apply within four weeks of grazing
3. Use a low sulphur fertiliser such as DAP or urea prior to sowing
4. Introduce rape slowly:
  - Run stock on the crop for one to two hours a day initially (about 20% of diet)
  - Build up to a maximum of 100% of diet by day seven to ten of introduction
  - Give supplementary feed such as straw while they graze
  - Alternatively allow the stock to have a pasture run-off paddock
5. Even once animals have adapted, continue to provide a supplementary high-fibre feed source (eg hay, straw or silage) to dilute any anti-nutritional factors.



# Summer turnips

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Summer turnip crops are a great tool to increase either milk production or live-weight gain in milking cows, sheep and cattle. They have the ability to grow extremely well in late spring / early summer and hold their feed quality and quantity when moisture is limiting over mid-late summer.



# Summer turnip guide

## Cost / benefit

In general terms it will cost \$1,200 - \$1,400/ha to grow a turnip crop, with average yields around 12tDM/ha achieved with this investment.

This equates to the cost of dry matter grown being between 10 - 11.7 c/kg DM of high-quality forage grown for feeding at times where pasture quality and quantity may be limiting animal production.

YIELD (kg DM/ha)	COST OF GROWING CROP (\$/ha)	COST OF DRY MATTER (\$/kg DM)
10,000	1,200	0.12
12,000	1,200	0.10
14,000	1,200	0.09

Ensuring accurate timing of both herbicide and insecticide application will increase the effectiveness of the application and increase yields.

## Area required

The area required depends on the yield objective of the crop, required grazing days and cow allocation. The below formula will help you calculate the required area of turnips to be sown per cow;

**Area required (per cow) = (Required Grazing Days \* Per Cow Allocation) / Crop Yield (kgDM/ha)** eg For a 12,000kg DM/ha turnip crop, with a daily allocation of 5kgDM/cow over 60 days, the area required per cow is 0.025ha, or 2.5ha per 100 cows.

If the area doesn't fit your paddock sizes, it is better to increase the area required rather than reduce it to fit as there will always be options to utilise the feed.

## Sowing

Sowing should occur when the soil temperatures reach 12°C and are rising, either broadcast or drilled. In light soils or if seed is roller drilled, the use of a Cambridge roller after drilling is advised to ensure good soil/seed contact and moisture is drawn up into the seed zone for faster and more even establishment.

Turnip seed should be sown at 2-3kg/ha. Treated seed is preferable to reduce the potential crop / yield loss from insect damage at establishment. Sowing depth is important when drilling; 10mm is the optimum, achieved with a roller or air drill.

Post-drilling it is recommended to spread slug bait onto paddock after the final roll.

Turnips establish well from mid-spring (October). The time of first grazing is the key driver behind when to plant. Turnips have different maturity dates so write down the timeframe when you want to start grazing, then take away one week (to allow for germination), then the crop maturity to get the ideal planting date.

## Grazing summer turnips

As with all brassica crops, when grazing turnips care should be taken to avoid nutritional disorders. This is because brassicas are low in fibre, high in sugars, and there are some toxic compounds found in brassicas that can potentially limit production or cause death.

The health issues that may arise with turnips include photosensitivity, nitrate poisoning, red water/SMCO poisoning, rumen acidosis, goitre, bloat, choke and recently reported acute interstitial pneumonia (AIP). Prevention to avoid these issues is ultimately the same. By strictly following the guidelines, then grazing summer turnips will ensure animals maximise summer production.

The most commonly seen health issue is photosensitivity due to glucosinolates which are present in higher concentrations in young plants, stressed plants, and during droughts. Glucosinolates are broken down in the rumen and the breakdown products affect the liver - the liver damage causes the visible signs of photosensitivity. Clinical signs are swollen face and ears, reddened skin on the udder, peeling of white patches of skin, irritability, kicking off the milkers, changes in behaviour, strange or erratic behaviour, or a drop in milk production.

