Agricultural extension **advice** for producers in the Hunter

WINTER 2021

PREPARING FOR SPRING CALVING & LAMBING

Doing the hard yards over winter

The groundwork for a successful spring calving and lambing season starts now in autumn and winter when feed and livestock health management decisions are time-critical to maintain nutrition and body condition of cows and ewes for peak breeding performance.

Combine increasing energy requirements of pregnant livestock with diminishing pasture availability, calculations to weigh-up feed supplementation options, cool climatic conditions, pest and disease control, and you may find yourself chasing your tail without a clear management plan in place.

Breeding management preparation is especially relevant this season as many farm enterprises are working overtime to recover from the drought and boost livestock production and profitability. On-farm management improvements with the potential to increase lambing and calving percentages are a low-cost investment that can translate to increased returns.

Buoyant beef cattle and sheep markets have attracted many new entrants to livestock breeding as traditional livestock traders turn to cow/calf and ewe/lamb operations, and landholders who destocked are trying their hand at breeding to gradually rebuild numbers. These are timely reminders to focus on reproductive health and feeding management to ensure healthy progeny are hitting the ground running come spring.

Your autumn and winter management decisions will ensure valuable breeding livestock are supported nutritionally over the final trimester of their pregnancy period, improving spring calving and lambing outcomes and ultimately, ensuring re-joining success. Avoid late weaning of last year's offspring to ensure breeding stock have a break and are in optimum body condition coming into winter. Late autumn, post-weaning, is the optimum and most cost-effective time to improve breeding animal condition score when energy requirements are low,

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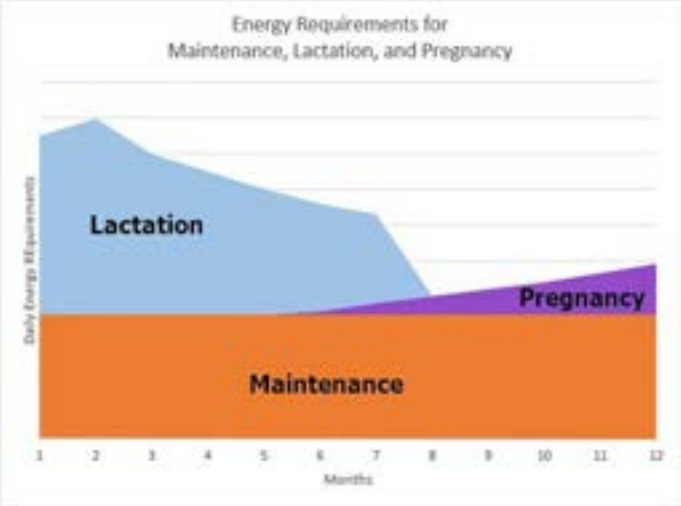
relative to the lactation period. This is an ideal time for energy and protein feed supplementation, if required. Productivity measures for breeder and offspring are improved with optimum nutrition during this period. Plan ahead for grazing management and be aware and prepare for potential feed gaps. For most areas, late winter to early spring is when a feed gap is most likely as the days are cooler and sunlight day length shorter resulting in slower pasture growth. Unfortunately, it is during the coldest part of winter that livestock energy requirements increase as they adjust to conditions. Livestock quickly lose condition when energy requirements are not met particularly young pregnant or lactating stock.

During pregnancy and lactation the energy demands of the cows and ewes fluctuates as shown in the figure below. Demand for energy increases during gestation peaking during early lactation. This demand steadily decreases from mid to late lactation as the calf or lamb begins to pick at feed on offer, reducing the pressure on the cow or ewe.

Cattle Energy Requirements



Source: Grass Fed Solutions

The reproductive stage of your breeding stock will determine how much feed they need to be consuming and whether or not there is enough feed sitting in the paddock to meet demand. By way of a guide only (as it varies between breed, age and feed source) on average a 500kg cow in late pregnancy requires 83.83 megajoules (MJ) of metabolisable energy (ME) per day as per Table 1 (Calculated by multiplying 10.1 DSE x 8.3MJ ME = 83.83MJ ME). Energy demand peaks during lactation at 166.83 MJ ME daily energy requirement (20.1 DSE x 8.3MJ ME = 166.83 MJ ME). If the feed on offer is 10MJ/kg DM (DM= dry matter) then the 500kg cow at peak lactation would need to be consuming 16.7kg/hd/day of feed for optimum production. When compared to the feeding rate of a 300kg steer, growth rate 0.5kg/hd/day the cow in early lactation requires more than double the amount of feed than the steer to meet daily energy requirements for production.

Livestock class	Body Weight (kg)		
Cows	**400**	**500**	**600**
Pregnant (last 3 mths)	8.2	10.1	11.9
Lactating (0–3 mths)	12.8	16.5	20.1
Lactating (150 kg calf)	16.5	20.1	23.8
Cow/calf average/year	12.5	15.8	18.6
Steers	**200**	**300**	**400**
Maintenance	3	4.2	5.4
0.5 kg/day	5.1	6.7	8.6
1.0 kg/day	6.6	8.8	11.3

Table 1: DSE (dry sheep equivalent) Values of different classes of cattle whereby 1DSE is equal to 8.3MJ ME

Source: Prograze MLA & NSW DPI

Grazfeed is a good industry supported benchmarking resource to assist in determining and meeting the energy and protein requirements of your livestock. Table 2 shows that a single lamb bearing ewe in early lactation requires nearly two times the metabolisable energy and protein in her diet than a 60kg dry ewe on a pasture grazing system and three times the energy of a 25kg+ weaner. Whilst a twin bearing ewe during that late pregnancy/ early lactation period has a 15% higher energy requirement than the single lamb bearing ewe.

It is important to monitor the health of the ewe, particularly twin bearing ewes to reduce the risk of pregnancy toxaemia and lambing difficulty. Pregnancy toxaemia (lambing sickness, twin lamb disease) in ewes occurs when there are low levels of glucose present in the blood resulting in adverse effects on the brain and nervous system of the ewe during the last month of pregnancy, particularly in twin bearing ewes. Although there may be an abundance of feed in the paddock, new green feed may not have enough available energy, this coupled with the low energy of dry stand feed will not be meeting the nutritional demands of the ewes during late pregnancy increasing the risk.

