



LUCERNE

**SUMMARY PAPERS FOR
ESTABLISHING AND
MANAGING LUCERNE**



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LUCERNE FOR LAMBS: EXAMINING THE RESULTS 2010-11

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FINDINGS FROM 2010-11

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CONSISTENCY

With lucerne we can plan at the start of the season and predict our stocking rate much better than we can with dryland pasture. We can use the available soil water at the end of winter and the average rainfall to set a reasonable standard.

Lucerne gives us a consistent high lamb growth rate (average 310 g/d over two years) and, along with a predictable stocking rate (approximately 10 ewes/ha) means that output per hectare can be optimised and predicted.

Grazing on lucerne means that ewes are weaned at good weights and in good condition, making summer management easier.

Ewes are in a more consistent condition (90-95% over BCS 2.5), lowering our need to put intensive management on the ewes to maintain good reproductive performance.

TOTAL PRODUCTION

Dryland lucerne provides 4 to 5 times the lamb production per hectare than dryland grass, while still using the same water resource (300-400 kg lamb weaned/ha compared to 80-135 kg lamb/ha).

Dryland lucerne gives a similar output of lamb weaned as irrigated pasture. Lucerne/grass mixtures give a result in between dryland grass and lucerne, so the decision to use mixtures needs to be second to the use of pure stands.

The use of dryland lucerne provided the opportunity to reduce stocking rate on other pastures to improve the performance of those sheep.

PLANNING

The ease of using a grazing rotation calculator and an estimate of potential growth provides a good forward planning tool to ensure a good result from spring grazing of lucerne.

Dryland pasture relies too much on rainfall, so becomes much harder to predict and plan.

Irrigated pasture provides a much more reliable resource, but comes at significant cost.

The compromise of water use by adding grass to lucerne means that it is harder to gain the greatest productivity from lucerne/grass mixtures, and creates less certainty when planning.

The Lucerne for Lambs programme is about investigating the impacts of changing some of our management practices with lucerne to see what

the effects on the whole farm system might be, and how we might fill the gaps that may arise from those changes.

With a predominant use of lucerne being to help fill the winter feed deficit, then practices revolve around making hay first when yield is more assured, and grazing second, if the season allows. This programme looks at the benefits of grazing first. How we cost-effectively fill the winter feed gap is approached in other ways, for example, by increasing the amount of lucerne to meet both hay-making and grazing requirements, by using strategic irrigations of crops, or by making sure all lambs are sold early and so all autumn growth is available for ewes, rather than finishing stock.

Planning in spring was done using a grazing rotation planner to estimate how much lucerne would grow and set the stocking rate in advance. This allows a consistent approach because we can predict how much lucerne will grow based on the soil moisture and estimated rainfall for spring.

RESULTS

This year we have had results collected on 6 farms (three of which were included in last year's results). The farm types and farm systems employed were very diverse so provided a wide range in opportunities for lucerne. These farms ranged from Maniototo, Ida Valley, to Upper Clutha. They also had dryland pasture, irrigated pasture, lucerne/grass mixes and lucerne alone. Ewes were Merino, Crossbred, Corriedale and Polwarth,

with some terminal sires being used. The farms also ranged in size from the typical valley floor property with some irrigation at approximately 400 ha, through to large runs over 4000 ha. Average annual rainfall also varies from 350 to 600mm.

While every farm is different, the results allow us to provide some robust outcomes that can be generally applied. Once the results are interpreted by individual farmers then the way the results may be applied can be determined.

EWES STOCKING RATES FOR THE FORAGE TYPES

Stocking rate varied across the region and farming types. The lowest stocking rate of 1.2 ewes/ha was on dry foothill country on native pasture, and was lower than normal as the remaining ewes were able to be transferred to lucerne at tailing. Stocking rates on the lucerne varied depending on soil depth and available water holding capacity.

On average the stocking rates were lowest on dryland pasture (2.6 ewes/ha) and increased by over a factor of two on the lucerne/grass mixtures (6.0 ewes/ha) and by nearly four times on both the lucerne (10.6 ewes/ha) and irrigated pasture (10.0 ewes/ha).

The dryland pasture was lower than the 2009/10 season for two reasons. On one farm the dry cool late spring meant that some pastures were destocked at this time in preference for grazing on lucerne/grass mixtures (Farm 5). On another, the use of lucerne was used to actively lower the stocking rate on the dryland pasture (Farm 1).

The lucerne/grass mixtures had a slightly higher stocking rate in 2010/11, possibly due to the inclusion of a new farm which had recently sown stands that had a higher proportion of lucerne.

The lucerne stands had the most consistent result from year to year, with the added bonus of several paddocks being also taken for hay, due to high levels of available soil moisture coming out of the winter, compared to the year before.

Table 1: Ewe stocking rate (SR) from tailing to weaning

Farm	Mob	Forage type				Tailing%	Notes	Breed
		Dryl. Grass	Irr. Grass	Grass + Lucerne	Lucerne			
Farm 1	Singles	1.2			10	97		Merino
Farm 2	Singles				5.9	108		Corriedale
Farm 3	Twins		10.0		10	144	1	Crossbred
Farm 4	Twins		10	8.7		151	2	Crossbred
Farm 5	Singles	2.1		4.4		85	3	Merino
Farm 5	Twins	2.6		5.2		132	4	Merino
Farm 6	Singles	4.7			16.6	100		Polwarth
Farm 6	Twins				10.5	148		Polwarth
Mean		2.6	10.0	6.1	10.6	120.6		
% increase from dryl. Grass			278	131	301			
Last year		3.5		4.2	9.4	117.7		

Notes

- 1 Lucerne SR does not account for cattle also grazed on area
- 2 Irrigated pasture SR does not account for other stock used on the same area
- 3 Dryland pasture mob grazed Lucerne+grass mix for 28% of time
- 4 Dryland pasture mob grazed Lucerne+grass mix for 43% of time

LAMB GROWTH RATES

Lamb growth rate up to weaning provides the opportunity to have options from weaning onward. Faster growth rates provide the opportunity to wean early if required, or to more easily take lambs to finished weights. While weaning weight can be altered by changing the date of weaning, the actual growth rate of the lamb provides a simple comparison.

Table 2: Lamb rate of liveweight gain (g/day) from tailing to weaning

Farm	Mob	Forage type				Tailing%	Notes
		Dryl. Grass	Irr. Grass	Grass + Lucerne	Lucerne		
Farm 1	Singles	281			285	97	
Farm 2	Singles				357	108	
Farm 3	Twins		314		313	144	1
Farm 4	Twins		309	262		151	2
Farm 5	Singles	240		246		85	3
Farm 5	Twins	240		269		132	4
Farm 6	Singles	218			249	100	
Farm 6	Twins				255	148	
Mean		253	312	259	259	120.6	
% increase from dryl. Grass				2	2		
Last year		275		266	266	118	

Notes

1 Weighted dryland pasture mob grazed Lucerne+grass mix for 28% of time

2 Weighted dryland pasture mob grazed Lucerne+grass mix for 43% of time

The liveweight gain of the lambs in this 2010/11 year again showed only a small advantage to lucerne grass mixtures over dryland pasture. Some dryland pastures in particular provided very high growth rates. This was based on low stocking rates, high feed quality and high annual legume content. The growth rate of lambs on lucerne was again high. The comparison of irrigated pasture, which wasn't included last year, shows the high potential gain of well managed, irrigated pasture in spring.

The live weight gain in the 2009/10 year was slightly higher than the current year, highlighting the need to provide close management in years when feed supply is higher. Feed quality can drop in years when there is a lot of feed on offer, and is reflected in lower lamb liveweight gain. Because these situations are relatively rare in this environment we are less experienced at managing high covers. The exception is the irrigated pasture, where the experience is built up over time with reliable yields.

