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Scoping study for the WA high rainfall zone lamb initiative

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Abstract

The aim of this project was to establish the feasibility of and opportunities for increasing lamb supply from the high rainfall zone (HRZ) of WA. Market research, on-farm benchmarking and bio-economic modelling indicated that sheep enterprises were 2 to 3 times more profitable than beef enterprises, and yet 84% of producers currently run beef and more than 50% run beef only enterprises. Market research indicated that up to 600,000 additional lambs could be produced per annum from the WA HRZ through the combination of improving the reproductive performance of existing lamb enterprises and the introduction of lamb production by landholders that might consider or have considered lamb production. Significant land use and practice change will depend on addressing both perceived and real barriers to adoption of lamb production, including lack of infrastructure, concern of footrot, fleece rot, lice, worms and flystrike and that sheep require too much labour.

Executive summary

There is potential to increase lamb supply by expanding the lamb industry in the HRZ of south-west Western Australia, which is currently dominated by beef production. The MLA Management Solutions Program demonstrated that production of 70 to 80 kg of lamb liveweight/ha per 100 mm of rainfall was possible in similar environments in south-west Victoria. The potential for high levels of lamb production per hectare, coupled with high lamb and sheep meat prices and low profitability of the WA beef and dairy industries, means that prime lamb enterprises should represent an attractive alternative for livestock producers in the HRZ. The aim of this project was to establish the feasibility of and opportunities for increasing lamb supply from this region. The project initially involved market research to identify the opportunity and landholder interest to expand lamb production in the HRZ. Focus groups involving over 50 beef producers were conducted to better understand: (i) key motives of landholders; (ii) reasons why beef are the dominant enterprise; (iii) frustrations landholders have with beef production systems; (iv) perceptions and knowledge of lamb production systems; (v) key barriers to adoption of lamb production systems; (vi) review of existing skills and infrastructure necessary for lamb production, and (vii) how landholders reluctance towards lamb production could be overcome. A subsequent telephone survey was completed by 300 livestock producers in the HRZ to quantify the findings from the focus groups.

The market research found that 80% of landholders in the HRZ ran a beef enterprise and 54% ran only a beef enterprise. The key reasons for beef being the dominant enterprise related to producer's existing infrastructure and management skills, the relatively simple and low labor requirement for beef and the suitability of cattle to the long and wet growing season. However, there was frustration among beef producers towards the poor market prices and there was recognition that lamb production is generally more profitable than beef. Despite this producer's didn'tt fully appreciate the real differences or opportunity that exists in increased lamb production as the profitability comparison of lamb and beef enterprises has not been quantified in the HRZ.

A number of key barriers to the expansion of lamb production were identified, highlighting the challenge in changing beef producers' perceptions of lamb production so it could be introduced or at least trialed. About 80% of beef producers cited unsuitable infrastructure, including fencing, as the main reason for not running sheep and this was also the main reason that prevented beef cattle producers from trialling lamb production. Furthermore, the majority of beef producers believe that labour use, intensity and timing is much greater and more critical for lamb production compared with beef. Finally, two thirds of beef producers indicated that they have no desire to run sheep, or they don't enjoy running sheep, with particular concerns about foot rot, fleece rot, lice, worms and fly strike.

The market research identified some key avenues to exploit to overcome these perceived or real barriers to the adoption of lamb production in the HRZ. The first of these is to quantify the differences in the profitability of lamb compared to beef over the longer term. The project completed benchmarking analysis using Red Sky and showed that the sheep enterprise on mixed sheep/beef properties was 3 to 4-fold more profitable than the beef enterprise ($343 *vs.* $98/ha). This benchmarking comparison was limited to a single year and was distorted by high sheep and wool and low beef prices in 2010/11. However, economic modelling using long term beef and lamb prices indicated that the profitability of lamb production was higher than beef production ($246 vs. $122/ha), confirming that lamb production is likely to a

profitable alternative to beef production in the HRZ. The economic modelling also compared different lamb production systems and indicated that a self replacing system based on a maternal composite genotype had a similar profitability to a dual purpose Merino ewe mated to a terminal sire to produce a first cross lambs, however the maternal enterprise was more profitable when there was a shortage of labour.

Even with limited labour, the sheep enterprises were more profitable than the beef enterprise with unlimited labour, suggesting that the requirement for labour may be a problem of perception rather than reality. Sensitivity analysis indicated that optimising pasture utilisation, improving the value of sale animals, achieving high reproductive rates and achieving high pasture growth rates in winter were the criticial control factors most important for the profitability of lamb production enterprises.

Farmers agreed stongly that another benefit from introducing lamb production is the diversification of income. This spreading of risk is a key virtue of a second enterprise and lamb production exploits a key frustration among beef producers that the loss of a calf means no income from that cow for the entire year. The fact that introduction of sheep leads to more diverse income streams for HRZ landholders is a key selling point that could be exploited if the potential increases in lamb production are to be realised.

Over half of the landholders surveyed that have considered or might consider lamb production, want to see lamb producer case studies from the HRZ. The case studies developed in this project emphasise what was involved in developing and now running a lamb enterprise and highlight advantages such as diversification of income, increased profitability, grazing management and better matching feed demand to pasture supply thereby requiring less hay. Emphasis on infrastructure is critical due to the lack of suitable infrastructure and fencing for lamb production (80% of landholders agree). Finally, another frustration among almost three-quarters of beef producers in the HRZ that could be exploited is the lack of competition from buyers for beef.

About 50% of landholders believed that sheep were more profitable than beef, because of higher lamb and wool prices, however almost two thirds of the landholders who would consider lamb production indicated that they needed confidence that lamb prices will remain high in order to develop a lamb enterprise.

Overall, the market research found that there is significant scope to increase lamb production in the HRZ. Potentially, over 600,000 additional lambs could be produced per annum through the combination of improved reproductive performance of existing lamb producers and the introduction of lamb by those not currently producing lambs. Improving the reproductive performance of existing lamb producers would be the easiest pathway to increasing lamb production in the HRZ, although this avenue only accounts for about one-third of the potential increases modelled. To achieve this all current lamb producers would need to increase lamb marking rates from 80% to 100% lambs marked to ewes joined. The modelling did not specifically identify ways to enable this, however the market research undertaken earlier in this project did identify that existing lamb producers felt they received very little industry information on best practice and were poorly serviced by livestock agents, who predominantly focused on cattle.

To realise the increases in lamb production modelled in this project a two-pronged strategy would be required. First, existing HRZ lamb producers would need to be engaged more effectively in an extension strategy tailored to their needs. This ultimately needs to result in high levels of participation in Lifetime Ewe Management,

which could effectively deliver the reproduction rate increases modelled in this project. This effort would require specific targeting of HRZ lamb producers given the market research undertaken highlighted these producers felt current WA extension programs such as the Sheep Back and More Sheep Campaign were targeting cereal-sheep zone producers only. Secondly, those landholders that might consider, or have considered, lamb production need to be engaged in an extension campaign that addresses the key barriers to adoption of lamb production identified in this project and that would lead to significant land use and practice change.

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1. Background

The supply of lamb is under threat given declining sheep numbers and improving supply in the immediate term requires a breeding ewe-replacement strategy and continued improvements in productivity at farm level (National Sheepmeat Production RD&E Strategy, 2010). Projected market demand can only be met by radical increases in carcase weight and at least a 10% lift in reproduction rate over the next five years, and the Centre for International Economics indicates that production can be doubled during this time without any significant deterioration in price (Palmer 2010). In the medium to longer term there is significant potential to increase lamb supply by expanding the lamb industry in the high rainfall zone (HRZ) of south-west Western Australia.

The western end of the HRZ is the target for this initiative and the MLA Management Solutions Program demonstrated that similar environments in south-west Victoria achieved 70 to 80 kg of lamb liveweight/ha/100 mm of rainfall (MLA Morelamb Quality Pasture Project, Andrew Kennedy, unpublished data). High levels of potential production per hectare, coupled with high lamb and sheep meat prices and low profitability of the WA beef and dairy industries, means that prime lamb enterprises should represent an attractive alternative for livestock producers in the HRZ of south-west Western Australia. The aim of this project is to establish the feasibility of and opportunities for increasing lamb supply from the HRZ of WA.

The HRZ of south west WA was defined as the shires of Augusta-Margaret River, Boddington, Boyup Brook, Bridgetown-Greenbushes, Busselton, Capel, Collie, Dardanup, Denmark, Donnybrook-Balingup, Harvey, Manjimup, Murray, Nannup, Plantagenet, Serpentine-Jarrahdale, Waroona (Figure 1). In addition to the shires outlined in Figure 1 the Esperance region was also included in the scope of this project.

Figure 1. Location of the shires included in the High Rainfall Zone of south west Western Australia

2. Project Objectives

The objectives of this 'Scoping study for the WA High Rainfall Zone Lamb Initiative' include:

1. Undertake market research to identify the opportunities and constraints to producers running a prime lamb production enterprise in the HRZ of WA.
2. Collect benchmark production data from commercial-scale prime lamb and beef enterprises.
3. Use bio-economic modelling to derive potential production benchmarks for lamb and beef production systems in southwest WA and identify the components of these systems that could be manipulated to have greatest impact on whole farm profitability.

3. Methodology

Market Research

Nine focus groups involving over 50 beef producers were conducted across the HRZ of WA to better understand:

(i) key motives of landholders in the high rainfall zone of southern WA;
(ii) reasons why beef cattle are predominantly the enterprise of choice;
(iii) frustrations landholders have with beef cattle production systems;

(iv) perceptions and knowledge of lamb production systems;
(v) key barriers to adoption of lamb production systems;
(vi) review of existing skills and infrastructure necessary for lamb production, and
(vii) how their reluctance towards lamb production can be overcome.

In addition, a telephone survey was completed by 300 livestock producers in the HRZ of south-west WA, representing a mix of producers across scale, production system, age, etc, to quantify the focus group findings and provide evidence to make informed decisions in the benchmarking and modelling components of the project. Full details on the methodology and results from the market research undertaken to evaluate the opportunities for, and barriers to, prime lamb production in the HRZ of WA are given in Appendix 1 and 2.

Benchmarking

Red Sky Farm Business Analysis was undertaken to benchmark the performance of beef and sheep businesses in the high rainfall zone of WA. Full details on the methodology and results from the benchmarking analysis undertaken are provided in Appendix 3. The Red Sky Analysis uses a mix of physical, financial and productivity measures to analyse business performance. The benchmark analysis was undertaken for businesses with both beef and sheep enterprises and businesses that only had beef or sheep enterprises. The benchmark data were also used to validate the bio-economic analyses to examine the potential for lamb enterprises in the HRZ.

The 2010/11 Red Sky Farm Business Analysis data for combined beef and sheep businesses as well as for individual beef businesses was obtained from the Beef Group within the Department of Agriculture and Food WA. The Red Sky analysis for individual sheep properties was undertaken as part of the current project. Approval for the confidential use of the Red Sky data was obtained from the individual business owners. The Red Sky Farm Business Analysis data was compared for beef and sheep enterprises within six businesses and for seven businesses with beef only and six businesses with sheep only. Only businesses running in excess of 1,500 DSE (either cattle or sheep) were included in the comparison. The average of the physical, financial and productivity measures for the beef and sheep enterprises were compared using a t-test. The standard error about each of the measures was large due to the small sample size and the large variation in the measures.

Economic analyses

Bio-economic modelling was used to examine the profitability of different production systems that vary based on the genotype of the ewe ('Easy-care' Merino, Maternal Composite and Dorper; Table 1), lambing opportunities (May, July or August) and finishing systems (slaughter, stores or live export). The management and production factors that were varied included: the feedbase, pasture utilisation, ewe nutrition, reproductive rate, age of ewe at first mating, lamb value, wool value and ewe replacement price. The analysis for the sheep enterprises was carried out using the MIDAS suite of models.

MIDAS is a computer model used to assess the impact of change in a farming system. It describes the biological relationships of a representative farm. This information is used to estimate the profitability of particular enterprises or management strategies. There wasn't an existing MIDAS model for the HRZ so a new model was developed based on the Manjimup region. Inputs for the model were based on:

1. Pasture & soil type data provided by Paul Sanford, DAFWA, (*pers. comm.*)
2. Management, cost & production data from the Red Sky benchmarking and Paul Omodei, AgVivo, (*pers. comm.*)

The analysis of the beef enterprise was based on a gross margin derived from information in the Red Sky benchmarking. The analysis was not carried out in MIDAS because there was insufficient information to calibrate the enterprise particularly the labour requirement for cattle jobs and liveweight performance of cattle versus sheep. This difference in analysis approach means that the basis for the stocking rates are not directly comparable, however, the stocking rates do reflect the differences that were observed in the benchmarking data. Therefore, we have confidence that the enterprise comparisons are valid, however, it is not possible to do an analysis of labour in the beef enterprise or look at the critical control points in the beef enterprise.

The MIDAS model represented a 'typical' farm in the Manjimup region in south west of WA. The total area of the farm is 600ha and is comprised of a single land management unit. Four production systems were examined in this analysis (see Table 1). Variation between the systems is related to the genotype of the ewes and the time of sale of the progeny. The expectation of the project team was that the composite maternal genotype has the greatest potential for this region and therefore this has been used as the standard for this analysis. The standard time of lambing for the sheep production systems was July/August and the standard calving time was Feb/Mar. The sheep systems were also evaluated with lambing in May.

Table 1: A description of the flock types included in this analysis.

Flock	**Description**
Composite ewes *(Maternal)*	A lamb system with a self replacing composite breed. The ewes are mated at 19 months of age.
Merino *(Merino)*	Buying in an 'easy care' merino genotype ewe. The ewes are mated at 19 months of age to a terminal sire to produce 1st cross lambs.
Dorper *(Dorper)*	A lamb system with a self replacing Dorper. The ewes are mated at 19 months of age.
Cattle *(Beef)*	A cattle system producing vealers for sale, calving in Feb/Mar.

The analysis for the three sheep breeds were repeated for a farm that was unable or unwilling to hire labour to complement the owner operator. Having this constraint on labour restricted the carrying capacity of the farm based on the time available to carry out the necessary jobs rather than related to feed available on the farm. This analysis was not carried out for the beef enterprise because as previously described the beef analysis was carried out using gross margins rather than MIDAS.

Sensitivity analysis using MIDAS was used to quantify the value of critical control factors of the 'Maternal' lamb production system to identify the important aspects of managing a lamb production enterprise in the high rainfall zone. Each of the factors were changed systematically (and individually) while the others were held constant. In each case the most profitable system – the current "best bet" - was taken as the finishing point and the increase in profit from adopting optimal management was examined.

Where possible the results are presented as the change in profit for a 10% change in the target parameter. It was assumed that the management changes or production changes could be achieved with no cost other than costs associated with running extra stock or feeding extra grain (if either of these was required). For example, increasing pasture production in winter could be achieved with no extra inputs to the pasture but the extra stock that are carried do incur extra costs for husbandry and supplementary feeding. Refer to Appendix 4 for full details on the methodology and results from the economic analysis undertaken.

4. Results

Market Research - producer attitudes

Several themes emerged from the market research and it is clear that a high rainfall lamb industry in WA could be a serious proposition subject to overcoming both perceived and real barriers to adoption. The responses and reasons outlined below to key questions are those that were identified in the focus groups and reiterated by the majority of survey respondents (>50%). Of the 300 completed and valid survey responses, 80 per cent were running cattle for beef production, including 54% that ran beef cattle as their only livestock production system, while 26 percent ran beef and also had some sheep. Reponses in both the focus groups and the qualitative survey identified the reasons for beef being the predominant enterprise of choice are;

- beef match the producer's infrastructure and management skills,
- long-wet growing season suits beef, and
- managing beef is relatively simple and has a low labour requirement.

However producers did have some key frustrations with beef that included;

- poor market prices and lack of competition on their product,
- poor cash flow and the loss of a calf means no income for year,
- high costs of production, and
- cost and time involved in cutting and carrying the spring flush to supplementary feed cattle.

The producers were also asked their opinion or attitude to running sheep as an alternative to beef. The negative perceptions of sheep, particularly lamb production, as an alternative enterprise to beef were;

- running sheep requires more intensive management and more labour than beef,
- timing of management practices is more critical with sheep than with beef cattle,
- lack of required infrastructure to run sheep - fences, yards, and shearing shed, and
- old fashioned Merinos not suitable in the region due to foot-rot, fly-strike, fleece rot and worms.

The main advantages of sheep, particularly lamb production, as an alternative to beef were;

- sheep produce two incomes per year, that is from wool and sheep sales,
- lamb production is generally more profitable than beef, and
- lamb markets are more developed and have greater competition than beef markets.

More specifically the key motivations or reasons for running sheep given by those producers with sheep were;

- diversification of income from running sheep,
- lamb and wool prices make sheep more profitable than beef cattle,
- sheep are a better grazing tool for weed control than beef cattle, and
- easier to match feed requirements to the pasture supply and sheep require less hay, and
- complementary benefits of running sheep and cattle.

The key barriers to the adoption of lamb production in the region were;

- infrastructure, including fencing is unsuitable for lamb production,
- no desire to run sheep, don't enjoy running sheep,
- concern over footrot, fleece rot, lice, worms and fly strike,
- sheep require too much farm labour for the returns, and
- longer growing season makes it more profitable to cattle than sheep.

The market research indicates that to overcome their reluctance to adopt lamb production systems existing beef producers will require;

- greater promotion of lamb production as a viable option in the region and case study examples of producers that have been successful with lamb production in the region,
- longer term, current and on-going comparisons of beef and lamb profitability in the region,
- on-farm demonstrations confirming the relative profitability of sheep versus cattle in the region, and including any complementary benefits to both enterprises, particularly the diversification of income,
- evidence that prices for lamb will remain high enough for long enough to justify change over and establishment costs, and
- support networks and education to enable producers to develop management skills in lamb production.

Market Research - opportunity to increase lamb production

The survey examined two options for increasing lamb production in the HRZ; that is adoption or introduction of prime lamb by those not currently producing prime lambs, and improvement in reproductive performance by those existing lamb producers.

New prime lamb producers - a decision tree analysis was used to estimate the potential for increase in the size of the lamb industry. Producers that currently do not produce lambs, but excluding those who said they would 'never' introduce lamb, were assumed to increase their ewe flock to the level of those who currently produce lamb. There are four groups (pathways on the decision tree) that would be the main targets for adoption or introduction of prime lamb production, and together they account for 16 per cent of HRZ producers:

- Sheep only producers/Lamb producer – No/Considered lamb – Yes (1.3 per cent)
- Sheep and Cattle producers/ Lamb producer – No/Considered lamb – Yes (3.0 per cent)
- Cattle only producers/ Considered lamb – Yes (7.0 per cent)
- Cattle only producers/ Considered lamb – No/Might consider – Yes (4.7 per cent)

This target group of ~450 producers could carry ~510,000 thousand ewes, which at a conservative reproduction rate of 85 per cent would produce about ~430,000 thousand extra lambs. They would account for ~77 per cent of the potential increase due to introduction of prime lamb production as modelled.

