Catalyst
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BEST PRACTICE WINTER GRAZING GUIDE

Contents

Introduction

During the winter months a feed deficit develops, and this is attributed to cooler temperatures causing pasture growth to reduce and/or stop, depending on the region. Farmers must put plans in place to ensure they have enough feed during this period to adequately feed stock. The most common means for achieving this is to sow forage crops (kale, fodder beet and swedes) during spring, with intention of them being ready to use during winter. These crops provide bulk and quality feed at a low cost in comparison to feeding supplement.

In recent times, winter grazing has become highly topical within the media and farming landscapes. Farmers and farm consultants are expected to provide animals with adequate feed whilst ensuring their methods comply with animal welfare obligations and environmental regulations, all while trying to generate profit. Increased negative attention towards the farming community around winter feeding has prompted a requirement to demystify exactly what 'best practice' winter grazing is and means.

As an overview, best practice wintering can be achieved with good forward planning of a suitable site to grow a crop. Feed budgeting, paddock layout plans, correct transitioning and good staff communication are all factors that impact the success of winter feeding. In an adverse weather event, both animal welfare and environmental welfare must be prioritised in order to achieve the desired results whilst complying with best practice.

This document will endeavour to provide the knowledge and tools you need to plan and execute a successful winter feeding system.

Paddock Selection

This is one of the most important decisions a farmer or farm manager will make regarding best practice wintering. Decisions following this will all be based around the chosen site, so it is imperative to get this right at the outset.

Table 1 (below) provides insight into what an ideal cropping site is, and what it is not. If a site has more than one of the high-risk factors outlined here, consideration should be given to identifying an alternative site. Careful consideration at this early stage will significantly impact the outcome. Environmental damage and animal welfare issues must be mitigated and this also starts with paddock planning.

The chosen site needs to allow for a space to transition animals, especially in high-yielding crops such as fodder beet. A run-off paddock next door to a fodder beet paddock is a practical way to run animals on and off a crop once they have consumed allocation for the day. This also provides a space for animals to be moved to in order to minimise soil damage during an adverse weather event.

You may choose to lift fodder beet and begin transition while animals remain on grass. This allows for space once animals move onto winter crop fully.

In line with paddock selection, a winter grazing management plan must be done. This will highlight the practical implications of the chosen paddock. An example winter grazing management plan can be found at the end of this document.

Figure 1: CSA fenced off to exclude stock and protect the waterway.

Factor	Good Paddock Conditions	Not Ideal Paddock Conditions	High-Risk Conditions
Slope**	Flat (<7°)	Rolling (7–15°)	Steep (>15°)
Soil Type	Light*	Medium	Heavy#
Winter Rainfall	Low	Medium	High
Waterways	None	Alongside paddock	Within paddock
Critical Source Areas (CSAs)	None	Drain to grass	Drain to waterway
Shelter Available	Yes	Very little	No
Paddock History (soil fertility and weed and pest)	Good fertility and no weed and pest issues	Fertility OR weed and pest issues	Fertility AND weed and pest issues
Ease of Management for Staff	Multiple access points and easy access to reticulated water		One access point and no reticulated water
Stock Water Source	Water trough – permanent or temporary	Stock water race	Ponds and streams
Wetlands	No wetlands present	Wetlands that may be fenced off	Wetlands that cannot be fenced off

Table 1: Factors influencing cropping site selection (Adapted from Dairy NZ, (n.d.))

*'Light' soils have low risk of pugging but have a higher potential risk for N loss if/when a drainage event occurs.

#'Heavy' soils are prone to pugging in high rainfall events, but lower potential for N loss if/when a drainage event occurs.

** The NES-F stipulates that the mean slope of the paddock that is used for intensive winter grazing must be 10 degrees or less without obtaining a consent.

Critical Source Areas and Waterbody Protection

Critical Source Areas (CSAs) have high potential for seepage, runoff and poor drainage due to lack of soil porosity. Areas, for example, where water run-off flows into gullies and swales (low-lying areas). They are areas in the paddock where, in the middle of winter, cows can be sighted up to their bellies in mud while grazing if they are not managed correctly. Depending on the slope towards the CSA, implementing a suitable buffer at grazing time could still enable the paddock to be cropped. If there is any doubt in suitability, select a different paddock for cropping.

Stock wintering in close proximity to a waterway presents an environmental risk of contamination to waterways via run-off from sediment, P and faecal runoff. Waterways must be protected from these contaminants. Strategies to mitigate/eliminate sediment runoff to waterways include;

- **Permanent fencing and riparian margins**

  A riparian is a strip of land adjacent to a waterway which is protected by a permanent fence. Riparian margins should accommodate the waterway in high flow events. Waterways that are more than 1 metre across during median flow require a riparian margin to be not less than 3 metres.

- **Temporary grass buffer strips**

  Buffer strips work by slowing surface flow and allowing water to infiltrate the soil, trapping sediment prior to reaching the waterbody. To be effective, the grass buffer needs to be proportional to the flow and volume of run-off it intercepts. These grass buffers are to be fenced off and left undisturbed. Often a grass buffer will be required in addition to an existing riparian margin.

- **Permanent structures (sediment traps)**

The size of the buffer strip or method of mitigation will vary depending on the individual paddock situation and environment (Amuri Irrigation Company, 2020). Riparian and buffer margins along waterways and CSAs must be adequate. As a minimum farmers are required to comply with any regional or national rules.

Where possible, select paddocks for winter cropping that are a greater distance from a waterbody or wet area, to reduce likelihood of contaminant reaching the waterbody (Environment Canterbury Regional Council, 2020).

Paddock Selection (continued)

Slope

National Environmental Standards for Freshwater (NES-F) requires that paddocks used for intensive winter grazing have a mean slope of 10 degrees or less, unless a consent is obtained (Parlimentary Counsel Office, 2020).

A flat site for cropping is ideal – there is little to no run-off of sediment and nutrients into waterways. As slope increases, so does the chance for run-off into waterways. If your chosen site does have slope, aim to graze down the slope, top to bottom (strategic grazing). The crop acts as a buffer, filtering and slowing overland flow. This will reduce the level of overland flow that reaches any CSAs at the bottom of the slope. It must be considered, stock will be grazing downhill, so a steeper slope could present issues with animals slipping over or bulbous feed rolling out of animal reach, thus affecting feed intake of the animal.

Soil Type

Heavier soils, like pallic soils, are more susceptible to treading (Paton, 2005) and structural damage leading to greater potential for overland flow. On the contrary, lighter soils are prone to nitrogen leaching (Beef and Lamb New Zealand, 2018).