LAMB LIVEWEIGHT GAIN PER HECTARE

The overall outcome from spring grazing is lamb live weight weaned per hectare. This combines the ewe stocking rate, the lamb liveweight gain and the lambing percent, and can be used to provide a direct comparison of the potential profitability of the different options.

Table 3: Lamb live weight per hectare at weaning

Farm	Mob	Forage type			Tailing%
		Dryl. Grass	Irr. Grass	Grass + Lucerne	
Farm 1	Singles	39			320
Farm 2	Singles				274
Farm 3	Twins		483		458
Farm 4	Twins		566	378	
Farm 5	Singles	55		117	
Farm 5	Twins	95		221	
Farm 6	Singles	133			501
Farm 6	Twins				460
Mean		81	525	239	403
% increase from dryl. Grass			552	196	400
Last year		117		151	242
Adj for later date		18		18	72
Last Year (same weaning date)		135		169	314

The dryland grass produced 81 kg lamb weaned per hectare. The productivity on the lucerne grass mixtures was approximately 3 times greater at 239 kg/ha while the lucerne and irrigated grass were 400 and 525 kg/ha, being 5 to 6 times higher.

When compared directly with the previous year the increases from dryland grass were greater in 2010/11, and the total productivity was higher this year. However the average weaning date was later this year by 10 to 28 days. When compared on an equal basis the differences become smaller.

EWE LIVEWEIGHT AND CONDITION SCORE CHANGES

Live weight and condition score of the ewes are another indicator of the productivity of the system, giving us an indicator of future performance of the ewe. An important feature of dryland systems is the ability to take a robust ewe through the summer to a good mating weight, ensuring good season-to-season performance. Key to this is the weaning weight of the ewe, as a higher weaning weight provides greater flexibility going into summer. Condition score goes hand-in-hand with liveweight. An aim for condition score 3 or greater at tugging provides an optimum for lambing percentage and subsequent performance during lambing and lactation.

Table 4: Ewe liveweight and body condition score (BCS) at tailing and weaning

Farm		Grass		Lucerne	
		CS	LWT	CS	LWT
Farm 1	Tailing	1.9	46.7	1.9	53.5
	Weaning	2.8	50.8	3.3	54.5
	% ewes < 2.5	18		6	
	% ewes > 3.5	6		26	
Farm 6	Tailing	2.4	58.9	2.3	59.0
	Weaning	3.0	55.5	2.9	56.5
	% ewes < 2.5	15		9	
	% ewes > 3.5	13		9	
Farm 5 (Twins)	Tailing		56		56
	Weaning		60		63
Mean at Weaning			55.4		58.0

Results are present only for this year, from three farms. Of note is the general increase in both live weight and condition score in most of the flocks. Also important is the spread of condition score. The greater the spread then the more variable future results will be. The flocks measured on Farm 6 were relatively similar in condition score between dryland pasture and lucerne. However, the range of condition scores in the ewes from pasture was greater with more being below 2.5 and above 4. This variability means that a greater management input is required in the dryland pasture ewes to ensure consistent results at the next tugging, than is required with the ewes from the lucerne.

SUMMARY

The results overall suggest that dryland lucerne is providing a similar output per hectare to irrigated pasture, and 4 to 5 times that of dryland pasture. Lucerne/grass mixtures were providing a result between dryland grass and lucerne.

Lucerne also provided a much more consistent result from year to year, with lower variability in stocking rate, lamb liveweight gain and overall per hectare production. This is related to the relatively predictable nature of the amount of feed we can grow based on early spring feed budgets. The use of the grazing rotation calculator that was used on these farms to estimate the required stocking rates to achieve a set level of performance meant that consistency was maintained. The use of rotational grazing also allowed farmers to identify surpluses early and harvest them, compared to the dryland grass grazing approaches.

Overall the stocking rate data provides three insights:

- The first is that the stocking rate on lucerne is approximately similar to irrigated pasture, and is 3 to 4 times that of dryland pasture.
- The second is the flexibility that is provided by that increase, to help ease the pressure on dryland pasture if required, as two of our farmers used the lucerne to aid their overall productivity.
- The third is the consistency that the lucerne provides. The stocking rate of dryland pasture varied by 30% between years while the lucerne varied by only 10%. Because we can relatively accurately predict the actual production from the lucerne based on the soil moisture available in late August, then we can be confident of the spring stocking rate.





LUCERNE; GRAZING FOR PRODUCTION AND PERSISTENCE

PROFESSOR DERRICK MOOT, Lincoln University

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Radically changed management of lucerne at Bonavaree Farm has been a major driver of improved profitability, despite sustained drought. Advice and inspiration on lucerne has come from Professor Derrick Moot, who provided the following general information on establishing and managing this crop.

THE LUCERNE CYCLE

AUTUMN RECOVERY (FEB/MAR)

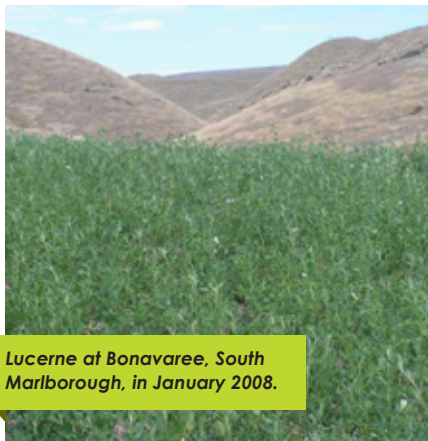
- Allow at least 50% of the lucerne stems to have an open flower sometime from mid summer to autumn, to encourage root recharge.
- Graze if drought is 'terminal' (ie stops plant growth), but then allow recovery after rainfall until growth stops.

WINTER WEEDS (JUNE/JULY)

- Hard graze with large mob once frosts stop growth.
- Apply weed control 14 days later.
- Node accumulation on stems sets up spring potential.
- Late spray or early 'green pick' drastically delays spring growth and reduces yield.

SPRING PRODUCTION (SEPT/OCT/NOV)

- Begin grazing with ewes and lambs at crop height ~20cm (1500 kg/ha).
- 7-10 day break e.g. 60 ewes+lambs/ha.
- 5-6 paddock rotation (35-42 days recovery).
- 'Salt the chips' – lucerne is low in foliar sodium so offer salt licks.
- Post weaning - lambs only eat lucerne leaf – stock at about 70/ha. Ewes follow.
- 2.5-4.0 kg DM/head allowance.
- Minimum of 6-8 weeks on lucerne to maximize liveweight gain.
- High quality leaf (ME >12, protein >24%).
- Low quality stem (ME~8, protein <14%).
- Crop doesn't want to flower – graze before flowering.
- Delayed harvest increases proportion of stem.



Lucerne at Bonavaree, South Marlborough, in January 2008.

SUMMER HOLIDAY (DEC/JAN)

- Go fishing.
- Shorter rotation, 30-35 day return.
- Water stress accelerates flowering but leaf is still high quality.
- Conserve a true surplus.

LUCERNE; AGRONOMY

ESTABLISHMENT

- Test soil to ensure a pH>6.0.
- Ensure 5-7 kg/ha of inoculated bare seed equivalent.
- Allow 50% flowering in spring establishment crop.
- Soil should be free draining.
- Modern cultivars are pest resistant.

WEED CONTROL

- Graze at 20 cm if weedy, then allow flowering.
- Annual and perennial weeds should be controlled in early to mid-winter.
- Paraquat burns leaves so early control is essential.

FERTILISER

- Lucerne is hungry for nutrients if always conserved, eg 20kg potassium/ha/t DM removed.
- Use potassic based fertiliser.
- Nitrogen is not required.

ANIMAL HEALTH

- Sodium is stored in roots so may be deficient for animals, use salt.
- Bloat is a risk on high quality feed so make fibre available, especially when feed is lush.