# Summer turnip guide

## Prevention of stock health problems

- Introduce stock gradually to the crop to allow the rumen time to adjust - this can take up to seven to ten days. Offer a maximum of 2kgDM/cow/day or one hour grazing for the first five days. Increase to a maximum of 5kgDM/cow/day. Turnips should make up no more than 5% of the ration
- Additional fibre (eg mature pasture, hay, straw) should always be fed in conjunction with brassicas
- Ensure animals have a full gut before grazing the crop and do not allow animals to gorge. It is useful to give animals a new break in the afternoon rather than the morning, as nitrate levels are likely to be higher in the morning
- Choking is a risk in cows grazing turnips in summer, so it's important to ensure that the turnip crop is fully mature so that the bulbs are sufficient in size and are less likely to be swallowed whole
- Feed appropriate stages of the crop, ie do not feed flowering brassicas to animals unless they are accustomed to it. In the case of suspect nitrate levels, let the crop mature and preferably test it for nitrate prior to feeding
- Ensure stock have adequate levels of trace elements before grazing brassica crops; otherwise supplement them at an appropriate time during grazing
- Avoid any sudden changes in the diet
- Always be vigilant and remove animals showing any signs of ill health from the crop immediately.

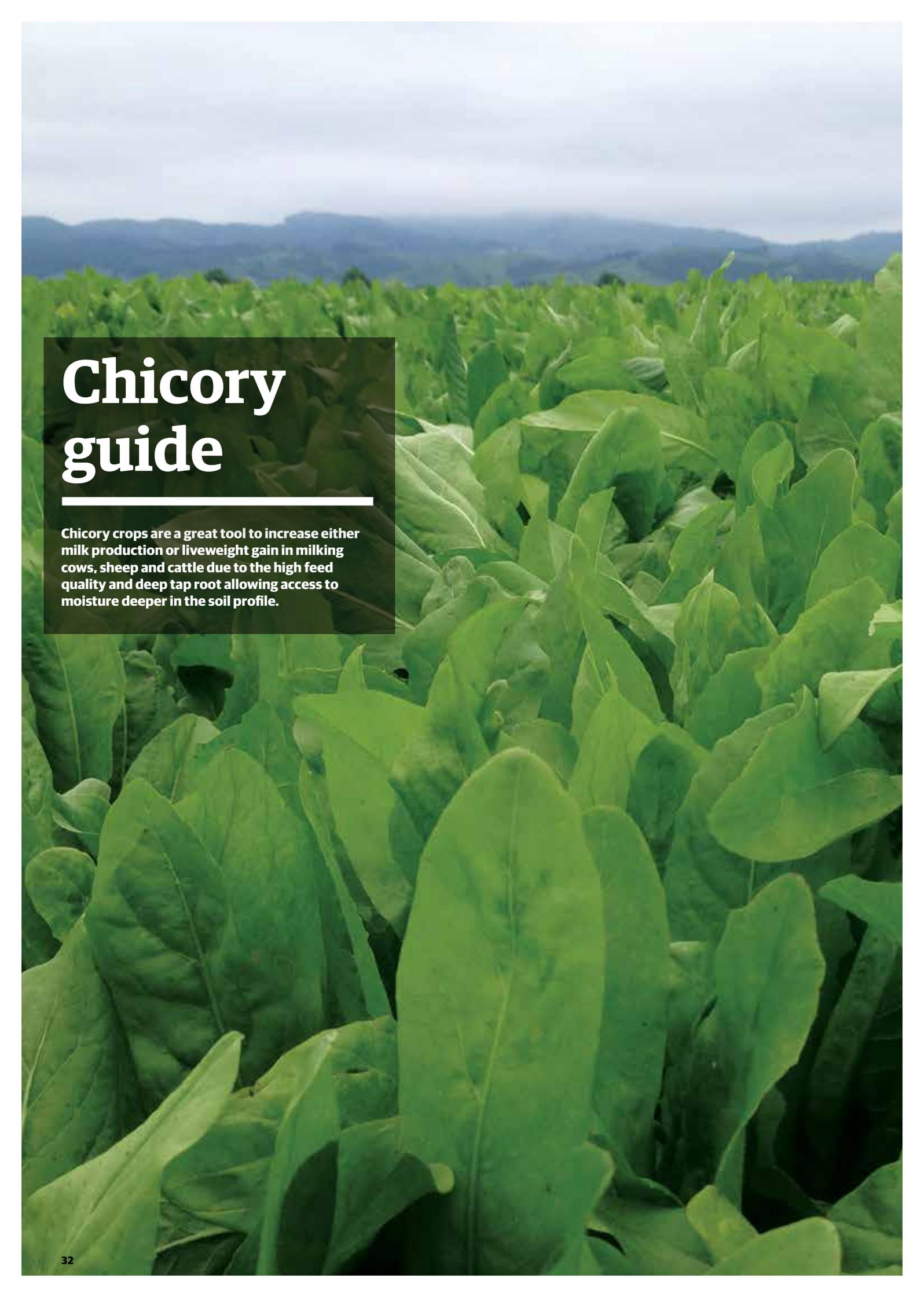
## Marco turnip system

Marco turnip is the shortest maturing turnip available at 55-60 days maturity, where other summer turnip cultivars are 60+ days, without affecting the yield of the crop. There are a number of practical advantages to this.

1. Reduced time out of pasture production
2. The option of getting two summer turnip crops from the same paddock in northern regions

3. Ability to sow Marco and a later maturing turnip in different paddocks at the same time to stagger crop maturity allowing maximum quantity and quality of grazed crop





# Chicory guide

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**Chicory crops are a great tool to increase either milk production or liveweight gain in milking cows, sheep and cattle due to the high feed quality and deep tap root allowing access to moisture deeper in the soil profile.**