Performance improvement - the target group for performance improvement are those producers who are already producing lambs. The aim would be to raise reproductive performance across this group by an average of 20 additional lambs marked per 100 ewes. No increase in ewe flock size is assumed. The main targets are:

- Sheep only producers/Lamb producer – Yes (10.0 per cent)
- Sheep and Cattle producers/ Lamb producer –Yes (17.7 per cent)

These groups account for 27.7 per cent producers in the HRZ, or ~780 producers. It is estimated that they are currently running just over a million ewes producing ~850,000 lambs marked per year. An additional 20 lambs marked per 100 ewes would result in ~210,000 extra lambs per year.

Total potential extra lambs - combining the potential increase from both target groups gives a total additional lamb production of over ~600,000 lambs. This is an estimate of the potential increase and actual uptake will be depend on many factors. Another dimension not considered in this market research is the capacity to produce heavier lambs (higher carcass weight). The HRZ is characterised by not only higher rainfall, but also by a longer growing season. This provides the capacity to feed lambs on green feed for longer and thus turn them off at heavier weights.

Benchmarking

Combined beef and sheep businesses - the 2010 growing season had below average rainfall with farms in the high rainfall zone receiving around half of their normal annual rainfall. The average (± standard error) for the business analysis measures for the beef and sheep enterprises within individual businesses are compared in Table 2. The state average for each of the beef measures (based on sample size of 23) are also presented. Note, there were insufficient sheep businesses to get a valid state average.

Table 2. The 2010/11 average (±SE) Red Sky benchmark data for the beef and sheep enterprises in businesses with both enterprises.

Measures	Beef			Sheep		
	Average	±SE	State Ave	Average	±SE	t-test
Physical						
Area (ha)	733	123	710	564	229	NS
Total stock numbers (DSE)	11,166	1,928	10,405	7,033	2,316	NS
Stocking rate (DSE/ha)	15.7	1.8	14.7	14.1	1.6	NS
Labour efficiency (DSE/FTE)	9,467	1,771	7,595	8,413	1,888	NS
Total labour (FTE)	1.3	0.2	1.4	1.0	0.3	NS
Pasture harvested (t/ha)	3.1	0.5	2.7	3.7	0.5	NS
Financial						
Gross revenue ($/ha)	451	90	407	842	112	0.03
Sale cattle or sheep	395	72	374	422	114	NS
Wool			33	411	46	
Other	56	47		9	3	NS
Gross expenses ($/ha)	353	35	379	498	70	NS
Animal health	15	5	14	47	12	0.05
Feed/Supplements	35	20	45	63	22	NS
Fertiliser	68	12	56	75	11	NS
Shearing & crutching				51	9	NS
Management & staff	89	15	93	103	19	NS
Other	161	19	185	207	37	NS
Operating profit ($/ha)	98	55	28	343	89	0.05
Operating profit ($/DSE)	2.22	1.90	1.90	23.6	5.2	0.01
Return on capital (5)	1.9	1.1	0.4	5.8	1.8	NS
Ave price beef or lamb ($/kg)	1.8	0.1	1.71	4.13		
Ave price wool (c/kg clean)				1214	121	
Ave price per sheep ($/head)				85	3	
Productivity						
Wool produced (kg clean/ha)				33.1	4.6	
Cattle or sheep produced (kgLW/ha)	239	48	220	136	40	NS
Cost of production wool (c/kg clean)				730	143	
Cost of production meat ($/kg)	1.64	0.21	1.73	1.9	0.3	NS

There was no significant difference in any of the physical measures for the beef and sheep enterprises. The area grazed, the total DSEs, stocking rate (DSE/ha) and DSE/FTE were similar for the cattle and the sheep enterprises in the business. However, the profitability per hectare of the sheep enterprise in 2010/11 was significantly ($P<0.05$) higher than that for the cattle enterprise ($343±89 *vs.* $98±55/ha). This was associated with a significantly ($P<0.01$) higher gross revenue per hectare for the sheep enterprise compared to the cattle enterprise ($842±112 *vs*.

$369±81/ha). However the gross expenses per hectare for the sheep enterprises tended to be higher for the cattle enterprises which indicated that the cost of running sheep was higher than it is for running cattle. Cattle sales were the predominant contributor to gross returns per hectare for cattle, whereas for sheep both sheep sales and wool contributed equally to gross returns, highlighting the advantage of the two income streams. The return per hectare from cattle sales matched that for sheep sales which meant that the returns from cattle were unable to compete with a dual income Merino sheep enterprise. The operating profit per DSE for sheep was around 10 times higher (P<0.010) than it was for cattle ($23.56±5.2 *vs*. $2.22±1.9/DSE).

This benchmark comparison is partly distorted by prevailing market prices for beef and sheep products. In the reference period, 2010-11, the average price per head for beef cattle sales were near the bottom (decile 1) and sheep sales near the top (decile 10) of their ranges since 1990. This is shown in the ABARE survey data for the Western Australian HRZ (Figure 2). Wool prices for 2010-11 as reported by ABARE were also above the average (decile 7) since 1990.

Figure2. Average price per head received for sales of beef cattle or sheep from farms in the high rainfall zone of Western Australia. (Source: ABARES AgSurf)

Comparison of beef only and sheep only businesses - a comparison of the average of the business analysis measures for the individual beef and sheep businesses are presented in Table 3. There was a difference (P<0.01) in some of the physical measures with beef businesses being smaller in size (341±67 *vs.* 897±154 ha), running higher stocking rates (17.8±1.5 *vs.* 10.6±1.5 DSE/ha) and having less full time FTEs (1.1 ± 0.2 *vs*. 1.9 ± 0.1) than the sheep businesses. Sheep businesses produced an average profit in 2010/11 of $31±70/ ha whereas, the beef businesses made an average loss of $131±45/ha. The difference in the profitability per hectare between the sheep and beef businesses was significant at the 6% probability level (P<0.06).

There was no significant difference in the average gross revenue or gross expenses between the beef and sheep businesses. However, the average gross revenue for sheep businesses ($588±117) tended to be higher than that for beef businesses ($421±82). The failure to get significant differences in the profitability measures for the beef and sheep businesses was due to the large standard error about the measures. The profitability (loss) for the beef businesses ranged from $88 to (-$299)/ha and for sheep businesses from $348 to (-$123)/ha. Similarly, the gross revenue for beef ranged from $117 to 849/ha and for sheep from $312 to $1116/ha.

To reduce the standard error about the measures benchmark data would need to be collected for additional individual beef and sheep businesses.

Possible ways to reduce the standard error about the measures are to increase the requirement for the number of DSEs being run on the properties that were analysed from 1,500 to 5,000 DSEs and to also increase the total number of beef and sheep businesses sampled. Measures should also be put in place to ensure the robustness of the data collected. It was not possible to have control over the robustness of the majority of the data collected because it was collected as part of another project.

In conclusion, the benchmark data showed that for combined beef and sheep businesses the profitability per hectare in 2010/11 for sheep was higher than it was for beef. This difference was associated with higher average gross revenue in these enterprises partly due to current commodity prices. The failure to get a significant difference in profitability per hectare between individual beef and sheep businesses was due to the large error about the profitability measure. The process of using the Red Sky Business Analysis to benchmark the performance of beef and sheep businesses shows promise. To improve the robustness of the comparison between the performance of beef and sheep businesses data needs to be collected for additional businesses as well as for the same businesses over a number of years.

Table 3. The 2010/11 average (±SE) Red Sky benchmark data for businesses with beef only and sheep only enterprises.

Measures	**Beef**			**Sheep**		
	Average	**±SE**	**State Ave**	**Average**	**±SE**	**t-test**
Physical						
Area (ha)	341	67	710	897	154	0.005
Total stock numbers (DSE)	5,746	1,049	10,405	9,227	1,995	NS
Stocking rate (DSE/ha)	17.8	1.5	14.7	10.6	1.5	0.01
Labour efficiency (DSE/FTE)	5,541	761	7,595	4,784	968	NS
Total labour (FTE)	1.1	0.2	1.4	1.9	0.1	0.005
Pasture harvested (t/ha)	2.9	0.2	2.7	3.6	0.5	NS
Financial						
Gross revenue ($/ha)	421	82	407	588	117	NS
Sale cattle or sheep	372	57	374	394	106	NS
Wool			33	193	24	
Other	50	35		0		
Gross expenses ($/ha)	552	54	379	557	76	NS
Animal health	18	5	14	32	14	NS
Feed/Supplements	75	22	45	124	32	NS
Fertiliser	76	10	56	61	7	NS
Shearing & crutching				48	11	
Management & staff	190	36	93	114	17	NS
Other	194	26	185	178	24	NS
Operating profit ($/ha)	-131	45	28	31	70	0.06
Operating profit ($/DSE)	-6.62	2.65	1.90	2.77	5.47	NS
Return on capital (%)	-1.4	0.5	0.4	0.6	1.2	NS
Ave price beef or lamb ($/kg)	1.74	0.07	1.71			
Ave price wool (c/kg clean)				786	58	
Ave price per sheep ($/head)				88	8	
Productivity						
Wool produced (kg clean/ha)				24.2	2.0	
Cattle or sheep produced (kgLW/ha)	208	30	220	100	27	0.05
Cost of production wool (c/kg clean)				7.9	1.0	
Cost of production meat ($/kg)	3.33	0.80	1.73	3.82	0.5	NS

Economic analysis

Enterprise comparison - The lamb production systems are all more profitable than beef production (Table 4). This is partly because of the extra income received from wool which is $89,000 for the composite maternal and $199,000 for the Merino. The gross income from meat sales is similar for each system ranging from $306,000 for the Merino system up to $362,000 for the beef system. The wool income for the maternal genotype is 27% of the meat income so having the dual income source is similar to a 27% increase in the meat price.

Table 4. Profitability of each farm type.

	Maternal[1]	Merino[1]	Dorper[1]	Beef[2]
Profit ($/farm/yr)	148 000	142 000	103 000	73 000
Meat Income	334 000	306 000	323 000	362 000
Wool Income	89 000	199 000	0	0
Wool income as % meat income	27%	65%	0%	0%
Stocking Rate	10.6	13.6	10.3	15.7
Supplement fed (t)	187	489	113	260
(kg/DSE)	29.4	60.0	18.0	28.0

[1] Based on analysis done using MIDAS
[2] Based on gross margins analysis

Critical control factors for lamb production – Quantifying the value of the critical control points to the lamb industry in the high rainfall zone provides focus for new lamb producers and for any extension campaign aimed at the new lamb producers. The factors identified as most important for the profitability of lamb production enterprises, in order, where pasture utilisation, value of sale animals, reproductive rate, pasture growth rate in winter and mating younger ewes. Increasing pasture utilization has the highest value if it can be achieved by reducing the loss of pasture from trampling. Increasing utilisation by grazing harder and reducing the summer residual is of lower value (Table 5).

Table 5. Increase in profit ($/ha) that is achievable if pature utilisation can be increased by 10% either by reducing loss of green & dry pasture due to trampling by stock, reducing the quantity of residual dry feed at the break of the season or improving allocation of the pasture to the stock during the year. Values are for the Maternal genotype lambing in July/August.

Summer residual	50
Trampling losses	82
Better allocation	42

Increasing the value of the sale lambs by 10% adds $50/ha to farm profitability. Increasing the value of sale ewes by 10% only increases farm profit by 4% so it is not an important control point and should only be achieved if there is no cost to the other important control points. The sheep flocks produce 20%, 40% & 0% of the total income from wool sales for the Maternal, Merino and Dorper respectively. Increasing the value of the wool produced in the maternal flocks by 10% increased profit by $15/ha.

For the flocks examined, the increase in profit averaged $42/ha for a 10% increase in number of lambs weaned. Increasing survival and increasing scanning % both have a similar return (Table 6).

Table 6. Change in profit ($/ha) resulting from increasing the number of lambs weaned by 10%.

Scanning %	42
Survival	43

The most valuable time of year to increase pasture growth by 10% is in winter. This is the time of year that feed is most limiting and this impacts upon on the cost of carrying more stock (Table 7).

Table 7. Increase in profit ($/ha) resulting from increasing pasture growth during different periods by 10%.

Whole year	52
Winter	40
Early Spring	18
Late Spring	12

Mating ewes younger sothey have their first lambing opportunity at 12 months of age increases profit by $37/ha. This is based on ewe lambs at 40kg achieving a weaning rate of 67%. If the young ewes achieve a higher or lower weaning rate then this will alter the value. The analysis includes the cost of feeding the young ewes to achieve 40kg when in the 'normal' management they would have been 34 kg. See Appendix 4 for full details.

5. Communications

A series of producer case studies were written by Jill Griffiths (Griffiths Environmental) on landholders in the HRZ of WA. Four case studies are outlined below, plus another case study has already been published in MLA's Feedback Magazine on Brad Ipsen from Manjimup. The producers highlighted had sheep enterprises of varying size but had experienced common benefits and challenges running sheep. These case studies could form part of a future communication strategy that promotes the potential role of sheep on HRZ land. It has already been agreed with MLA, that a series of four workshops to lift the profile of the lamb industry in the HRZ will be undertaken during February-April 2014.

Case Study 1- Allan and Jane Guthrie

Snapshot:

Name: Allan and Jane Guthrie

Location: Busselton

Property: Main property is 250 hectares in the Busselton Shire; lease another 100 hectares next door; run ewes and weathers on another 120 hectares in Margaret River Shire (32km away)

Enterprise: Sheep for wool; and a third for fat lambs

Livestock: Shear 3500 Pollwarth breeders; 150 Lincoln Red x Shorthorn breeders on the Margaret River property

Pastures: Mainly ryegrass and clover

Soil: Main property - sandy gravel over clay

Rainfall: 760 mm on main property; around 1000 mm on the Margaret River property.

Images:

Alan Guthrie and his father before him have farmed sheep in the Busselton area for about 45 years. (Photo by Jayne Guthrie.)

HEADLINE: Pollwarths prove profitable

Sheep have been the mainstay of the Guthrie family farm for about 45 years.

“Originally, my family was in the timber industry and bought the original farm for the timber rights,”
Allan Guthrie explained. “But as the timber was cleared, the family moved on to running sheep, and we’ve been doing so ever since.”

For the past 35 years, the Guthrie family (Allan now farms with his daughter and son-in-law) have run a Pollwarth stud, supplying stud rams and ewes to other producers.

“I like the Pollwarths mainly because of the long white staple, and they can handle the high rainfall without getting fleece rot,” Alan said. “They have a staple length of around 109 mm, and 21 micron. We also run some South African Meat Merinos (SAMMs), but their staple is shorter at 80 mm, even though the fleece is the same – 21 micron.

“The Pollwarths are a low maintenance sheep – easy handling, easy care.

“Pretty much the only trouble we get with them is a bit of flystrike when the weather is warm and wet, mostly in spring.

“On one property, we have had a bit of bother with capeweed. There’s too much water in the capeweed so the sheep get a bit daggy when they graze it.”

Getting good help

The Guthrie family shears the flock in the last week of November, using contracted labour.

“We’ve gone to contractors for our shearing, but I still do the classing,” Allan said.

“With sheep, the hardest thing is getting labour at the busy times, like shearing and crutching. You can’t do those things on your own; you need a workforce.

“People seem to think there’s a lot of work in sheep but there’s actually less than in cattle. For one thing, you don’t need to cut as much hay. Three weeks of the year you have to work hard – shearing, mulesing, crutching, but the rest of the time, it’s pretty low maintenance.

“With cattle, you have to be constantly checking them. Sheep are more self-sufficient. In fact, we find it best to stay away from the ewes when they’re lambing, as we get less mis-mothering that way. You don’t want them stirred up and running around the place when they’re lambing down.”

Timing the operations

Lambing on the Guthrie farm begins around 1 June, the rams having gone out with the ewes on 1 January.

“Our lamb marking rates last year were shocking – around 70 per cent – because we had a lot of trouble with foxes,” Allan said. “One of our properties is surrounded by State forest and we notice a definite effect on our lambing rates when the fox control program is running in the forest. It puts our lamb marking percentages up to the high 70s to low 90s.

“On the home property, where foxes aren’t a problem, our lamb marking rate is around 100 per cent.”

Allan said they were looking at other options for fox control, including the idea of putting alpacas in with the flock to guard them.

“I don’t know if I will do that or not. It’s really just an idea at this stage,” he explained. “We are not sure how the Alpacas will go with our sheep dogs and rounding up the sheep.”

The lambs come off their mothers at shearing time in November, and are 90% paddock finished, with a small amount of supplementation if required. They are sold off as prime lambs with an average dressed weight of 21 kg to a local company for the domestic market.

“We run the operation as a self-replacing flock and sell off about 700 fprime lambs a year,” Allan said.

The properties are stocked at around 4.5-5 DSE per hectare.

“Our soils are fairly light, and we only have a five-month growing season, so our stocking rates are relatively low, but it’s a more sustainable and profitable operation that way.

"We need to supplementary feed from February through to the end of May, when the pasture comes through."

Profitability

"Our enterprise has been profitable for the last few years, although before that we went through a period when we were probably making a loss, but we knew we would come through in the end."
Allan stresses the importance of keeping input costs down, and says there is sense in running bigger flocks, which bring in economies of scale, particularly as far as labour goes.

"With things like drenching and moving the mob, you need at least two people regardless of whether you are working a small mob of say 150 sheep or a much bigger flock. And it doesn't take much longer to work the bigger mob – most of the time is in setting up. So it makes sense to work a bigger mob – the dollars come in per sheep, not per hour worked."

The Guthries use long-acting injectable drench for worm control, which helps save time and therefore money in sheep handling. Allan says fertiliser is another important input cost that needs to be kept in check.

"You have to be vigilant with fertiliser – making sure you're getting it at a good price and not wasting it."

Allan said that while it was crucial to keep input costs down, the main factor that affected profitability and caused it to vary so much was prices.

"Something only has to happen somewhere in the world and it affects our prices. That's why we have two enterprises – if sheep are down, beef is up, and vice versa."

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Case Study 2 - Wayne and Denise Credaro

Snapshot:

Name: Wayne and Denise Credaro

Location: Carbunup River, Western Australia

Property: 350 hectares

Enterprise: Sheep – fine wool and prime lamb; horticulture – mostly potatoes, but some other crops (e.g. watermelons) as well

Livestock: 1300 Merino ewes; breed for wool

Pastures: Clover and ryegass

Soil: Sandy loam

Rainfall: 900-1000 mm

Images:

Wayne Credaro (pictured) rotates horticulture – mainly potatoes – with sheep across about half of the family farm. The rest is sheep only

HEADLINE: Breeding sheep to fit the climate pays off

Wayne and Denise Credaro have combined sheep and horticulture on their farm at Carbunup River, Western Australia, for several decades. But in the past 15 years, have concentrated on breeding high quality Merino sheep suited to their high rainfall property.

“Up until about 15 years ago, we used to buy in replacement ewes every year, but it was difficult to get good sheep,” Wayne said.