Flat areas are well drained with deeper soil profile and have a reduced risk of overland flow. In some regions there is a strong emphasis on reduced nitrate leaching. In these situations, paddocks should be selected where soils are not so light that they present increased risk of nitrate leaching.

In other regions, sediment and phosphorous (P) losses are of greater concern. In these regions, paddocks with poorly drained soils and/or sloping land should be avoided. Local regional councils are the best source for specific advice on your region's targets (Beef and Lamb NZ, 2019).

High rainfall during the winter is conducive to greater soil damage and sediment/nutrient run-off during feeding. Soils become saturated and overland water flow increases. This is exacerbated on heavier, poor draining soils.

Shelter Availability

The Animal Welfare Act (1999) requires stock to have access to adequate shelter and protection from all weather. Existing shelter belts can be utilised if there is enough space for all animals to seek shelter when required. It is important to think ahead; if there is not sufficient shelter in the paddock, look to identify a paddock somewhere close by that animals can be moved to while any adverse weather passes. A tree block or standoff paddock with trees are examples of alternative solutions (Dairy NZ Ltd, 2020).

Ease of Management

This requires a forward-thinking approach to managing stock during grazing time, and a close look at the overall practicality of the proposed paddock plan in order to ensure it is practical for strategic grazing and able to be safely and efficiently implemented by staff. In the event of an adverse weather event, if stock needs to be removed from the paddock (for reasons mentioned above), consideration should be given to whether this can be done with minimal soil damage.

Other factors to consider include identifying whether there is more than one access point to the grazing face and whether staff can manage grazing breaks easily around CSAs. If there is only one access point, soil may become pugged and subsequently structurally destroyed due to stock treading and heavy machinery travelling in and out.

Fodder beet crop with face fence and catch fence.

FARMER TIP

Square bales can be used in an emergency to create a wind break for animals to shelter; this is more effective for smaller animals such as sheep and calves, and in smaller mob sizes.

Paddock Layout and Fencing

Long, narrow breaks (as opposed to wide breaks) improve utilisation of feed due to a reduction in trampled feed and better access for all stock to the feed face (Dairy NZ, 2013). When sowing the paddock, consider leaving a strip in grass to allow extra space for animals when they are initially moved onto the paddock (at least 1 m^2/cow at the feed face).

Animals should be strategically grazed from top to bottom of slopes to reduce sediment run-off (Beef and Lamb NZ, 2019). Again, paddock layout should be determined in advance to grazing time and, ideally, at paddock selection time. Grazing directions should be planned around CSAs and subsequent back fencing and catch fences.

It is important to ensure the site must have good electricity to prevent stock from breaking out. Animals that break out onto feed are at risk of becoming sick and dying, particularly in transition periods. To minimise risk of whole paddock breakouts, a catch fence should be erected in front of the day break fence. This will form the following day's break.

Power levels should be checked daily for faults and corrected if there is not sufficient power to keep stock in. Hot post standards are useful if there are animals in the mob pushing on standards. These will help to prevent fence standards from becoming dislodged. A backup generator should be on farm so that in the event of power loss to fences, the generator can be used to provide power until the main source is restored.

Planting direction

Precision sown crops, such as fodder beet and swedes, should be planted in the direction that is practical to graze, i.e. so that mobs can be allocated to specific rows that are parallel with the break fence, as rows are easier to allocate than metres. Grazing intakes of animals may be compromised in driving rains so where possible set drill rows to graze north (Gibbs, 2016). This simple method of crop allocation is described in more detail under Feed Allocation.

Back fencing and CSAs

The back fence should be moved at least once a week, if space allows, to reduce stock movement around the paddock. This reduces severity of soil structural damage (Dairy NZ Ltd, 2020) (Monaghan, 2017) and spreads nutrients evenly over the grazing area.

CSAs are required to have a buffer/riparian strip at least 5 m either side of the CSA which is fenced off to exclude stock from entering the CSA (Parlimentary Counsel Office, 2020). As the slope of the site increases, so should the buffer size. This increases the area to filter sediment and overflow from grazed land (Dairy NZ Ltd, 2020). The buffer zones prevent stock from accessing CSAs. If lifting crop, like fodder beet, do not lift near a CSA as this will leave bare ground susceptible to erosion and sediment loss into the CSA.

Feed Budget

A feed budget should be done prior to spring planting to plan for the following winter. This indicates how much crop should be planted relative to stock units intended on wintering. The calculation to determine required feed for winter needs to include stock wintered; target feed level; duration of feeding period; predicted crop yield and crop utilisation (Judson, 2010); and supplement and transition period. Another feed budget is done late summer/autumn prior to winter to ensure enough feed is on hand to take stock comfortably through the winter. Yield tests should be carried out to determine how much crop is available.

From there, further supplement or crop may be purchased if necessary. The earlier this can be done, the better prepared a farmer or farm manager will be for a successful winter (Dairy NZ Ltd, 2020). Catalyst Performance Agronomy, Beef and Lamb NZ or Dairy NZ can all provide assistance with feed budgeting.

Feed Allocation

Crop allocation is key to improving wintering outcomes – industry production targets and good animal welfare. Incorrect crop allocation often results in animals consuming less or more than their targeted DM intake. It is critical to accurately assess paddock yield, paddock sizes and break widths to achieve target daily DM intake. As an example, a 1 metre reduction in break size (in kale) can reduce allocation by as much 2 kg DM/cow/day. Consider using a measuring wheel when allocating crop break sizes.

Variability in crop yield across the paddock can make this difficult but an accurate crop average with corresponding grazing days and break sizes will help to reduce daily allocation variability (Judson, 2010). Below is an example of crop allocation. Note: It does not include the remainder of the cow diet, silage and straw.