# Chicory guide

## Cost / benefit

If you have a low use of imported summer feed, the use of chicory as a summer feed option will be profitable for you. Over summer periods the quality of ryegrass can drop, especially in dry / drought conditions, whereas the quality of spring sown chicory will range in quality from 11.5 – 13MJ ME/kgDM.

This lift in quality, combined with the increased production of chicory over the summer period can lift milk production by 17% over purely ryegrass based pasture (DairyNZ – chicory and plantain programme).

YIELD (6 MONTHS)	COST OF GROWING CROP (\$/ha)	COST OF DRY MATTER (\$/kg DM)
10	1,100	0.11
12	1,100	0.09
14	1,100	0.08

Ensuring accurate timing of both herbicide and insecticide application will increase the effectiveness of the application and increase yields.

## Soil requirements

Chicory will tolerate a wide range of soil types including sand, peat and silt loams although persistence on heavy clay loams or poorly drained soils will be poorer. Under heavy, summer moist soils, chicory will be able to grow extremely well over the summer/autumn period.

However the long-term persistency of the chicory stand will be adversely affected as the plant cannot handle long term waterlogging due to crown damage and tap root rots caused by

*Sclerotinia spp.* Therefore chicory should only be sown in heavy, moist soils if you are looking for a short term crop (1-2 years).

Under free draining soils chicory will perform very well allowing the tap root to grow unrestrained. While its summer / autumn growth may not be as high as in heavy soils, the long-term persistence of the plant will increase resulting in a high yielding crop that should persist for 3+ years.

## Optimum nutrient status for chicory

SOIL PH	OLSEN P	QT POTASSIUM	SULPHATE-S	QT MAGNESIUM
5.6 - 6.0	20 - 30 (sedimentary & ash) 35 - 45 (pumice & peat)	7 - 10	10 - 12	8 - 10

## Area required

The optimum total area in chicory over the spring / summer has been found to be between 20-30% of milking platform when the average crop yield was 11tDM/ha. If your average yields are higher this can be reduced.

