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MFS
MONARO FARMING SYSTEMS

Monaro Seasonal Outlook (September 2015)

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Introduction

The Bureau of Meteorology seasonal outlook for Winter 2015 (28th May 2015) was for only a 35-40% chance of exceeding the long term median seasonal total. Additionally the outlook was for warmer than average temperatures both maximum and minimum. In fact the winter seasonal rainfall total exceeded the median and while maximum temperatures hovered around the median minimums were colder.

Soil moisture at the end of May were just above the 75th percentile giving confidence moisture would not limit winter growth, rather the lack of sunshine hours and lower than expected temps kept a lid on pasture growth especially for the month of July. However having entered the winter with above average herbage availability the current seasonal ranking is still above average. Modelled animal performance followed this same trend with ewes reaching spring in top quartile body condition. Please note this is likely to be an overestimate with soil nitrogen effects on pastures and feed quality, the effect of animal disease issues and winter shearing in some flocks not accounted for.

Method

As usual the weather data is sourced from the SILO data drill for Bungarby (36°39' S: 149°00' E). The base historical simulation (starting 1 Jan 1960) was re-run up to the 27th of August 2015 to establish how the current seasonal conditions rank compared the past 55 years. A tactical simulation was then carried out using the final state of the historical run as its starting parameters.

The projections for the coming autumn have applied weather data for the period 28th of Aug – 30th of November for each year from 1960 to 2014 so as to create a distribution of possible seasonal outcomes to compare with the historical distribution of performance.

Potential for utilising anticipated spring growth through a cattle trade has also necessitated extending the tactical period out to the 31st of Jan to full explore the potential for trading steers and finishing them by this time.

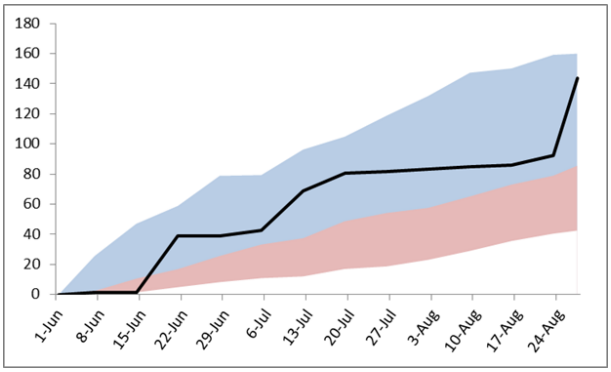
Conditions leading up to Spring 2015

Weather

At the May 28th update the BOM seasonal projections indicated a drier than normal winter season with 35-40% chance of the rainfall total exceeding the median. The season was also predicted to be warmer than average with a 70-80% chance of maximums being warmer than average and a 60-70% chance of the minimums being warmer than average.

The Silo data drill for the Bungarby monitor locality shows the total rainfall for the period from 1 June 2015 to 27 August 2015 was around 140mm while the median for that period is around 80mm. Figure 1. shows that while the cumulative total never fell below the median after the 15th of June the total accumulated as a result of three rain events driven by south coast lows in the weeks starting the 15th of June, 6th of July and 24th of August. These types of rainfall events are notoriously difficult to forecast and relate poorly to indicators such as El Nino.

Figure 1. Cumulative seasonal total from the 1st of Jun 2015 compared to the long term distribution.

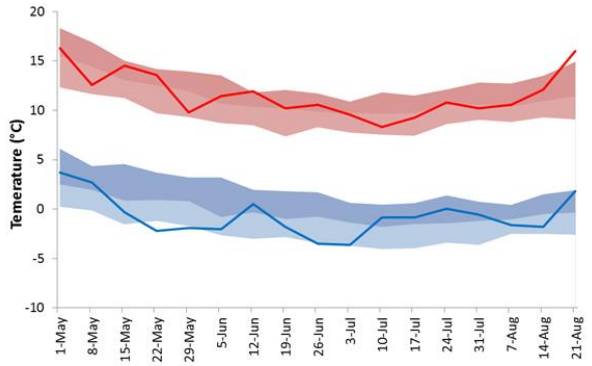


(Red area represents the span from the 10th percentile to the median while the blue shading covers the range from median to the 90th percentile)

Figure 2. demonstrates that weekly average maximum temps were around the median until the

end of August and minimums were more often colder than the median.

Figure 2. Weekly average Max and Min temps compared to the historical distribution.