Feed budgeting over autumn/winter is the key to a stress-free and profitable spring calving and lambing season. Early preparation and planning will allow time to make management

Table 2: Energy (ME) and protein requirements of sheep

	Dry sheep maintenance requirements			Ewe (mid pregnancy)	Ewe (early lactation)	Weaner	Weaner	Weaner
	40kg	50kg	60kg	50 kg	50 kg	< 20kg	20–25 kg	> 25kg
MJ ME / hd/day (confinement fed)	6.4	7.0	8.0	10.0	15.0	3 - 4	4 - 5	5 - 6
MJ ME / hd/day (grazing)	7.6	8.5	9.7	11.5	17.0	3.4 - 4.5	4.5 - 5.7	5.7 - 6.8
Protein min %	6 – 8	6 – 8	6 – 8	8 - 10	12 - 14	14 - 16	12 - 14	10 - 12

Source: Ruminant Standards of Australia and GrazFeed®
Note: Ewes carrying twins in late pregnancy and in lactation will have a 15% higher energy requirement than single bearing ewes.

adjustments to meet critical nutritional requirements for breeders. Feed calculators are available to assist assessment of feed requirements. Know your classes of stock and plan ahead for a reasonable period to be certain that you have access to feed. Be vigilant on the changing energy requirements of the livestock that you are feeding and monitor and follow your parasite control plans. Set yourself critical dates to reassess how things are tracking so that you don't find yourself caught short for feed. Low quality hay, silage or pasture will require additional energy and protein to meet the nutritional requirements of livestock.

Always introduce a new feed slowly (applies to pasture, crop and supplementary feed), provide a good source of roughage (hay, straw or dry stand feed) and when supplementary feeding, shandy feeds between batches even when it is the same product.

Upcoming Livestock Events in the Hunter:

Farm Rejuvenation Workshop Series: Get your livestock pasture system back on track with ag consultant, Neil Nelson at Mirannie and McCully's Gap in the Upper Hunter during June/ July.

For any further information or to discuss your livestock production and management contact;

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Feeding & Managing Livestock Over Autumn/Winter Key Points

- Energy demand increases during pregnancy, peaking in early lactation, then steadily decreasing through mid to late lactation as calves and lambs begin to forage for themselves.
- Breeding livestock are most susceptible to the impact of feed gaps due to their relatively high feed and energy requirements. Sudden feed changes or prolonged feed gaps for cows and ewes can lead to stock losses from pregnancy toxaemia and other health conditions.
- Feed gaps are common during winter as pasture demand can outweigh supply with pasture quality and growth rates restricted by cool temperatures and shorter days.
- Feed budgeting is an essential tool to assist with grazing management decisions for breeding animals, preparing for possible feed gaps with supplementary feeding and crop options.
- Calculate autumn/winter feed requirements for different classes of livestock and plan ahead.
- The quality of hay and grain is variable this season and feed testing is strongly recommended. Higher volumes of water-damaged and rodent-impacted feed is in the marketplace. Stressed or failed crops turned into hay could potentially pose nitrate or prussic acid concerns and levels should be checked before feeding.
- March to early June is the window for sowing winter crops and pasture such as oats, wheat, rye grass or brassicas, while soil temperatures are still warm enough for seeds to germinate.
- Low quality hay or silage will require additional energy and protein to meet the requirements of breeding livestock. When feed is not providing adequate energy to stock, condition can slip quickly as a result of poor-quality feed or not providing the correct quantity according to class of stock and their energy requirements.
- Ensure your drenching and vaccination program is up to date - if you can't remember the last time you vaccinated or drenched, get in touch with your livestock officer or district vet to discuss your individual needs and determine a plan of management moving forward.
- Provide shelter from harsh weather conditions as livestock use more energy in cold weather to keep themselves warm.
- Monitor your pregnant livestock regularly to ensure that you pick up on any health and welfare issues early, allowing you to lessen the impact they may have on productivity.

AUTUMN PASTURE UPGRADE STRATEGY

A good 2020 autumn, winter, spring and summer for many, but not all areas of NSW, allowed many pastures to at least partly rebuild density and strength following the dry/drought years 2017 to mid-summer 2020. Now is a good time to assess how to further upgrade these pastures for future improved production and persistence.

A key component of most pastures is legume content. Last autumn-winter-spring, for many areas, there was a good seed-set of winter legumes like sub clover, medics, biserrula, arrowleaf, vetch, serradella and gland clover. One plant not grazed too hard, in a reasonable season, can set hundreds and even thousands of seeds. Provided they are "hard-seeded" types, soil seed levels could commonly now be adequate for a few years.

If you have not already done so, now is a good time to soil test, at least from some sample pasture paddocks. Assessing and correcting soil deficiencies is a key ingredient of productive high-quality pastures. In most areas of NSW including the Upper and Lower Hunter regions, most soils in their natural state are generally low in sulphur (including basalt soils) and many are also low in phosphorus. While many pasture species can persist in low soil fertility situations, feed quantity is commonly way below pastures where deficiencies are corrected. Importantly, correcting soil fertility also results in far better feed quality.

In many areas, pastures would barely run two to three dry sheep equivalents per hectare (2.0 - 3.0 DSE/ha) if soil deficiencies were not corrected. Fertiliser, for example like single superphosphate at 100 kg/ha to correct sulphur and phosphorus deficiency, at a cost of around $45/ha, commonly raises carrying capacity by several times to around 7.5 – 10 DSE/ha in many typical situations. Equally importantly, correcting soil deficiencies allows a much broader choice of enterprises, especially opening up for enterprise options like fattening steers or heifers with gross margins/ha of over $500 - $700 in a good year like 2020/21, and even around $200/ha in drought years.

Soil phosphorus and sulphur levels will gradually rise with a regular fertiliser program. For example, it is common in treated paddocks with initially low sulphur and phosphorus levels for test results to rise above the critical point where fertiliser applications are required for one or more years. Typically, in contrast untreated paddocks low in phosphorus and sulphur will remain in a "cot-case" condition without the correction of soil deficiencies resulting in poor pasture production.