Fodder Beet Allocation Example		
Paddock Dimensions	=	500 m long x 200 m wide – 10 ha
Crop Row Spacings	=	0.375 m
Crop Yield	=	25 t DM/ha
Stock	=	400 MA Jersey Fresian x dairy cows
Average Cow Weight	=	450 kg LWT
Daily Feed Requirement	=	14 kg DM/d eaten
Fodder Beet Ration/Cow/day	=	10 kg DM
Fodder Beet Utilisation	=	95%
Total Available Feed	=	Crop Yield (kg DM) x Paddock Size (ha)
	=	25,000 × 10 ha
	=	250,000 kg DM
Kg DM/row	=	(Paddock Length (m) x Crop Row Width (m)) x (Crop Yield (kg DM/ha)/10,000 m^2/ha)
	=	(500 × 0.375) x (25,000/10,000)
	=	469 kg DM/row
Mob Daily Feed Requirement	=	400 cows x (10 kg DM/Crop Utilisation 95%)
	=	4,211 kg DM/d
Fodder Beet Row Allocation/d	=	4,211 kg DM/d/469 kg DM/row
	=	9.0 rows
Number of Days on Paddock	=	Total Feed Available/Total Daily Feed Requirement
	=	250,000/4,211
	=	59 days

	DM %	Crude Protein %	NDF %	WSC %	MJME/kg DM
Fodder Beet Average	14–20	9–14	11–16	50–70	12–12.5
Beet Leaves (Tops)	12–13	19–23	30	10–12	11
Beet Bulb (Low DM)	10–13	9–11	15	65	11.8–13
Beet Bulb (High DM)	15–20	10	11	70	12.2–13
Swedes	10.4 (7.8–13.9)	11.9 (8.5–15.1)	21.3 (15.5–29.5)	45–50	11.6 (10.4–13)
Kale	14.2 (11.2–16)	13.1 (6.1–17.7)	27.1 (18–48.2)	35–40	11.5 (8.8–13.7)

Table 2: Feed composition of common winter feed crops with means and ranges. Adapted from Rattray, P.V (2007) and Dairy NZ (2013).

"We introduce our cows to beet during milking, starting in mid-March and slowly building to 5 kg DM/cow/day, and continue feeding beet through dry off. This has two main benefits – reducing the amount of silage required and reducing the risk of acidosis."

WESTERFIELD, CANTERBURY

Supplementary Feeding

Supplements are used to offset feed shortages and/or to nutritionally complement a winter crop.

Table 3 below provides examples of nutrient composition of different supplementary feeds for reference.

Ideally test supplementary feeds to gain accurate nutritional information.

Protein Requirement of Stock

Protein is a requirement in the diet for synthesis of body tissue, milk, wool, enzymes and hormones. An animal has a maintenance requirement for protein to maintain normal body function. An increase in protein is required when an animal is pregnant, lactating, producing fibre and for liveweight gain. Protein is supplied in the diet as crude protein (CP). CP is a combination of true protein and non-protein nitrogen (NPN) compounds (Rattray, 2007).

As illustrated in ***Table 2 above***, fodder beet contains between 9 –14% CP, kale averages 13.1% CP, and swedes average 11.9% CP. Thus, fodder beet and possibly swedes may not always contain enough protein to support maintenance and growth of the grazing animal. To increase CP intake of the animal and to support growth and pregnancy of the grazing animal, quality supplementary feed must be provided to stock. Protein levels in fodder beet becomes further compromised in mid-late winter when leaf has deteriorated and represents a low proportion of the animal diet, or when fodder beet has been harvested and tops removed. We can expect CP levels to be at the lower range of 9% during this time unless leaf is maintained.

As described above, a given allocation of feed does not necessarily mean an animal is consuming a nutritionally balanced diet. In Table 4 below, several examples are used to show how a change in supplement and fodder beet top-to-bulb ratio can influence protein levels in the diet.

Continued over page.

Supplement Type	DM %	CP% of DM	WSC% of DM	NDF% of DM	MJME/kg DM
Pasture Silage/Baleage	36.1 (15.9–66.3)	15.4 (10.0–23.0)	6.4	48.4 (34.4–59.2)	11.1 (9.6–12.5)
Maize Silage	36.1 (29.4–43.6)	7.0 (5.4–8.2)	3.1 (1.8–4.6)	40.9 (30.8–51.0)	11.1 (10.3–12.4)
Oat Silage	36.7 (34.5–39.0)	12.1 (8.9–13.9)	16.0 (8.5–23.5)	56.5 (48.1–69.1)	10.2 (8.5–11.2)
Barley Silage	34.7 (26.0–48.1)	10.5 (7.9–14.1)	6.1 (4.0–8.2)	47.7 (34.2–59.9)	10.5 (9.2–12.1)
Wheat Silage	42.8 (34.4–56.7)	9.9 (7.5–11.50	7.6 (3.3–15.0)	49.2 (35.9–60.4)	10.0 (8.4–11.8)
Triticale Silage	42.4 (31.3–66.7)	9.3 (4.9–13.6)	7.6 (3.3–15.0)	54.0 (36.1–68.9)	9.9 (7.7–11.8)
Ryecorn Silage	47.3 (39.5–52.0)	8.6 (5.7–10.2)	10.6 (10.6–10.6)	71.4 (68.9–75.5)	8.1 (7.0–9.3)
Lucerne Silage	46.7 (24.2–67.1)	20.7 (14.3–25.6)	6.3 (1.3–11.2)	39.7 (31.7–50.4)	10.0 (8.1–11.6)
Barley Straw	86.9 (81.2–90.9)	4.5 (3.0–7.7)	2.0 (1.6–2.5)	73.8 (67.1–79.6)	6.5 (4.7–7.0)
Ryegrass Straw	88.8 (86.0–93.4)	4.6 (2.6–7.9)	6.5 (1.1–19.0)	67.9 (59.6–78.9)	8.6 (7.8–9.3)

Table 3: **Nutrient composition of supplementary feeds, means and averages.** *Adapted from Rattray, P.V.(2007).*

Supplementary Feeding (continued)

Using an adult dry dairy cow as an example, with a requirement of 12% dietary CP (Dairy NZ , n.d.), a ratio of 10 leaf:90 bulb, allocated at 10 kg DM with 4 kg DM supplement, is not sufficient to meet the protein needs of the animal. As the leaf-to-bulb ratio increases, overall dietary CP% increases above 12%. Good crop husbandry will help to achieve greater leaf yields. This also highlights the importance of knowing the feed value of the forage crop being used as well as feeding high-quality supplement in the diet on top of this, in order to increase CP where required. As Table 4 indicates, there is a possibility that kale and swede can fall below the desired CP level, so it is important to be aware of this and increase supplement when necessary. This becomes even more necessary when grazing young stock and rising two-year-old in calf heifers – these animals require between 14 and 15% dietary CP.

Note: Forage crop and supplements can vary in their MJME and CP content depending on environmental factors and crop nutrition. Average parameters have been derived from Tables 2 and 3 for the below example.