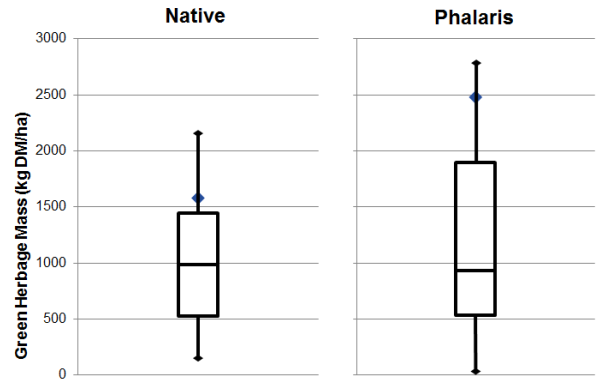
The shaded areas represent the long term weekly max and min temperature percentiles (10%, 50% and 90%). The solid lines are the weekly average max and min temperatures for the period from 1st Mar 14 to 26th Aug 14

Pasture Growth

Modelled pasture growth has overall been average for the winter but as the systems entered winter with above average green herbage mass this as carried forward to above average green herbage at the end of winter also. Anecdotally this is likely to be an overestimate since a number of factors which serve to temper the pasture growth have not been accounted for by the model.

The extraordinary summer of 2014-15 undoubtedly used a large proportion of available soil nutrients which would not have recycled back into the system before winter. This effect is not accounted for by GrassGro as soil fertility is simply mimicked through a scalar that restricts pasture growth constantly across the year. Also the weather data drill provides a calculated estimate of radiation which while accounting for cloud cover does not account for low level screening by fog. Overall the green herbage mass is likely to be overestimated however this should not have a large impact on the projections going forward.

Figure 3. Green herbage mass (kgDM/ha) at the 27th of August relative to the historical distribution. (Current conditions indicated by the diamond and the boxplot the long term distribution.)

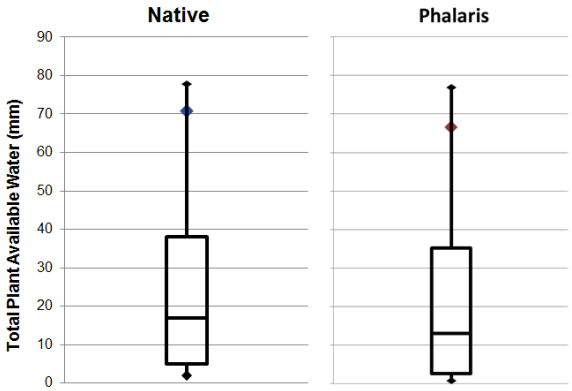


It should be noted that the high estimate of green herbage on the native pasture is driven heavily by the Poa spp. component of this system and that the availability of other species (predominantly Austrostipa spp.) only makes up less than 500kgDM/ha.

Soil Moisture

Figure 4. shows the relative plant available water for both native and improved pastures as at the 24th of February. The plant available soil water is well up in the top quartile of the years since 1960 and gives confidence that early spring growth should be good. The recent rainfall even in the week of the 24th of August has been a major influence in lifting the soil water levels so high at this point in time.

Figure 4. Plant available water (mm) on 27th August relative to historical values for that day.



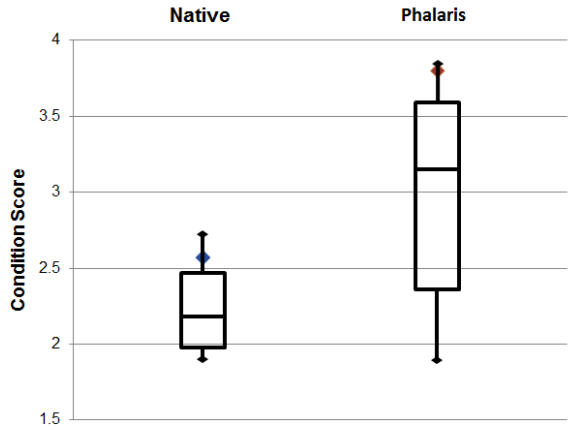
Animal Condition

The exaggerated pasture conditions have also probably lead the model to overestimate the body condition of ewes at the end of winter. Figure 5. shows that for both pasture systems the condition score (CS) of mature breeding ewes is in the top quartile for the time of year at around CS 2.6 for ewes on native pasture while ewes on improved pasture are about CS 3.8.