Notably, research supports that nutrient deficiency correction also adds to organic matter build-up (carbon) and healthier soils.

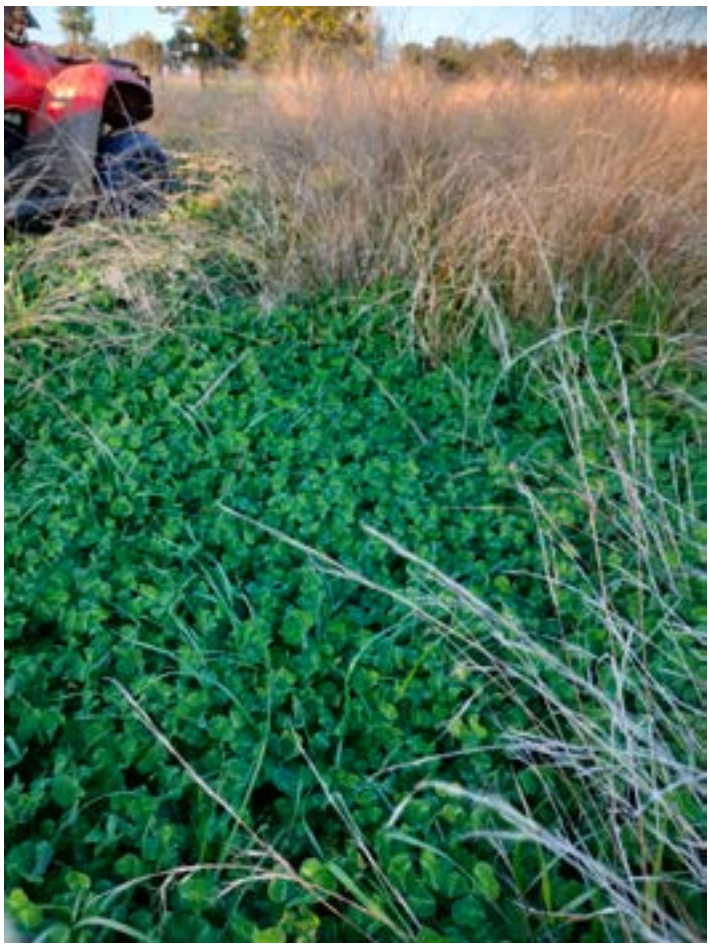
Grazing management is also an important pasture upgrade consideration. A consequence of a wet summer can be an explosion of summer grass growth; tropicals, native perennials or annual summer grasses like liver-seed grass. At least for some paddocks, it will be beneficial to winter legume germination and establishment if dry matter levels of summer grasses can be kept to around 3.0 t/ha or less. Otherwise, too much shading can delay winter legume establishment and therefore their contribution to winter feed and soil nitrogen build-up.

For optimum winter feed, it is recommended to allow species like annual clovers, grasses, temperate perennials and lucerne, to get a decent start before the first grazing. Early feed may be needed but grazing too soon reduces total winter feed. Short young plants can't efficiently use sunlight and grazing too soon reduces early root growth, and therefore plant effectiveness of seeking nutrients and moisture.

An aspect of autumn-winter-spring pasture growth worth considering is noting what species are present. If some parts

Biserrula, as part of a tropical grass pasture last spring. Biserrula is providing a dense legume component of the pasture, has good acid soil tolerance and is regarded as bloat free.

Sub clover, still a mainstay winter legume on many properties. It is worth assessing if given paddocks have the best variety and if it is worth adding more suited varieties if past performance has been patchy.



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of a paddock have commonly been low in productivity, for example lighter acid soil pockets, it can be profitable to add more appropriate species or varieties. For example, biserrula and serradella are far more acid soil tolerant than sub clover. If new annuals like winter legumes are to be added, it is generally preferable to have them in the ground in time for the autumn break. This gives them an equal chance to establish with existing species. Care needs to be given to ensure a new species correct strain of rhizobia is combined with them.

Weeds can be an issue in pastures however it is important not to be too focused on weeds as many can be useful stock feed. For example, in 2020 saffron thistle was a major spring problem in many paddocks but commonly went unnoticed until they ran to head in mid-spring onwards. Early control in autumn or winter via herbicide can commonly retard winter legume growth especially from newer species like serradella and biserrula. Additionally, saffron is often not a major issue if the spring turns dry. There are cost effective control options when heading should the season suit as occurred in 2020.

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BEYOND THE SHED

Management options for beef paddocks, litter storage and composting for improved production in the poultry industry

Hunter Local Land Services in partnership with Mid Coast Council is working with local poultry producers in the Karuah, Myall and Wallis catchments to improve practices for pasture management on their farms. The program 'Beyond the Shed' works directly with poultry farmers to provide management options and advice for improved production.

Most farmers are busy with sheds and the myriad of requirements placed on them to comply with industry standards. This program focuses on the areas 'beyond the shed' and encourages more attention on what's happening in the paddock with great results.

Hunter Local Land Services embarked on this project to help identify ways to improve nutrient management. The program included soil analysis to identify nutrients lacking or in surplus in the soil. On most farms, it's been found that the paddocks were highly productive and the addition of more nutrients in the form of chicken litter for pasture production was not needed.

As part of the program, the poultry farmers receive a tailor-made package of information to suit their specific requirements including one-on-one advice on soil tests, guidance on the financial implications of changing practices, advice on composting and a small incentive payment.

Beyond the Shed has implemented a range of positive outcomes and improvements in farm management activities including rotational grazing, river and creek fencing, prescribed fertiliser applications to meet nutrient deficiency, reduction of runoff and new pasture mixes. In addition, these poultry producers now sell all their chicken litter off-farm to other land areas low in nutrients.

Summer and winter pasture management and silage production are also encouraged to improve production and use existing soil nutrients. Producing beef from rotationally grazed paddocks with cattle also improves pasture utilisation. These practices are increasing the kilograms of beef produced per hectare.

Hunter Local Land Services is also running a trial of different pastures currently being used in the area and alternatives to litter for pasture production. The trial involves using legumes for pasture nitrogen and liming soil to aid in releasing nutrients already in the soils.