The total area to be sown in a dairy farm situation depends on the amount of feed required for each cow per day. For every 100 cows, sow 1ha of chicory per kgDM/ha being fed – assuming a grazing rotation of 21 days over the summer period eg for 100 cows being fed 2kgDM/day, sow 2ha, for 100 cows being fed 4kg DM/day of chicory sow 4ha.

It may be an option to stagger planting date with different paddocks, two weeks apart, for a couple of reasons;

1. This time of year is when pasture is under most pressure. By taking a reasonable area out of the round we are putting pressure on pasture on the rest of the farm
2. When the first grazing comes around it is not all ready at the same time, so optimum feed value is obtained

# Chicory guide

## Sowing

Sowing should occur when the soil temperatures reach 12°C and are rising. Chicory establishes well from mid-spring (October) with first grazing possible by mid-December. In cooler environments eg Southland, November sowings will be better. Sowing depth is important; 10mm is the optimum and achieved with a roller or air drill. Chicory should not be sown after legume or brassica crops to avoid problems with Sclerotinia.

In specialist forages, chicory is sown at 6-8kg/ha in pure chicory stands and 4-5kg/ha together with large leaved white clover at 4kg/ha and red clover at 4kg/ha. Coated chicory seed will improve

germination percentage and seedling vigour. In addition to any capital fertiliser or lime that may be required 165kg DAP/ha should be sown at planting, avoiding any contact between seed and fertiliser.

In light soils or if seed is roller drilled, the use of a Cambridge roller after drilling is advised to ensure good soil / seed contact and moisture is drawn up into the seed zone for faster and more even establishment. It is recommended to spread Endure slug bait onto paddock after the final roll.

## Post sowing management

After sowing, carefully monitor the crop for weeds and insects. Flumetsulam (AIM) herbicides are safe to use on seedling chicory to control broadleaf weeds such as amaranthus (redroot), black nightshade, buttercups, chickweed, cresses, hedge mustard, wild radish, mallow, fathen, wire weed and cape weed (suppression only).

At 10-12 weeks after sowing a side dressing of 25kg N/ha should be made.

The time from sowing to first graze will depend on what the soil conditions are at the sowing and early stage of crop. The first grazing should be delayed until plants have reached the seven leaf stage where they are likely to be resistant to pulling. This should occur within 8-12 weeks given adequate soil moisture and temperature. The first couple of grazings may be whole paddock grazings to allow good establishment of the crop, after that break fencing can be made in proportion to the required animal allocation.

To ensure persistence of the stand, prolonged grazing with heavy set stocking should be avoided, as should high stocking rates during heavy rainfall. Rotational grazing is recommended for maximum animal and plant performance, aiming for a pre-grazing height of 20-25cm, with post-grazing residuals of around 5cm. Back fencing is recommended.

Over winter, grazing should be kept to a minimum, with only one or two light grazing's when the soil is firm. Specialty chicory pastures may be conserved with cuts made no later than mid-November producing excellent quality wilted silage.

Your local agri manager or Ravensdown agronomist can help you with the decision around what's happening with the paddock post chicory.

## Aim®

### For the selective control of broadleaf weeds in new and established pasture, chicory, clover, lucerne, and maize

- A clover friendly herbicide for broadleaf weed control in many situations
- Ideal for use in new and established pasture, chicory and lucerne
- Add to Pasture Guard® Nurture to improve weed-control in new pasture



**ACTIVE INGREDIENT:** flumetsulam 800g/kg  
**PACK SIZE:** 500g



## Maintenance fertiliser

- The actual rates required will depend on soil type, stocking rate, soil test levels and fertiliser history but a generalised programme would include:
- At sowing: 35kg N; 35kg P; 35kg K and 20-30kg S per hectare
- Early December: 20-25kg N/ha
- Late February / early March: 20-25kg N/ha (where autumn growth rates are good)

# Chicory guide

## Animal health

The feed value of chicory is very high, offering high amounts of minerals, energy and protein to grazing animals. In addition chicory is very high in beneficial trace elements such as zinc, copper and iron (see Table 1).