- Red gut can be caused by rapid passage of high quality feed. Watch for in early spring.
- Offer suitable supplement, e.g. meadow hay to reduce possibility of red gut.
- Flushing is possible on young fresh lucerne. Avoid lucerne with leaf spots.

CONSERVATION

- Leaf is the high quality component.
- Bale with dew.
- Silage should be wilted and may need an inoculant.
- Spring crop is heaviest and vegetative (but why bale it?).

IRRIGATION

- Minimal irrigation is recommended at establishment, to encourage root growth.
- Irrigate 10-14 days after grazing. (No leaf=no demand).
- Irrigation encourages weed seed germination.
- Sitting water rots roots.

Never set-stock lucerne!



Lucerne at Bonavaree

PRACTICAL LUCERNE GRAZING MANAGEMENT

PROFESSOR DERRICK MOOT AND MALCOLM SMITH

Email: Derrick.Moot@lincoln.ac.nz

1 GETTING STARTED (PADDOCK 1)

One of the most difficult things to understand when grazing lucerne is what stocking rate to use and when to start grazing. At Lincoln University we have been faced with this dilemma over many years and we don't always get it right. This guide summarises our experiences to date;

- Start spring grazing of lucerne when it is about 15-20 cm tall – the first paddock grazed and sprayed in the autumn clean-up round is likely to be the first one ready for grazing in spring.
- Put ewes with lambs at foot onto lucerne as early as your management allows i.e. lamb onto older stands with some fibre available or start drifting stock on when lambs are no more than 2 weeks of age. The younger the lambs are on lucerne the better!
- Stock at 10-14 ewes plus lambs (180%+) per hectare in one mob to commence grazing in the first paddock (Paddock 1) of a six paddock rotation. e.g. if you have 30 hectares of lucerne that is 300-420 ewes and lambs all being put on the first 5 ha when it is 15-20 cm tall in spring or about 1500 kg DM/ha. (And then you can wonder where all your stock have gone as they come off lambing blocks letting those areas recover).
- The exact number of animals to put on is location and spring dependent and will take a year or two to work out for yourself. For us it is 12-14 ewes plus twins for 10 -12 weeks.
- Paddock 1 needs to be consumed in 3-4 days. There will be little post grazing pasture mass (PGPM) because all of the herbage on offer is leafy rocket fuel (all herbage ME=12+ and protein 26%+).
- Animals grazing lush lucerne are most prone to health issues as guts adjust – but it is really important to start grazing lambs on lucerne as young as possible. Ensure fibre and salt are available. Ewes that have previously been on lucerne are likely to take to it with little adjustment.
- If you find you are losing lambs or ewes (usually the best ones) check your vaccination programme is up to date and consider 10 in 1 vaccine. Fast growing animals are more prone to clostridia disease from rapid bacterial growth in the rumen that causes sudden death. This is often mis-reported as bloat because they blow quickly after death.



Plate 1. Hoggets grazing lucerne in spring 2007 at the MaxClover Grazing Experiment at Lincoln University, Canterbury, New Zealand

2 FIRST ROTATION (PADDOCKS 2-5)

Having started ewes and lambs on lucerne the next issue is when to move them onto Paddocks 2-6. This is a combination of observation and experience and not always easy to get right the first year you start grazing. Some tips;

- The lucerne continues to grow in front of you as you are grazing a paddock - so you are building a wedge or bank of feed ahead of you – managing this is the key to maintaining animal quality to maximize animal growth in this vital spring period.
- As you open the gate to Paddock 2 the ewes will usually walk (not run) because they know they are getting good quality feed and won't have to hunt for the tasty legume amongst grass. But make sure there is fibre and salt on offer.

- Paddock 2 will be taller and contain more dry matter than when you started in Paddock 1.
- Figure 1 is an example of one years grazing management from our six paddock rotation for the 'MaxClover' experiment at Lincoln. Grazing of hoggets started in Paddock 1 in early September 2005. The dry matter increased from 1500 kg DM/ha to 2200 kg DM/ha before entry to Paddock 2.
- Paddock 3 was about 2600 kg DM/ha upon entry. The PGPM is shown as less than 500 kg DM/ha for these first three paddocks.
- Paddocks 4-6 were all around 3300 kg DM/ha upon entry and the PGPMs were closer to 1000 kg DM/ha.
- To get an idea of how much to leave behind after grazing test the herbage as animals go in. Either squeeze or bend a step until you can find where the woody part begins - this is low quality (ME=8, Protein = 12%) that is maintenance feed at best so not recommended for fast growing stock!

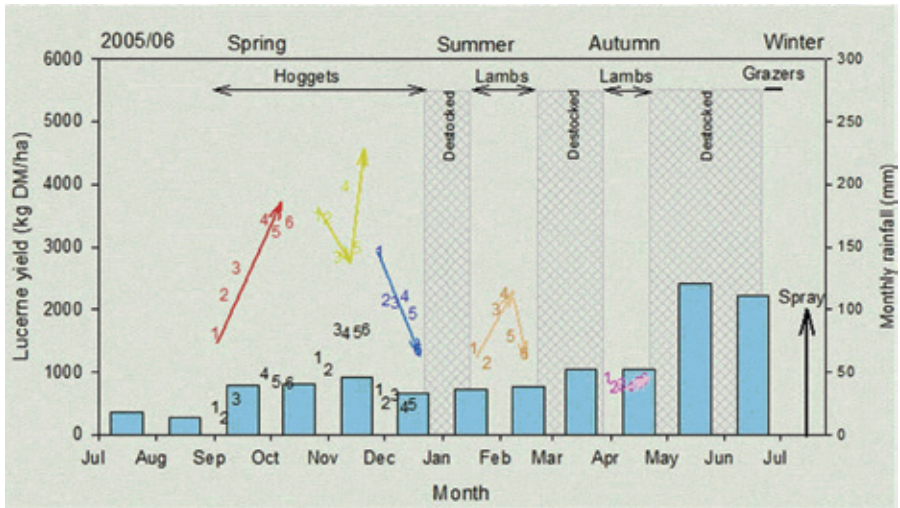


Figure 1. Yields in paddocks 1-6 as stock begin grazing the MaxClover experiment at Lincoln University in 2005. Values at the bottom of the 1st, 2nd, and 3rd grazing cycles are post grazing pasture (stem) mass (PGPM) when stock were moved to a new paddock.

3 WHEN TO GO BACK TO Paddock 1?

When you enter Paddock 4 you should look to see if recovery in Paddock 1 is 10-15 cm tall. How this grows over the next two weeks dictates paddock rotation. If regrowth is rapid you may not want to graze Paddock 6 but drop it out of the rotation for hay or silage or increase the mob size to cope. As a guide, the time of return to Paddock 1 after leaving should be between 30 and 42 days (or you will have grown too much stem).

- Ideally Paddock 1 will have about 3300 kg DM/ha upon entry the second time (Figure 1 shows this was similar to Rotation 1 in Paddocks 4, 5 and 6). In our example, Paddocks 1 – 5 were all grazed at reasonable yields for the second rotation but Paddock 6 was starting to become too heavy/stemmy.

- The PGPM for Paddocks 1-6 shows about 2000 kg DM/ha was grazed or about 70% utilization. Herbage analyses indicate this level of DM utilization will see over 80% of the total ME and CP consumed. There is no point in making growing animals eat the lower quality residual.
- The amount of regrowth in the second cycle will depend on in season rainfall. In our 2005/06 example the monthly average rainfall was around the long term mean of 50 mm. This was sufficient to keep lucerne growing in Paddock 1 for a third rotation with another 3000 kg DM upon entry.
- For Paddocks 2-6 this level of in season rainfall is inadequate and meant growth was reduced. Paddock 6 only 1200 kg DM/ha was available for grazing in late December.