In addition the impact of internal parasites, feet troubles on wet ground and the impact of winter shearing in some flocks will have highlighted a discrepancy between the model and some district flocks. Nevertheless the discrepancy for the native pasture system is probably only very slight given that the animal performance on these systems is driven more by feed quality than feed quantity. The ewe condition on the phalaris system is probably more exaggerated but is of less consequence as even if it has overestimated condition by 0.5 CS units the ewes are still above the average for the time of year.

NB: For both systems condition score does not fall below 2 since both systems are set up to feed animals to maintain them at this level when required.

Figure 5. Ewe condition score on 27th of August relative to historical values for that day of year.



BOM weather outlook Spring 2015.

The three month rainfall outlook –September to November shows probabilities of exceeding median rainfall is 45-50%, Furthermore the Bureau claims moderate accuracy for their outlook in our region with around 60% consistency between forecast range and the ultimate outcome.

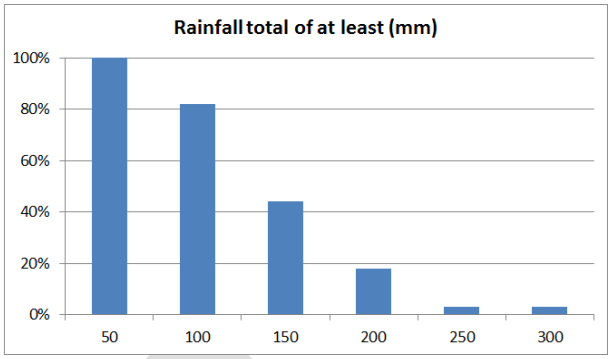
Figure 6. BOM Sep – Nov Rainfall Outlook.

On this occasion the BOM outlook provides no strong signal as to the season being more likely to be better or worse than average so this report will consider the historical probability distribution of the full range of seasonal outcomes from 1960 – 2014 to generate the GrassGro model projections for the coming season.

Based on this assumption Figure 7 shows the seasonal rainfall outlook for the Bungarby SILO weather data drill suggesting that the median total rain for the period is 142mm but there is an 82% chance that the rainfall over the next three months will exceed 100mm. This along with the current soil moisture levels should give us confidence that the seasonal pasture growth should be above the average.

Figure 7. Rainfall outlook, Bungarby Sept - Nov

Median	142
Chance of above median	Even



Past Accuracy	Moderate

Projections 28th Aug – 30th Nov.

A tactical simulation was conducted using historical weather data for the period of the 28th of August to the end of November for *each year 1960 – 2014.*

Pasture availability expected to be above average.

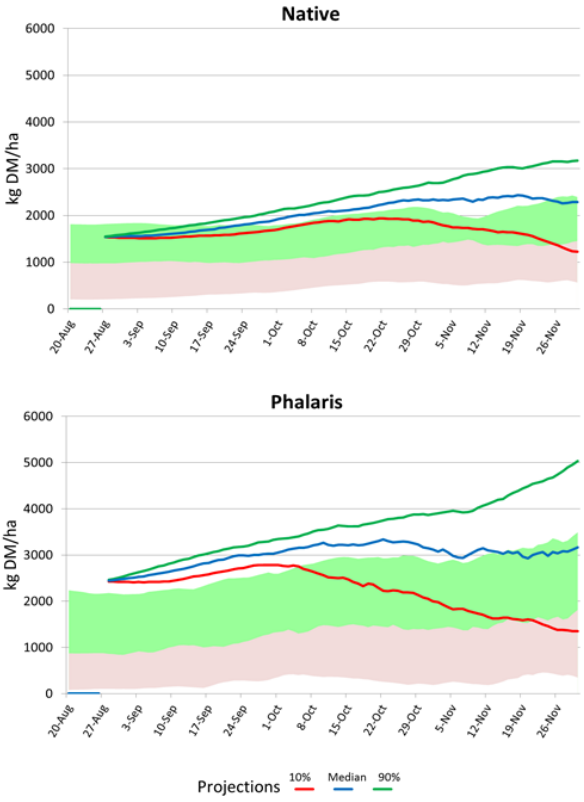
Figure 8 indicates the projected percentile distribution for available green herbage relative to the historical percentiles.

Green herbage on the 27th of August is below the 90th percentile for the native pasture and just above for the Phalaris. Plant available water is excellent and with the expectation of normal rainfall probabilities Ongoing growth can be expected.