“We had all sorts of problems with fleece rot and coloured wool – we had green wool, orange wool. It was simply trial and error buying in sheep. One of the problems was that we were always buying in someone else’s culls.

“As a result, we weren’t making much from wool and our sheep income relied on prime lambs.

“We decided to look around and find wool, and a sheep, that really suited our climate.”

Finding good wool

“I spoke to the agent who buys our wool each year and asked him who I should approach to buy some good quality ewes and rams from to form the nucleus of a flock,” Wayne said.

On the wool agent’s recommendations, Wayne and Denise approached several Merino breeders and ended up buying several hundred ewes from a breeder based near Boyup Brook. Boyup Brook is about 150 kilometres east of Carbunup River and

the climate is similar, although rainfall is a bit lower and temperatures slightly more variable.

Wayne figured that sheep from that breeder would be better suited to the Carbunup River climate than would the sheep he had been buying in from hotter, drier wheatbelt farms.

Building the flock

“From that nucleus, we’ve built up the flock we now have,” he said. “We still go back to the same breeder each year for our rams, but we self-replace our ewes. Other than the rams, we haven’t bought in sheep since that initial purchase of our flock nucleus 15 years ago.”

Since then, the Credaros have carefully selected the best ewes to breed their replacements.

“The 500 ewes with the finest micron go to our Merino rams and the rest of the flock go to terminal sires – usually Suffolks – for prime lamb production.

“Out of those 500 top ewes, we expect about 250 ewe Merino lambs. And from that 250, we select the top 100 to be kept as replacement ewes.

“The balance of the Merino ewe hoggets that are not chosen to breed Merino lambs are kept on another property and mated to produce prime lambs. The wether hoggets are sold as prime lambs or wethers.”

Fine wool

“Since we started our breeding program, we have never had any problem with fleece rot or coloured wool.

“Our hogget micron now averages around 15-17 and our adult ewes are around 20.5 micron. Across the flock, our average micron is 18-20.5, and we cut an average fleece of 5.5 kg. We also stick to breeding sheep with wool with a comfort factor of around 100 per cent, so we are producing a good volume of high quality wool.

“Concentrating on producing fine wool on a sheep that suits our local conditions has really paid off for us.”

Wayne thinks the secret to running sheep in the high rainfall zone is to buy in, or breed up, the right wool type for the climate. He has found that the top end Merinos are easier to run and maintain than lower quality sheep.

“That fine, soft, rolling type of wool dries quickly. So there’s not a problem with the sheep in the rain,” Wayne said. “We don’t have much of a problem with flies – I seem to be the last one to get flystrike, and I think that’s down to the wool type.”

Making the most of lambs

Lamb marking on the Credaro farm is up to 100-105 per cent for Merino ewes and, at 110 per cent, a bit better for the terminal sires.

“We do a fair amount of fox control, which helps our lamb marking rates,” Wayne said.

"We also make sure the ewes are in good condition before joining and we run all our sheep at a comfortable 9.5 DSE per hectare, to allow for 100 per cent lamb marking.

"We give the rams a Christmas present – they go out with the ewes around Christmas and New Year. That way the ewes drop the lambs in June, and we can sell off a fair portion of them before we start shearing in the first week of November.

"We sell our lambs to a local market. Before they go, we weigh them all and try to pull them out at 45-50kg liveweight. If they're too light we supplement them with a locally-made lamb mix.

"Our lambs have hit $100 in the last couple of years, but probably average a little lower than that."

Income streams

"Until recently, horticulture was our main income – but you can't compare that income to the sheep income on a per hectare basis because it's a different thing entirely.

"We probably should be doing a bit better on wool, as far as income goes, but I think it will come up again."

Other than creating separate income streams, Wayne sees certain advantages for the farm in combining the horticulture with sheep.

"Our property is fenced into relatively small paddocks because that's how we organise the horticulture, but we also run our sheep mobs across that same ground. That means we have small mob sizes – maybe only 100 sheep in a paddock. That keeps the mob tight, which is especially beneficial during lambing."

Combining horticulture and sheep

"We graze paddocks for three years, and then put them to horticulture. The horticulture rotates across half of the farm – the other half is sheep only.

"After the crop comes off, the paddocks are reseeded with clover and ryegrass and when that grows, the sheep come back on," Wayne said.

In this way, paddocks are rested from grazing, giving a natural break for worm control and pasture regeneration.

"We did a lot of faecal egg counts at one stage, and now have a good control program in place. We don't have any major health problems with the sheep now.

"And sheep are good pasture controllers, so the pastures tend to be good as well."

The Credaros have built up their farming infrastructure and system since they bought the property in 1980. They have invested in sheep yards and shearing shed. Wayne has banded together with other wool producers in the region to secure the reliable services of a shearing team each year.

"We line up a run of sheds for the shearing team – it works well all around. For the shearing team, they know they have enough work to make it worthwhile bringing the

team in – they make enough money to keep coming back, and the other wool producers and I all know we can get the labour for shearing."

The shearing team comes with shedhands and wool classers, along with shearers.

"When you look at land values around here, the reality is it's hard to make anything pay for it. But if you're going to run stock, sheep are the best bet.

"For me the best thing about running sheep has been the satisfaction of breeding up the flock and getting it to the level it now is. Everything we set out to achieve, we have managed to pull off.

"Running sheep is like anything, if you enjoy it, you'll find the best way to make it work for you. That's as true of sheep as it is of anything. If you enjoy what you're doing, you'll do it better."

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Case Study 3 - Rodney and Leanne Muir

Snapshot:

Name: Rodney and Leanne Muir; Murray and Jan Muir

Location: Franklin, 55km east of Manjimup

Property: 1210 hectares arable, plus 220 ha non-arable bushland and wetland

Enterprise: Sheep and cropping

Livestock: Around 4000 ewes (comprised of about 550 cross bred ewes (Kelso), 850 Dohne, 2450 South African Merino), 82 rams (mostly Poll Dorset), plus weaners.

Pastures: Perennials – kikuyu, rye and clover; Stubbles – barley and canola

Soil: Sandy loam to gravel

Rainfall: 600 mm (although only 500 mm over the last five years)

HEADLINE: Concentrating on sheep makes enterprise more manageable

A few years ago the Muir family sold all their cattle to concentrate their farming enterprise on sheep and cropping. It has proved to have been a good decision, according to Leanne Muir, who with husband Rodney and parents-in-law Murray and Jan, lives and farms at Franklin, on the edge of Western Australia's high rainfall zone.

"We really felt we had too many enterprises running when we had cattle, sheep and cropping," Leanne said. "There was always some major job on – seeding, calving, spraying, lambing, crutching, shearing, harvesting, drenching – there was never a break of any length.

“Besides which, cows are tough on fences; sheep are lower maintenance and more profitable.”

With that in mind, the Muirs built up their sheep flock, with the idea that they would still have three income streams – cropping, wool and prime lamb.

Markets and profitability

“For 2012, 30 per cent of our farm income came from cropping and 70 per cent from sheep. Our wool sales returned $160 per winter-grazed hectare and sheep sales $200 per winter-grazed hectare, but of course those figures and splits vary from year to year depending on the markets.”

Leanne said the markets are the most frustrating aspect of the family’s sheep farming enterprise.

“Four years ago we started specifically breeding our flock to target the live export market, but these days it can be hard to get them on a boat.

“We have fallen in a hole because of the export market. The rules keep changing. We were aiming to have cross-bred lambs ready to market at 36 kilograms starting from December to January, with the others coming through later in March to June, or even into July for the tail-enders.

“But now we have to get them up to a higher weight before they can get on the boat, if there is a boat available. The Merino types don’t come up to weight as quickly as the cross-breds, and that means it takes us longer to get them ready, which affects our profitability.”

Despite this difficulty, Leanne maintains that the decision to concentrate on sheep instead of cattle was the right one. The sheep are set-stocked at 12.5 DSE per winter-grazed hectare.

“The Muirs have run sheep here for 100 years, and sheep work in well with cropping,” she said.

Later lambing

“Generally we put the rams in 1 February, to lamb down in July, and be ready to sell from December onwards. That fits in with the seeding and harvesting cycle of the cropping and was planned to fit with the best times to market the lambs.

“But in the past few years, poor seasons have meant we have had no feed on the ground in July, which has meant more supplementary feeding to sustain the pregnant and lactating ewes. So this year, we didn’t put the rams in until 1 March, pushing our lambing time back to August. We hope that will mean there is more feed for the ewes in the late stages of pregnancy and during lactation.
Supplementary feeding consists of barley, lupins and hay fed out in the paddocks.

“We have found the hay is really important – it keeps them full and helps to give the bulk to the feed. Lupins are important for the weaners. We buy in the hay and lupins, but keep barley from our cropping operations.

"We aim for the ewes to have a condition score around 2.7 before joining. That way they don't need as much feed early in the pregnancy. Our new strategy is aiming at good lactation, which is the key to growing lambs quickly."

"We considered how this later lambing would affect marketing the lambs, but we hope they will actually grow quicker because of better feed availability. We'll see how we go and then work out what to do for the best in the future," Leanne said.

All ewes are scanned post-joining and those bearing twins separated. Dry and cull ewes are sold off. Ewe lambs are kept for replacements to prevent having to buy new breeding stock.

Last year lamb marking rates on the Muir property at Franklin were 103 per cent for Dohnes and 87 per cent for the cross-breds.

Worm control

"We run some sheep on another property further east, in a lower rainfall area, and they tend to do better than the ones on the home farms. We're not sure why this is, as there is more feed here. We have wondered if it is to do with trace minerals in the soil or worm burdens but honestly don't know.

"We have good worm control generally. We have tested for drench resistance and it showed good results. We've also done a lot of faecal egg counts and have implemented drenching programs accordingly.

"Over the years, the sheep's worm burden has increased and decreased, depending on various factors. Interestingly, when we fenced off a creek line the worm burden decreased.

"At Franklin, barber's pole worms can come up pretty quickly after summer rain, so we have worked to control that. This past summer, it wasn't a problem.

"When we had cows as well as sheep, the worm burden was lower because we could rotate the paddocks. That was one of the benefits of having cattle on the farm."

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6. Discussion

The analysis undertaken suggests that beef producers in the HRZ of WA could increase their profitability by including lamb production in their business or switching entirely to lamb production. Red Sky Benchmarking analysis indicated that the sheep enterprise on mixed sheep/beef properties was 3 to 4-fold more profitable than the beef enterprise. This benchmark comparison was partly distorted by prevailing market prices for beef and sheep products. In the reference period, 2010-11, the average price per head for beef cattle sales were near the bottom (decile 1) and sheep sales near the top (decile 10) of their ranges since 1990. Wool prices for 2010-11 as reported by ABARE were also above the average (decile 7) since 1990. However, economic modelling using long term beef and lamb prices confirmed that the profitability of lamb production was likely to be higher than beef production ($246 *vs*. $122/ha). Bioeconomic modelling of different lamb production systems suggested that a self replacing system based on a maternal composite genotype has a similar profitability to buying in a dual purpose Merino ewe and mating to a terminal sire to produce a first cross finished lamb. The critical control points for maximising the profitability of lamb production enterprises were similar to those reported by Young *et al*. (2010) for lamb systems in south west Victoria. These included pasture utilisation, value of sale animals, reproductive rate, pasture growth rate in winter and mating younger ewes.

Despite lamb production being more profitable than beef production, about 80% of landholders in the HRZ run a beef enterprise and more specifically 54% of the landholders run a beef only business. The main reasons for beef cattle being the predominant enterprise of choice related to producer's infrastructure and management skills, the relatively simple and low labour requirement for beef cattle and the suitability of cattle to the long-wet growing season in the HRZ. However, there is widespread frustration among beef producers towards the poor market prices that have persisted for beef and there is some recognition that lamb production is generally more profitable than beef. Furthermore, the profitability comparison of lamb and beef enterprises has rarely been quantified in the HRZ and therefore producers don't fully appreciate the real differences or opportunity that exists.

The South West Monitor Farms Project that has been benchmarking sheep and beef enterprises for over 40 years in south west Victoria has also found substantial differences in enterprise profitability (South West Monitor Farms Report: 2010/11). In fact the 41 year average on a gross margin basis for lamb is $392/ha where as beef is $230/ha. Albeit the difference in these averages has narrowed in recent times, with the 10 year average for lamb gross margin remaining stable at $394/ha while beef gross margin has rise to $328/ha (Figure 3). Such long term comparisons of enterprise profitability are not available in the HRZ of WA, but would be a key component of an overall strategy to increase lamb production from the region.

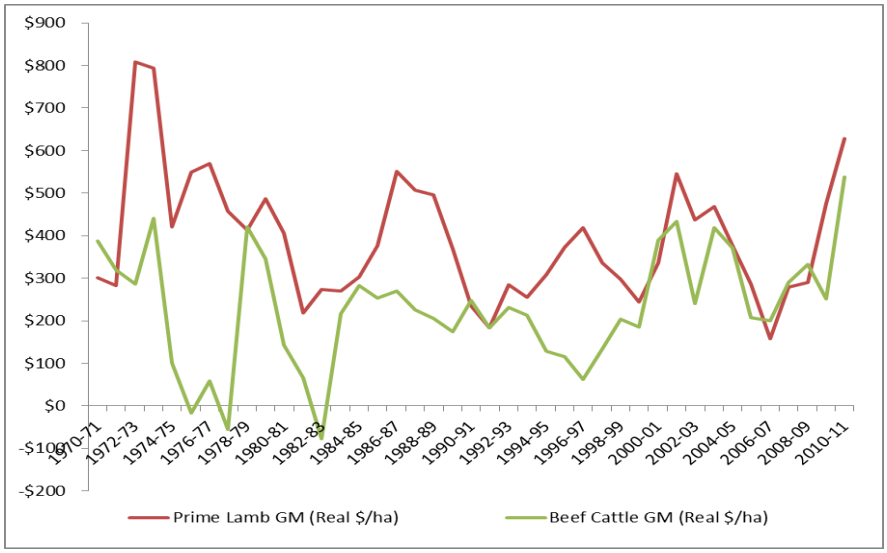

Figure 3. Gross margin ($/ha) for prime lamb and beef cattle enterprise since 1970/71

There is significant scope to increase lamb production in the HRZ of Western Australia. Potentially over ~600,000 additional lambs could be produced per annum through the combination of improved reproduction performance of existing lamb producers and the introduction of lamb by those not currently producing lambs. Improving the reproductive performance of existing lamb producers would be the easiest pathway to increasing lamb production in the HRZ, although this avenue accounts for less than one-third of the potential increases. The modelling did not specifically identify ways to enable 20% increases in weaning rates, however the market research undertaken earlier in this project did identify that existing lamb producers felt they received very little industry information on best practice and were poorly serviced by livestock agents, who predominantly focused on cattle. Furthermore it appears the Sheeps Back Network and the recently evolving More Sheep Campaign are more pitched at the cereal-sheep zone rather than the HRZ of WA. The strategy to improve reproductive performance of existing lamb producers in the HRZ of WA would be to run a series of forums, and perhaps Bred Well Fed Well workshops, that would highlight best practice in nutrition and genetics for sheep production and motivate participants to join Lifetime Ewe Management (LTEM). LTEM has proved to be an effective extension model for improving reproductive performance, with participants lifting the number of lambs weaned per hectare by more than 20% while halving adult ewe mortality rates (Trompf *et al.* 2011).

The bigger challenge is to deliver the potential increase in lamb production in the HRZ by changing beef producers' perceptions of lamb production, resulting in the introduction or trialling of a lamb enterprise. This is particularly so given the strong negative perceptions of the infrastructure and labour requirements of lamb production. 80 per cent of beef producers cited unsuitable infrastructure, including fencing, as the top reason for not running sheep and this was also the most common reason proposed by beef producers when asked what is or would prevent them from trialling lamb production. Furthermore, the majority of beef producers believe the labour use, intensity and timing is much greater and more critical for lamb production compared with beef cattle.

Despite the domination of beef production in the HRZ and the significant barriers to adoption of lamb production, the market research identified some key avenues to exploit that will help enable this significant land use and practice change. The first of these avenues to pursue would be to quantifying the differences in profitability of

lamb compared to beef in the HRZ, over a longer term. This would provide irrefutable evidence that lamb production is more profitable than beef in the HRZ of WA. The critical challenge will be how to best extend this enterprise profit comparison to effectively lead to land use change. Currently there is a network of beef groups in the HRZ, some of which were engaged in early stage market research in this project, and given the groups' primary motive is to improve their beef production systems, the profit comparison is unlikely to gain much traction in that forum. A more effective approach would be to undertake a series of forums on lamb production in the HRZ of WA, where this information can be targeted to landholders that have considered or might consider lamb production. The modelling undertaken in this project showed that if the 16% of HRZ landholders who have or who may consider lamb production were effectively converted to lamb production this could conservatively equate to more than 400,000 extra lambs. The two thirds of cattle producers who indicated that they have no desire to run sheep, or they don't enjoy running sheep, with particular concerns about foot rot, fleece rot, lice, worms and fly strike, would not be targeted by future extension and training focused on the lamb industry.

Diversification of income and that sheep have two income streams - wool and sheep/lamb sales – are seen as the major benefits of introducing lamb production. This spreading of income risk is another key virtue of lamb production that has been evident in the benchmarking and modelling analyses, and exploits a key frustration among beef producers that the loss of a calf means no income from that cow for the entire year. These outcomes can be highlighted in the same forums used to extend profitability comparisons. The fact that introduction of sheep leads to more diverse income streams for HRZ landholders is a key selling point that must be exploited if the potential increases in lamb production are to be realised.

Over half of the landholders in the HRZ, that have considered or might consider lamb production, want to see lamb producer case studies from the HRZ. The case studies developed in this project emphasise what was involved in developing and now running a lamb enterprise, highlighted advantages such as diversification of income, increased profitability, grazing management and better matching feed demand to pasture supply thereby requiring less hay. The case studies documented will be distributed to interested landholders in the HRZ and the leading case studies will also be presented at the HRZ Sheep Forums to show that running a lamb enterprise in the HRZ is practical and profitable.

Another avenue to exploit is the frustration among many beef producers in the HRZ of WA on the lack of competition from buyers for beef cattle. Almost 50% of landholders believe sheep are more profitable than beef because of higher lamb and wool prices, however almost two thirds of the landholders who would consider lamb production, agreed they needed confidence that lamb prices will remain high in order to develop a lamb enterprise. One strategy to address this would be to engage with lamb processors and marketing groups such as WAMMCO and V&V Walsh Meat Processors and Exporters to identify the specifications for lambs they require and discuss the option of forward contracts for lamb produced from the HRZ. At the very least the process will identify and then subsequently promote the numerous buyers and markets available to lamb producers in the HRZ. A second strategy would be doing a comparison of beef and lamb prices over a number of years and then using this information to calculate relative profitability of the two enterprises.