- Conveniently our experimental plots were destocked from late December until mid January – beach time for dryland farmers!
- The average summer rainfall until May was inadequate for much regrowth so only a single summer rotation was possible with lambs before a clean-up graze in April followed by destocking and a winter weed spray in mid July.

4 ANNUAL PRODUCTION SUMMARY

- Figure 1 shows the timing of production from each paddock varied across the season. However, when the total dry matter yields were accumulated each grew 10-11 t DM/ha.
- For spring, Paddock 1 produced 7.8 t DM/ha (1.5+ 3.4+2.9) across the first three rotations compared with 8.8 t DM/ha (3.4+4.2+1.2) for Paddock 6. If we converted these to herbage quality the difference would be smaller with the higher yield from Paddock 6 resulting from more stem production, particularly in the second rotation.
- The annual rainfall for this season was 600 mm which is similar to our long term average. Of note, the 230 mm of rainfall in May and June did not result in any significant autumn lucerne growth. At this time the moisture would be accumulated in the soil for use the following spring.
- Ideally the stock on these experimental plots would have been ewes and lambs. However, the small size meant hoggets and weaned lambs are more appropriate.

5 ESTIMATING DRY MATTER YIELDS

One of the key questions when determining stocking rate is assessing current herbage yields. Over the life of the 'MaxClover' experiment and other Lincoln University experiments we have examined the relationship between yield and height and can show a distinct seasonal relationship.

- Figure 2 shows that in spring the lucerne yield can be estimated by multiplying the height (cm) by 90 to get an estimate of yield (kg DM/ha). For example, when a paddock is ready for grazing at about 35 cm height it contains about 3200 kg DM/ha.
- Figure 2 also shows that for summer and autumn the relationship is lower with the multiplier being 60. Thus, that same 35 cm height equates to 2100 kg DM/ha.
- Figure 3 gives a picture of the multiplier on a calendar basis. The overall pattern of a higher multiplier in spring than summer held for stands of many different ages. At Lincoln the highest multiplier of 100 is appropriate in the main growth period of September and October but it then declines to be about 60 from December on.

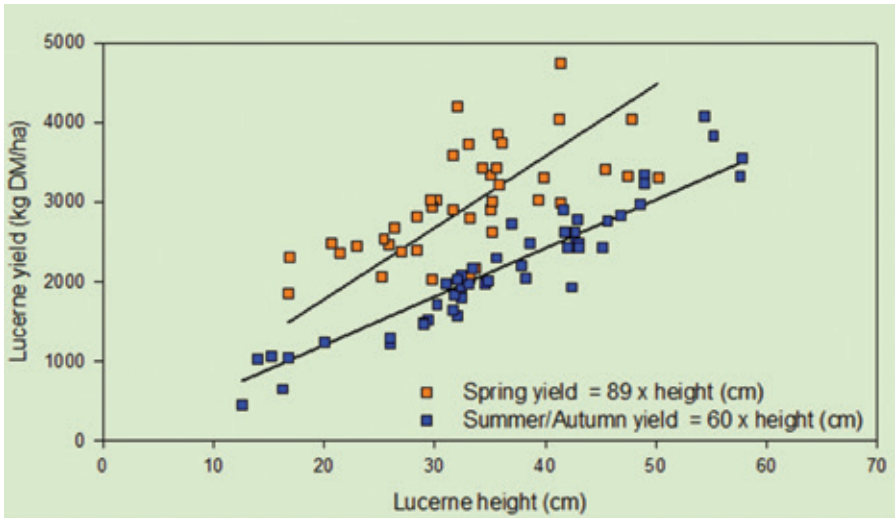


Figure 2. Lucerne dry matter yield estimated from height measurements in Spring (orange squares) and Summer/Autumn (blue squares). Changes in the multiplier used to predict dry matter from lucerne height over a year.

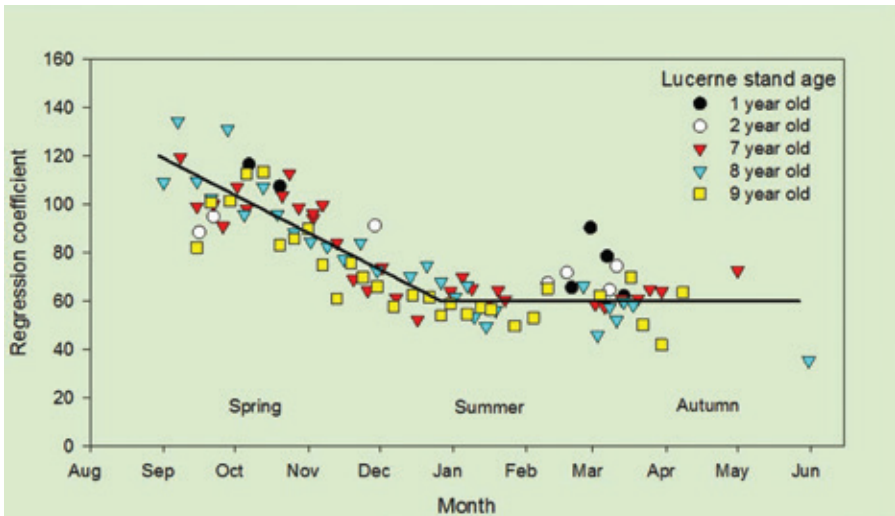


Figure 3. Changes in the multiplier used to predict dry matter from lucerne height over a year.



MAXIMISING YOUR LUCERNE PRODUCTION! IT'S ALL IN THE PREPARATION

JULIE KEARNEY

- Soil test early and apply nutrients needed, especially lime to increase the pH to at least 5.8 (to minimise aluminium toxicity).
- Autumn spray, autumn spray, autumn spray!!!! This is the cheapest and most effective tool we have.
- Key result from autumn spraying to conserve soil moisture and kill mass root systems.
- Spring spray again prior to drilling the lucerne, ensuring you use insecticide.
- Always direct drill your seed with fertiliser, critical for seed germination.
- Before you graze your 1st year stand, let the lucerne flower. This ensures it has an established root system.
- Follow Derricks management guide for grazing lucerne and enjoy your increase stock growth rates and extra feed grown.
- Winter spraying stands is a fantastic tool to clean up any weeds which are competing for that ever important soil moisture. Spray early so that you don't impact on the early spring growth.
- Maintenance fertiliser depends on soil test and herbage analysis; make sure the herbage is done from the early spring growth.

NUTRITION OF LUCERNE-FED LAMBS

**CHARLOTTE WESTWOOD BVSc MACVSc PhD, Veterinary Nutritionist,
WAYNE NICHOL, Animal Nutritionist, PGG Wrightson Seeds**

Lucerne is a top shelf, premium feed for lamb finishing. Achieving the best feed conversion efficiencies (more kg of lamb liveweight per kg of lucerne dry matter consumed) relies on an understanding of lamb requirements vs what the lucerne stand has to offer.

1 QUANTITY AND QUALITY OF LUCERNE OFFERED TO LAMBS

The **FIRST** limiting nutrient of lucerne is total amount of **dry matter (DM) on offer**. There's little point of worrying about crude protein (CP), neutral detergent fibre (NDF) and mineral requirements of lambs if total amount of lucerne on offer is insufficient to support target liveweight gains.