Due to the high green leaf area of the Phalaris (probably an overestimate) the worst case scenario is for growth to slow and herbage availability to decline beyond the beginning of October. If the amount of green present in the pasture at the start of spring is an overestimate we would expect the actual early spring water usage to be less and for the point of inflection for this worst case scenario to be later in the season. The less green leaf currently present the longer the current soil moisture levels will last. Overall the current seasons probability distribution for the phalaris should probably start lower but since growth is likely to continue for longer before a soil water deficit occurs then the distribution of green herbage available at the end of November will likely be similar to that modelled.

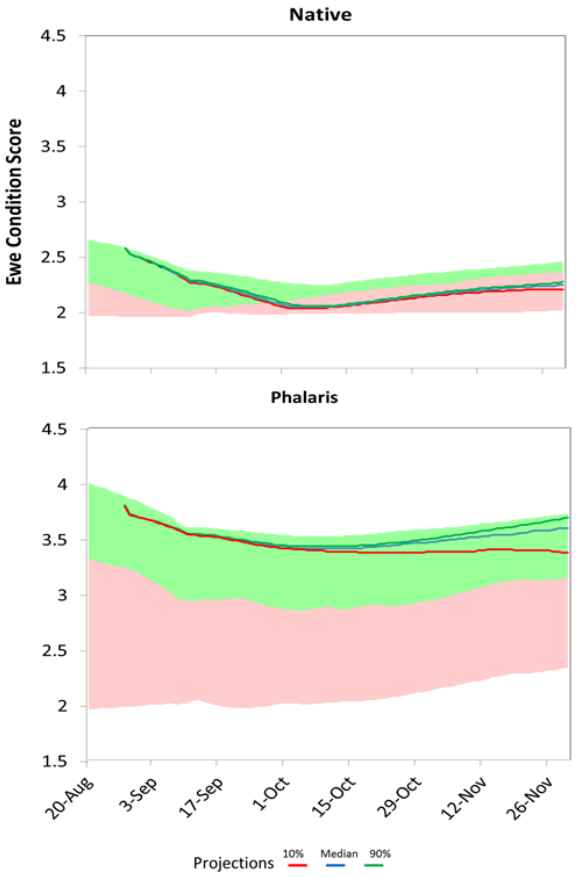
The projections for available herbage on the native pasture indicate that if rainfall is median or better then available green herbage on the native pasture should remain above the long term 90th percentile while the worst case scenario still keep green herbage availability around the long term median.,

Figure 8. Projected green available herbage (kgDM/ha) relative to historical variation.



Green shading is the area between the historical median and 90th percentile while light red shading is the area between the historical median and 10th percentile.

Figure 10 Projected ewe conditions score relative to historical variation. Green shading is the area between the historical median and 90th percentile while light red shading is the area between the historical median and 10th percentile.



Ewes in good condition

While ewe condition score is estimated to be well above the median for the time of year for reasons explained earlier this is likely to be an over estimate, especially for ewes on the improved pasture. Also since lambing is just starting in September it is expected that regardless of seasonal conditions ewes will lose some body condition over the coming month but that on the native pasture this will reliably be regained t over the second half of spring. The projected distribution for the ewes on native pasture is very narrow which is due to the spring performance on native pasture being limited almost solely by pasture quality rather than availability which is controlled more by the time of year (stage of growth) than by the seasonal conditions themselves. For ewes on Phalaris pastures even if their current CS is lower than indicated they should still reliably finish spring above the median regardless of the rainfall outcome. A positive outlook for body condition along with the outlook for pasture growth suggests there is likely to be reliable surplus carrying capacity this spring which could be utilised through trading stock.

Potential Strategies.

In the past we have tested seasonal opportunity in the by making strategic trades to take advantage of un-utilized carrying capacity. In a similar fashion to the analysis in spring 2013 a tactical simulation was carried out to determine what proportion of the farm could sustainably carry the current spring stock numbers in order to determine how many hectares could be given over to other pursuits such as a trading enterprise.