7. Conclusion

Lamb production in the HRZ of WA is a profitable alternative to beef production. The benchmarking analysis carried out showed that producers with mixed sheep/beef properties, that the sheep enterprise on their properties were $245/ha more profitable than their beef enterprises during 2010/11. However 80% of landholders in the HRZ run a beef enterprise and more specifically 54% of the landholders run a beef only enterprise. Hence, there is significant scope to increase lamb production in the HRZ. Potentially over ~600,000 additional lambs could be produced per annum through the combination of improved reproduction performance of existing lamb producers and the introduction of lamb by those not currently producing lambs. This is the potential increase in lamb supply assuming full adoption and maybe a more realistic target is an extra 200,000 lambs by 2020.

To realise the increases in lamb production modelled in this project a two-pronged strategy would be required. First, existing HRZ lamb producers would need to be engaged more effectively in an extension strategy tailored to their needs hat ultimately results in high levels of participation in LTEM, which could effectively deliver the reproduction rate increases modelled in this project. This effort would require specific targeting of HRZ lamb producers given the market research undertaken highlighted these producers felt current WA extension programs such as the Sheep Back and More Sheep Campaign were targeting cereal-sheep zone producers only.

Secondly, those landholders that might consider or have considered lamb production need to be engaged in an extension campaign that addresses barriers to adoption of lamb production that leads to significant land use and practice change. Key avenues to be exploited in this campaign, comprising a series of HRZ sheep forums and communications, include a more long term overt comparison of lamb versus beef profitability in the HRZ, promotion of the advantages of a diversified income that comes from sheep enterprises yielding lamb, surplus sheep and wool returns, local case studies of successful HRZ sheep enterprises including examples of modifying existing infrastructure to cater for sheep and clear signals from processors regarding specifications for lamb and opportunities for forward contracts.

8. Acknowledgements

Meat & Livestock Australia for providing the financial support for this project “Scoping Study for the WA High Rainfall Zone Lamb Initiative” (B.LSM.0027). Funding was also provided by the Department of Agriculture and Food WA and Murdoch University. The authors are grateful for the advice and expertise provided by colleagues on the project, in particular, Kimbal Curtis, Andrew van Burgel, Stephen Gherardi and John Young. We also recognise the contribution made by the Taverner Research team that aided in the market research undertaken and the Red Sky Farm Business Analysis (Red Sky Agricultural Limited) that undertook benchmarking of sheep and beef producers in the HRZ, who are also commended for their contribution to this project.

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Appendix 1

Report on focus groups for the WA High Rainfall Zone Lamb Initiative

Jason Trompf
J.T. Agri-Source
September 2011

Report on Focus Groups in WA High Rainfall Zone Lamb Initiative

Background

The supply of lamb nationally is under threat given the decline in ewe numbers (from >70 million breeding ewes in 1990 to approximately 40 million ewes in 2010). Improving supply in the immediate term requires at least a 10% lift in reproduction rate over the next five years, continued improvements in carcass weights and a breeding ewe-replacement strategy (National Sheep Meat Production RD&E Strategy, 2010).

There is significant potential to increase lamb supply by expanding the lamb industry in the high rainfall zone of south-west Western Australia (WA). The length of growing season in this region would improve the continuity of lamb supply and enable high productivity levels (lamb production/ha) to be attained. Whereas currently almost all of the WA sheep flock is located in other lower to medium rainfall regions of the state. The aim of this project is to establish the feasibility of and opportunities for increasing lamb supply from the high rainfall zone of WA. Currently land use in high rainfall zone of WA is dominated by other industries, including beef and dairy production, forestry and horticulture.

Market research phase- focus groups

In the market research phase of the WA High Rainfall Zone Lamb Initiative a number of focus groups were planned with producers. The purpose of these focus groups was to understand the breadth of responses to the following key questions.

- Key motives of landholders in the HRZ of southern WA,
- Reasons why beef cattle are predominantly the enterprise of choice,
- Frustrations landholders have with beef cattle,
- Perceptions and knowledge of lamb production systems,
- Key barriers to adoption of lamb production systems,
- Review of existing infrastructure and skills necessary for lamb production, and
- How their reluctance towards lamb production can be overcome

The critical issues and opportunities identified in the focus groups will be subsequently used to scope the remainder of the market research phase of the project, as well as providing insight for the type of benchmarking and economic analysis landholders require for contemplating changing their current land use.

Focus groups have been conducted with landholders at Manjimup East (7 producers), Manjimup (4 producers), Nannup (3 producers), Scott River (13 producers), Albany-Narrikup (6 producers), Brunswick (4 producers), Esperance (4 producers), Bridgetown (4 producers) and Harvey (3 producers). The producers involved were mostly beef producers, with a small representation of producers with mixed enterprises that included sheep, cropping and horticulture.

Focus group findings

Aims of producers

The landholders consulted in the HRZ of southern WA were mostly motivated by running profitable and sustainable farms that produce high quality livestock that meets market specifications. However, ease of management to ensure quality of lifestyle was also a key consideration for some producers.

Beef cattle the predominant enterprise of choice

Beef cattle are predominantly the enterprise of choice due to the reasons outlined below;

- ease of management- simple and less labor requirement,
- tradition- almost everyone has always had cattle,
- progression from when the area had dairy cattle,
- the opportunity to work off farm while running beef cattle,
- set up for cattle- infrastructure and management practices/skills,
- older age of farmers, and
- long-wet growing season suits cattle.

Frustrations with beef cattle

Landholders key frustrations with beef cattle were;

- poor market prices- downward pressure on prices over a long period, until recently (spring 2010),
- lack of competition on their product- where there once 5-6 buyers, now there is 1 buyer operating for just 2-3 companies, only 1 in every 10 years buyers are chasing producers for beef (happens every year in lamb), beef too exposed to export market and very few market alternatives,
- cost and time involved in cutting and carrying the spring flush to supplementary feed cattle in the autumn/winter (difficult to match feed demand with pasture supply)- some producers have chosen to calve later to reduce hay feeding but have subsequently increased stocking rate and are now feeding just as much hay, feeding hay for 6 months a year was common practice (many producers recognised it was a lot easier to feed sheep),
- having one cash crop only during the year and producing feeder steers is not the end product (ie. relies on a viable feedlot industry to finish the cattle),
- calving difficulties- lose calf then no return for year and troubles with calving heifers,
- high cost of production, and
- lack of efficiency converting grass into dollars (small margin)- therefore run at high stocking rates to generate turnover but can't afford inputs to improve the productive capacity of land.

Perceptions of sheep as an alternative enterprise for the region

Negative perceptions of sheep, particularly lamb production, as an alternative enterprise for the region were;

- sheep require more intensive management- more management hassles with higher labor inputs and the timing of management practices is critical and more

intensive grazing management because sheep bare off hills leading to erosion and capeweed,
- old fashioned Merinos not suitable in the region due to foot-rot, fly-strike, fleece rot and worms,
- sheep not a flexible as cattle,
- wet environment means that sheep stocking rates can't be push as hard in winter
- lack of technology gains in the sheep industry- hard to get labor for shearing, crutching, marking and drenching,
- lack of required infrastructure to run sheep- fences, yards, and shearing shed,
- grew up believing (being told) that this country is too wet for sheep,
- can't run sheep and work off-farm,
- not convince that sheep make enough extra income for the work required,
- many landholders wealthy enough not to rely on livestock income (either growing vegetables or working off-farm) don't want the extra work with sheep,

Positive perceptions of sheep, particularly lamb production, as an alternative enterprise for the region were;
- lamb production generally seen as a more profitable enterprise than beef,
- lamb markets have been developed leading to diversified markets and more competition,
- producing something that people want with lambs,
- two incomes from sheep- lambs and wool,
- great alternative to diversify income,
- can match feed demand to pasture supply better with sheep,
- much easier to feed sheep than cattle (not the huge requirement for hay), and
- cross grazing with sheep improves pastures- manipulate kikuyu without slashing so that pasture more open in autumn leading to better winter production.

Key reasons to adopt or not adopt lamb production

The key reasons for the adoption of lamb production in the region were;
- lamb and wool prices- more profitable than cattle,
- diversification of income,
- a lot more markets with lamb than beef,
- can forward contract lambs- difficult with beef (WAMCO forward pricing has pricked my ears- but we need assurance of 3 year profits to change over),
- processors interested in building relationships with lamb producers,
- portable contractors make a huge difference to reality of running sheep,
- can match feed requirements to pasture supply easier with sheep,
- sheep are easier to supplementary feed in autumn/winter (less hay),
- use sheep as a grazing tool for cattle and weed control,
- sheep fit in with vegetable production better than cattle,
- complimentary benefits of running sheep and cattle,
- need a crop/stock mix to have flexibility in autumn with sheep,
- could be very profitable if can source the right sheep for this region (must be higher rainfall adapted sheep), and
- have to be easy lambing sheep otherwise it will put people off straight away.

The key barriers to the adoption of lamb production in the region were;
- labour requirements- harder work handling sheep, need labor to help,
- contractors an option but very costly- need higher returns to justify,
- margin is not sufficient to justify extra labor,
- no contractors servicing this area,
- seen other producers get rid of sheep because too much work involved,
- lack of infrastructure- poor fencing, particularly for crossbred sheep,

- cost to change over from beef cattle to sheep and will returns be good enough in sheep for long enough to justify change over (offset trading deficit),
- have never seen the differences in income in trials in this region and lamb production is never promoted in this region- we just never see or hear from anyone,
- lack of desire to run sheep- don't enjoy running sheep,
- agents like producers to stick with what they have been doing and they have a big influence,
- too busy working off farm to run sheep,
- foot rot, fleece rot, lice, worms and fly strike,
- only sheep you can buy in WA are not suitable for this country,
- shifted into cattle because less health risks, management risks and environmental risks,
- economic advantage with cattle over sheep with longer growing season,
- if intensified to run sheep may as well go dairying,
- if margins really low in beef just put in more crop,
- ewe and lamb mortalities a real turnoff for people that are not use to it,
- managing hill country with sheep- not controlled it gets too bare and it is very costly to fence hills to control sheep adequately,
- long dry summers- cause erosion with sheep, and
- sheep grazing hard on perennials over the summer/autumn.

How reluctance to change to lamb production maybe overcome

To overcome reluctance to adopt lamb production producers require;

- longer term comparison of beef and lamb profitability in the region (as well as reference to dairying and cropping),
- proof that there are sheep available to suit the HRZ environment,
- evidence that prices for lamb will remain high enough for long enough to justify change over and establishment costs,
- seeing differences in trial results comparing sheep versus cattle versus combination of both in this region- per hectare economics,
- promotion of lamb production as an option in this region through a series of 'profitable sheep forums',
- education and hand holding to enable producers to develop management skills in lamb production,
- evidence that there are contractors that service this region and details on what services they offer,
- knowing that there are some agents with different companies in the region that are interested in lamb and will provide support when getting into lamb,
- case study examples of producers in the region that have had successes with lamb production- outlining the background story, the 'pro's and con's' of lamb production and the economics, and
- development and promotion of alternative pathways into lamb production- such as from buying sheep and doing it all yourself/some contract labor, buying sheep and using contract labor for all animal husbandry/management, share farming models- where one producer supplies the sheep and management while another provides the land or variations of the above (at the very least the development of a system that facilitates the hooking up of producers that are looking for others to work with- either agistment, profit share or alliances etc), and
- segmentation of the production/supply chain of lamb so producers can partake in stage of lamb production that best suits their desires, infrastructure and management capabilities.

Esperance region

Findings from discussions in the Esperance region are summarized below;

- the loss of sheep numbers out of the Esperance region has been primarily due to cropping and some forestry rather than beef cattle (as found in the other HRZ regions studied in this project),
- particularly the 'sand plains region' that runs parallel to the coast, which is regarded as the high carrying country that receives 500-600 mm of rain per annum, where 10 years ago 10% was cropped compared to 50% today,
- the croppers that want livestock in their system generally prefer sheep over cattle and the typical four year rotation of canola, cereal, pasture and pasture means there is a lot of feed for sheep particularly in the summer months,
- however a full generation of producers have been lost to the sheep industry because since the late 1980's producers have rarely heard or experienced good things with sheep and with no positivity in the sheep industry producers diversified into cropping, cattle or sold to forestry,
- cropping is preferred over sheep because of less labor, better lifestyle, cereal crops are more profitable than sheep and a lack of infrastructure for sheep,
- big opportunity now to promote the virtues of sheep in the cropping system to help with chemical resistant weeds and improve nitrogen fixation with pasture,
- the sheep system that works well in the Esperance region is to lamb in June/July and turn off the lambs before putting in the next crop- this could be encouraged by processors paying higher rates for the right Merino product,
- the most effective way to promote the sheep industry and provide incentive for others to get back in, would be local examples of what top sheep producers are achieving in the region and how it integrates with cropping, and
- some trials to demonstrate how maternal sheep (crossbreds) may better handle this environment- more robust, quicker turn-off and easier care.

Recommendations

The focus groups undertaken have been effective in identifying the range of issues and opportunities relating to lamb production in the HRZ of WA. The next steps planned in this project are (i) to conduct a random survey of landholders in the HRZ to quantify the findings of the focus groups and the size of the potential market for lamb production, and (ii) undertake economic modeling and farm benchmarking to compare the returns of sheep in the HRZ to beef cattle, cropping and dairying.

From the market research undertaken to date the emerging themes to incorporate into the Phase II (Implementation phase) of the WA HRZ Lamb Initiative include;

- promotion of lamb production in the HRZ,
- business development opportunities- pathways into the lamb supply chain,
- education and skills development- HRZ Lamb Production Network, and
- technical constraints to lamb production in the HRZ.

To further inform the development of strategies to address each of the emerging themes for Phase II it is recommended that detailed consultation, via a series of depth interviews, be undertaken with the following target groups;

- **lamb processors** and marketing groups such as WAMMCO, Hillside Meats and WA Q Lamb, V&V Walsh Meat Processors and Exporters, and Western Lamb,

- **contractors** servicing sheep producers- including development of an inventory of contractors and their services offered in the HRZ,

- **livestock agents** with the interest and skills to support lamb production,
- **successful HRZ lamb producers** to understand how expansion of their lamb enterprise could be supported, canvass their interest for driving/engaging in expansion models, investigate the suitability of their sheep for the HRZ and scope avenues for breeding more of the right maternal ewes for the HRZ,
- **large landholders** in the HRZ, and
- **beef producers** to test their response to the economic data generated and discover the likely implications, if any, on their future decision to produce lamb.

This consultation will gather the interest and capacity of each group to contribute to Phase II, and test the likely impacts of profitability data on producer decisions.

Appendix 2

Report on market research to evaluate the opportunities for, and barriers to, prime lamb production in the high rainfall zone of south west Western Australia

Kimbal Curtis, Livestock Industries Development
Department of Agriculture and Food WA

11th June, 2012

IMPORTANT DISCLAIMER

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia accept no liability whatsoever by reason of negligence or otherwise arising from the use or release of this information or any part of it.

Executive Summary

Attitudes to beef and lamb production

Focus groups conducted prior to this market research provided a set of opinions about, and attitudes toward, beef and lamb production in the high rainfall zone (HRZ) of south west Western Australia. This study was designed to quantify and rank those findings. The main results are summarised against each of the key questions.

Why is beef production the enterprise of choice in this area?

The main reasons given for beef cattle being the livestock of choice (amongst beef producers) are

- they match the producer's infrastructure and management skills (89 per cent agree),
- the long wet growing season suits beef cattle (75 per cent agree), and
- managing beef cattle is relatively simple and has a low labour requirement (66 per cent agree).

What are the main frustrations with beef production?

- Until recently, market prices have been poor (91 per cent agree),
- There is a lack of competition from buyers of beef cattle (74 per cent agree)
- The loss of a calf means no income for a year (67 per cent agree), and
- The cost of production is high (67 per cent agree).

What is the opinion or attitude of the producer to running beef compared to running sheep?

- Most producers believe that running sheep requires more intensive management and more labour than beef cattle (83 per agree),
- Producers agreed (68 per cent) that an advantage of sheep over cattle is that they produce two incomes per year (wool and sheep sales), and
- The timing of management practices is more critical with sheep than with beef cattle (64 per cent agree).

For those with sheep, what is their motivation for running sheep?

- The diversification of income from running sheep was important to a majority of producers (81 per cent agree),
- Two thirds of producers agreed they were a better grazing tool for weed control than cattle, and
- More than half of the sheep producers run sheep because it is easier to match sheep feed requirements to pasture supply, and they require less hay (57 per cent agree).

For those who have considered prime lamb production, what was the motivation?

The main reasons given for considering lamb production were

- Lamb and wool prices mean sheep are more profitable than cattle (volunteered by 16 per cent of producers),
- Lamb production is generally seen as a more profitable enterprise than beef (26 per cent), and
- [Opportunity to spread] income risk across more than one product (21 per cent).

What are the barriers to running sheep in the HRZ?

- My infrastructure including fencing is unsuitable for lamb production (80 per cent agree),
- No desire to run sheep, don't enjoy running sheep (65 per cent),
- Concern over foot rot, fleece rot, lice, worms and fly strike (62 per cent), and
- Sheep require too much labour for the return (53 per cent).

For those producers who said they would not consider lamb production, what was the reason they would not produce prime lamb?

The main reasons provided were

- Lack of suitable infrastructure (volunteered by 48 per cent), and
- No desire to run sheep (39 per cent).

What were seen to be the benefits of a prime lamb production enterprise?

- The diversification of income is important to the producer (81 per cent agree).

What options might assist the development or adoption of prime lamb production?

Of the small number of producers who said they might consider introducing lamb production,

- Nearly two thirds needed confidence that prices for lamb will remain high enough, and
- Just over half wanted to see lamb producer case studies from their region.

Estimating the potential increase in the HRZ lamb industry

Two options for increasing lamb production were analysed; introduction of lamb production by non lamb producers, and improvement in reproductive performance in existing lamb producing flocks.

New lamb producers: A decision tree analysis was used to estimate the potential for increase in the size of the lamb industry. Producers that currently do not produce lambs, but excluding those who said they would 'never' introduce lamb production, were assumed to increase their ewe flock to the level of those who currently produce lambs. This resulted in a projected increase in the average number of ewes per HRZ

producer of 40 per cent, from 433 to 605. Across the region, this indicates the potential for an additional 510 thousand ewes producing about 430 thousand extra lambs (at a conservative marking rate of 85 per cent).

Improved reproductive performance: An increase of 20 lambs per 100 ewes (from a current level of 80 lambs per 100 ewes) by existing prime lamb producers would result in an additional 210 thousand lambs from the HRZ.

As these two groups operate very different farming systems, and in light of the findings of this study, actual adoption might be quite different between the groups. As a result, different strategies will be required to trigger adoption.

Acknowledgements

In Meat and Livestock Australia provided financial support for this study under the project “Scoping Study for the WA High Rainfall Zone Lamb Initiative” (B.LSM.0027). The expertise of the team at Taverner Research contributed to the successful completion of the field work. The author is grateful for the advice and feedback provided by colleagues on the project, in particular, Andrew van Burgel, Stephen Gherardi, Andrew Thompson and Jason Trompf.