The partnership program between Hunter Local Land Services, Mid Coast Council and the poultry farmers is working, and there is a benefit of shared learning and experience. All properties involved have seen great improvements.

All the producers in the Karuah, Myall and Wallis catchments have a chance to be involved in the Beyond the Shed program.

Mid Coast Council is offering small incentive payments to poultry farmers to implement the changes to improve management of nutrients and runoff.

If this program interests you, please contact Albert Mullen, Hunter Local Land Services on 0428 670 524 or Andrew Morris, Mid Coast Council on 0429 220 493

Poultry Industry: Beyond the Shed Project

Management Options for your beef paddocks and litter storage and composting

Step 1: Soil Tests

- Soils in each paddock tested and analysed

Step 2: Soil Sample Results Explained

On farm results explained:

- Fertiliser needed & options
- Costs of fertilisers vs litter
- Agronomy advice
- Composting advice and mentoring service

Step 3: Farm Nutrient Profile

Your "Farm Nutrient Profile" prepared and explained on farm:

- Nutrient maps
- Buffer areas, slopes, boundaries
- Fertilizer needs & options
- Costs of fertilisers vs litter
- BMP guidelines
- Benchmarking

Step 4 : Funding

"Farm Priority Action Plan" agreed on farm with you on basis of Farm Profile

- Priority projects identified and costed
- Application for Mid Coast Council Funding

Types of activities

- Composting
- Gravel roads for litter dump access
- Storage facilities upgrades
- Riparian fencing
- Stock water
- Stock grazing subdivision fencing

MANAGING SEASONAL RISK AND MAKING THE MOST OF RYE GRASS GROWTH

Every season has its challenges, risks and pitfalls. If we understand the risks and the opportunities, we can make the most of any situation. In the second webinar of the Making the Most From Nitrogen Project 2020 series, Seasonal Nitrogen Demand, Professor Richard Eckard of The University of Melbourne and Associate Professor David Rowlings of the Queensland University of Technology examined strategies to manage nitrogen in each season, starting with winter/spring growing ryegrass.

In dryland ryegrass trials conducted in Taree from 2004 to 2006, and then 2015 to 2017 we see growth rates as high as 60 kg DM/ha/day in June-July then in August–September they can reach 80 to 100 kg DM/ha/day (Figure 1). This corresponds with good soil moisture through winter then as spring approached increased day length and higher temperatures spurred growth higher. Increasing day length is critical compared to autumn/winter when day length decreases.

Higher Winter Growth Rates

Modelling work by Karen Christie from the University of Tasmania, agrees with the local data (Figure 1), indicating growth potential in winter (June, July, August) at 70 kg DM/ha/day. This compares to only 40 kg DM/ha/day in Victoria in the same months. For the Mid North Coast, August is part of our spring and helps contribute to the higher winter growth.

As soil moisture declines and temperatures increase, growth rates decline in late September and often cease in October (Figure 1). Christie's modelling with 18 years weather data shows average growth rates decline to 40 to 50 kg DM/ha/day in spring (September, October, November). Yet although this decline is normal on average, it can be very variable and how we manage it is crucial to making the most out of spring.

Higher growth rates also need higher nitrogen rates, but the same amount per kilogram of dry matter produced. This can be managed by using similar rates (1.0 to 1.5 kg N/ha/day)

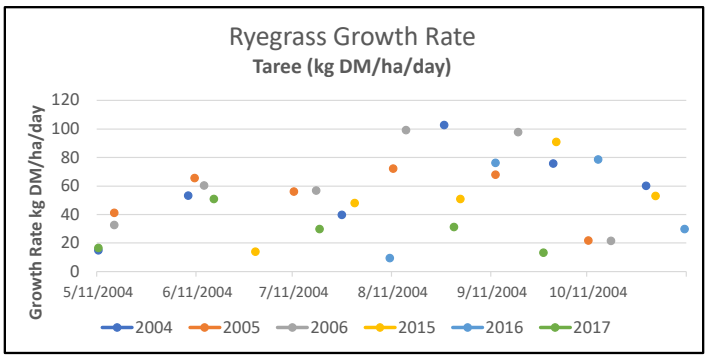


Figure 1. Ryegrass Growth Rates 2004 to 2006 and 2015 to 2017 (kg DM/ha/day) measured over 6 trial years at Taree. Annual yields varied from 6 to 10 t/ha. Highest growth rates occur in August to early September. Spring growth is most variable.

with rotation length of 28 to 30 days. It is important to provide enough nitrogen each grazing to reach the potential growth rates available in August and September and be able to utilise that feed.

The aim with dryland ryegrass is to utilise potential of 7 to 10 t DM/ha from April to November at a cost of $500 to $900/ha or 10 c/kg DM. Italians can produce 2- 4 t/ha more in November-December with irrigation. Utilising the higher spring growth rate is essential to achieve high utilisation and in doing so it reduces the cost of feed for the whole year.

Managing a Spring Surplus

Many dairy farms will calve more cows in spring, to utilise the extra feed. Beef farmers can bring in more steers or cows as spring growth increases and both systems can use silage to conserve feed surplus. Feeding Pasture for Profit provides a good management tool to anticipate and manage surplus for silage, setting aside paddocks before excess occurs.

However, spring rain is highly variable and strategies need to be in place to manage for moderate and dry years, i.e. be prepared to sell or feed if the spring turns against them. Yet many farmers miss potential growth by not fertilising enough to get the most out of spring. This can occur when it hasn't rained for several weeks yet there is moisture in the soil to keep the ryegrass growing. This is discussed in a companion article.

2020 for all its woes, provided an early spring surplus, especially in the lower Hunter. This gave an opportunity to observe 'problems' of a surplus. Wet conditions in July prevented grazing and despite normal strategies to utilise ryegrass, a surplus occurred in August and September. Figure 2 shows how the ryegrass grew too tall (over 30 cm or 3000 kg DM on offer).

As this happened, the stem fraction increased and is left by cattle that only want to eat the fresh leaf material (Figure 3). This is especially true as annuals move into the reproductive stages. In addition, smaller plants are shaded, and larger well tillered plants survive, but this can thin out the ryegrass population as spring progresses.