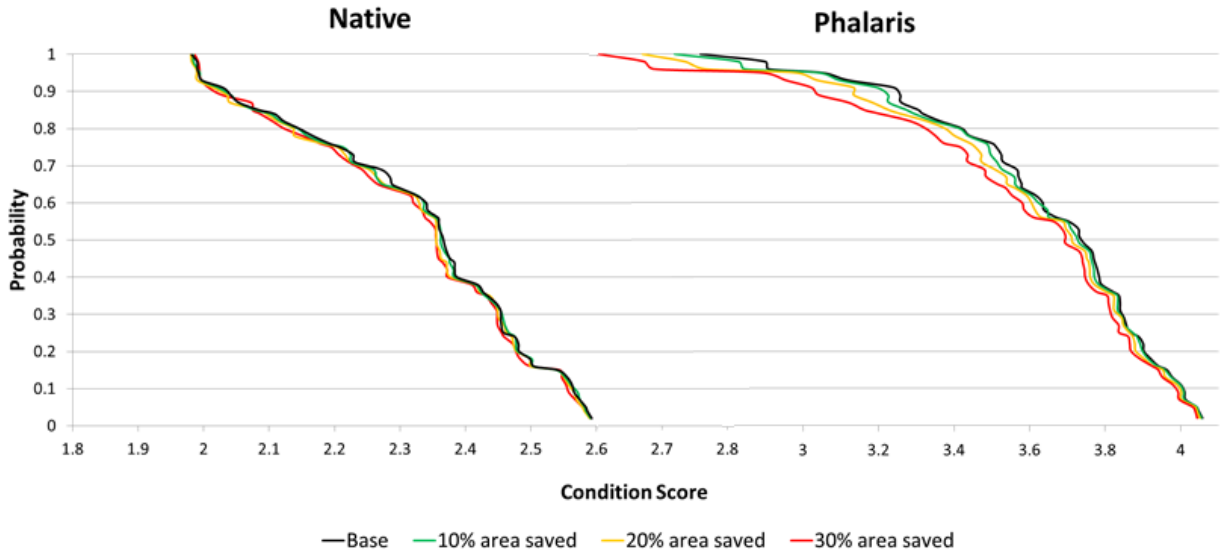
To do this, animal and pasture performance including ground cover was simulated for both pasture types at a range of stocking rates which represented a policy of reducing the area grazed and saving 10%, 20% and 30% of the land area for supplementary grazing (ie 90%, 80%, and 70% of the total land area utilised). The period of the simulation was extended to the end of January to allow the extra time needed to simulate a steer trade and still reach desired live weight at sale.

Figure 8 shows the cumulative density function for ewe condition score. The vertical axis shows the probability that ewe condition score will exceed the threshold level shown on the horizontal axis.

For the native pasture reducing the grazed area by up to 30% has little impact on the distribution of possible ewe body condition, further reinforcing that over the spring period the limiting factor for

livestock performance on native systems is feed quality not quantity. Regardless of the stocking rate there is a 93% chance CS will exceed 2 and feeding will not be required to achieve this. At the other end of the distribution the maximum CS of ewes on native pasture at the end of January is 2.6. By comparison there is a small impact on ewe condition score that results from increasing the stocking rate on the Phalaris. This impact is obviously greatest in the poorest seasonal outcome scenarios (top left of the curves) but still this difference is less than a fifth of a condition score and the worst case scenario is that the ewes grazing the Phalaris pasture will have a CS equal to that of ewes grazing native pasture in the best possible season.

Figure 8. Probability of ewe CS staying above threshold levels by the end of January if grazing less than the total available area of pasture (i.e. at higher stock densities)



This same trend is indicated in the data for both lamb live-weight and minimum ground cover as shown in Figures 9 and 10. The impact of the stocking rate on lamb weaning weight on either pasture type is negligible while as expected there was some effect on ground cover especially on the Phalaris pasture which is already running at much higher stocking rates than the native pasture.

Despite this the minimum projected ground cover at the end of January is still over 80% for both pasture types in the worst case scenario.

Overall this would tend to indicate that up to 30% of the land area could be retired from use by the breeding enterprise this spring causing no issue with the enterprise productivity nor any sustainability issues in terms of ground cover

Figure 9. Probability of Lamb live weight exceeding threshold levels at the end of Spring 2014 if grazing less than the total available area of pasture (i.e. at higher stock densities)