Background

In recent decades, dairy and beef production have been the main livestock industries in south west region of Western Australia. Prime lamb production has been identified as a likely more profitable enterprise than beef in this high rainfall zone (HRZ). The HRZ was defined as the shires of Augusta-Margaret River, Boddington, Boyup Brook, Bridgetown-Greenbushes, Busselton, Capel, Collie, Dardanup, Denmark, Donnybrook-Balingup, Harvey, Manjimup, Murray, Nannup, Plantagenet, Serpentine-Jarrahdale, Waroona (see map).

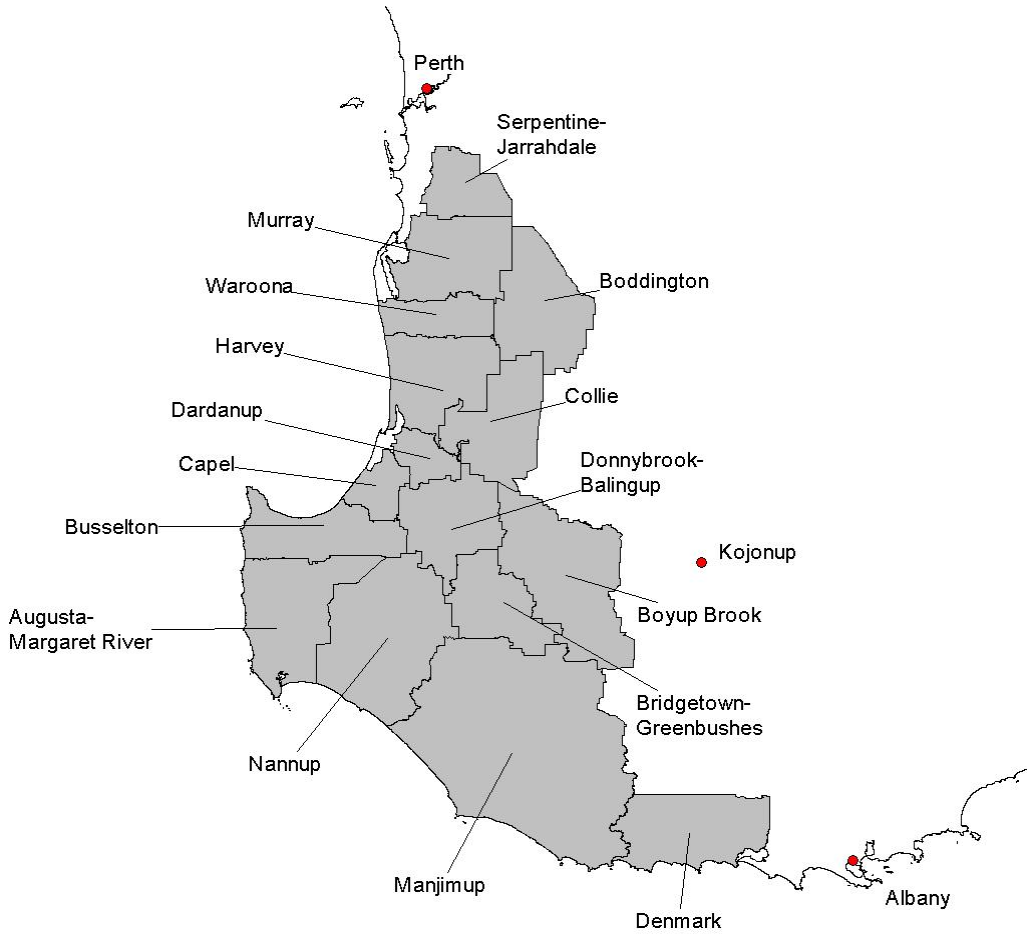


Figure 1 Location of the shires included in the High Rainfall Zone of south west Western Australia

The HRZ survey area includes all shires in the South West statistical division (SD) plus the shires of Serpentine-Jarrahdale and Denmark (Figure 1). At the last ABS agricultural census in 2006, these shires had 785 businesses (producers) with sheep, 2268 with meat cattle and 279 with dairy cattle. Individual businesses that run more than one of the classes of livestock (sheep, meat cattle, or dairy cattle) are included in each count. Between 2006 and 2010, the total number of these livestock businesses in the south west statistical division rose by six per cent.

The findings of market research involving nine focus groups involving about 50 beef producers from the high rainfall zone of WA have already been reported. Several themes emerged from that market research including both perceived and real barriers to adoption. These barriers relate to business development and industry integration, overcoming technical constraints and producer training and skills development.

The focus group market research indicated that, to overcome their reluctance to adoption of lamb production systems, existing beef producers will require;

- greater promotion of lamb production as a viable option in the region and case study examples of producers that have been successful with lamb production

- longer term, current and on-going farm benchmarking comparisons of beef and lamb profitability in the region
- on-farm demonstrations confirming the relative profitability of sheep versus cattle in the region, and including any complementary benefits to both enterprises, and where appropriate comparisons of crossbred maternal versus Merino ewes
- evidence that prices for lamb will remain high enough for long enough to justify change over and establishment costs
- support networks, education and hand holding to enable producers to develop management skills in lamb production
- evidence that there are sheep contractors that service this region
- segmentation of the lamb production supply chain so producers can partake in the stage of lamb production that best suits their desires, infrastructure and management capabilities
- development and promotion of alternative business development models and pathways into lamb production, including combinations of land and livestock ownership and access to labour
- proof that there are sheep available to suit the region (resistance to diseases, high maternal ability and easy-care and quicker turn-off).

The survey undertaken for this study was designed to evaluate the focus group findings across a representative sample of livestock producers in the HRZ. Specifically, it addressed the potential for a HRZ lamb industry and the relative importance of the focus group identified barriers to adoption. The key questions addressed were:

- Why beef production is the enterprise of choice in this area?
- What are the main frustrations with beef production?
- What is the opinion or attitude of the producer to running beef compared to running sheep?
- For those with sheep, what is their motivation for running sheep?
- For those who have considered prime lamb production, what was the motivation?
- What are the barriers to running sheep in the HRZ?
- For those producers who said they would not consider lamb production, what was the reason they would not produce prime lamb?
- What were seen to be the benefits of a prime lamb production enterprise?
- What options might assist the development or adoption of prime lamb production?

This report presents the results from the telephone survey of producers in the HRZ, and provides an estimate of the potential for increase in the HRZ prime lamb industry. This information will assist planning of approaches to developing the lamb industry in the HRZ.

Methodology

A market research company, Taverner Research, was contracted to undertake a telephone survey of landholders in the HRZ of south west Western Australia. A standard questionnaire was developed, tested and loaded into a Computer Aided Telephone Interview system.

The questionnaire (see Appendix A) was in three sections:

a) The first section establishes if they are beef cattle or sheep producers (or both), how many cattle and or sheep they are running, and asks about their attitude (unprompted) toward lamb production, and barriers to adoption of lamb production.
   This section was included to establish the key issues in their minds regarding lamb production without "*leading the witness*".

b) In the second section, producers are asked to indicate whether they agree or disagree with a set of statements under six headings:
   - Reasons beef cattle are the enterprise of choice;
   - Frustrations with beef cattle;
   - Perceptions of sheep versus cattle;
   - Reasons for adoption of sheep;
   - Key barriers to the adoption of sheep; and
   - Overcoming reluctance to adopt lamb production.

   This section tests the wider level of agreement with the issues identified by the focus groups.

c) The last section establishes age distribution, proportion of income from different farming enterprises, shire in which they farm, and contact details.

The sample (list of candidate producers) was drawn from a land title database. Using GIS software and a vegetation mask, properties were selected that had over 100 hectares of cleared land. This list was further filtered to remove duplicate listings, those without valid contact details and government agencies. The remaining list of 942 landholders was provided to Taverner Research.

Each landholder was phoned at least five times, at different times of the day until a successful interview was conducted, the landholder refused or was not grazing cattle or sheep, or the phone number was faulty/disconnected/facsimile machine.

The answers to the open ended questions in section (a) of the questionnaire were coded and the number of producers providing each response is reported.

The statements in section (b) were given ratings of 1 for strongly agree, 2 for agree, 3 for neutral or no opinion, 4 for disagree and 5 for strongly disagree. The average and standard deviation of the ratings given to each statement are reported in tables along with the per cent of producers who agree (rated 1 or 2), are neutral (rated 3) or disagree (rated 4 or 5) with each statement.

Results and Discussion

This section is presented in three main parts. The first section provides a break down of the survey response rate including an explanation for the exclusion of two responses.

The following section provides a profile of the participating producers with their break down by age, shire and production system.

The final section outlines and quantifies the participant's attitudes and opinions on running beef cattle, producing prime lambs, barriers to adoption and what might assist them in introducing prime lamb production.

Sample participating

From the sample of 942 numbers, a total of 302 interviews were completed. The full telephone sample analysis is given in Table 1 below.

Two completed interviews were deemed invalid. The first had a grazing area of 1.5 million hectares (more than half the pasture area of the nominated shire) and 14,000 cattle indicating this producer is not operating in the high rainfall zone. The second provided inconsistent answers e.g. No cattle, No sheep and 100 per cent of income from beef. These interviews were excluded leaving 300 responses for analysis.

Table 1 Analysis of the phone records for the sample used

Description	Count	Per cent
Invalid number (recorded message)	133	14.1
Facsimile machine	11	1.2
Business number (not a farm)	3	0.3
No answer after 9+ attempts	172	18.3
Sub-total – invalid numbers	319	33.9
Refused	123	13.1
Unavailable during duration of study	31	3.3
Hearing or language barrier	5	0.5
Sub-total – refused, could not complete	159	16.9
Not beef or sheep producers	44	4.7
Under 50 hectares	31	3.3
No longer farming	87	9.2
Sub-total – not required demographic	162	17.2
Completed	302	32.1
Grand total	942	100.0

Producer profile

Regions surveyed

Producers from 16 shires in south west Western Australia participated in the survey (**Table 2**).

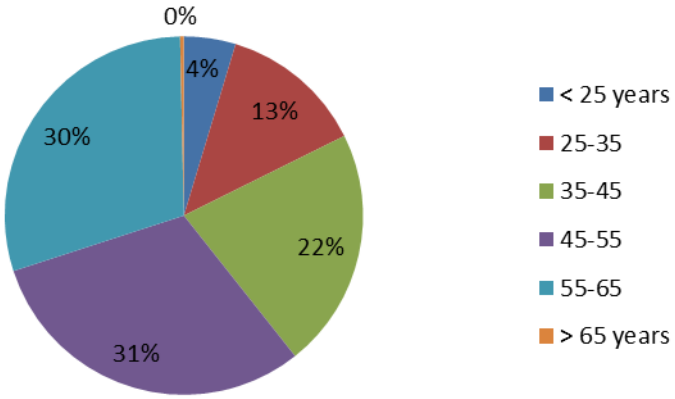
Table 2 Number of producers by shire and per cent of producers operating cattle only, sheep only, both cattle and sheep, dairy livestock systems

Shire name	Number of producers	Per cent of producers in shire by livestock system			
		Cattle only	Cattle and Sheep	Sheep only	Dairy
Augusta-Margaret River	21	57	19	10	14
Boddington	5	40	40	20	-
Boyup Brook	39	18	33	49	-
Bridgetown-Greenbushes	27	30	56	11	4
Busselton	24	54	17	13	17
Capel	17	53	18	-	29
Collie	6	50	33	17	-
Dardanup	11	45	9	-	45
Denmark	23	83	17	-	-
Donnybrook-Balingup	22	59	36	5	-
Harvey	23	65	13	4	17
Manjimup	35	69	23	9	-
Murray	25	64	28	4	4
Nannup	9	67	22	11	-
Serpentine-Jarrahdale	2	50	-	50	-
Waroona	11	82	9	-	9

Age data

The 300 producers participating in this survey had an average age of 47 years with only one over 65 and 14 under 25 years old. Cattle only producers (48 years old) and sheep only producers (47 years old) were a little older than the dairy producers (44 years old) and producers running both beef cattle and sheep (45 years old) that participated in the survey. The age distribution of all participants is shown in Figure 2 (n=300).

Figure 2 Distribution of participating producers by age categories



Livestock production system

Of the 300 responses, 80 per cent were running cattle for beef production, including 26 per cent that also had sheep (Figure 3, n=300). Average flock and herd sizes are presented in Table 3. There were 24 responses from producers receiving over 50 per cent of their income from dairy production.

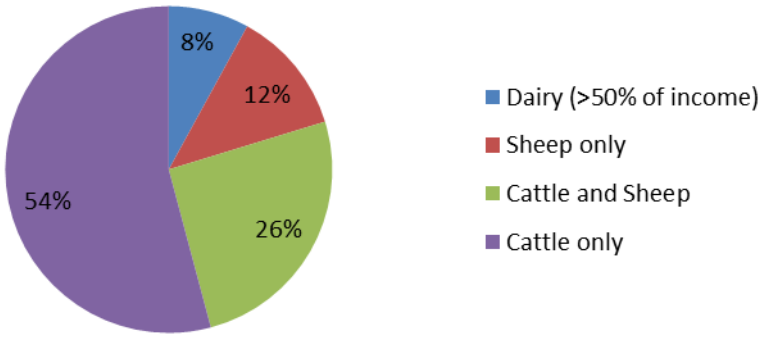


Figure 3 Distribution of the 300 producers by livestock enterprise.

Of the 114 producers running sheep (excluding dairy producers),

- 51 per cent were both breeding and finishing prime lambs,
- 27 per cent were not producing prime lambs,
- 13 per cent were breeders only, and
- 9 per cent were finishing prime lambs.

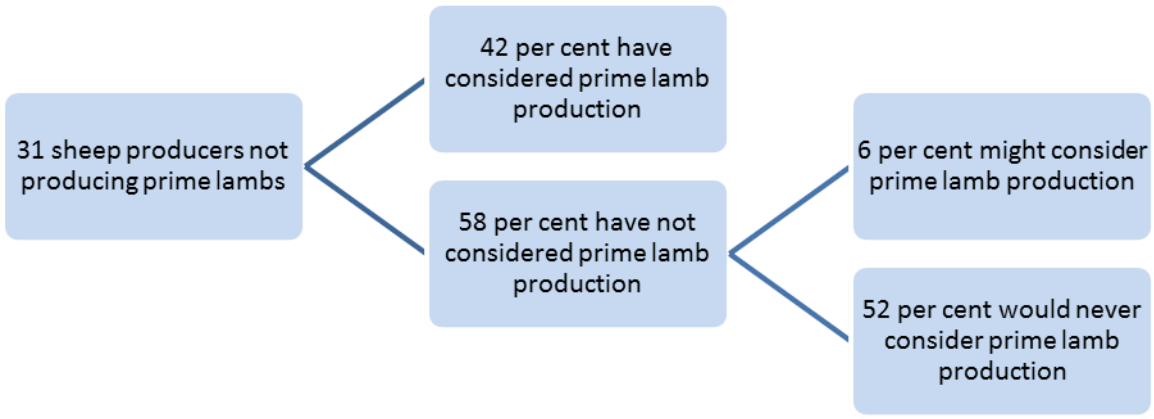
Sheep producers who were not producing prime lambs, and cattle only producers were asked if they had considered prime lamb production. Those that had not were asked if they might consider prime lamb production. The results presented in Figure

4 show that 52 per cent of the 31 sheep producers not producing prime lambs, or 14 per cent of all sheep producers, would 'never' consider prime lamb production. When asked why not, there was no stand out reason, the most common responses being "*don't want the extra work of lamb production*" and "*region not suited to sheep (foot rot, fleece rot, lice, worms and fly strike)*".

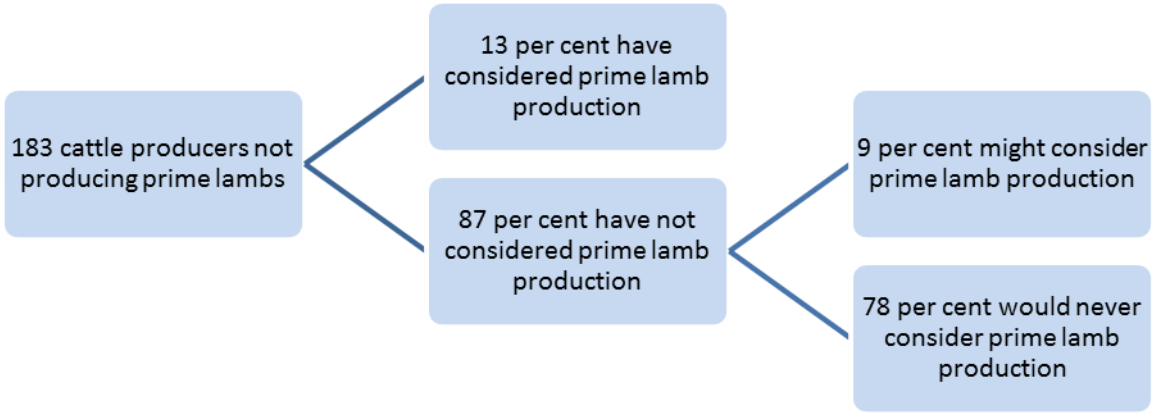
Of the 183 beef cattle only producers, 78 per cent stated they would 'never' consider introducing prime lamb production.

Figure 4 Producers that do not produce prime lambs were asked if they had considered introducing prime lamb production, and if not, whether they would ever consider prime lamb production. Results are reported for (a) sheep producers not producing prime lambs and (b) cattle only producers

(a)



(b)



Number of livestock per producer

The average number of cattle (excluding calves), cows, sheep (excluding lambs) and ewes per producer are presented in **Table 3**. Cattle and cow numbers are presented for all producers with cattle and for producers that only have cattle. Sheep and ewe

numbers are presented for all producers with sheep and for producers that only have sheep.

Table 3 Average number beef cattle, breeding cows, sheep and breeding ewes by category of producer

Producer category	Cattle	Cattle only	Sheep	Sheep only
Number of responses	239	162	114	37
Number of cattle (excluding calves) per producer	237	256		
Number of breeding cows per producer	142	148		
Number of sheep (excluding lambs) per producer			1414	2285
Number of breeding ewes per producer			1109	1707

Attitudes toward producing prime lambs and beef cattle

Why is beef production the enterprise of choice

There were 239 cattle producers that rated each of the statements in Table 4 (n=239).

From the responses, the main reasons beef cattle are the livestock of choice are because they match the producer's infrastructure and management skills, and because they are suited to the long wet growing season.

Most statements had very few neutral (rating 3) responses and two statements had similar numbers of agree and disagree ratings. This indicates a polarisation of opinion, perhaps around two separate producer profiles.

Almost half the producers agreed that "… running beef cattle lets me also work off farm", yet 43 per cent disagreed.

Running beef cattle as "… they are a replacement for dairy cattle [in this area]" also polarised opinion with 44 per cent agreeing and 46 per cent disagreeing.