Feed Mix Ration	Kg DM	MJME/kg DM	Total MJME Consumed	CP%/kg DM	CP g/kg DM	CP %/kg DM
Kale	11	11.5	126.5	13.1%	1.441	
Barley Straw	3	6.5	19.5	4.5%	0.135	
	14		**146**		**1.576**	**11.3**
Kale	12	11.5	138	13.1%	1.572	
Barley Straw	1	6.5	6.5	4.5%	0.045	
Pasture Silage	1	11.1	11.1	15.4%	0.154	
	14		**155.6**		**1.771**	**12.65**
Fodder Beet Tops (30%)	3	11	33	21.0%	0.63	
Fodder Beet Bulbs (70%)	7	12	84	10.0%	0.7	
Pasture Silage	2.5	11.1	27.75	15.4%	0.385	
Barley Straw	1.5	6.5	9.75	4.5%	0.0675	
	14		**154.5**		**1.7825**	**12.7**
Fodder Beet Tops (20%)	2	11	22	21.0%	0.42	
Fodder Beet Bulbs (80%)	8	12	96	10.0%	0.8	
Pasture Silage	2.5	11.1	27.75	15.4%	0.385	
Barley Straw	1.5	6.5	9.75	4.5%	0.0675	
	14		**155.5**		**1.6725**	**11.9**
Fodder Beet Tops (10%)	1	11	11	21.0%	0.21	
Fodder Beet Bulbs (90%)	9	12	108	10.0%	0.9	
Pasture Silage	2.5	11.1	27.75	15.4%	0.385	
Barley Straw	1.5	6.5	9.75	4.5%	0.0675	
	14		**156.5**		**1.5625**	**11.2**
Swedes	10	11.6	116	11.9%	1.19	
Pasture Silage	2	12	24	15.4%	0.308	
Barley Straw	2	11.1	22.2	4.5%	0.09	
	14		**163.1**		**1.697**	**12.1**
Swedes	10	11.6	116	11.9%	1.190	
Barley Straw	2	11.1	22.2	4.5%	0.090	
	12		138.2		1.280	10.7

Table 4: Example of how crop and supplement allocation influence crude protein (CP) and megajoules metabolisable energy (MJME) intake in a 450 kg LWT adult JxF dairy cow consuming 14 kg DM/d. Total CP %/kg DM required in a dry cow diet is 12% (Dairy NZ , n.d.).

Supplementary Feeding (continued)

Feeding Supplement

In wet areas like Southland, baleage should be placed out in the paddock on respective daily breaks prior to winter while conditions are dry. A fair yield estimation of the crop yield is determined. Baleage is then placed out on the daily breaks according to this. This method reduces requirement for a tractor in the paddock each day to feed supplement, therefore reducing soil degradation (Dairy NZ, 2013). When stock are grazing, an alloy bale feeder may be rolled onto the next bale. Wrap, string or netting are then removed and disposed of. This should not be left in the paddock as animals will eat it.

In drier regions, bales should be fed out in feeders and moved every day close to the break. This reduces stock foot traffic up and down the paddock and excess nutrients compiling in the one place. Enough feeders should be provided so all animals have equal access to supplementary feed.

If feeding silage out with a wagon, this should be fed along the fence – prior to stock moving onto the break or under the back fence – to improve utilisation of silage.

Mineral Supplementation/Animal Health

Winter feeds are low in specific nutrients required for maintenance, growth and pregnancy of the animal. Mineral supplementation of animals prior to going onto winter crop and while animals are grazing is recommended. A vet or nutritionist should be consulted where necessary to get relevant recommendations for a specific farm system.

Fodder Beet

Fodder beet is very low in phosphorous (P) in some regions. P supplementation is of particular importance in dairy cattle to reduce incidence of downer cows and in young growing stock (particularly hoggets and yearling cattle). Phosphorous is required in the body for a number of functions, the main ones being bone strength, prevention of metabolic diseases, the maintenance of pregnancy and milk solids production.

Commonly used products for P supplementation are DCP and specially formulated fodder beet loose licks. DCP may be spread over the crop or mixed in with supplement as a slurry. Supplementation should begin prior to animals moving onto fodder beet and continue while stock are on crop and into early lactation when demand is greatest.

Other nutrients required are magnesium and, in some lower sunlight areas, Vitamin D. Some loose licks will provide these nutrients. It is important to check the contents of the loose lick being used to ensure animals are being supplemented adequately.

Molasses blocks are easy and practical to use. Better quality products will contain adequate P and other nutrients if the animal consumes them at the correct dose each day. Issue being the variability of animal intake. Not all animals will consume their daily requirement of mineral which can then lead on to metabolic troubles.

Downer cows are a result of poor mineral supplementation compounded over several winters and milking seasons. Adequate supplementation to restore minerals – with a large emphasis on P – will reduce incidence of downer cows and will also increase in calf rates and animal performance. Other stock classes should also be supplemented to ensure adequate intake of P and protein – this is particularly important in young stock; hoggets, weaner deer and yearling cattle. Prior to transitioning stock onto fodder beet, ensure they are up to date with clostridial and salmonella vaccinations.

Brassicas

Brassicas provide quality feed, but they can lack specific minerals that an animal needs to perform and grow. Selenium and copper can be administered via injection, drench or copper bullet. Iodine in brassicas is also low. This can be exacerbated by glucosinolates contained in brassicas that reduce the effectiveness of iodine utilisation by the animal. In lamb ewes can be given an iodine injection such as 'Flexidine' prior to going on to winter crop. Drenches can be used which contain iodine, otherwise dosatrons and loose licks are a useful way of administering minerals while stock are on crop.

Phosphorus and magnesium are not as critical as in fodder beet though they may be supplemented as previously mentioned. Speak with a vet to determine an animal health programme that works with your farm system.

Example to determine CP %/kg DM in the diet using kale with straw as supplement. Figures taken from Table 4.		
Kale Intake kg DM/d	=	11 kg DM
Barley Straw Intake kg DM/d	=	3 kg DM
Total Feed Intake kg DM/d	=	14 kg DM
CP g/kg DM kale	=	Kale Intake x CP % DM
	=	11 × 13.1%
	=	1.44
CP g/kg DM Barley Straw	=	Straw Intake x CP % DM
	=	3 × 4.5%
	=	0.135
Total Consumed CP g/kg DM	=	Kale CP g + Barley Straw CP g
	=	1.44 + 0.135
	=	1.575 g/kg DM
Diet CP %/kg DM	=	Total Consumed CP/Total Feed Intake
	=	1.575/14
	=	11.3%

Note: This example does not provide the required CP to support an adult dry dairy cow as described above.

Transition onto Winter Crop

Transitioning stock onto winter crop allows the bacteria in the gut of the animal to adjust from the usual grass-based diet to winter feed. Animals that are poorly transitioned may suffer injury to the gut that can lead to long-term season losses, and death in severe circumstances. Care must be taken to ensure it is done correctly (Dairy NZ, n.d.) (Beef and Lamb NZ, 2013).