(A) AMOUNT OF LUCERNE OFFERED: ENERGY DEMANDS FOR LAMB GROWTH

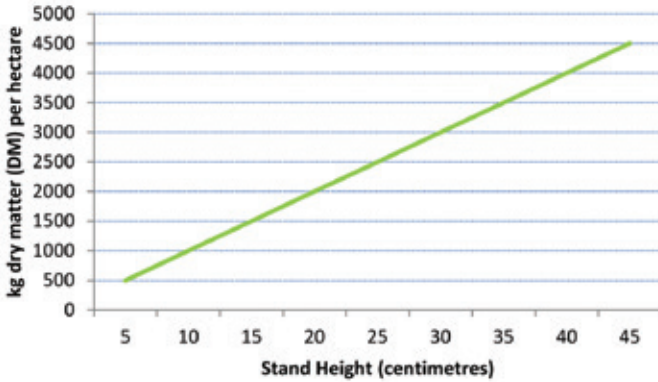
- There are many tables and calculators available that define the daily metabolisable energy (MJME) requirements of lambs. E.g. The publication "Pasture Supplements for Grazing Animals" (NZSAP Occasional publication No. 14) gives good guidelines to help with calculation of energy demands of lambs based on current liveweight and ambitions for different rates of liveweight gain.

You can convert a lambs MJME requirement to kgDM / head per day by dividing the MJME requirement by the MJME value of lucerne, presuming that good quality, well managed lucerne will contain up to 12.0 MJME/kgDM consumed.

OR keep things simple: Target to offer between 2.5 and 3.5 kgDM of lucerne per head per day for lambs between 35 and 45 kg liveweight. E.g. If you are grazing a stand at 25 cm height (or around 2500 kgDM on offer), you wish to offer 3.0 kgDM per head per day and after 7 days you want to leave behind at least 10 cm of post-grazing residual, stocking rate would be up to 70 lambs per ha for the 7 day period.

Higher post-grazing residuals will promote better per head liveweight gains. For higher per head allowances, stocking rate could be closer to 50-60 lambs per ha for the 7 day period leaving behind higher post-grazing residuals, using another stock class to tidy up post-grazing residuals.

Graph 1. Approximate relationship between lucerne stand height and kilograms of dry matter (DM) on offer. This is intended as a guideline only and will vary with plant density and developmental stage of the lucerne plant.



QUANTITY OF LUCERNE AS INFLUENCED BY ROTATIONAL GRAZING

Lucerne should always be rotationally grazed and never set stocked. Setting an ideal rotation for lucerne-fed lambs is a balancing act between what is good for the lamb and what's best for the persistency of the stand - nutritionists often argue this point with agronomists. Lambs benefit from a faster rotation, with more frequent grazings of higher quality, shorter lucerne. The stand benefits from a slower rotation with less frequent grazings to permit more time for the stand to replenish root reserves.

Beef + Lamb New Zealand recommend that an ideal grazing rotation for lucerne is:

Spring: Wait until pre-grazing cover is at least 20 cm (1500 kgDM / ha) then graze for 5-7 days until all leaf and softer green stem is consumed. Spell for 35 to 42 days between grazings

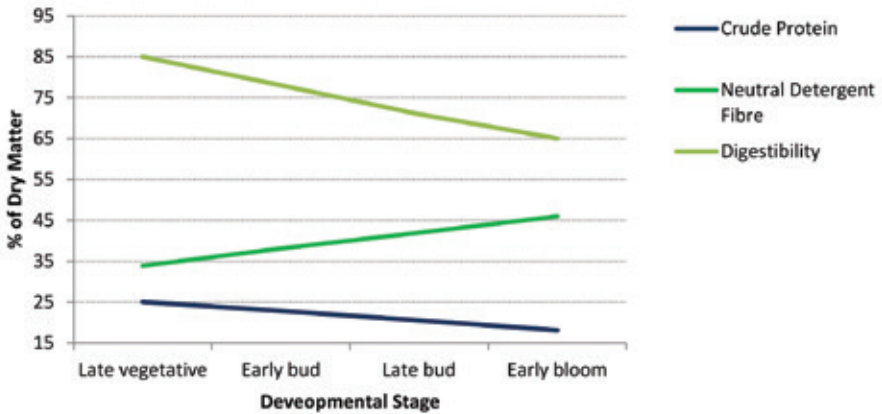
Summer: Same as for spring but allow a shorter rotation, around 35 days

Autumn: Allow flower set (50% flower) to replenish root reserves **WINTER:** Hard graze when growth stops

(B) QUALITY OF LUCERNE OFFERED:

Typically the feed quality of lucerne is extremely good, but is influenced by grazing management, particularly the stage of regrowth at which lambs go onto the lucerne. Quality is typically best pre-bud, or shorter than 30 cm in height when neutral detergent fibre (NDF) is less than 33% DM and crude protein (CP) can be as high as 26-30% DM.

Graph 2: Approximate indication of the quality of whole plant lucerne vs. developmental stage. Lambs will select leaf at the expense of stem and intake of nutrients is typically better than that shown by by this graph.



NUTRIENT REQUIREMENTS OF HIGH PERFORMANCE LAMBS

Neutral Detergent Fibre (NDF): Low concentrations of NDF are ideal to support optimum intakes of dry matter, with a target of between 28 and 30% NDF. Higher concentrations of NDF can constrain intake of dry matter by lambs. High concentrations of NDF are found when more than 25% flower is present.

Crude Protein (CP): Optimum intakes of CP for lamb finishing are around 15-16% CP. Leaf contains most of the CP found in the lucerne plant, therefore grazing management that promotes leaf will encourage higher concentrations of dietary CP.

Digestibility: Lamb performance will improve when lambs access highly digestible lucerne, this is typically at the pre-bud developmental stage.

HIGH QUALITY LUCERNE: TOO MUCH OF A GOOD THING?

Rumen adjustment time is often needed when pasture-fed lambs transition onto lucerne. Lucerne-fed lambs selectively consume leaf, resulting in intakes of potentially very high concentrations of CP and low levels of NDF – a very different diet to moderate quality pasture. Adjustment time is needed for:

- The rumen to adjust to higher concentrations of rumen degradable protein and lower concentrations of NDF.
- The liver to increase capacity to convert excess ammonia to urea.

Adaptation can take weeks rather than days. With abrupt diet change to lush lucerne, lambs may scour with a dark loose dung, often called a "protein scour" which can be confused with an internal parasite challenge.

Time requirement for rumen and liver adjustment to lucerne depends on:

- Quality of lucerne – lambs require less adaptation time when transitioning onto more mature lucerne than onto lush, vegetative lucerne.
- Quality of pasture that lambs graze before the lucerne – lambs on high quality vegetative ryegrass / clover require less adjustment time than those coming from poor quality summer dryland pasture.
- Presence of other non-lucerne species e.g. adjacent run off pasture-dominant paddocks, standing grass (or herb or weed species) around the edge of paddocks, or supplements.

Lambs should remain on lucerne for at least a few weeks rather than just a few days to a couple of weeks. Efficiency of feed conversion and liveweight gains improve with time due to the benefits of rumen and liver adaptation. Run smaller, lighter lambs on lucerne for longer periods rather than heavier lambs already close to target weights for shorter periods of time to optimise feed conversion efficiencies.

2 SUPPLEMENTS FOR LUCERNE-FED LAMBS

Supplements may be offered for a range of reasons, simply to balance a feed deficit or to try to add some nutritional balance to the diet – e.g. by diluting down intake of CP and / or to increase intake of NDF. Attempts to offer lucerne-fed lambs 'complementary' feeds have resulted in mixed outcomes depending on the nutritional profile of the lucerne and ambitions for lamb liveweight gains. Extra roughage will be of greatest

benefit during the first few days / weeks that lambs start grazing lucerne, being useful to not only improve feed conversion efficiency but also to reduce the risk of:

- Red gut
- Bloat
- Enterotoxaemia (used in conjunction with an appropriate vaccination program)
- Polioencephalomalacia (Thiamine or Vitamin B1 deficiency)

SOURCES OF ROUGHAGE

- Whilst lucerne hay is well accepted by lambs and is therefore popular as a roughage source, nutritionally lucerne hay isn't ideal for lucerne-fed lambs because lambs select leaf from the hay, leaving stem in the same way that they graze fresh lucerne. This may reduce the potential benefit of hay as a roughage source.
- Good quality meadow hay can be more successful with hay potentially reducing risk of red gut.
- Straw is less useful as a roughage source for lucerne-fed lambs, however a fine stemmed ryegrass straw may be acceptable and would be preferable to coarser cereal straws.