Table 4 Summary of ratings given by cattle producers on why they run beef cattle. Statements were rated from strongly agree (1) to strongly disagree (5). Average and standard deviation of the ratings plus per cent of responses that agreed (rating 1 or 2), were neutral (3) or disagreed (4 or 5) with each statement are presented

Per cent of producers				
Average (sd)	Agree (1, 2)	Neutral (3)	Disagree (4, 5)	Statement
1.9 (0.7)	89	6	5	I run beef cattle because they match my infrastructure and management skills.
2.2 (1.0)	75	10	15	I run beef cattle because the long wet growing season in my area suits beef cattle.
2.4 (1.2)	66	10	24	I run beef cattle because managing beef cattle is relatively simple and has a low labour requirement.
2.6 (1.0)	54	18	28	I run beef cattle because they have always been the enterprise of choice in this area.
2.9 (1.2)	48	9	43	I run beef cattle because running beef cattle lets me also work off farm.
2.9 (1.2)	44	10	46	I run beef cattle because in this area, they are a replacement for dairy cattle.

Results for 239 cattle producers

What are the main frustration producers have with beef cattle

Ratings on eight frustrations over beef production are presented in Table 5 (n=239).

Recent poor market prices and the lack of buyer competition were the most agreed upon frustrations of cattle producers – both off farm issues largely out of the control of the producer.

Two thirds of producers were concerned with production issues – loss of a calf means no income for the year, and the high cost of production. Interestingly, half of the producers were not concerned to be producing feeder cattle for another sector, but 28 per cent agreed it was a frustration.

Table 5 Summary of ratings given by cattle producers to statements about the frustrations of running beef cattle. Statements were rated from strongly agree (1) to strongly disagree (5). Average and standard deviation of the ratings plus per cent of responses that agreed (rating 1 or 2), were neutral (3) or disagreed (4 or 5) with each statement are presented

Per cent of producers				
Average (sd)	**Agree (1, 2)**	**Neutral (3)**	**Disagree (4, 5)**	**Statement**
1.6 (0.8)	91	4	5	Beef cattle production has been frustrating because until recently, market prices for beef cattle have been poor.
2.1 (1.1)	74	11	15	Beef cattle production is frustrating because there is a lack of competition from buyers of beef cattle.
2.4 (1.1)	67	9	24	Beef cattle production is frustrating because the loss of a calf means no income for the year.
2.4 (1.1)	67	10	23	Beef cattle production is frustrating because of the high cost of production.
2.9 (1.1)	46	15	38	Beef cattle production is frustrating because it involves a lot of cost and time in cutting and carrying the spring flush to feed during autumn and winter.
3.1 (1.1)	37	14	49	Beef cattle production is frustrating because receiving only a single cash cheque per year impedes my management decisions.
3.2 (1.0)	30	16	54	Beef cattle production is frustrating because they are not efficient at converting grass into dollars.
3.2 (1.0)	28	21	51	Beef cattle production is frustrating because I would rather produce a final product than feeder cattle for the feedlot sector.

Results for 239 cattle producers

How would you compare running beef cattle to running sheep

Table 6 (n=276) presents the ratings for statements comparing sheep and beef cattle production. A strong majority (83 per cent) of producers believe that “running sheep requires more intensive management and more labour than beef cattle”. Further, 64 per cent agree that “the timing of management practices is more critical [with sheep] than with beef cattle”, confirming the view that management is a greater issue with sheep than with cattle.

Sixty-eight per cent of producers agreed that “an advantage of sheep over cattle is that they produce two incomes per year, that is from wool and sheep sales” and 53 per cent agreed that “lamb production is generally more profitable than beef.”

Half of all producers disagreed with the statement that “my feed supply better matches the feed demand of sheep than the feed required by beef cattle” and just 27 per cent agreed. Only a third of producers believed “it is easier to supplementary feed sheep than beef cattle” with 42 per cent disagreeing.

Table 6 Summary of ratings by producers of statements about the differences between running sheep and beef cattle. Statements were rated from strongly agree (1) to strongly disagree (5). Average and standard deviation of the ratings plus per cent of responses that agreed (rating 1 or 2), were neutral (3) or disagreed (4 or 5) with each statement are presented

Per cent of producers				
Average (sd)	Agree (1, 2)	Neutral (3)	Disagree (4, 5)	Statement
2.0 (0.9)	83	9	8	I believe that running sheep requires more intensive management and more labour than beef cattle.
2.3 (0.9)	68	17	14	I believe that an advantage of sheep over cattle is that they produce two incomes per year, that is from wool and sheep sales.
2.4 (1.0)	64	17	19	I believe that with sheep, the timing of management practices is more critical than with beef cattle.
2.5 (0.9)	53	29	17	I believe that lamb production is generally more profitable than beef.
2.8 (0.9)	41	36	23	I believe that lamb markets are more developed and have greater competition than beef markets.
3.1 (1.0)	34	24	42	I believe that it is easier to supplementary feed sheep than beef cattle.
3.2 (1.0)	27	24	50	I believe that my feed supply better matches the feed demand of sheep than the feed required by beef cattle.

Results for 276 producers

What are the main reasons for, or benefits of, prime lamb production

Among the reasons sheep producers run sheep (Table 7, n=114), "the diversification of income" (81 per cent) was the highest rated statement followed by their "[superiority over cattle] as a grazing tool for weed control" (67 per cent).

Only 52 per cent of producers run sheep because "lamb and wool prices make sheep more profitable than beef cattle".

Interestingly, 57 per cent of sheep producers agreed that they "run sheep because it is easier to match sheep feed requirements to the pasture supply and they require less hay". This contrasts with 34 per cent of all producers who agreed "it is easier to supplementary feed sheep than beef cattle" and only 27 per cent "believe [their] feed supply better matches the feed demand of sheep than the feed required by beef cattle" (Table 6, n=276).

More producers disagreed than agree with two statements:

- Producing lamb is attractive to me because the processors are interested in building relationships with producers (42 per cent disagree), and
- Producing lamb is attractive to me because I can take out a forward contract (50 per cent disagree).

Table 7 Summary of ratings by sheep producers of statements concerning the reasons they run sheep or produce lambs. Statements were rated from strongly agree (1) to strongly disagree (5).

Average and standard deviation of the ratings plus per cent of responses that agreed (rating 1 or 2), were neutral (3) or disagreed (4 or 5) with each statement are presented

Per cent of producers				
Average (sd)	Agree (1, 2)	Neutral (3)	Disagree (4, 5)	Statement
2.2 (0.8)	81	10	10	I run sheep because the diversification of income is important to me.
2.4 (1.1)	67	11	22	I run sheep because they are a better grazing tool for weed control than cattle.
2.5 (1.0)	52	31	18	I run sheep because lamb and wool prices make sheep more profitable than beef cattle.
2.6 (1.0)	55	23	23	I run sheep because of the complimentary benefits in running sheep and cattle.
2.7 (1.0)	57	12	31	I run sheep because it is easier to match sheep feed requirements to the pasture supply and they require less hay.
3.0 (0.9)	32	32	35	I run sheep because they are a better fit with vegetable production than cattle.
3.0 (0.9)	31	34	35	I am a lamb producer because there are more markets for lamb than beef.
3.2 (0.9)	28	30	42	Producing lamb is attractive to me because the processors are interested in building relationships with producers.
3.3 (0.9)	19	31	50	Producing lamb is attractive to me because I can take out a forward contract.

Results for 114 producers

What prompted you to consider producing prime lambs

Non lamb producers were asked (unprompted) if they had considered introducing prime lamb production, and if they had, what had prompted this consideration. Increased profitability and income risk management were the only reasons provided by more than 10 per cent of these producers (Table 8, n=34).

Table 8 List of the reasons producers not producing lambs had considered lamb production. Multiple responses were accepted. Only reasons given by 10 per cent or more of respondents are listed

Number (per cent)	Statement
16 (47%)	Lamb and wool prices mean sheep are more profitable than cattle
9 (26%)	Lamb production generally seen as a more profitable enterprise than beef
7 (21%)	Spread income risk (more than one product)

Results for 34 producers (21 cattle, 13 sheep)

What is preventing you from introducing prime lamb production

From a list of 16 reasons for not running sheep or producing lambs, only four scored agreement by more than 50 per cent of cattle producers (Table 9, n=162). Unsuitable infrastructure including fencing was the top reason for not running sheep - agreed with by 80 per cent of producers. It was also the most common reason proposed by cattle producers when asked what is preventing or would prevent them from trialling lamb production (Table 10, n=50).

Two thirds of cattle producers indicated that they have no desire to run sheep, or they don't enjoy running sheep, thus it is unsurprising that such a high proportion indicate their infrastructure is unsuitable for running sheep.

Concern with animal health (foot rot, fleece rot, lice, worms and fly strike) and the labour requirement of running sheep were both issues for over 50 per cent of cattle producers.

Nearly three quarters of cattle producers rejected the statement that they would rather change to dairying than switch to lamb production. Most cattle producers rejected the statements that "they were too busy working off farm to run sheep" (61 per cent) and "they don't produce lamb because it has not been promoted in this region" (63 per cent).

Table 9 Summary of ratings by cattle producers of statements expressing reasons why they don't run sheep and/or produce lamb. Statements were rated from strongly agree (1) to strongly disagree (5). Average and standard deviation of the ratings plus per cent of responses that agreed (rating 1 or 2), were neutral (3) or disagreed (4 or 5) with each statement are presented

	Per cent of producers			
Average (sd)	Agree (1, 2)	Neutral (3)	Disagree (4, 5)	Statement
2.1 (1.0)	80	6	14	I don't run sheep because my infrastructure including fencing is unsuitable for lamb production.
2.4 (1.1)	65	11	23	I have no desire to run sheep, as I just don't enjoy running sheep.
2.5 (1.1)	62	10	28	I don't run sheep because of concern over foot rot, fleece rot, lice, worms and fly strike.
2.7 (1.0)	53	22	25	I don't run sheep because they require too much labour for the return.
2.8 (1.0)	44	23	32	I don't produce lamb because I don't know if the returns from lamb production will be good enough and last long enough to justify the change.
2.9 (1.0)	42	22	36	I don't run sheep because the season here makes it more profitable to run cattle.
3.0 (0.9)	36	30	33	I don't produce lamb because the contractors needed to meet the additional labour demands are too costly.
3.0 (1.1)	39	20	41	I don't run sheep because they present too many health risks, management risks and environmental risks compared to cattle.
3.0 (1.1)	40	12	49	I don't run sheep because this country is unsuitable for running sheep.
3.1 (0.9)	28	27	44	I don't run sheep because they are hard on perennials over the summer/autumn.
3.2 (1.1)	35	9	56	I don't run sheep because there are no sheep contractors servicing this area.
3.4 (1.0)	19	25	56	I don't produce lamb because ewe and lamb mortalities are a real turnoff for me.
3.4 (1.0)	24	20	56	I don't produce lamb because local agents like producers to stick with what they have been doing for years and they have a big influence.
3.5 (0.9)	19	18	63	I don't produce lamb because it has not been promoted in this region.
3.4 (1.0)	24	15	61	I don't run sheep because I am too busy working off farm to run sheep.
3.8 (0.9)	13	15	72	I would rather change to dairying or put in more crop than switch to lamb production.

Results for 162 producers

Table 10 List of the reasons preventing producers trialling lamb production. Multiple responses were accepted. Only reasons given by 10 per cent or more of respondents are listed

Number (per cent)	Statement
16 (32%)	Lack of suitable infrastructure eg fencing etc
11 (22%)	Don 't think returns from sheep will be enough for long enough to justify change over
7 (14%)	Harder work handling sheep
7 (14%)	Hard to get labour for shearing, crutching, marking and drenching

Results for 50 producers (35 cattle, 15 sheep)

What would assist you to introduce prime lamb production

There were only 11 producers who had not considered lamb production, but said they might consider trialling lamb production. Almost two thirds of these agreed they would "*want confidence that prices for lamb will remain high enough before introducing lamb production*".

There was majority (seven or more of the eleven producers) disagreement with several of the statements. This included:

- 82 per cent disagreed that "*they would consider adopting lamb production if they could own the sheep but have all management handled by a contractor under a profit sharing arrangement*";
- 73 per cent disagreed that "*the promotion of lamb production as an option in this region would be needed before I would consider adopting lamb production*";
- 73 per cent disagreed that "*they would need to see a longer term comparison of beef and lamb profitability in this region before I would consider adopting lamb production*";
- 64 per cent disagreed they would "*want support to develop management skills in lamb production, before I would consider adopting lamb production*"; and
- 64 per cent disagreed they would "*need to see trials comparing sheep versus cattle versus a combination of both in this region, before I would consider adopting lamb production*"

Table 11 List of the assistance measures that might assist make the decision to introduce lamb production.
Multiple responses were accepted. Only reasons given by 10 per cent or more of respondents are listed

Number (per cent)	Statement
18 (36%)	Evidence that lamb production is more profitable than beef
10 (20%)	Nothing

Results for 50 producers

Why would you never introduce prime lamb production

Producers that said they would not ever consider lamb production were asked why, and multiple responses were recorded. The main reason indicated by cattle producers (Table 12, n=127) was unsuitable infrastructure (48 per cent) followed by no desire to run sheep (39%). Interestingly, only 10 per cent indicated that they don't think returns from sheep will be enough for long enough.

Table 12 List of reasons why cattle producers said they would not consider lamb production on their property.
Multiple responses were accepted. Only reasons given by 10 per cent or more of respondents are listed

Number (per cent)	Statement
61 (48%)	Lack of suitable infrastructure eg fencing etc
49 (39%)	No desire to run sheep, cattle producers
37 (29%)	Don't want the extra work (of lamb production)
37 (29%)	Region not suited to sheep (foot rot, fleece rot, lice, worms and fly strike)
26 (20%)	Too old to change / retiring soon
13 (10%)	Don't think returns from sheep will be enough for long enough to justify change over

Results for 127 cattle producers

For the small sample of sheep producers not producing prime lamb (Table 13, n= 16), 25 per cent said they didn't want the extra work of lamb production, and 25 per cent said the region was not suited to sheep due to foot rot, fleece rot, lice, worms and fly strike, even though they were running sheep.

Table 13 List of things preventing sheep producers from trialling lamb production. Multiple responses were accepted. Only reasons given by 10 per cent or more of respondents are listed

Number (per cent)	Statement
4 (25%)	Don't want the extra work (of lamb production)
4 (25%)	Region not suited to sheep (foot rot, fleece rot, lice, worms and fly strike)
3 (19%)	No desire to run sheep, cattle producers
3 (19%)	Lack of suitable infrastructure eg fencing etc
2 (13%)	Sheep require more intensive management
2 (13%)	Don't think returns from sheep will be enough for long enough to justify change over
2 (13%)	Too old to change / retiring soon
2 (13%)	I breed for fine wool

Results for 16 sheep producers

Opportunity Analysis

The opportunity to increase prime lamb production in the HRZ is split into two options. Adoption or introduction of prime lamb by those not currently producing prime lambs, and improvement in reproductive performance by those existing lamb producers running sheep under traditional management practices. Both opportunities are evaluated below.

New prime lamb producers

A decision tree analysis was used as a logical framework to estimate the potential for increase of the lamb industry in the HRZ due to the adoption of prime lamb production. The decision tree was created using the following branches:

- Current livestock system – Dairy, Sheep Only, Sheep and Cattle, and Cattle only
- Whether currently a prime lamb producer – Yes, No
- Whether producer has considered prime lamb production – Yes, No
- Whether producer might consider prime lamb production – Yes, No

The decision tree was populated with the percentages for each split and with the average number of ewes per producer as the payoff. The base scenario (Figure 5) is the combination as recorded in the survey data. Producers (of all types) in the HRZ are currently carrying an average of 433 ewes each.

The potential prime lamb opportunity was modelled by increasing the number of ewes carried by non prime lamb producers to the number carried by the corresponding group of current prime lamb producing producers. The following rules were applied:

- The number of ewes carried by *sheep only* producers that are not producing prime lambs (1023 ewes per producer) was increased to match that of sheep only producers that are producing prime lambs (1867 ewes), but only where they had considered prime lamb production, or might consider prime lamb production;
- The number of ewes carried by sheep and cattle producers that are not producing prime lambs (206 ewes per producer) was increased to match that of sheep and cattle producers that are producing prime lambs (1100 ewes), but only where they had considered prime lamb production, or might consider prime lamb production;
- The number of ewes carried by cattle only producers was set to match that of sheep and cattle producers that are producing prime lambs (1100 ewes), but only for those that had considered prime lamb production, or might consider prime lamb production; and
- No adjustment was made to the number of ewes carried by dairy producers,

The updated decision tree is shown in Figure 6. The average number of ewes per producer is estimated to rise to 605 (from the current level of 433), a rise of 40 per cent.

Using the livestock enterprise split of the producers in this survey (Figure 3) and allowing for a six per cent increase since 2006, the total number of producers in the HRZ is approximately 2,970. Thus a rise in average ewes per producer from 433 to 605 would result in an additional 510 thousand ewes producing ~430 thousand lambs (at 85 per cent marking[1]). This is a best-case scenario assuming full adoption.

There are four groups (pathways on the decision tree) that would be the main targets for adoption or introduction of prime lamb production, and together they account for 16 per cent of HRZ producers:

- Sheep only producers/Lamb producer – No/Considered lamb – Yes (1.3 per cent)
- Sheep and Cattle producers/ Lamb producer – No/Considered lamb – Yes (3.0 per cent)
- Cattle only producers/ Considered lamb – Yes (7.0 per cent)
- Cattle only producers/ Considered lamb – No/Might consider – Yes (4.7 per cent)

This target group of ~450 producers might carry, ~520 thousand ewes, an increase of about ~464 thousand on their current holding (Table 14). They would account for ~77 per cent of the potential increase due to introduction of prime lamb production as modelled in Figure 6.

Table 14 Estimation of potential additional ewes and lambs from producers adopting lamb production

	per cent of HRZ	Producers	current ewes	target ewes
Sheep only producers/Lamb producer – No/Considered lamb – Yes	1.3%	36	1,023	1,867
Sheep and Cattle producers/ Lamb producer – No/Considered lamb – Yes	3.0%	84	206	1,100
Cattle only producers/ Considered lamb – Yes	7.0%	195	0	1,100
Cattle only producers/ Considered lamb – No/Might consider – Yes	4.7%	131	0	1,100
Total	**16.0%**	**446**	**54,132**	**518,212**

Extra ewes	464,080
Marking rate	85.0%
Extra lambs	394,468

[1] Average marking rate in the South West statistical division since 2000-01 has been 81.6 per cent, a little higher than the WA average over the same period of 79.9 per cent (DAFWA analysis based on ABS data).