Transition to Kikuyu

Later in spring if ryegrass is allowed to grow tall and lush it will shade the kikuyu sprigs as they emerge from the soil, especially through October-November. This then delays kikuyu regeneration after the ryegrass finishes and can allow other less desirable weeds to gain a hold. Therefore, it is important to maintain rotations that do not allow ryegrass to grow beyond 2500 kg DM/ha on offer for extended periods and ensure light can penetrate to the soil level. This can also mean adjusting nitrogen rates to avoid excessive growth.

What is important overall is we learn to anticipate seasonal risks and manage for whatever eventuates as difficult as it may be.

These results are only part of the story. For more details, please watch the three-part Seasonal Nitrogen Demand webinar on the Hunter Local Land Services YouTube channel in the Coastal Agronomy Research Talks playlist - use the links below or follow the YouTube QR code on the back page of this newsletter:

No 1: Richard Eckhard: https://youtu.be/TxldVGQjBVU

No 2: David Rowling: https://youtu.be/MwniTcwXvUA

No 3: Discussion: https://youtu.be/eOuxzrCqfMg

For more information contact Peter Beale, Senior Land Service Officer, Hunter Local Land Services, 0427 007468

Figure 2. Excellent spring ryegrass growth but for a couple of weeks, just too fast for cows to keep up, after wet conditions delayed grazing. Great problem to have but it has problems.

Figure 3. Spring Surplus – tall growth that has a higher stem content that cattle will reject at normal stocking rates. Our springs are very variable and can be difficult to manage

MAKING EFFECTIVE IRRIGATION DECISIONS

February 2021 Irrigation Report: November-January period

A watchful eye on weather forecasts pays dividends

There are production and input cost benefits associated with using weather forecast information to better inform irrigation scheduling! That is certainly the key message of the quarter from *Hunter Smarter Farming: Irrigating for Profit Project* Gloucester dairy farmers, Tom Middlebrook, of Bowman Farm, and Adam Forbes, of Kywong Flat. Visit the Hunter LLS YouTube channel Starting Smarter: Irrigating for Profit playlist to view the Kywong Flat and Bowman Farm Irrigation Update videos for the 2020/21 summer season and the autumn post-flood updates.

Managing the dry before the rain

With soil moisture sitting within the optimal Readily Available Water (RAW) zone in early November, the late November to early December period saw soil moisture decline with a dry spell (aprox. 50mm rainfall) and rising evapotranspiration (ETo) rates (30-45mm/week). With available irrigation, over this period Adam applied approximately 120mm to Paddock F3 (heavier, deep soil- Italian ryegrass/ kikuyu) and half that to Paddock F6 (lighter, shallow alluvial soil- Lucerne/Chiccory). He used off-peak Monday to Friday evenings to apply rates at 8mm and off-peak weekend days to apply larger applications of 20mm. This strategy of segmenting irrigation application rates was an ideal response to irrigation requirements of the different soil/ crop types of the two areas under this one pivot. Both paddocks remained in the RAW through this management (Figure 1).

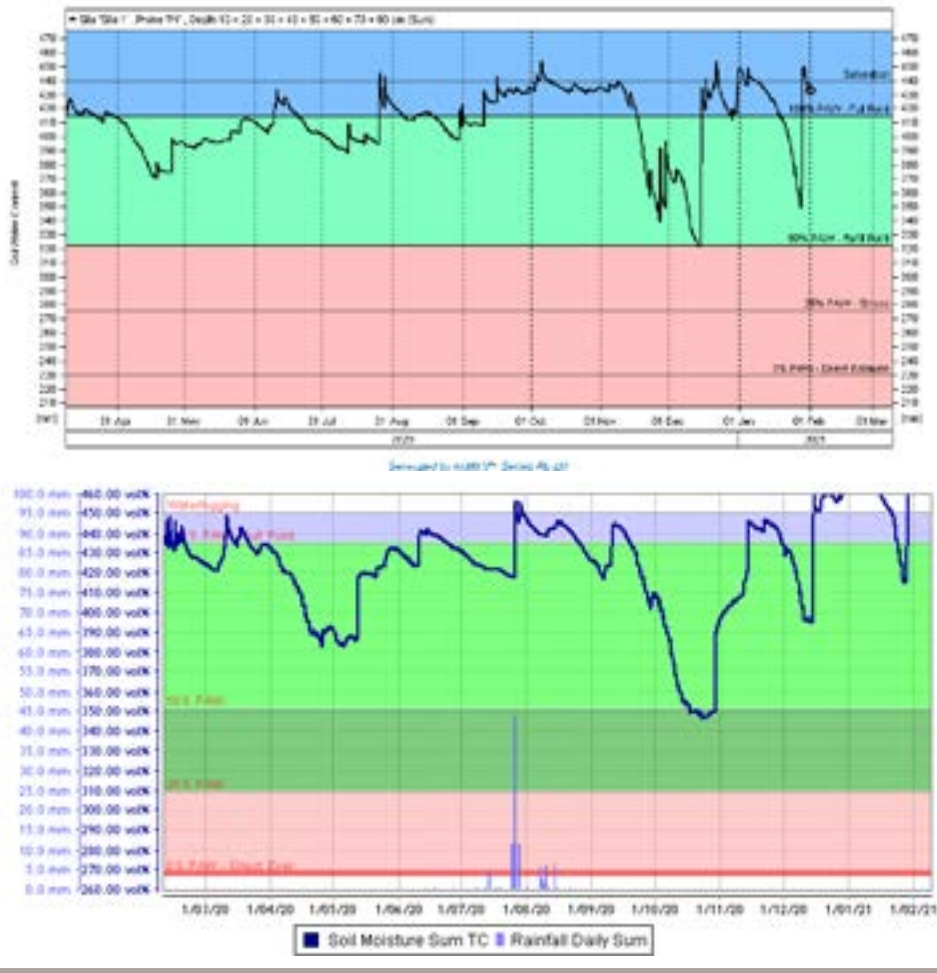
"There was great growth as the irrigation worked well with the warm conditions on both sites. We were on 18-19 day rotations," said Adam.