3 RED GUT IN LUCERNE-FED LAMBS

Red gut can occur when lambs graze extremely good quality lucerne. Red gut is another term for 'intestinal volvulus', meaning that either the small and / or large intestines of the lamb become reddened and can twist within the abdominal cavity of the lamb.

Lambs can show signs of gut pain, distension of the gut, discomfort and be down on the ground, or are simply found dead. Red gut is most common during spring and early summer and often peak numbers of cases can occur around 3 weeks after rain on dryland crops.

It's important to differentiate cases of red gut from other causes of gut distension and death, including pulpy kidney and bloat.

Red gut is probably caused by a combination of:

- The rapid transit of very high quality lucerne forage through the rumen to the intestines where it ferments, forming gas and causing the gut to twist.
- The smaller size / capacity of the rumen of lambs grazing high quality lucerne compared with pasture-fed lambs – allowing more abdominal capacity within which the intestine can move around, increasing risk of red gut.

REDUCING RISK OF RED GUT

Offering a source of additional dietary fibre is one important approach for controlling red gut if you're right in the middle of seeing some deaths. Ways to increase fibre come down to the practicalities of how you can increase fibre in the diet, ideas include:

- a Slowing the grazing rotation**, such that lucerne becomes more fibrous – e.g. with more than 10% flower. The risk of red gut must be weighed against the loss of feed quality (and poorer liveweight gains) with a slower grazing rotation. More mature lucerne contains less energy and CP and more NDF than lush leafy lucerne.

b Hay – offering meadow hay (or a drier baleage) as a supplement may reduce risk of red gut by increasing the size of the rumen and slowing the flow of feed from the rumen. Lucerne hay is not ideal as a forage source with lambs often selecting just leaf and little stem from the hay, however the very good acceptance of lucerne hay by lambs means that it may work well in some lucerne grazing systems.

c On-off grazing of lucerne with some drier summer grass-based pasture. Run lambs on just hay and / or poorer quality pasture for 2 days and onto lucerne for 5 days, repeating the cycle. The theory is that the hay and pasture pickings floats around in the rumen for a few days and keeps the rumen size larger, reducing risk of red gut for the 4 or 5 days that they're back on the lucerne.

d Maintaining another higher fibre companion plant species within or around the lucerne stand.

- Contrary to popular belief, salt supplementation does not reduce risk of red gut.

4 BLOAT IN LUCERNE-FED LAMBS

Ruminal bloat occurs when there is a build-up of gas and slime in the first and second stomach of lambs (the reticulum and rumen). Best known in cattle and less often reported in sheep, we can occasionally lose lucerne-fed lambs to bloat.

Lambs are less prone to bloat than cattle because lambs chew their feed more slowly and completely than cattle, adding more saliva, potentially decreasing risk of bloat. It would

appear that bloat is less common in NZ and Australian lucerne-fed lambs than lambs grazing lucerne in the northern hemisphere, the reasons for this are unknown.

Vegetative, pre-bud lucerne is more likely to cause bloat than pasture because:

- In the rumen, lucerne particles break down more quickly than pasture particles.
- Rapid release of soluble proteins and other plant factors from lush lucerne increases the risk of the formation of a stable foam in the rumen.

REDUCING RISK OF BLOAT IN LUCERNE-FED LAMBS

Standard 'best practice' for bloat protection fits well with best practice for lamb performance:

- Don't allow lambs to become hungry on lucerne. Move lambs off onto a fresh lucerne break while post-grazing residuals are high enough that lambs aren't yet too hungry.
- Move lambs onto their new paddock/break of lucerne in the afternoon. There's a slightly increased risk of bloat in the morning with dew and/or frost. Most cases of bloat occur within the first couple of hours of lambs moving onto a fresh break of lucerne.
- Graze lambs continuously through lucerne - have a large enough area of lucerne that allows you to do this so lambs do not transition off lucerne back to pasture and vice versa.

- Maintain higher stocking rates of lambs per ha – more lambs per ha for shorter periods of time (usually fewer than 7 days on a paddock). Increased competition between lambs in a high stocked situation will reduce risk of some lambs selectively grazing very high quality leaf over a large area and encourage lambs to consume a more balanced diet between leaf and stem.
- Watch for bloat after lambs have been off lucerne for any reason, e.g. yarding, or after seeking shade on hot days. Lambs consume most of their daily intake of forage in the few hours leading up to sunset – be aware of this timeframe if lambs have been off lucerne during the day.

5 COUMESTROL PRODUCTION FROM DISEASED LUCERNE PLANTS

Coumestrol is a phyto-oestrogenic compound produced very occasionally by lucerne plants under stress, typically as a result of fungal infection, aphid pressure and / or nutritional stress. For lamb finishers, coumestrol is of limited consequence, except that lucerne plants with foliar disease and less green leaf will be of reduced quality and are less well accepted by lambs. As for mixed age ewes, care is required when grazing ewe hoggets before and during tupping on lucerne with foliar damage.

6 MACRO AND MICRO NUTRIENT REQUIREMENTS OF LUCERNE-FED LAMBS

(A) SODIUM

HOW MUCH SODIUM DOES LUCERNE DELIVER?

- Lucerne is a 'natrophobic' plant – which means that the plant has a poor capacity to transfer sodium to the above-ground part of the plant. The roots in contrast contain higher levels of sodium – up to tenfold higher than levels found in above ground stem and leaf material.
- The sodium content of lucerne is typically less than 0.05% of DM.

HOW MUCH SODIUM DO LAMBS NEED?

- For optimum performance and well being, lambs require minimum dietary sodium levels of at least 0.07 % of DM.
- The diagnosis of sodium deficiency in lambs is challenging because signs are non-specific, including poor appetite, ill thrift and dull eyes. Sometimes sodium deficient lambs show 'pica', a term that describes odd appetite, with lambs potentially chewing on and eating unusual things including soil.

DO I NEED TO SUPPLEMENT MY LUCERNE-FED LAMBS WITH SODIUM?

Sodium deficiency may occur in lambs grazing on lucerne, however risk isn't absolute and may be influenced by:

- **Distance from the coast.** Sea spray within 40 km of the coast can to some degree overcome challenge of low levels of sodium in lucerne, depending on the direction of the prevailing wind. Lambs grazing lucerne growing inland,

including inland Canterbury, inland Marlborough, Central Otago and the central plateau of the North Island remain at high risk of sodium deficiency.

- **Other plant species in the paddock.**

If you observe lambs preferentially eating anything in the paddock other than lucerne and only then reluctantly coming back to the lucerne, the lambs may be sodium deficient. Don't confuse this grazing pattern with lambs that haven't seen lucerne before and are taking some time to learn to eat lucerne. Weed and grass species around the edges of paddocks are often 'natrophilic' species which accumulate sodium in their leaves, increasing their attractiveness to lambs. Examples of natrophiles include cocksfoot, Yorkshire fog, ryegrass, prairie grass, white clover and phalaris.

RESOLVING THE CHALLENGE OF SODIUM DEFICIENCY IN LUCERNE-FED LAMBS

- Application of sodium with fertiliser e.g. as salt does not increase sodium levels in lucerne.
- Planting of a natrophilic plant species with the lucerne or around the edges of the paddock can provide more sodium to the lambs. Plantain and chicory both accumulate good levels of sodium.
- Salt-based loose licks or salt blocks. Not particularly ideal as some lambs take a lot of salt, others leave it, all the same this remains a practical approach for most systems.