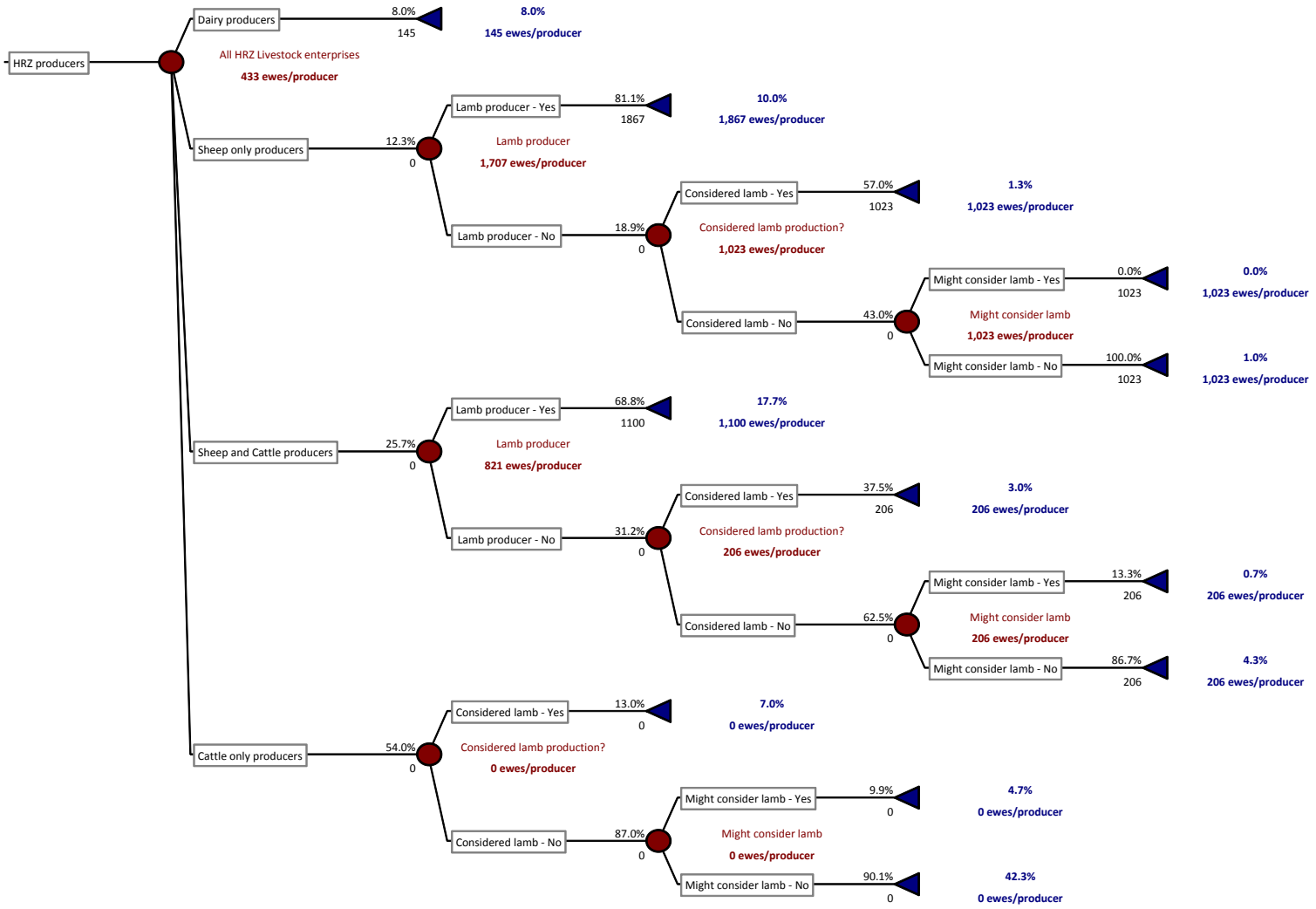


Figure 5 Decision tree for current level of prime lamb production (baseline scenario).

1.1.1.1 Interpreting the Decision Tree

End nodes (blue triangles) have no branches (arcs) succeeding them. They calculate (values to the right of the end node) the per cent of all producers on that path (probability) and the average number of ewes per producer (the payoff). The sum of all end nodes is 100 per cent.

Chance nodes (red circles) have branches for all possible outcomes. The weighted average number of ewes per producer (payoff) is displayed to the right of the node.

Decision tree inputs are displayed above (probability) and below (payoff) the arcs. The probabilities of all arcs of a single chance node must total 100 per cent.

Any payoff entered on an arc is added to all arcs of succeeding nodes.

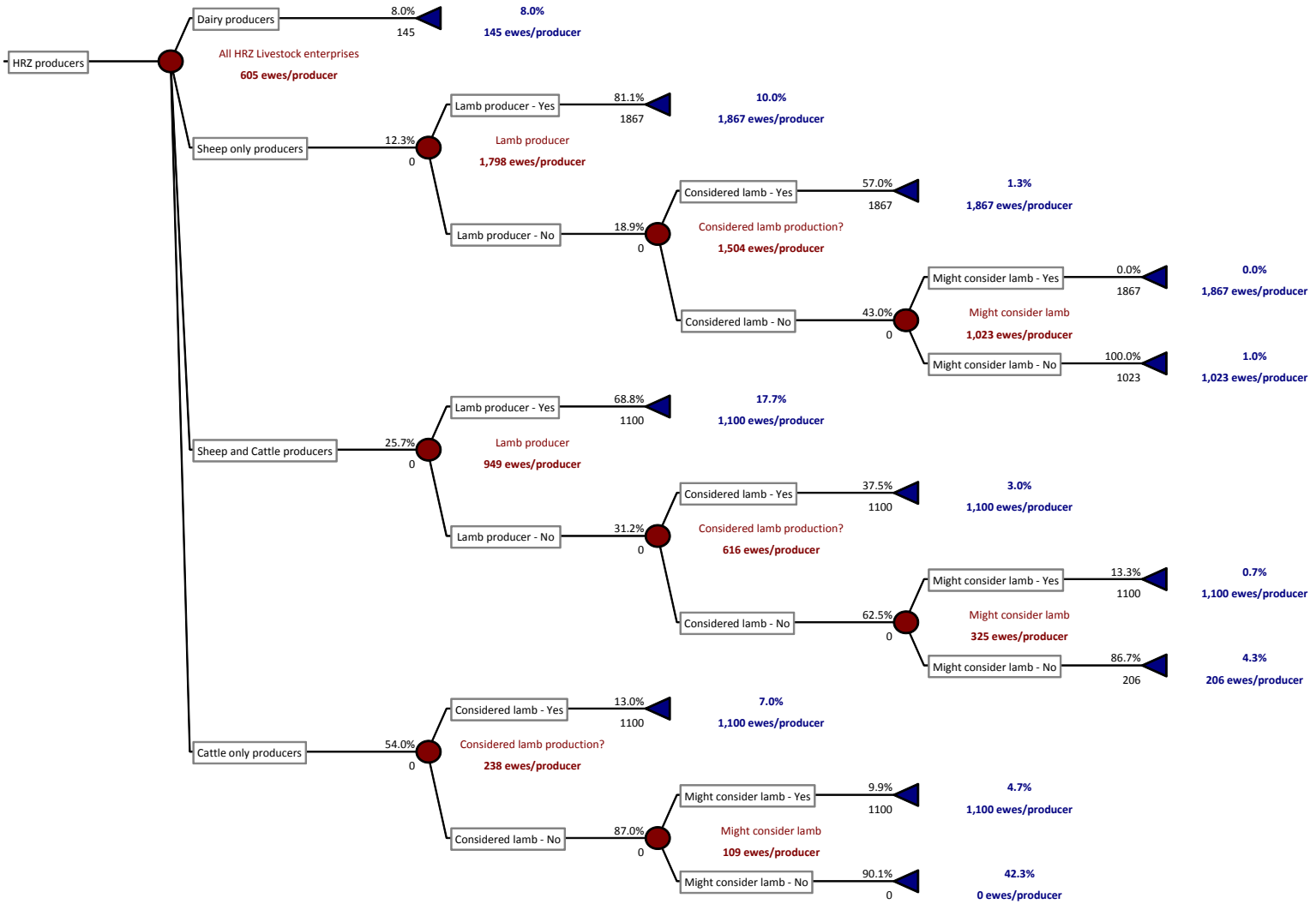


Figure 6 Decision tree for potential uptake of prime lamb production. Ewe numbers set to match those of current lamb producers.

Performance improvement of existing producers

The target group for performance improvement are those producers who are already producing prime lambs. The aim would be to raise reproductive performance across this group by an average of 20 additional lambs marked per 100 ewes. No increase in ewe flock size is assumed.

On Figure 5, they are

- Sheep only producers/Lamb producer – Yes (10.0 per cent)
- Sheep and Cattle producers/ Lamb producer –Yes (17.7 per cent)

These groups account for 27.7 per cent producers in the HRZ, or ~780 producers. It is estimated (Table 15) that they are currently running just over a million ewes producing ~850 thousand lambs marked per year. An additional 20 lambs marked per 100 ewes would result in ~210 thousand extra lambs per year.

Table 15 Estimation of potential for additional lambs by lifting reproductive performance of existing prime lamb producers in the HRZ

				marking rate	
	per cent of HRZ	Producers	current ewes	current	future
Sheep only producers/Lamb producer – Yes	10.0%	279	1,867	80%	100%
Sheep and Cattle producers/ Lamb producer –Yes	17.7%	494	1,100	80%	100%
Total	**27.7%**	**773**	**1,064,293**	**851,434**	**1,064,293**
			Extra lambs	212,859	

Potential extra lambs

Combining the potential increase from both target groups gives a total additional lamb production of ~605 thousand lambs. This an estimate of the potential increase and actual uptake will be depend on many factors.

Another dimension not considered in this market research is the capacity to produce heavier lambs (higher carcass weight). The HRZ is characterised by not only higher rainfall, but also by a longer growing season. This provides the capacity to feed lambs on green feed for longer and thus turn them off at heavier weights.

As these two target groups have quite different farming systems, different strategies or approaches will be required for each group for successful adoption to be accomplished.

Any increase in the number of lambs produced would be split between providing replacement adults ewes (and wethers), and sales to processors and live exporters. On the basis of current practice, around 40 per cent of the additional lambs (about a quarter of a million) would be sent to processors. However, with increased emphasis on prime lamb production, this proportion would be expected to be higher.

Appendix A. Telephone survey questionnaire

FilterQ. What area of your property are you using to graze livestock?

Q1. A. How many beef cattle excluding calves are you currently running?
_____(number)

B. How many of these are breeding cows? _____(number)

Q2. Have you run beef cattle on that property before?

Q3. A. How many sheep excluding lambs are you running?
_____(number)

B. How many of these are breeding ewes? _____(number)

Q4. Have you run sheep on that property before?

Q5. Do you run sheep for prime lamb production?
Q6. Have you considered introducing lamb production on your property?

Q7. Would you ever consider lamb production on your property?
Q8. Why not?
Q8b. Of those reasons, which is most important?

Q10. What prompted you to consider introducing lamb production?
Q10b. Of those reasons, which is most important?

Q12. What would assist you to make the decision to introduce lamb production?
Q12b. Of those ideas suggested, which is most important?

Q14. What is preventing or would prevent you from trialling lamb production?
Q14b. Of those reasons you suggested, which is the most important?

Q16. What are the main reasons or benefits you see in producing prime lambs?
Q16b. Of those benefits you suggested, which is the most important?

CATTLE PRODUCERS ONLY

Q17. This first set of statements seeks to understand why beef cattle are the enterprise of choice. Please tell me how strongly you agree or disagree with each of the following statements:

		Strongly Agree	**Agree**	**Neither Agree/ Disagree**	**Disagree**	**Strongly Disagree**
a)	I run beef cattle because managing beef cattle is relatively simple and has low labour.	1	2	3	4	5
b)	I run beef cattle because they have always been the enterprise of choice in this area.	1	2	3	4	5
c)	I run beef cattle because in this area, they are a replacement for dairy cattle.	1	2	3	4	5
d)	I run beef cattle because running beef cattle lets me also work off farm.	1	2	3	4	5
e)	I run beef cattle because they match my infrastructure and management skills.	1	2	3	4	5
f)	I run beef cattle because the long wet growing season in my area suits beef cattle.	1	2	3	4	5

CATTLE PRODUCERS ONLY

Q18. This next set of statements seeks to identify any frustrations producers have with beef cattle production. Please tell me how strongly you agree or disagree with each of the following statements:

		Strongly Agree	Agree	Neither Agree/ Disagree	Disagree	Strongly Disagree
a)	Beef cattle production has been frustrating because until recently, market prices for beef cattle have been poor.	1	2	3	4	5
b)	Beef cattle production is frustrating because there is a lack of competition from buyers of beef cattle.	1	2	3	4	5
c)	Beef cattle production is frustrating because it involves a lot of cost and time in cutting and carrying the spring flush to feed during autumn and winter.	1	2	3	4	5
d)	Beef cattle production is frustrating because receiving only a single cash cheque per year impedes my management decisions.	1	2	3	4	5
e)	Beef cattle production is frustrating because I would rather produce a final product than feeder cattle for the feedlot sector.	1	2	3	4	5
f)	Beef cattle production is frustrating because the loss of a calf means no income for the year.	1	2	3	4	5
g)	Beef cattle production is frustrating because of the high cost of production.	1	2	3	4	5
h)	Beef cattle production is frustrating because they are not efficient at converting grass into dollars.	1	2	3	4	5

ALL PRODUCERS

Q19. These next statements seek your opinion on running beef cattle comparing to running sheep. Please tell me how strongly you agree or disagree with each of the following statements:

		Strongly Agree	Agree	Neither Agree/ Disagree	Disagree	Strongly Disagree
a)	I believe that running sheep requires more intensive management and more labour than beef cattle.	1	2	3	4	5
b)	I believe that with sheep, the timing of management practices is more critical than with beef cattle.	1	2	3	4	5
c)	I believe that lamb production is generally more profitable than beef.	1	2	3	4	5
d)	I believe that lamb markets are more developed and have greater competition than beef markets.	1	2	3	4	5
e)	I believe that an advantage of sheep over cattle is that they produce two incomes per year, that is from wool and sheep sales.	1	2	3	4	5
f)	I believe that my feed supply better matches the feed demand of sheep than the feed required by beef cattle.	1	2	3	4	5
g)	I believe that it is easier to supplementary feed sheep than beef cattle.	1	2	3	4	5

SHEEP PRODUCERS ONLY

Q20. Your rating of the following statements will help us identify the main motivations for run sheep. Please tell me how strongly you agree or disagree with each of the following statements:

		Strongly Agree	Agree	Neither Agree/ Disagree	Disagree	Strongly Disagree
a)	I run sheep because lamb and wool prices make sheep more profitable than beef cattle.	1	2	3	4	5
b)	I run sheep because the diversification of income is important to me.	1	2	3	4	5
c)	I am a lamb producer because there are more markets for lamb than beef.	1	2	3	4	5
d)	Producing lamb is attractive to me because I can take out a forward contract.	1	2	3	4	5
e)	Producing lamb is attractive to me because the processors are interested in building relationships with producers.	1	2	3	4	5
f)	I run sheep because it is easier to match sheep feed requirements to the pasture supply and they require less hay.	1	2	3	4	5
g)	I run sheep because they are a better grazing tool for weed control than cattle.	1	2	3	4	5
h)	I run sheep because they are a better fit with vegetable production than cattle.	1	2	3	4	5
i)	I run sheep because of the complimentary benefits in running sheep and cattle.	1	2	3	4	5

CATTLE PRODUCERS ONLY

Q21. Your rating of the following statements will help us understand the relative importance of different barriers to running sheep. Please tell me how strongly you agree or disagree with each of the following statements:

		Strongly Agree	Agree	Neither Agree/ Disagree	Disagree	Strongly Disagree
a)	I don't run sheep because they require too much labour for the return.	1	2	3	4	5
b)	I don't produce lamb because the contractors needed to meet the additional labour demands are too costly.	1	2	3	4	5
c)	I don't run sheep because there are no sheep contractors servicing this area.	1	2	3	4	5
d)	I have no desire to run sheep, as I just don't enjoy running sheep.	1	2	3	4	5
e)	I don't run sheep because they present too many health risks, management risks and environmental risks compared to cattle.	1	2	3	4	5
f)	I don't run sheep because they are hard on perennials over the summer/autumn.	1	2	3	4	5
g)	I don't run sheep because this country is unsuitable for running sheep.	1	2	3	4	5
h)	I don't run sheep because of concern over foot rot, fleece rot, lice, worms and fly strike.	1	2	3	4	5
i)	I don't run sheep because the season here makes it more profitable to run cattle.	1	2	3	4	5
j)	I don't run sheep because I am too busy working off farm to run sheep.	1	2	3	4	5
k)	I don't run sheep because my infrastructure including fencing is unsuitable for lamb production.	1	2	3	4	5
l)	I don't produce lamb because I don't know if the returns from lamb production will be good enough and last long enough to justify the change.	1	2	3	4	5
m)	I don't produce lamb because it has not been promoted in this region.	1	2	3	4	5
n)	I don't produce lamb because local agents like producers to stick with what they have been doing for years and they have a big influence.	1	2	3	4	5
o)	I would rather change to dairying or put in more crop than switch to lamb production.	1	2	3	4	5
p)	I don't produce lamb because ewe and lamb mortalities are a real turnoff for me.	1	2	3	4	5

CATTLE PRODUCERS THAT DO NOT RUN SHEEP FOR LAMB PRODUCTION, BUT WOULD CONSIDER RUNNING SHEEP FOR LAMB PRODUCTION

Q22. Your opinion on the following statements will help us understand what might be done to assist in developing prime lamb production in your area. Please tell me how strongly you agree or disagree with each of the following statements:

		Strongly Agree	Agree	Neither Agree/ Disagree	Disagree	Strongly Disagree
a)	I would need to see a longer term comparison of beef and lamb profitability in this region before I would consider adopting lamb production.	1	2	3	4	5
b)	I would need to see proof that there are sheep available to suit my environment before I would consider adopting lamb production.	1	2	3	4	5
c)	I would need to have confidence that prices for lamb will remain high enough before I would consider adopting lamb production.	1	2	3	4	5
d)	I would need to see trials comparing sheep versus cattle versus a combination of both in this region, before I would consider adopting lamb production.	1	2	3	4	5
e)	The promotion of lamb production as an option in this region would be needed before I would consider adopting lamb production.	1	2	3	4	5
f)	I would need to see evidence that there are sheep contractors that service this region and details on what services they offer, before I would consider adopting lamb production.	1	2	3	4	5
g)	There would need to be some agents from different companies in the region that are interested in lamb and will provide support, before I would consider adopting lamb production.	1	2	3	4	5
h)	I would want to see lamb producer case studies from my region, before I would consider adopting lamb production.	1	2	3	4	5
i)	I would want support to develop management skills in lamb production, before I would consider adopting lamb production.	1	2	3	4	5
j)	If I could own the sheep but have all management handled by a contractor under a profit sharing arrangement, I would consider adopting lamb production.	1	2	3	4	5

Finally, we would like to know a little about yourself.

Q23. What is your age category? Are you …

1 < 25 years
2 25–35
3 35–45
4 45–55
5 55–65
6 > 65 years
7 (refused)

Q24. What per cent of your income is derived from farming?

	%
1. Beef	_____
2. Lamb	_____
3. Wool	_____
4. Cropping	_____
5. Dairy	_____
6. Non farming income	_____

Q25. In which shire is your grazing property?

Q26. Taking into account the information requested in this survey, how easy was the survey to complete?