Before beginning transition of stock onto winter crop, it is important to know how much feed is in the paddock animals are transitioning onto. This way there is certainty as to how many kilograms of dry matter (kg DM) stock are being fed at a given time. It highly recommended to have paddock yield tested (Beef and Lamb NZ, 2013). Farmers and farm managers should know their stock numbers, paddock size, length and consequential crop allocation per animal. Nitrate levels in brassicas should be checked prior to putting animals on to determine safety of the crop and adjust management to suit.

Ensure stock are full prior to being allocated winter crop for the day. This can be achieved by feeding out supplement or allocating grass before putting on a winter feed break. This ensures stock are not hungry and cannot gorge themselves on the crop alone. Providing roughage to stock increases salivation, which buffers acidity in the gut and also helps prevent acidosis, particularly in fodder beet. Throughout transition after crop allocation, adequate baleage/straw should always be provided for animals to graze on. This will keep stock content and reduce pressure at the feed face.

Brassicas

- Transitioning of cattle onto brassicas such as kale, swedes, turnips and rape may be done over a period of 7–10 days.
- If the crop is of very high quality, run animals off after 1–2 hours grazing, back onto pasture or feed out silage or baleage.
- Repeat this process daily, increasing the crop allocation by 15–20% of the desired total allocation every second day until animals have reached their full crop allocation.
- Feed cattle a maximum of 80% crop and the remainder as supplement.
- Sheep should consume 10% of their total daily diet as supplement (PGG Wrightson Seeds, 2019/2020).

Fodder Beet

R2 and Mixed Aged Cattle

- Transition onto fodder beet will take longer, 14–21 days, be patient and do it correctly.
- Begin by feeding stock 1 kg DM/day at the beginning of transition with 8 kg DM palatable supplement or pasture.
- Increase crop allowance by 1 kg DM every second day and reduce supplement allocation accordingly. By the end of transition cattle will have access to 8–12 kg DM of crop and 2–4 kg DM (Beef and Lamb NZ, 2013).
- Through transition always feed supplement out first and allow animals 2–3 hours for animals to fill on supplement before allocating crop.

R1 Calves

- Begin feeding calves on 0.5 kg DM fodder beet and 4.5 kg DM quality supplement or pasture.
- Increase allocation of fodder beet by 0.5 kg DM every second or third day, adjust supplement accordingly.
- By day 21 calves can be fed ad lib fodder beet (4–5 kg DM) with quality supplement at 1 kg DM (Anexa Veterinary Services, 2020).
- As above, feed supplement out prior to allocating crop for calves to fill on.

Sheep

- Transition of sheep on to crop is less vigorous than with cattle. It may be done over the course of a week. Run sheep on to crop from a pasture paddock. Ensure they a full prior to going on to crop. Provide quality baleage. In lamb ewes require supplement to provide adequate protein in the diet. Shift breaks daily so they are consuming both bulb and leaf, maintaining ufficient CP intake.

Deer

- Run on and off crop for two hours for one week and then lock on to crop. As above, ensure they are full of baleage or pasture prior to going on to crop. Provide quality supplement throughout feeding.

Continued over page.

“Beet utilisation can be improved by cultivating the grazing ground to make bulbs fully accessible especially when the ground is hard. Care must be taken not to over allocate when doing this and it may be safer to wait until the stock are fully transitioned.”

LISMORE, CANTERBURY

Transition onto Winter Crop (continued)

What to look out for

While transitioning animals onto winter crop, stock should be monitored for signs of stress. Poor doers should be watched out for and all stock should be observed eating, with none off feed. Once the fence has been shifted for the day, animals should be checked on within half an hour to ensure they have settled in. This is the time to spot any animal that is not transitioning well onto feed. Any animals, particularly on beet, that are not going on to eat their allocation are at risk of gorging themselves on a daily ration greater than their individual transition phase.

If they continue to behave in this way, they should be removed and fed on grass for the remainder of the winter, or a mob of slow-transitioning animals can be grazed on crop separate to the main mob.

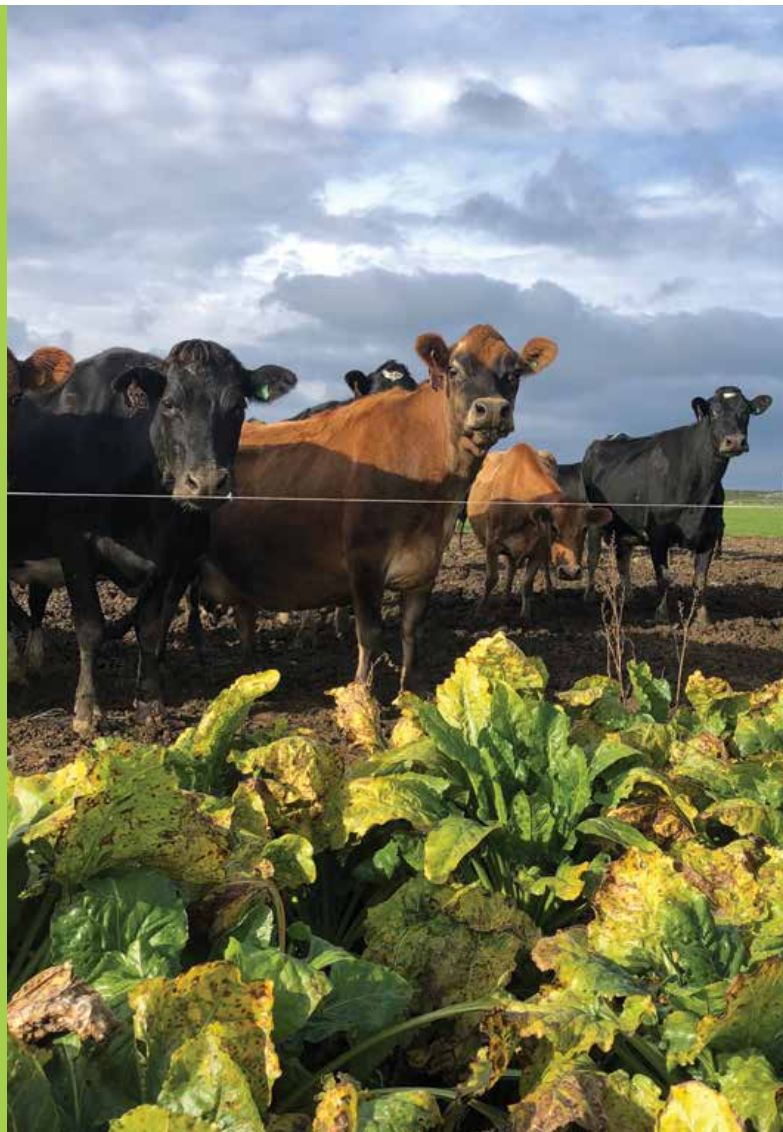
Animals that have not had previous exposure to crop are more cautious towards a new feed, which is contrary to those animals that have previously grazed on the crop and transition quickly. Avoid boxing these animals together at transition.