(B) CALCIUM AND PHOSPHORUS

Lucerne is characterised by a high calcium: phosphorus ratio of approximately 5:1. With phosphorus levels typically higher than what is required by the lamb for normal

skeletal growth and energy functions, this unusual ratio is of limited consequence for growing lambs.

(C) POTASSIUM, SULPHUR, MAGNESIUM

Lucerne can contain very high concentrations of potassium, often higher than 3.5% of dry matter, this is of no consequence for young growing lambs. Sulphur levels range from 0.26 to 0.5% DM, well above the requirements of lambs. Relatively high magnesium levels, between 0.3 to 1.0% of dry matter easily exceed the demands of lambs.

(D) TRACE MINERALS

Concentrations of trace minerals (copper, cobalt, selenium, zinc and iodine) are typically greater in lucerne compared with concentrations found in ryegrass and white clover plants growing the same paddock. Absolute levels will vary within and between paddocks, trace mineral status should be monitored with the help of your veterinarian.

(E) VITAMIN A, D AND E

Leafy lucerne contains good levels of these vitamins and additional supplementation is not typically required for lambs. Australian work suggests that injections of lambs with vitamin A, D, E and vitamin B12 every 6-8 weeks may reduce the incidence of red gut in lucerne - fed lambs.

7 STOCK WATER SUPPLY FOR LUCERNE-FED LAMBS

The requirements by lambs for water while grazing lucerne depend on the dry matter % of the lucerne crop, on temperature and relative humidity. Hotter temperatures increase daily demand for water particularly when combined with higher humidity levels. The consumption of lush, more vegetative lucerne will reduce demand for water. Predictions of probable water requirements for lambs consuming lucerne are shown in Table 1.

Table 1: Predicted daily water intake (litres per lamb per day) when lambs graze lucerne of different water content (DM%) with different ambient air temperatures (NRC, 2008)

		Dry Matter % of fresh lucerne								
		12	14	16	18	20	22	24	26	28
Ambient Air Temperature °C	10	0	0	0	0	0	0	0	0.4	0.9
	12	0	0	0	0	0	0	0.4	1.0	1.5
	14	0	0	0	0	0	0.4	1.1	1.7	2.2
	16	0	0	0	0	0.2	1.1	1.7	2.3	2.8
	18	0	0	0	0	0.9	1.7	2.4	3.0	3.5
	20	0	0	0	0.5	1.5	2.3	3.0	3.6	4.1
	22	0	0	0	1.2	2.2	3.0	3.7	4.3	4.7
	24	0	0	0.6	1.8	2.8	3.6	4.3	4.9	5.4
	26	0	0	1.2	2.5	3.5	4.3	5.0	5.6	6.0
	28	0	0.3	1.9	3.1	4.1	4.9	5.6	6.2	6.7
	30	0	0.9	2.5	3.8	4.8	5.6	6.3	6.8	7.3
32	0	1.6	3.2	4.4	5.4	6.2	6.9	7.5	8.0	







RESEARCH AND DEVELOPMENT

R&D BRIEF 143: LUCERNE update on management

This R&D Brief outlines best practice recommendations for establishing and managing lucerne.

Lucerne provides quality feed, which it retains through dry periods and/or late summer when grasses are wilting or losing quality.

It has been successfully used for growing young cattle, sheep and deer at fast growth rates and for ewes during tugging and lactation.

ABOUT LUCERNE

Lucerne is a perennial legume that offers farmers excellent options to provide quality feed both in spring and through into summer. A dryland stand at Lincoln University on silt loam soils produced 17 tonnes per hectare (t/ha) from six grazings while at a drier stony site averaged 7t/ha.

The metabolisable energy (ME) value of lucerne leaf is 12 MJME/kg dry matter and it has 27% protein. It maintains this quality as yield increases

but the stem component has an ME of ~8.5 and protein of 15%. This means that the average feed quality declines as the proportion of stem increases.

Lucerne responds quickly to moisture. It allows farmers to build a bank of quality feed for growing young animals. It can be cut or conserved.

Lucerne can also be grown with grass, to produce a 'transition' feed crop, as a step to introducing stock to single-sward lucerne. This is most appropriate in low (<600mm/year) rainfall environments where the grass will not dominate the lucerne.

USING LUCERNE FOR OPTIMUM ANIMAL PRODUCTION

Lucerne provides quality feed for trading cattle, cows, ewes or lambs. Growth rates of lambs on lucerne at Bonavaree farm, Marlborough, are in the top 5% of the national flock average. Lambs average 390 grams/head/day pre-weaning and 250 to 300 g/head/day post-weaning. Bonavaree specialises in feeding ewes and their lambs on lucerne from birth to sale of lambs.



ESTABLISHING LUCERNE

Discuss establishment with people experienced at growing lucerne successfully. General recommendations are:

- Select a free draining, weed free site with pH over 6 to aid molybdenum availability, and high fertility (e.g. Olsen P near 20, sulphur 10+ and Potassium 6+). Maintain these with annual soil tests and fertiliser applications.
- Lucerne is spring sown usually and can be direct-drilled into a sprayed out block.
- Sow 8 to 10 kg/ha of inoculated seed. It can be autumn sown in warmer regions.
- Allow at least 50% of the plants to flower before the first grazing.
- If the stand is weedy at establishment it can be grazed once down to 15 to 20cm high and then left to flower.

MANAGING LUCERNE FOR PERSISTENCE AND PERFORMANCE

To help lucerne persist it is important to understand the seasonal lucerne cycle.

Figure 1: Managing established lucerne for optimum plant/animal production.

SPRING: graze when over 1500kg DM/ha (20cm tall), rotational graze for 5 to 7 days, until all green leaf and soft stem is gone, with a 35 to 42 day recovery period between grazings

SUMMER: shorter rotation (35 day recovery). Can conserve true surplus

Let it recover in **AUTUMN:** let at least 50% of stems flower before grazing

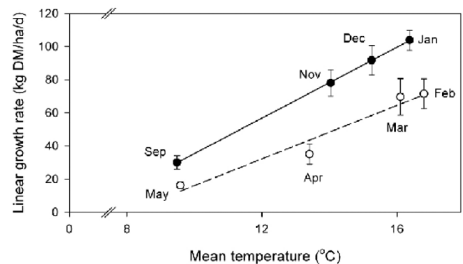
WINTER: hard graze when growth stops, spray for weeds within 10 days of grazing

SPRING

As temperatures rise, shoot growth rate increases. Growth is higher in spring than in autumn at the same temperature because root reserves are mobilised in spring. In autumn plants replenish the roots, leaving less energy for shoot growth.

Figure 2: Growth accelerates as temperatures rise. Measured on irrigated lucerne, Lincoln University.

Data points are the mean of five years and the bars represent one standard error.



Lucerne does not need to flower in spring. It is fine to graze lucerne in spring when it is at least 20cm tall (1500kg DM/ha). Grazing an early "green-pick" (e.g. July/August) drastically delays spring growth and reduces yield.

Rotational grazing (e.g. 5-7 days grazing with a 35 to 42 day recovery) maximises plant production. Research has shown that grazing every 28 days reduced root size and shoot height markedly. In the crop with 42 days between grazings the roots were able to get back to the size they were the previous spring.

Figure 3: Lucerne roots and canopy are smaller if it is too frequently grazed. Result from grazing every 28 days (left) versus every 42 days.