Table 1: Mineral Analysis: Chicory, Perennial Ryegrass and Lucerne (Summer).

ELEMENT (PPM)	CHICORY	LUCERNE	PERRENIAL RYEGRASS
Calcium	0.9 - 1.3	1.8 - 2.0	0.25 - 0.3
Copper	13	7 - 10	6 - 7
Iron	300	100	25 - 30
Magnesium	0.28 - 0.44	1	0.16 - 0.2
Manganese	210 - 400	50	50 - 300
Phosphorus	0.3 - 0.5	0.3	0.35 - 0.4
Potassium	2.6 - 6.9	1.0	2.0 - 2.5
Sulphur	0.5	0.2 - 0.3	0.3
Zinc	66 - 117	15 - 20	14 - 20

(NSW Agriculture, Reme Soils Goulburn and Ag Research New Zealand)

As with most rapidly growing forages, nitrate poisoning can occur under certain environmental conditions (high N uptake but cool cloudy conditions) and if in doubt perform an herbage nitrate test before feeding off. The high energy content in chicory can cause pulpy kidney in lambs and these or any at risk animals should be revaccinated before grazing this crop for any length of time.

Chicory can cause bloat in early spring, however, in dairy situations, the use of break feeding reduces this risk.

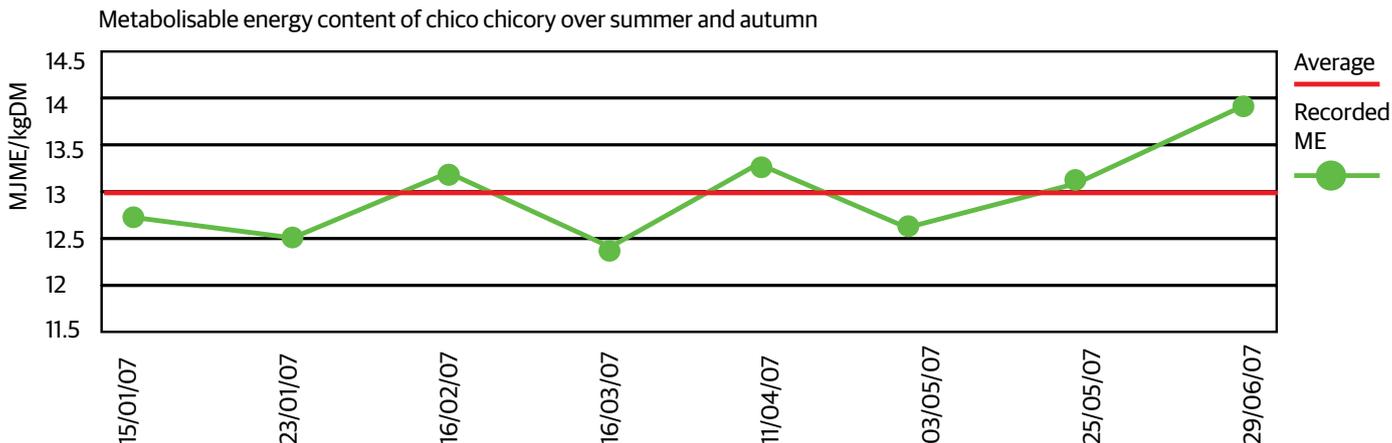
# Chicory guide

## Trial results

**Figure 1:**

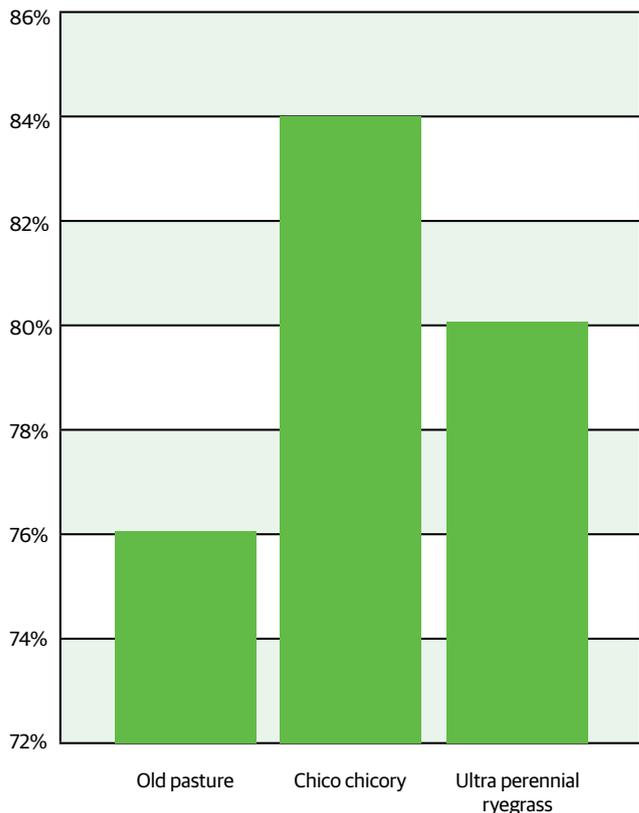
MJME/kgDM of chico chicory from samples taken at Paterangi, Waikato Jan - June 2007.

ME analysis conducted by NZLABS Ltd, Ruakura Research Centre, Hamilton.



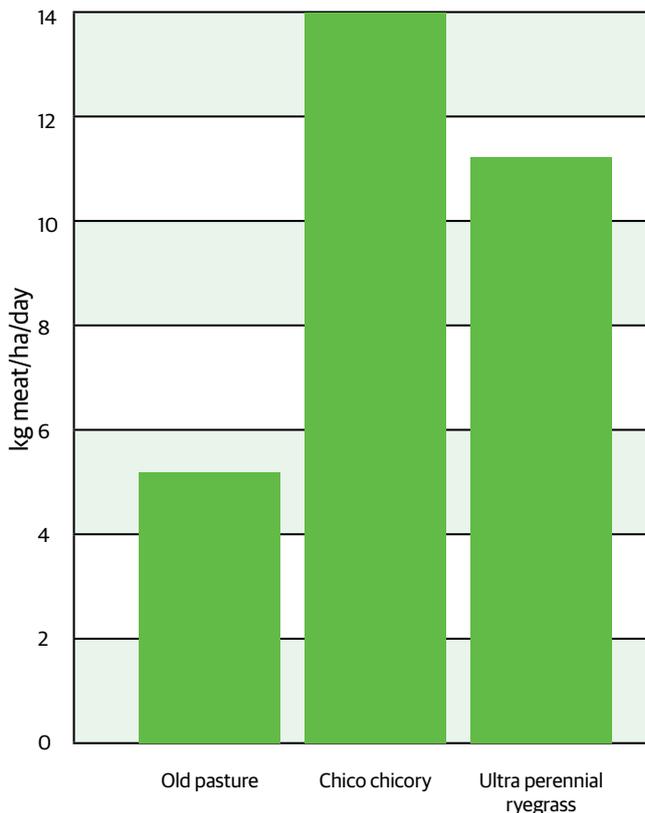
**Figure 2:**

The percentage of lambs that reached 44kg after 28 days of grazing for each type of forage typed. Animal trial work conducted jointly by Cropmark Seeds and Alliance Group Ltd, Gore, 2011.



**Figure 3:**

The total volume of meat (kg meat/ha/day) grown using different forages. Animal trial work conducted jointly by Cropmark Seeds and Alliance Group Ltd, Gore, 2011.



# Agronomy planner

NOTES				
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