At Bowman Farm, the response was a little different. As the Sorghum crop had been heavily "watered-in" during early November, and the crop was still immature, plant water demand was not high. Whilst soil moisture trended downwards, there was enough moisture in the RAW 'bucket' to see levels remain in the optimal zone (Figure 2).

Response to predicted rainfall

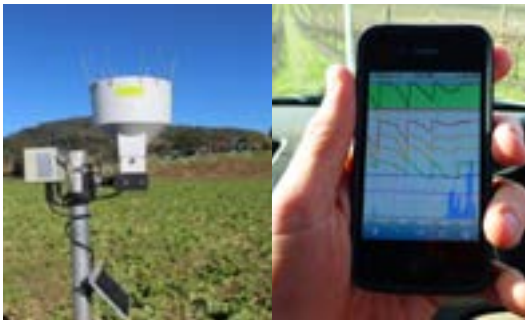
By mid- December, as both farms saw soil moisture continue to trend downwards, Tom prepared the irrigator to start-up and Adam considered his options to increase his weekly schedule on both sites.

Holding back a couple of days in response to their SWAN Systems® daily weather notifications (Figure 3), both were rewarded with their decision to mark time for just a few days, seeing a significant rainfall event from December 12 to 22.



← *Figure 1- Kwong Flat soil moisture graph shows that Adam maintained RAW during the Nov-Dec dry-spell then waited for forecasted rainfall mid-December to lift soil moisture. Decline was again addressed by forecasted rainfall in late January.*

← *Figure 2- Irrigation applied in late October and early November on the sorghum crop lifted soil moisture above the full point. The dry-spell of mid-November to mid-December still saw levels remain in the RAW zone. Forecasted rainfall saturated the site from mid-December.*



Date	ETo*	Chance of Rain	Rain Range	Rain Estimate	Temp Range	Avg R. Humidity	Avg Wind Speed
	mm	%	mm	mm	°C	%	km/hr
Wed, 09-Dec	6.3	< 5	< 1	0.0	11-29	54	9
Thu, 10-Dec	6.7	50	0-2	2.0	13-34	53	10
Fri, 11-Dec	3.2	95	15-45	34.9	17-21	79	14
Sat, 12-Dec	3.1	90	20-65	50.8	16-21	78	14
Sun, 13-Dec	3.4	85	10-30	18.5	16-22	77	15
Mon, 14-Dec	3.9	85	10-40	24.7	16-25	79	15
Tue, 15-Dec	4.8	65	1-10	8.5	17-27	74	10
TOTAL	31.4			139.4			

Figure 3- Swan Systems ® seven-day weather forecast on the 9th December 2020

This saw all three monitored sites pass the "full-point" on their soil moisture monitors. With over 500mm of rainfall from mid-December to mid-January, both farmers were forced to manage their farms for wet conditions, with grazing rotations lengthened over Christmas as the paddocks became difficult to access.

Again, soil moisture began to decline in mid to late January. At Bowman Farm, having sat in the extreme saturation zone 28 days, the soil moisture monitors gave Tom confidence that irrigation was certainly not needed. At Kywong flat, Adam took relief from the wet, drying F3 deliberately to cut low quality kikuyu hay from the site for calf feed, whilst on F6, soil moisture fell to mid-RAW which allowed the milkers to access the site.

Again, at this point both farmers needed to consider a response to downward trending soil moisture in the next week. With the SWAN Systems® daily weather notification indicating that rainfall would outstrip ETo in the last week of January, both Tom and Adam decided not to irrigate. The 28-29 January rain event delivered 100mm, lifting all three sites again above full-point (Figure 1).

"There is no doubt that having a weather forecast I have confidence in has saved input costs such as power and nitrogen and also helped us manage impact to yield. If we had turned the irrigators on the site would be more saturated than it is," said Tom.

Key management decisions of the period at Bowman Farm

- 100-120kg/ha urea applied during the moist (but not saturated) periods of early November and late January boosted growth rates.
- Not applying Urea during the wet of late December, when growth was slow, mitigated nitrogen losses, the main pathway of concern would have been denitrification. This saved on input costs and prevented loss to the environment.
- The sorghum crop (planted October 21) has recently had its fourth grazing on a 14-day rotation.

Key management decisions of the period at Bowman Kywong Flat

- Keeping soil moisture in the RAW during the dry period increased growth rates and allowed Adam to optimise production.
- Wet paddocks were managed to avoid pugging but were individually strategically managed as they dried from mid-January.
- To increase the quality of kikuyu on F3 from late January (after cut for low quality hay), the paddock is on a 10-12 day rotation and is topped every second rotation.

Upcoming considerations

- The Bureau of Meteorology's prediction for the February to April period is a 75% chance of 200-300mm of rainfall.
- Although SWAN Systems ® forecasts 15mm of rainfall in the next 7 days, ETo is over 32mm. This means that soil moisture will begin to decline. At this time, drying of soil moisture may be welcomed, but Adam and Tom need to continue to monitor their moisture levels to maintain RAW.
- Making informed decisions using weather forecasting tools will be an ongoing requirement this summer and into early Autumn in order to manage wet, rather than dry, conditions.

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Figure 4- Tom Middlebrook and Hunter Local Land Services Senior Land Services Officer- Agronomy, Peter Beale, inspect the sorghum crop and discuss how nitrogen has been managed on the wet site over the period.

PLANNING FOR SPRING GROWTH USING SOIL MOISTURE PROBES

In both sport and farming, anticipation is a key skill for improved management. When farmers can access accurate data on what moisture is still in the soil, they can better understand and anticipate the impact of seasonal conditions. Spring is a critical time in farming to anticipate your next move by looking at soil moisture probe levels and then taking into consideration the underlying drivers of pasture growth.

Moisture drives growth potential.

Rainfall at Taree, and along most of the NSW coast, is, on average, surplus to evapotranspiration from February to July (Figure 1). The rainfall then moves into deficit from August onwards producing moisture stress. The soil profile can store 50 to 150 mm of soil moisture that helps extends the ryegrass growth period into August-September. Therefore, how much moisture is in the soil in July-August has a large bearing on how well the spring will be.