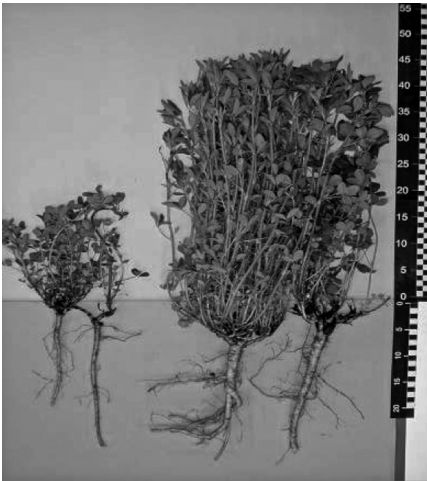
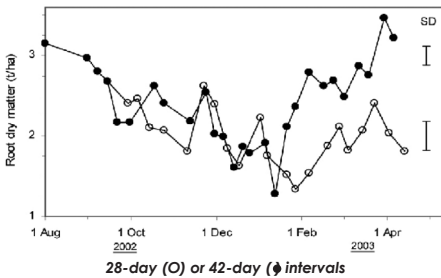


Figure 4: Root dry matter production on irrigated Kaituna lucerne crops defoliated at either 28-day or 42-day intervals.



Lucerne leaves grow from the top of each stem. However, when cut or grazed, new stems shoot from the base of the plant. They must get a chance to regrow before grazing. This is why set-stocking is never recommended.

Figure 5: Lucerne shoots from the crown.



Have enough area or sub-division to graze stock on lucerne for at least 28 days, to get the benefit of good growth rates following the 14 day period needed for adjustment to the new feed. The longer the period on lucerne the higher the average growth rate for the entire period. For example, over 28 days if sheep grow at 50 grams for 7 days, 100g for 7 days then 400g for 7 days, the average growth rate is 183g/head/day. But if they graze for 35 days, then the average rate is 270g/head/day.

Choose a stock class likely to remain on lucerne for a long period e.g. a smaller mob of lighter lambs to rotate on the block rather than a large mob of prime lambs close to sale weight.

An observation by Doug Avery, Bonavaree farm, is that to maximise liveweight gain in lactating or weaned lambs, stock should spend at least six to eight weeks on lucerne.

SUMMER/AUTUMN

Over summer the spell between grazings can be shortened (e.g. 30 to 35 days) as lucerne is growing faster. If drought stops plant growth then the dry herbage can be grazed off, but then allow the crop to recover to at least 20 cm height after autumn rainfall. At least 50% of the lucerne stems should have an open flower. This encourages root growth and shades out weeds that germinate after rain.

Shorter day lengths and lower temperatures signal to plants to direct energy to root reserves.

WINTER

In early to mid winter hard graze with a large mob once frosts stop growth. This clean-up will help control aphids. Within 10-14 days of grazing apply appropriate contact and residual activity herbicides.

Contact herbicides burn the leaves so spray soon after grazing, before leaves grow back to minimise any crop damage.

The order in which paddocks are grazed and sprayed in winter is likely to be the order in which they will ready for grazing the following spring.

FERTILISER

Requirements are higher if conserved feed is constantly removed by machine, compared with grazing by stock. If harvesting, you will be removing 20kg of potassium/ha/tonne of DM, so potassic fertilisers are required. Nitrogen applications are not usually required for lucerne.

Sulphur is important and extra applications may be needed if rainfall

or irrigation is sufficient to leach it from the soil. Ready-mixes of lucerne fertilisers are available to supply micro and macro nutrients.

ANIMAL HEALTH AND DISEASE ISSUES

Lucerne is a good source of protein so it can help reduce faecal egg counts, increase milk production and boost animal growth rates.

Provide salt blocks for animals. As lucerne stores sodium in the roots, the leaves don't offer an adequate sodium supply for animals.

Bloat is a risk on all high quality feed and lucerne is no different. Make fibre (e.g. barley straw) and mineral blocks available at all times. Never put hungry stock onto lucerne. Bloat capsules for bulls or steers are useful when grazing fresh lush lucerne but may not be needed if cleaning up stems following ewes and lambs.

Red gut can be caused by the rapid passage of high quality feed through the gut. Most risk is in early spring or after rain when lucerne is lush so offer fibre, e.g. lucerne or meadow hay, during these times.

Risk of death from red gut is reduced by grass or weeds in the sward during the adjustment period. To further reduce the chance of bloat or red gut, graze stock for half a day on lucerne then remove to grass for the balance of the day. This on/off strategy for three to five days helps the rumen adjust to a high legume diet.

Ovulation rates will not be negatively affected by flushing ewes on healthy lucerne. Bonavaree has lifted conception rates by tupping two-tooths on lucerne in late summer.

However, oestrogenic compounds are produced by plants that are under significant disease stress (e.g. spots on leaves, aphid attack) so flushing ewes is not recommended during this time. Autumn is also the time to let lucerne flower and recharge root reserves.

The most common lucerne pests are weevils, nematodes, aphids, fungi and viruses. Modern cultivars offer resistance to some of these. White fringed weevil feeds on roots and its impact has been reduced at Bonavaree by drilling grass into lucerne to suppress the pest. Putting the paddock into barley for two years also breaks the weevil cycle.

LUCERNE UNDER IRRIGATION

Lucerne can be irrigated to maximise production. Only irrigate if green leaf is present (no leaf = no water demand). So wait 10 to 14 days after grazing, when new leaves have appeared and are ready to expand. Sifting water rots roots which is why free draining soils are recommended.

CONSERVING LUCERNE

If baling, a little dew on the cut lucerne can keep the high quality leaf attached to the stem. Leaf shatter on dry lucerne reduces overall quality. Lucerne taken for silage should be wilted before stacking. An inoculant aids fermentation in this high protein crop.

BONAVAREE EXAMPLE: SHIFT FROM CUT/CARRY TO DIRECT GRAZING

After years of growing lucerne for seed and to make silage, Doug Avery was introduced to the idea of direct grazing lucerne. The Averys' dry coastal Marlborough property grew lucerne well but ewes were

mainly grazed on the grass-based hill pastures, which were suffering from over-grazing following continual droughts.

Derrick Moot, speaking at a Lincoln University field day, outlined seasonal management of lucerne for feeding directly to stock. The Averys' took on the idea and revolutionised their farming system. Ewes now lamb on lucerne and lambs are grown on lucerne from birth to sale.

As Bonavaree has 25% of the farm in lucerne, some grazing of lucerne must start in August before the ideal height is reached. To minimise the impact on stand persistence, older paddocks targeted for renewal are grazed at this time. Transition paddocks, where both grass and lucerne are grown, are used to introduce lactating ewes to lucerne. Ewes and lambs (12 ewes plus twin lambs/hectare) graze a break for no longer than 7 days and it is then rested for at least 30 days.

Bulls and steers are used to clean up the stems after the ewes for two days. In 2007/2008 Bonavaree's economic farm surplus was \$140/ha compared with the New Zealand average of \$20/ha.

SUMMARY

Consider grazing lucerne instead of baling it. Grow large areas of lucerne so you can rotate stock during spring/summer so that only one adjustment period to new feed is needed.

"Salt the chips". Offer salt blocks to stock as lucerne is low in sodium.

Don't graze in spring until over 1500kg DM/ha. Let the crop flower in autumn and graze then spray in winter.

Do not set-stock at any time of the year.

ACKNOWLEDGEMENTS & MORE INFORMATION

There are many Lincoln University research reports on lucerne and they appear in the NZ Grassland Association Proceedings. To become a member and download papers visit www.grassland.org.nz/publications or phone (03) 477 0712. The Legumes for Dryland Pastures Symposium book is also available.

For more information on Bonavaree and the Starborough Flaxbourne Soil Conversation Group visit www.landcare.org.nz or phone Barbara Stuart (03) 545 0443.

For Beef + Lamb New Zealand publications on lucerne and other legume options e.g. clovers, phone Beef + Lamb New Zealand on 0800 233 352 and request the R&D Brief Index or visit www.beeflambnz.com.

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