The face fence should be checked at the end of the day for loose standards. If necessary, standards can be stepped back away from the crop to reduce pressure and likelihood for a breakout. This can serve as another opportunity to check how stock are doing and look for any signs of stress. Crop residue left behind should be taken note of as it may be necessary to adjust feed allocation if there is too much wastage.

For further information on brassicas, the 'Forage Options' (2020/2021) booklet is available on the PGG Wrightson website (refer to References on Page 35). It contains valuable information around animal health and wellbeing of stock whilst grazing on brassicas.

FARMER TIP

Some operations will lift fodder beet and begin to feed and transition animals onto fodder beet while they are still on pasture. This allows animals to move onto winter crop semi transitioned. This also provides space for animals when they are initially moved onto the winter crop.



Feeding once Transitioned

Feed allocated to the animal will not be the same as animal intake. Utilisation of the crop must be considered as a proportion of the crop will never be eaten. Roots, leaf material and lower-quality stem, particularly in kale crops, will be left behind or trampled into the ground by stock. Knowing this, the feed allocated to stock must be proportionately more than what the feed demands of the animal is (Dairy NZ, 2013). Depending on weather conditions, utilisation of crops as stated by Beef and Lamb NZ, 2013 are as follows:

- Kale – 50–90%, typically 80%.
- Swedes – 60–85%.
- Fodder Beet – 90 – >95% (utilisation can be increased after grazing by cultivating the paddock to bring up bulb buts for further grazing).

When a frost occurs overnight on crop, wait for it to melt before putting stock onto their daily break. This reduces risk of nitrate poisoning, particularly on brassica crops. Supplement can be fed out prior to allocating crop if frost looks to continue into the day to prevent stock gorging.

When moving stock to a new paddock, new yield and DM tests should be obtained for the paddock, with feed allocations altered to suit test results. Results can often vary between paddocks, varieties and areas of the farm. Feed allocation can be reduced to ensure stock do not get an over-allocation of feed. This can soon be altered once animals have settled in.

As mentioned above, the face fence should be continually checked at the end of the day and any loose fences and standards fixed. Stock should be continually monitored once transitioned.

Transition Off

Transition off winter crop to allow microbial population in the rumen to adjust from crop to a grass-based diet once again.

Below are recommendations for best practice:

Brassicas

Transition over a one-week period. The allocation of crop is reduced over the week and supplement or grass allocation is increased. This will prevent short-term production loss.

Fodder beet

Transition off fodder beet should be done as animals were transitioned on, but in the reverse order.
The animals' allocation of fodder beet should be reduced, and supplement or pasture intake increased. Animals may be removed from the crop entirely when allocation is just 2 kg DM/day of crop.

The Animals' Winter Experience and Management

Taking good care of animal health and wellbeing over the winter months is essential.

A successful wintering plan will take into consideration the experience of the animal as well as financial, environmental and practical aspects of the plan. Poor animal welfare can, and will, have negative effects on an animal's long-term production and, in some scenarios, the welfare and productivity of offspring.

Animal welfare must therefore be front of mind while preparing a wintering plan. It is the farmer's ultimate responsibility to take care of their stock. Some things to consider as set out by the Winter Grazing Taskforce:

- Animals giving birth in mud.
- Avoidable deaths in adverse weather events.
- Mass mortality events in winter grazing systems.

These three factors are attributable to management issues and are therefore avoidable. They should never happen in any farming system.

- Lying time – Provision for animals to lie down and rest comfortably for as much time as they need. The welfare code requires a minimum of eight hours lying time per day. (Dairy NZ, n.d.) (Ministry for Primary Industries , 2019).
- Ability to move animals, if required, to a sheltered area in adverse weather events before any suffering occurs.
- Clean and fresh water conveniently available.
- Access to a balanced diet to keep animals warm and prevent acute or chronic malnutrition and metabolic disorders.

The above four factors should always be available to animals. Immediate action is required to ensure they are all met.

As stated in the Winter Grazing Taskforce document, these are the absolute minimum required standards to meet Animal Welfare Codes.

Farmers should aim to do better than these minimum standards to avoid animal welfare issues in the future. Future farming systems will need to be developed to avoid negative welfare issues and promote positive welfare stories.

Stock Water

Water availability is a requirement stated in the Animal Welfare Act (1999). Stock must always have fresh, clean water available. Although stock may be feeding on high water content feeds such as swedes and fodder beet, water availability is still a requirement.

Ideally, portable troughs should be used and moved at least weekly, close to the feed face. This reduces stock movement and prevents unnecessary soil treading. If possible, portable troughs should be moved along a side fence rather than over grazed land.

A portable water trough should be secured to the fence, or fixed in place with waratahs to prevent stock from moving it around. Bending the ball cock arm downwards will prevent the trough from overfilling and overflowing. This also assists staff when moving the trough (Dairy NZ, n.d.). Troughs may be cleaned when shifted to maintain good water quality. Concrete portable troughs can be used and are more durable than plastic troughs. They may be moved with lifting chains.

Hydrants in the stock water system for access to pipe water to movable troughs is a great way of simplifying water access and reduce distance animals are required to walk to get water while on winter crop.

In some circumstances (hill country), water may not be available by trough. Where stock access water from streams, they must not cause pugging, slumping or erosion. There must be no change in water colour and clarity (Dairy NZ Ltd, 2020).

Adverse Weather Events

In adverse weather such as a snowstorm or continual rainy and windy days, an animal's requirement for feed will increase due to an increase in energy demand to keep warm. Ten percent more feed should be allowed for in the feed budget for these events in order to prevent a shortfall.

Two days leading up to, and while there is poor weather, stock feed allocation should be increased by 10% (Dairy NZ Ltd, 2020). To improve crop utilisation, it may be necessary to shift the fence twice in the day to reduce feed wastage.

To minimise environmental impact in extremely wet circumstances, it is often advisable that stock finish grazing their break for the day before being moved out of the paddock to a sheltered area with supplement. They may go back to the paddock when their next feed allocation is due.