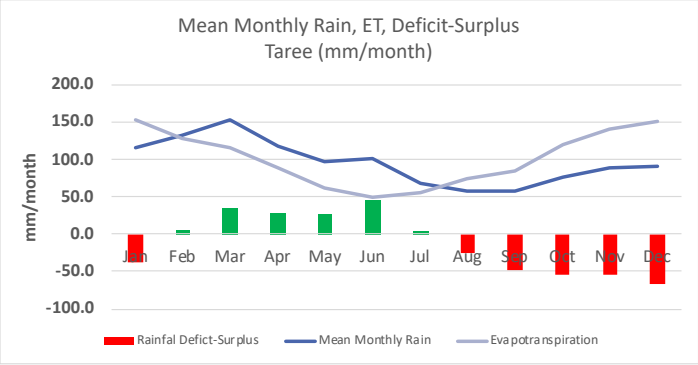


Figure 1 Mean Monthly Rainfall, Evapotranspiration ET, and the result surplus or deficit per month Taree.

As temperature increases and rainfall deficits accumulate from September and into October, the soil moisture content declines (Figure 2), and so also ryegrass growth rate declines into October (Figure 3). There can be an increase in soil moisture November to December due to storms of 50 to 150 mm that can refill the soil profile (Figure 3).

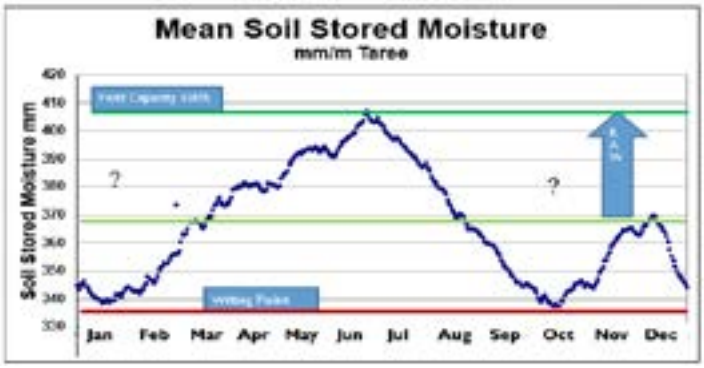


Figure 2: Mean Soil Moisture for a kikuyu ryegrass pasture (modelled over 100 years). Readily available water RAW is above 368 mm, when plant growth is unhindered. Below the light green line soil moisture limits growth with wilting point around 340 mm.

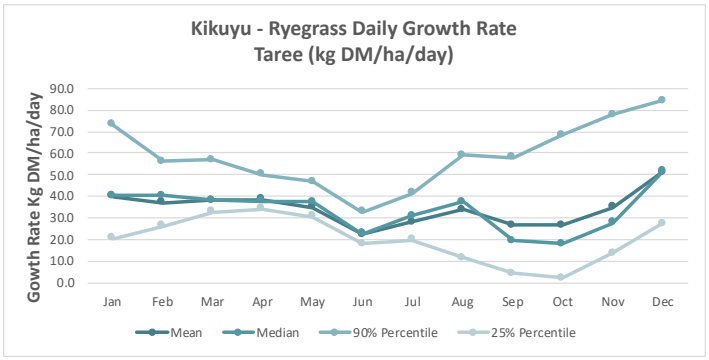


Figure 3: Modelled kikuyu ryegrass growth rate (kg DM/ha/day) at Taree with Mean, Median, 90% Percentile, 25th Percentile.

Nitrogen Response.

Ryegrass's ability to access soil moisture reserves in this spring period is a key factor to consider. As stated soils can hold anywhere from 80 to 150 mm moisture per meter depth. Deeper soils (>1 m depth) can provide say 100 mm of readily available soil moisture. With a WUE of 22 kg DM/ha/mm moisture ryegrass can grow as much as 2200 kg DM just on soil moisture reserves.

The Hunter Soil Moisture Probe Network can be a very useful tool to see how soil moisture reserves are travelling through the June-July and early to how much soil moisture is available. These probes are now spread out over the entire Hunter Local Land Services region and can be viewed at **https://www.lls.nsw.gov.au/regions/hunter/projects-and-programs/Soil-moisture-network-project**

To make the most of a good spring it is logical to increase nitrogen rates from early July to mid-August to accommodate more growth potential. Data suggests increasing to 2 kg N/ha/day or 50 to 60 kg N/ha per 30 day rotation provided your confident soil moisture is adequate and you farm can utilise the extra growth.

Irrigation

With irrigation the variability of spring growth is reduced. What is important though it to realise August September are peak growth periods and irrigation needs to start early enough to avoid moisture stress in these periods. Professor David Rowling of QUT in work at Casino found that ryegrass growth rate and nitrogen response peaks in September but remain high well into October early November. Its also logical for irrigators to use higher nitrogen rates than dryland but not excessive (Figure 4).

These results are only part of the story for more details go to the Hunter LLS YouTube channel and watch the Making the Most From Nitrogen - Seasonal Nitrogen Demand webinar series.

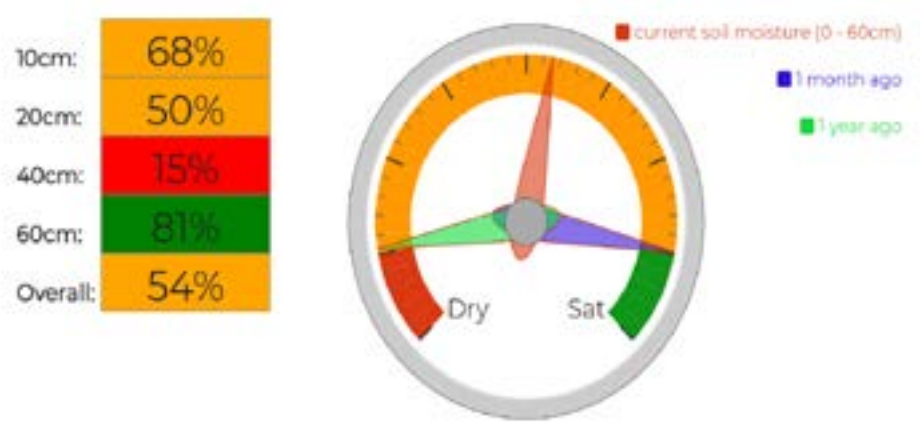


Figure 4: In this example the Soil Moisture Indicator shows there is some soil moisture to depth. If this was the case in late July the spring outlook would look doubtful, but if the profile was full i.e. at 70 to 80% then the spring would look promising.