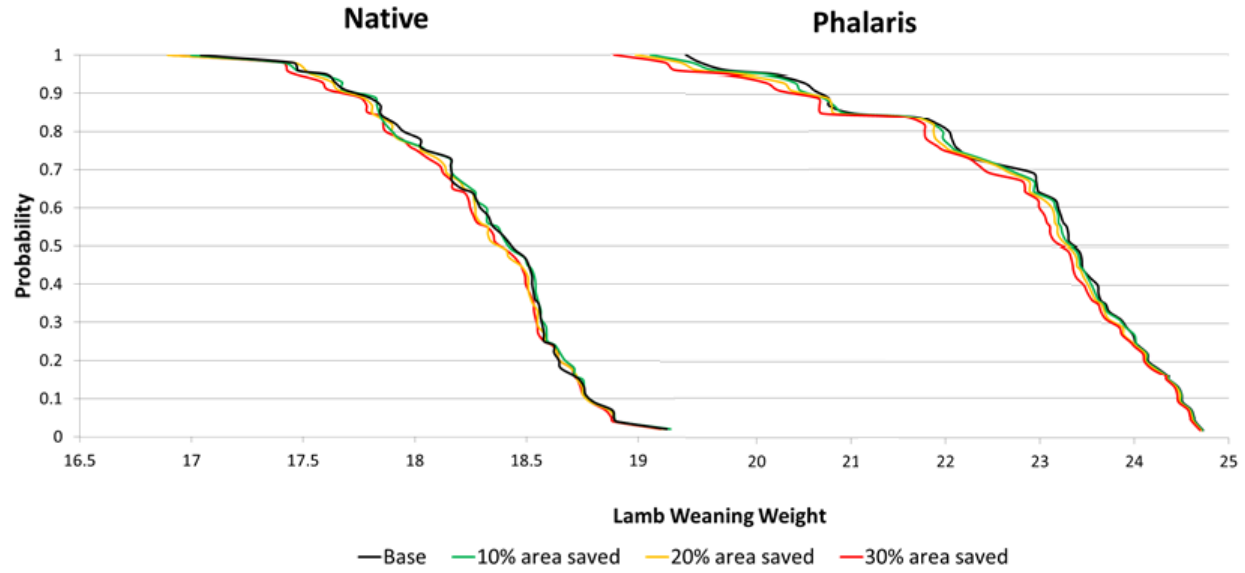
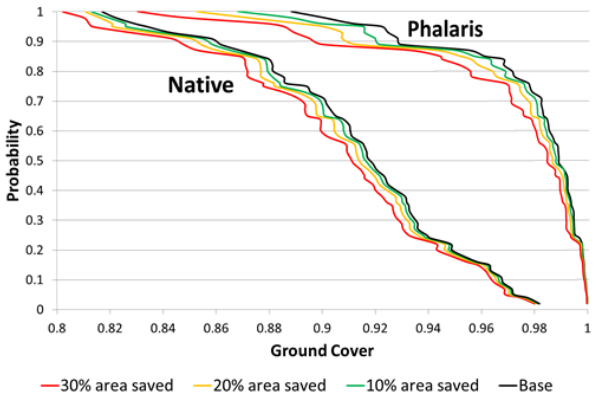


Figure 10. *Probability of ground cover staying above threshold levels during spring of 2014 if grazing less than the total available area of pasture (i.e. at higher stock densities)*



Trading Opportunity

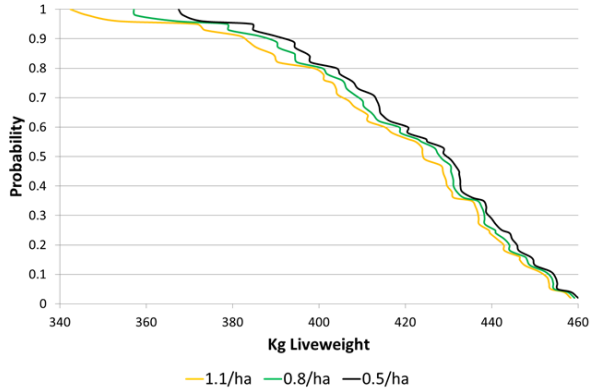
If up to third the farm area could be available for opportunistic enterprises then one possibility is to trade stock to utilise the excess pasture. Discussions with MFS members has indicated a reluctance to trade sheep due to the potential flock health risks such as OJD, foot rot, lice etc. Instead I have only used a steer trade as an example of the capacity to finish stock based on the assumption that the stock traded would be grazed solely on the improved phalaris based pasture.

In order to do this 600 of the ewes from the 1000ha phalaris pasture system have been moved to the native pasture system giving an overall stocking rate on the native pasture of 3 ewes/ha. The remaining ewes on the phalaris are being grazed at 5.2 ewes/ha rather than the original 4.2 and around 300 ha of the phalaris pasture is made available for trading stock in the process.

Core assumptions are that 280kg C2 yearling steers will arrive on the 10th of September and three different stocking rates were simulated ranging from 0.5 to 1.1 steers/ha grazed.