Alternatively, stock can be removed from the paddock entirely until the weather has passed.

In this case, there may be a crop paddock elsewhere on the farm that is more sheltered and less prone to pugging and soil damage that animals can be shifted to.

If animals are removed off crop entirely for a number of days, animals should be re-transitioned back onto crop once the weather has improved (Beef and Lamb NZ, 2019).

Post Grazing – Catch Cropping

Once animals have finished grazing the paddock, a catch crop should be planted as soon as conditions allow. Back fencing while stock graze will help speed this process.

The main purpose of a catch crop is to utilise and mop up any excess nutrients in the soil, mainly nitrogen (N), which being highly mobile in the soil is susceptible to leaching through or over the soil profile.

This has the potential to then reach ground water and waterways causing pollution (Dairy NZ, n.d.). Following a crop of kale, there may be as much as 300 kg N sitting there that will be lost if nothing is sown to capture this (Beef and Lamb NZ, 2019). The most effective catch crops are cereals, such as oats. They are winter active with robust rooting systems and will establish with greater success in cooler ground conditions. Annual and Italian grasses may also be planted, but success is varied.

Catch crops should be sown as early as possible following winter feeding to allow for greater opportunity to catch excess nutrients before they leach below the rooting zone.

A catch crop such as oats may be harvested in October/November and has the potential to yield as much as 8–10 t DM/ha (Beef and Lamb NZ, 2019) – a significant amount of feed grown off an area that would otherwise provide no additional feed/productivity.

For further information on catch cropping, the Foundation for Arable Research (FAR) has a useful document, 'Forages for Reduced Nitrate Leaching – Catch Crops' available to view online.

Essential Freshwater Rules/National Environmental Standard for Freshwater (NES-F) – Intensive Winter Grazing

The Government announced new essential freshwater ('Action for Healthy Waterways') regulatory requirements and rules on the 5 August 2020 (Beef and Lamb New Zealand, Federated Farmers, 2020). These rules cover stock exclusion from waterways and intensive winter grazing (IWG) with the aim to stop further degradation of freshwater and improve water quality (Environment Canterbury Regional Council, 2020).

These rules will be implemented by local regional councils. Information below is only relevant to IWG, there may be other laws relevant to your farming operation. For more information relating to the wider NES-F refer to the Ministry for Environment. The following information was retrieved from Beef and Lamb New Zealand and Federated Farmers, 2020.

Intensive winter grazing (IWG)

Grazing stock on a forage crop, 1 May to 30 September, in any one year is permitted where the following standards can be met; Hill country farms (land over 10 degrees slope, and farms which are unable to meet the permitted activity standards will need a resource consent by 1 May 2021).

To be a permitted activity the following standards must be met;

- No more than 50 ha or more than 10 percent of the property, whichever is the greatest.
- The cropped paddock has a mean slope of 10 degrees or less.
- The cropped paddock is set back by 5 metres or more from waterways.
- Pugging is not deeper than 20 cm. Pugging covers no more than 50 percent of the paddock, regardless of depth.
- Paddocks are resown by 1 October (1 November in the Otago or Southland regions). All winter cropping is to be resown as soon as practicable.

OR

- The activity has a Certified Freshwater Farm Plan.

If the activity is not permitted, you will need to apply for a resource consent from your regional council. If you intend to increase your winter grazing area from what occurred between the years 2014 and 2019 you will also need to apply for a resource consent.

Note: The Government has made the decision to delay the IWG rules until May 2022. Rules preventing the expansion of IWG will still apply. The Government will work with industry stakeholders over the next 12 months to develop a farm plan module that is ready for formal incorporation into the wider certified freshwater farm plans in 2022 (Rural News, 2021).

Local Council Regulations

Environment Canterbury

Environment Canterbury has strict rules in place throughout Canterbury that requires farmers to manage environmental effects from their farming operation. This includes those caused by winter grazing. The NES-F apply in addition to Environment Canterbury's rules and requirements. These are the main things that farmers in Canterbury need to consider:

- **Implementing Good Management Practices**

  This should be front and centre for all farmers when planning and carrying out winter grazing, and it is also a requirement in the Canterbury Land and Water Regional Plan (LWRP). Industry bodies such as Beef+Lamb and Dairy NZ have plenty of guidance on how to identify environment risks and how to manage the effects of winter grazing.

- **Farming Land Use Consents**

  Some farms will require a farming land use consent; however, the trigger for consent can differ between zones throughout Canterbury. The trigger is generally a nitrogen loss limit, or based on the amount of winter grazing or irrigation that is on farm. 'Winter grazing' has a smaller definition for this purpose and only includes cattle being break-fed on certain crops over a certain period. Farming land use consents include a nitrogen loss limit for a farm as well as the requirement to have a Farm Environment Plan (FEP) that is independently audited. Some farms will be managed under an Irrigation Scheme and will not require this. All farms that do not require a consent, do require an FEP to be considered a permitted activity.

- **Have a plan for winter grazing**

  A winter grazing plan should be prepared as part of the FEP to better identify and manage the risks related to winter grazing. Winter grazing plans are expected to be addressed in FEP audits as part of documenting good management practices.

- **Stock access to waterways**

  'Intensively farmed stock' cannot access the bed of a river, lake or wetland without a resource consent. This includes all dairy cows, farmed pigs, cattle and deer grazed on irrigated land, or contained for break-feeding on winter feed crops. The rules also prevent other stock from causing pugging and/or sediment loss to water where there is a change in water quality or clarity. There are also certain sensitive areas, such as freshwater bathing sites, drinking water protection zones and salmon spawning sites, that all cattle, deer and pigs are prohibited from accessing. There may also be zone area specific restrictions, so it is advisable to double check the rules that apply to a particular property.

- **Discharges of sediment or drainage water**

  Sediment and/or drainage water must be managed with good management practice to mitigate risk of discharge into waterways. There are also specific rule requirements that may need to be met.

To learn more about rules that apply specifically to a particular farm, the Farming Rules page on the Environment Canterbury website is a good source of information. For further advice, a Land Management Advisor from Environment Canterbury can be reached on 0800 324 636.

Local Council Regulations (continued)

Otago Regional Council

There are rules about intensive grazing in Otago's Water Plan, which are designed to protect waterways and are based on good management practice. These the rules are outlined in Plan Change 8*.

If you can answer "yes" to the following questions, you do not need a resource consent for intensive grazing:

- Is the area of intensive grazing the lesser of 100 ha, or 10% of the total landholding?
- Does the area of intensive grazing avoid any critical source areas?
- Are stock break or block fed from the top to the bottom of a slope?
- Is a vegetated strip of at least 10 m maintained between the area of intensive grazing and any water body?