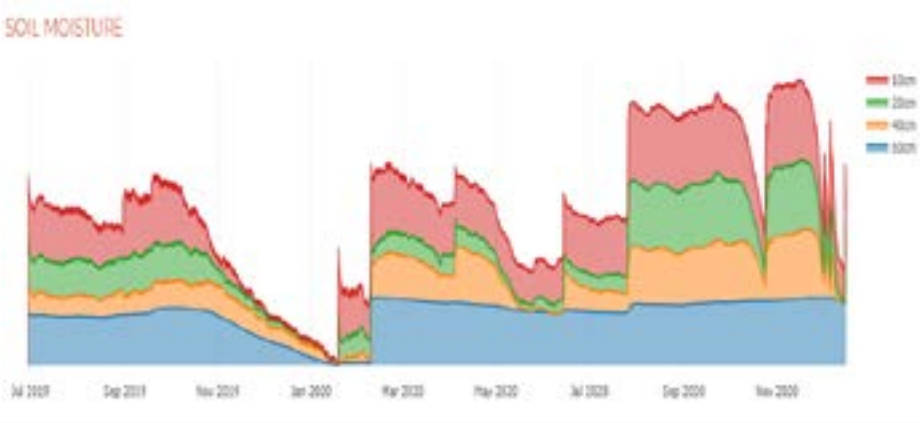


Figure 5: Soil Moisture data is also presented as a graph over the year. Here we see that at Singleton

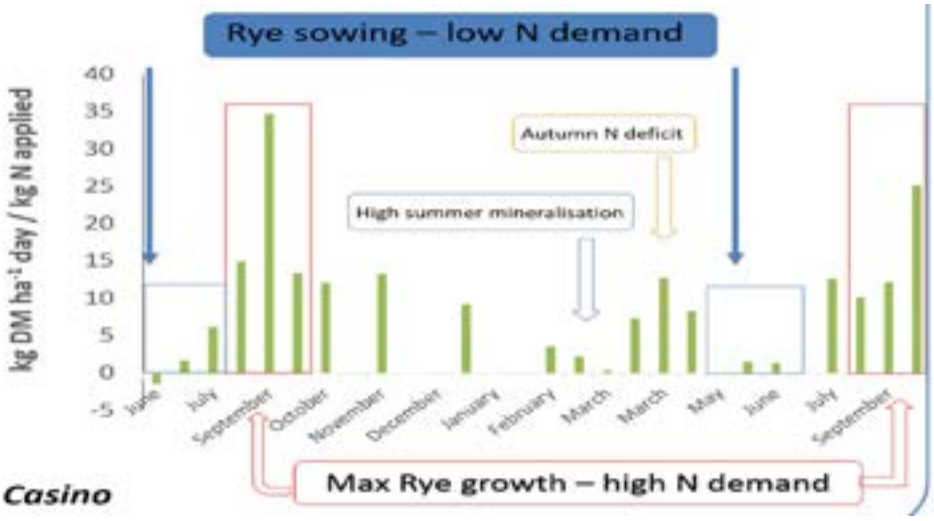
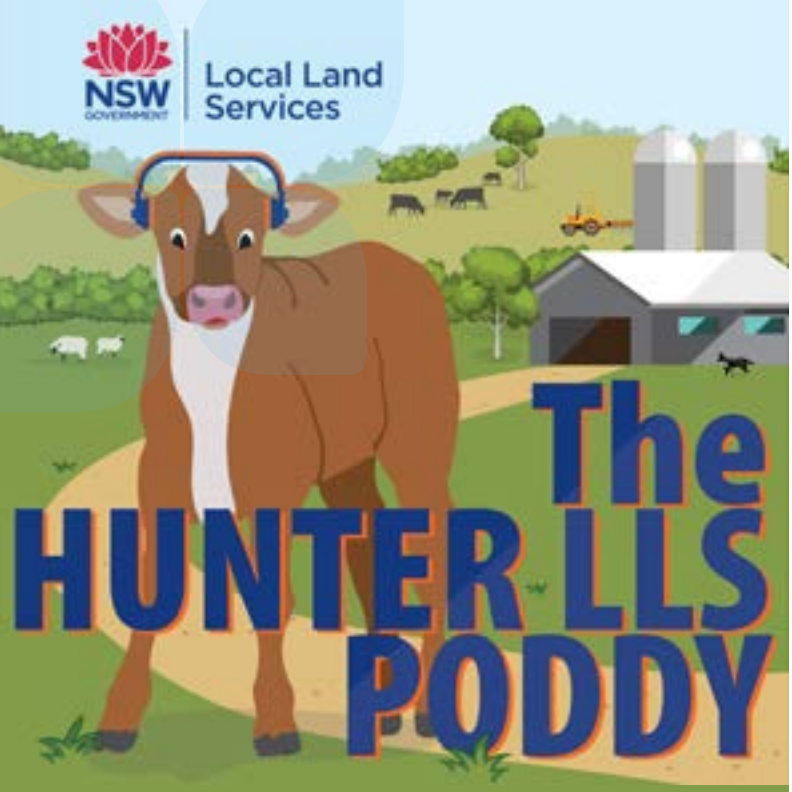


Figure 6. Nitrogen Use Efficiency over the 15 months at Casino. Highest responses to fertilising nitrogen occurred in September. This is in part because soil mineralisation increase adding to the supply of nitrogen for the plants.



YouTube

Visit the Hunter Local Land Services Youtube Channel for videos and webinars on ag extension, stock managemnt, pest animal, NRM and more. Subscribe for notications on new cotent. Just Scan the QR code to head over.

Check out these playlists:

Coastal Agronomy Research Talks

Starting Smarter: Irrigating for Profit

Singleton Pasture Demonstration Site

Challenge and Change

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