Figure 11 shows the probability of the final weight (31st Jan) of the traded steers exceeding certain levels if run at three different stocking rates

Figure 11. *Probability of steer live weight exceeding threshold levels at the end of January 2016 grazing at three stocking rates.*



The probability surface for final live-weight is not substantially affected by the stocking rate unless the seasonal outcome is below the 10th percentile (0.9 probability of exceedance). This is largely due to the limitation on live weight gain being driven more by pasture quality than by any limitation in availability. The Median final live weight (probability 0.5) is around 430kg regardless of stocking rate representing an average daily gain around 1 kg/hd/day.

While this data on the physical output of the trading enterprise demonstrates the technical feasibility of trading steers successfully, however the principle reason to make the trade is to make a profit. Given the positive outlook for the cattle market and the apparent value in the current store market (Mecardo 27th August 2015) the modelled weight gain data was used to create a trading profit probability curve based on some core cost and price assumptions shown in Table 1.

Table 1. Cost and Price assumption for a steer trade in September 2015 with final sale 31st Jan 2016.

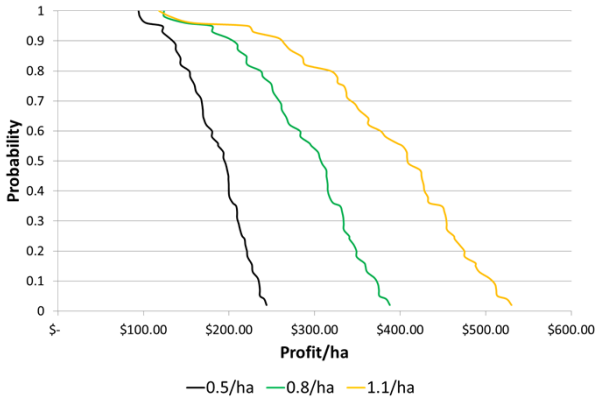
Purchase Price (318c/kg# Lwt)	$890
Sale Price (330 c/kg# Lwt)	$1320*
Husbandry	$9.70/hd
Fixed selling costs	$22/hd
Sales commission	3.5%
Cartage to farm	$23/hd
Opportunity cost of capital	5% p/a
Deaths	2%

Buy in price is the NSW weekly average (28/8/15) for the weight category as reported by the NLRS plus a 5c premium assuming a rising market. Sell price is the NSW weekly average (28/8/15) for the weight category as reported by the NLRS
*Assuming a sale weight of 400 kg, actual sale price depends on the modelled live weight at 31 Jan.

Figure 12 shows the probability distribution of the trading profit per hectare. Importantly the profit probability distribution shows that under the stated price and cost assumptions the minimum profit to be expected from the trade would exceed $100/ha. If capital can be raised choosing the higher stocking rate of 1.1 steers per hectare (ie buying in 330 steers) could yield a trading profit of more than $500 per hectare under the best seasonal conditions. It is also important to note the being conservative in terms of stocking rate is not a good economic strategy since trading 0.8 steers/ha has a 90% chance of yielding more profit than the best case scenario for trading 0.5 steers/ha. Similarly trading 1.1 steers/ha has around a 60% chance of

making more profit than the best case scenario for trading 0.8 steers/ha. Even more telling is the fact that none of the line cross over in the poorer seasons (top left of the graph) indicating that there is no down side to trading the larger number.

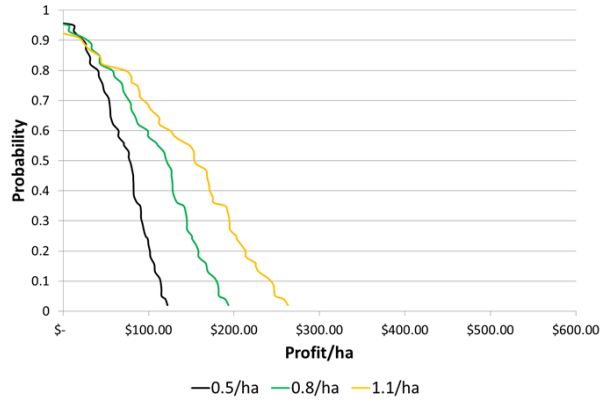
Figure 12. *Probability of trading profit exceeding threshold levels grazing at three stocking rates.*



Price sensitivity

Farmers are notoriously price risk averse so the following figure seeks to contextualize the impact of price risk on a trade this spring. Assuming that the market goes up 10% between now and the time that stores can be purchased and that the price of finished cattle falls 10% between now and the 31st of Jan (representing a 20% price correction between the buy and sell dates) figure 13 shows that even under such an extremely risk averse scenario the trade will still have a 90 – 95% chance of breaking even and that there is still an 80% chance that trading 1.1 steers/ha will be the most profitable option. Median profit at 1.1 steers/ha is still around $160/ha or $48,000 in total for the farm.