You may also be able to continue intensive grazing without a consent under existing use rights, provided you continue grazing on the same scale with the same effects you have previously.

If you cannot meet all the conditions listed above, you'll need to apply for a simplified resource consent to undertake intensive grazing in 2021.

There is a cost of $200 for these resource consents. Consents will be issued for the period up to 1 November 2021.

Anyone who is unsure if they need a consent is encouraged to get in touch with our Consents Team on 0800 474 082 or by emailing public.enquiries@orc.govt.nz for help.

** Note that the rules in Plan Change 8 are subject to change through the Environment Court process.*

Environment Southland

The NES-F came into effect on the 3rd September 2020. The following regulations combine Environment Southland and NES-F regulation criteria. If you cannot meet one or more of the below criteria, then you need to apply for a resource consent. The following information was retrieved from Environment Southland Regional Council, 2021.

- The areas to be intensive winter grazed on farms up to 333 ha is no more than 15% of the farm.
- The area to be intensive winter grazed on farms between 334 ha and 999 ha is no more than 50 ha or 10% of the farm whichever is greater.
- The area to be intensive winter grazed on farms over 1,000 ha is no more than 100 ha.
- A farm Environmental Management Plan is prepared and implemented in accordance with Appendix N of the proposed Southland Water and Land Plan.

- Either a 20 metre vegetated and stock excluded strip is maintained from the outer edge of the bed of a lake, river, artificial watercourse, modified watercourse, or natural wetland; OR the following practices are implemented:
  - Break-feeding from top to bottom of a slope, or 20 m last bite strip is left.
  - Back-fencing cattle when break feeding.
  - Transportable water troughs in or near area being grazed.
  - Portable feeders if supplementary feed is being used.
  - No more than 120 cattle or 250 deer in a herd.
  - CSAs are grazed last.
- Stock are excluded with vegetated strip of at least 5 metres from the bed of a lake, river, artificial watercourse, modified watercourse, or natural wetland regardless of whether there is any water in it.
- Stock must be kept at least 5 metres away from any other type of wetland, drain (including subsurface drainage), or ephemeral river (regardless of whether there is any water in it).
- Intensive winter grazing does not occur within 20 metres of a regionally significant wetland, sensitive water body, estuary or the coastal marine area.
- Mean slope of the paddock is 10 degrees or less.
- Pugging (hoof penetration of soil to a depth of 5 cm or more) is no deeper than 20 cm at any one point (other than within 10 metres of a gate entrance or fixed water trough) and any pugging must not be more than 50 percent of the paddock.
- Paddocks are replanted as soon as practicable, or by 1 November.
- Land on the farm must have been used for IWG between 1 July 2014 – 30 June 2019, with no more than the maximum area of that grazing being used on the farm for future IWG.

For further advice a Consent Officer from Environment Southland can be reached on 0800 76 88 45 or email service@es.govt.nz.

Winter Grazing Management Plan (WGMP)

Sourced from CG Ag Practical Farm Planning

Farm name:		**Prepared by:**	
Paddock:		**Date:**	

** Draw plan of paddock here with features.*

Step 1: Draw an outline of the paddock	Symbol or Complete (tick)
Paddock number	
Note map direction (e.g. North arrow)	
Mark on obvious features	
Indicate any slopes	
Direction of prevailing wind	

Step 2: Identify risk areas/ paddock features	Symbol or Complete (tick)
Critical source areas and slopes (not to be cultivated)	
Soil Type	
Drainage	
Waterways and wetlands	
Gateways	
Troughs	

Step 3: Plan	Symbol or Complete (tick)
Direction of cultivation	
Cultivation type	
Direction of grazing	
Buffer Zones	
Critical source areas (CSA's) that are to be strategically grazed	
Baleage placement	
Portable troughs	
Back Fence	
Front grazing fence	
Catch fence (tomorrows grazing fence)	
Shelter	
Crop Type	
Ungrazeable Areas	
Paddock History – Soil fertility	
Paddock History – Weed/Pests	

Grazing Plan		
Paddock name		
Paddock Size		ha
Measured crop Yield		tDM/ha
TOTAL FEED GROWN		tDM
No. of stock grazing		
Feed allocation		kgDM/cow/day
Straw		kgDM/cow/day
Silage		kgDM/cow/day
Crop supply		kgDM/cow/day
Crop face length		m
Crop yield		kgDM/m^2
Area required		m^2/cow/day
		m^2 TOTAL
Break width required		m

We make sure all cows transition well by:

If we see a sick or lame animal or a cow that has slipped/aborted, we:

If several of the herd/mob are sick, our farm policy is to:

And quickly phone:

When stock graze a steep downhill slope, we alter feed allocation to:

Snow:

Rain:

Wind:

In an adverse weather event where the mud gets too bad for stock to lie down, we execute our Plan B:

To keep ourselves safe and well, we:

To make sure our stock are well fed, we:

To make sure our stock can lie down, we:

We check all of our stock have feed every day by making sure all stock come to the feed face when a fresh break is offered.
We make sure all our stock get the right amount of crop and roughage every day by:

We make sure all our stock have water every day by:

Winter Grazing Management Plan (WGMP)

Post Grazing Plan
Planned crop rotation and timing:
Planned finish date of grazing:
Crop to follow winter grazed crop & planned sowing date:
In an adverse weather event where the mud gets too bad for stock to lie down, we execute our Plan B:
Notes:

Adapted from DairyNZ template & B&L Fact sheet.

Summary

Given the environmental and animal welfare attention surrounding the topic of winter grazing at present, it is imperative that improvements are diligently made in this space.

Much of this can be achieved through good planning. Paddock plans and feed budgets allow farms and the people involved to be well prepared for winter grazing, thereby reducing the likelihood of any animal welfare and environmental issues occurring throughout the season.

Beef and Lamb and Dairy NZ provide numerous valuable resources and are all armed with the right information to help ensure all farmers are conducting winter grazing in a manner that adheres to all environmental and animal welfare regulations, without compromising profitability in the process.

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Acknowledgements

Catalyst Performance Agronomy would like to acknowledge and thank those who have assisted in bringing this document together;

Charlotte Westwood – PGG Wrightson Seeds
Environment Canterbury
Environment Southland
Otago Regional Council
Cameron Burton – Milk Map Consultancy
Mark Everest – Macfarlane Rural Business
Chris Gibbs – CG Ag
Nina Jaine – Gateway Vets
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