Figure 13. *Probability of trading profit exceeding threshold levels assuming 10% higher buy in price and 10% lower price at the time of sale.*



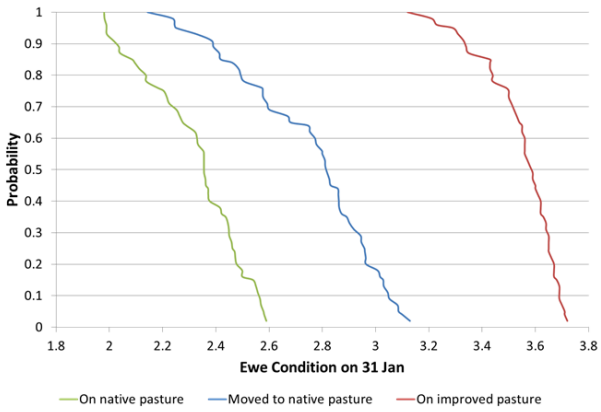
Downside Risks to the Sheep enterprise.

While increasing the stock density of sheep in the systems will not have any significant effect on the animal performance the choice to move 600 ewes from the Phalaris pasture to the native pasture does carry a downside in terms of the performance of these ewes and their progeny.

To determine this, another tactical simulation was conducted by using the current state for the soils and pastures on the native systems but stocking it with the ewes from the phalaris system at the target rate of 3 ewes/ha.

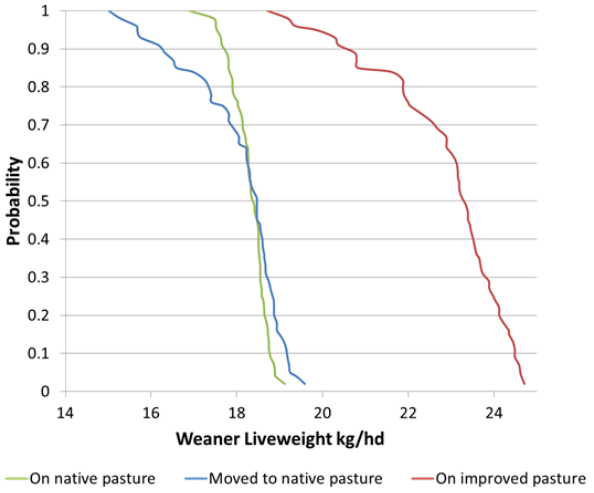
Unsurprisingly this change in pasture has the effect of these ewes losing more body condition than if grazing the improved pasture. Figure 14 show that the best case scenario for these ewes is a CS at the end of January equivalent to the worst case scenario for ewes grazing the Phalaris pasture. Despite this due to their high starting point they still have a 75% chance of having a higher CS than the ewes that had continuously grazed on the native pasture.

Figure 14. *Effect on ewe condition at 31st Jan 2016 of moving ewes from improved pasture to native pasture in September.*



More importantly this change in fed base does impact on their lambs as well. Figure 15. Indicates that the lambs of the ewes that have moved to the native pasture will perform similarly to the lambs from ewes continuously grazing the native pasture despite the better condition of their mothers. This can be explained through the intake of animals higher than CS 3 being suppressed and these fatter animals losing condition at a much higher rate than the leaner ewes.

Figure 14. *Effect on lamb weaning weight of moving ewes from improved pasture to native pasture in September.*



Conclusions

Seasonal conditions for the spring period of 2015 show great promise and potential to increase production. Excellent soil moisture and pasture condition at the start of spring should lead to pasture availability tracking a path well above the median until well into October even with a poor seasonal outcome. A neutral BOM seasonal outlook indicates the median pasture availability outlook this season exceeds the long term 90th percentile throughout the spring.

Based on the Bungarby modelling, opportunities exist to trade stock at considerable profit and increase the overall stocking rate over the spring period. Even quite pessimistic price sensitivities suggest such a trade has a high probability of turning a profit and that producers should have the confidence to stock at rates higher than their long term average.

Overall the outlook for the season is probably at least as good as this time last year; and this outlook is based solidly on what we know about the current state of the system rather than reliance on positive seasonal weather forecasts. Indeed this year's GrassGro projections hold up even with a pessimistic outlook for seasonal rainfall.