Would you say it was

1. Very easy
2. Easy
3. Difficult
4. Very difficult

Q27. Do you have any comments or suggestions you would like to make regarding this survey?

_____

Q28. Would you like to receive a copy of the report from this study?

Q29. Would you like to be entered into the draw to win an Apple iPad?

Q30. Contact details :

Name: _____
E-mail address: _____
Address line 1: _____
Address line 2: _____
Town: _____
State: _____
Postcode: _____
Contact number (please include the area code): _____

Appendix 3

Farm performance analysis of beef and sheep enterprises for the High Rainfall Zone of WA

Stephen Gherardi
Department of Agriculture and Food WA
May 2013

Farm performance analysis of beef and sheep enterprises for the High Rainfall Zone of WA

Background

Red Sky Farm Business Analysis (Red Sky Agricultural Limited) provides users with the opportunity to benchmark their performance with other businesses in their own district as well as across districts and across countries. It uses a mix of both physical, financial and productivity to analyse the business performance and design business plans.

For this project, Red Sky Farm Business Analysis was undertaken to benchmark the performance of beef and sheep businesses in the high rainfall zone of WA. The benchmark analysis was undertaken for combined beef and sheep businesses as well as individual beef businesses and sheep businesses. The benchmark data were also used to validate the bio-economic analyses to examine the potential for a lamb industry in the high rainfall zone.

Methodology

The 2010/11 Red Sky Farm Business Analysis data for combined beef and sheep businesses as well as for individual beef businesses was obtained from the Beef Group within the Department of Agriculture and Food WA (DAFWA). The benchmark analysis for these properties was undertaken as part of the Beef Profit Partnership project. The Red Sky analysis for individual sheep properties was undertaken as part of this project. Approval for the confidential use of the Red Sky data was obtained from the individual business owners.

The Red Sky Farm Business Analysis data was compared for the beef and sheep business within six combined beef and sheep (five Merino and one cross bred) businesses and for seven individual beef and six individual sheep (Merino) businesses. Only businesses running in excess of 1,500 DSE (either cattle or sheep) were included in the comparison. The average of the physical, financial and productivity measures for the beef and sheep businesses were compared using a t-test. The standard error about each of the measures was large due to the small sample size and the large variation in the measures.

Results and Discussion

Combined beef and sheep businesses

The 2010 growing season had below average rainfall with farms in the high rainfall zone receiving around half of their normal annual rainfall.

The average (±standard error) for the business analysis measures for the beef and sheep enterprise within combined beef and sheep businesses are compared in Table 1. The state average for each of the beef measures (based on sample size of 23) are also presented. Note there were insufficient sheep businesses to get a valid state average.

There was no significant difference in any of the physical measures for the beef and sheep enterprises. The area grazed, the total DSEs, stocking rate (DSE/ha) and DSE/FTE were similar for the cattle and the sheep components of the business.

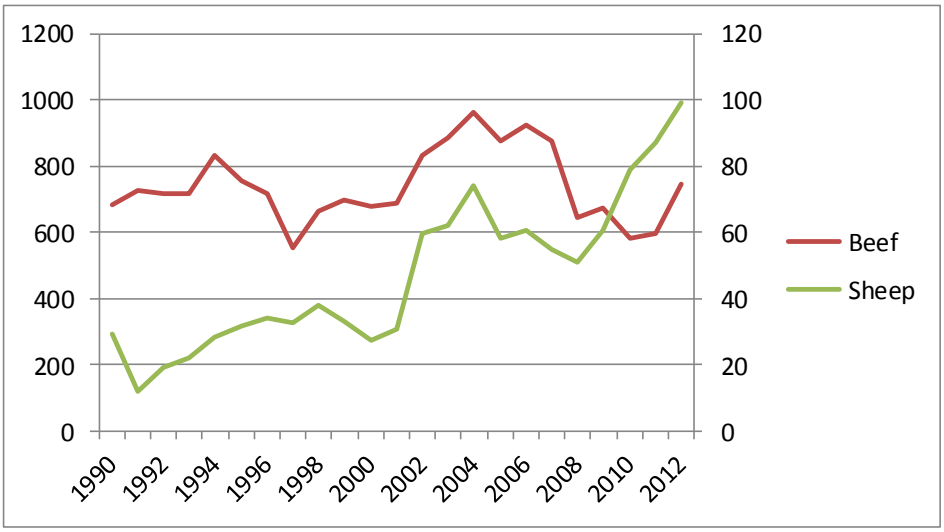
However, the profitability per hectare of the sheep enterprise in 2010/11 was significantly (P<0.05) higher than that for the cattle enterprise ($343±89 cf. $98±55/ha). This was associated with a significantly (P<0.010) higher gross revenue per hectare for the sheep enterprise compared to the cattle enterprise ($842±112 cf. $369±81/ha), as there was no difference in the gross expenses per hectare between the two enterprises. Cattle sales were the predominant contributor to gross returns per hectare for cattle, whereas for sheep both sheep sales and wool contributed equally to gross returns, highlighting the advantage of the two income streams. The return per hectare from cattle sales matched that for sheep sales which meant that the returns from cattle were unable to compete with a dual income Merino sheep enterprise.

Table 1. The 2010/11 average (±SE) Red Sky benchmark data for the beef and sheep component of combined beef and sheep enterprises.

Measures	Beef			Sheep		
	Average	±SE	State Ave	Average	±SE	t-test
Physical						
Area	733	123	710	564	229	NS
Total DSE	11,166	1,928	10,405	7,033	2,316	NS
DSE/ha	15.7	1.8	14.7	14.1	1.6	NS
DSE/FTE	9,467	1,771	7,595	8,413	1,888	NS
FTE	1.3	0.2	1.4	1.0	0.3	NS
Pasture harvested	3.1	0.5	2.7	3.7	0.5	NS
Financial						
Gross revenue ($/ha)	415	75	407	842	112	0.010
Sale cattle or sheep	361	78	374	422	114	NS
Wool			33	411	46	NS
Other	8	4		9	3	
Gross expenses ($/ha)	353	35	379	498	70	NS
Animal health	15	5	14	47	12	0.05
Feed/Supplements	35	20	45	63	22	NS
Fertiliser	68	12	56	75	11	NS
Shearing & crutching				51	9	NS
Management & staff	89	15	93	103	19	NS
Other	161	19	185	207	37	NS
Operating profit ($/ha)	98	55	28	343	89	0.05
Operating profit ($/DSE)	2.22	1.90	1.90	23.6	5.2	0.01
Return on capital (5)	1.9	1.1	0.4	5.8	1.8	NS
Ave price beef or lamb ($/kg)	1.8	0.1	1.71	4.13		
Ave price wool (c/kg clean)				1214	121	
Ave price per sheep ($/head)				85	3	
Productivity						
Wool produced (kg clean/ha)				33.1	4.6	
Cattle or sheep produced (kgLW/ha)	239	48	220	136	40	NS
Cost of production wool (c/kg clean)				730	143	
Cost of production meat ($/kg)	1.64	0.21	1.73	1.9	0.3	NS

This benchmark comparison is partly distorted by prevailing market prices for beef and sheep products. In the reference period, 2010-11, the average price per head for beef cattle sales were near the bottom (decile 1) and sheep sales near the top (decile 10) of their ranges since 1990. This is shown in the ABARES survey data for the Western Australian high rainfall zone (Figure 1). Wool prices for 2010-11 as reported by ABARES were also above the average (decile 7) since 1990.

Figure 1. Average price per head received for sales of beef cattle or sheep from farms in the high rainfall zone of Western Australia. (Source: ABARES AgSurf)



The operating profit per DSE for sheep was around 10 times higher (P<0.010) than it was for cattle ($23.56±5.2 cf. $2.22±1.9/DSE).

Comparison of beef only and sheep only businesses

A comparison of the average for the business analysis measures for the individual beef and sheep businesses are presented in Table 2.

There was a difference (P<0.01) in some of the physical measures with beef businesses being smaller in size (341±67 cf. 897±154), running higher stocking rates (17.8±1.5 cf. 10.6±1.5) and having less full time FTEs (1.1±0.2 cf. 1.9±0.1) than the sheep businesses.

Sheep businesses produced an average profit in 2010/11 of $31±70/ha whereas, the beef businesses made an average loss of $131±45/ha. The difference in the profitability per hectare between the sheep and beef businesses was significant at the 6% probability level (P<0.06). There was no significant difference in the average gross revenue or gross expenses between the beef and sheep businesses. However, the average gross revenue for sheep businesses ($588±117) tended to be higher than that for beef businesses ($421±82).

The failure to get significant differences in the profitability measures for the beef and sheep businesses was due to the large standard error about the measures. The profitability (loss) for the beef businesses ranged from $88 to -$299/ha and for sheep businesses from $348 to -$123/ha. Similarly, the gross revenue for beef ranged from $117 to 849/ha and for sheep from $312 to $1116/ha. To reduce the standard error

about the measures benchmark data would need to be collected for additional individual beef and sheep businesses.

In conclusion, the benchmark data showed that for combined beef and sheep businesses the profitability per hectare in 2010/11 for sheep was higher than it was for beef. This difference was associated with higher average gross revenue in these enterprises partly due to current commodity prices. The failure to get a significant difference in profitability per hectare between individual beef and sheep businesses was due to the large error about the profitability measure.

The process of using the Red Sky Business Analysis to benchmark the performance of beef and sheep businesses shows promise. To improve the robustness of the comparison between the performance of beef and sheep businesses data needs to be collected for additional businesses as well as the same businesses over a number of years.

Table 2. The 2010/11 average (±SE) Red Sky benchmark data for the beef only and sheep only enterprises.

Measures	Beef			Sheep		
	Average	±SE	State Ave	Average	±SE	t-test
Physical						
Area	341	67	710	897	154	0.005
Total DSE	5,746	1,049	10,405	9,227	1,995	NS
DSE/ha	17.8	1.5	14.7	10.6	1.5	0.01
DSE/FTE	5,541	761	7,595	4,784	968	NS
FTE	1.1	0.2	1.4	1.9	0.1	0.005
Pasture harvested	2.9	0.2	2.7	3.6	0.5	NS
Financial						
Gross revenue ($/ha)	421	82	407	588	117	NS
Sale cattle or sheep	372	57	374	394	106	NS
Wool			33	193	24	
Other	50	35		0		
Gross expenses ($/ha)	552	54	379	557	76	NS
Animal health	18	5	14	32	14	NS
Feed/Supplements	75	22	45	124	32	NS
Fertiliser	76	10	56	61	7	NS
Shearing & crutching				48	11	
Management & staff	190	36	93	114	17	NS
Other	194	26	185	178	24	NS
Operating profit ($/ha)	-131	45	28	31	70	0.06
Operating profit ($/DSE)	-6.62	2.65	1.90	2.77	5.47	NS
Return on capital (%)	-1.4	0.5	0.4	0.6	1.2	NS
Ave price beef or lamb ($/kg)	1.74	0.07	1.71			
Ave price wool (c/kg clean)				786	58	
Ave price per sheep ($/head)				88	8	
Productivity						
Wool produced (kg clean/ha)				24.2	2.0	
Cattle or sheep produced (kgLW/ha)	208	30	220	100	27	0.05
Cost of production wool (c/kg clean)				7.9	1.0	
Cost of production meat ($/kg)	3.33	0.80	1.73	3.82	0.5	NS

Acknowledgements

We thank the high rainfall zone beef and sheep producers for allowing us to use their Red Sky benchmarking data.

Appendix 4

Bio-economic Analysis for the Scoping Study for the WA High Rainfall Zone Lamb Initiative

John Young
Farming Systems Analysis Service
31 July 2012

Executive Summary

This bio-economic analysis is part of a scoping study examining the potential for a lamb industry in the high rainfall zone in WA (Project B.LSM.0027). The project is structured in two Phases. In the current phase, Phase 1, a feasibility study will be undertaken to quantify the potential for a prime lamb production industry in the HRZ of south-west WA. This phase comprises both market research and bio-economic modelling.

The aim of the bio-economic modelling is

1. to compare profitability of lamb and beef production and
2. identify the components of these systems that could be manipulated to have greatest impact on whole farm profitability

The analysis for the sheep enterprises was carried out using the MIDAS suite of models. MIDAS describes the biological relationships of a representative farm, it was selected as the modelling tool for the economic component of this project because it includes an optimisation routine that optimises animal and pasture management across the whole farm. This makes MIDAS an efficient tool to examine altering the management of flocks as it accounts for the changes in the optimum management when production options & production potential are altered. There wasn't an existing MIDAS model for the HRZ so a new model was developed based on the Manjimup region. Inputs for the model were based on pasture growth modelling using GrassGro and benchmarking provided by Red Sky.

The analysis of the beef enterprise was based on a gross margin derived from information in the Red Sky benchmarking.

The analysis shows that there could be potential to increase the profitability of farmers in the High Rainfall zone by increasing the adoption of lamb production systems in this region. The profitability calculated in MIDAS and the gross margins (lamb production $246/ha and beef production $122/ha) is consistent with the benchmarking analysis carried out by Red Sky which showed that producers that had mixed sheep/beef properties that the sheep enterprise on their properties were $220/ha more profitable than their beef enterprises.

A comparison of possible lamb production systems shows that a self replacing system based on a maternal composite genotype has a similar profitability to buying in a dual purpose merino ewe and mating to a terminal sire to produce a first cross finished lamb. This finding is underpinned by the value of the wool produced by the sheep systems. The practicality of the composite ewe system may be greater than the merino ewe system because it doesn't require having a supply of dual purpose merino ewes available from another region.

The findings regarding the profitability of the different sheep genotypes are dependent on the productivity of the different genotypes. Further benchmarking information where the 3 genotypes have been run in common and objectively measured would be useful to ensure that the assumptions are robust. This would increase the confidence that producers would have in this analysis.

The profitability of lamb production versus beef production is dependent on the prices received for lamb and beef. A detailed examination of the historical prices received for lamb and beef would add weight to the analysis findings and give producers more confidence in making the change. Also, calculating the correlation between the prices

would allow examination of the amount diversification by including a combination of beef and sheep could reduce variation in profit (risk).

The critical control factors for producers that are going to focus on lamb production are:

1. high pasture utilisation ($40-$80/ha)
2. high value for lambs sold ($50/ha)
3. high reproductive rates ($42/ha)
4. high winter pasture growth rates ($40/ha), and
5. mating ewe lambs ($37/ha).

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1.0 Background

This bio-economic analysis is part of a scoping study examining the potential for a lamb industry in the high rainfall zone in WA (Project B.LSM.0027). The project is structured in two Phases. In the current phase, Phase 1, a feasibility study will be undertaken to quantify the potential for a prime lamb production industry in the HRZ of south-west WA. This phase comprises both market research and bio-economic modelling.

The market research will be used to provide a better understanding as to why more producers in this region are not choosing to run lamb production systems and how their reluctance to do so can be overcome. It will identify their current knowledge, attitudes, skills and aspirations which are widely recognised determinants of landholder's behaviour to land use.

The aim of the bio-economic modelling is

1. to compare profitability of lamb and beef production and
2. identify the components of these systems that could be manipulated to have greatest impact on whole farm profitability

The MIDAS analysis also allows analysis of the labour requirements of the different lamb systems and whether this impacts on the most profitable sheep options.

2.0 Model Farms

The analysis for the sheep enterprises was carried out using the MIDAS suite of models. MIDAS is a computer model used to assess the impact of change in a farming system. It describes the biological relationships of a representative farm. This information is used to estimate the profitability of particular enterprises or management strategies. MIDAS was selected as the modelling tool for the economic component of this project because it includes an optimisation routine that optimises animal and pasture management across the whole farm. This makes MIDAS an efficient tool to examine altering the management of a lamb & beef producing flock as it accounts for the changes in the optimum management when production options & production potential are altered.

There wasn't an existing MIDAS model for the HRZ so a new model was developed based on the Manjimup region. Inputs for the model were based on:

1. Pasture & soil type data provided by Paul Sanford
2. Management, cost & production data from the Red Sky benchmarking and Paul Omodei (*pers. comm.*)

The analysis of the beef enterprise was based on a gross margin derived from information in the Red Sky benchmarking. The analysis wasn't carried out in MIDAS because there was insufficient information to calibrate the enterprise particularly the labour requirement for cattle jobs and liveweight performance of cattle versus sheep. This difference in analysis approach means that the basis for the stocking rates are not directly comparable, however, the stocking

rates do reflect the differences that were observed in the benchmarking data. Therefore, we have confidence that the enterprise comparisons are valid, however, it is not possible to do an analysis of labour in the beef enterprise or look at the critical control points in the beef enterprise.

2.1 Land management units

The model represents a 'typical' farm in the Manjimup region in south west of WA. The total area of the farm is 600ha and is comprised of a single land management unit (LMU).

2.2 Animal production systems

Four production systems have been examined in this analysis (see table 2.1). A brief description of each of the systems is in the table below. Variation between the systems is related to the genotype of the ewes and the time of sale of the progeny.

Table 2.1: A description of the flock types included in this analysis.

Flock	**Description**
Composite ewes *(Maternal)*	A lamb system with a self replacing composite breed (Romney/Coopworth base). The ewes are mated at 19 months of age.
Merino *(Merino)*	Buying in an 'easy care' merino genotype ewe. The ewes are mated at 19 months of age to a terminal sire to produce 1st cross lambs.
Dorper *(Dorper)*	A lamb system with a self replacing Dorper. The ewes are mated at 19 months of age.
Cattle *(Beef)*	A cattle system producing vealers for sale, calving in Feb/Mar.

The expectation of the project team is that the composite maternal genotype has the greatest potential for this region and therefore this has been used as the standard for this analysis. The standard time of lambing for the sheep production systems was July/August and the standard calving time was Feb/Mar. The sheep systems were also evaluated with lambing in May. The details of the four flock types are outlined in the Table 2.2 & 2.3.

Table 2.2: Productivity & costs of the 3 sheep genotypes in the analysis.

		Merino		Maternal		Dorper	
		Aug	May	Aug	May	Aug	May
SRW	(kg)	52		60		60	
Reproductive Rate (lambs weaned /ewe joined)	overall	95	104	122	135	122	135
	adult	100	109	130	144	130	144
	maiden	82	88	98	106	98	106
Lamb survival Single	(%)	87	87	90	90	90	90
Twin	(%)	66	60	75	70	75	70
CFW	(kg 3yo ewe)	3.4	3.5	2.6	2.7	0	0
FD	(µ 3yo ewe)	20.6	20.9	32	33	-	-
Wool Value	Ewes ($/hd)	31.50		17.10			
Husbandry Cost	Ewes ($/hd)	8.40		8.20		2.10	
	Hoggets ($/hd)	-		7.75		1.65	
	Lambs ($/hd)	6.30		6.50		1.20	

The reproductive rate of the Maternal & Dorper genotypes were assumed to be the same and this was 27% or 31% higher than the merino x terminal cross depending on the time of lambing. The reproductive rate of the early joined flocks was superior to the later joined flocks because liveweight at mating was higher. The flocks joined for lambing in July/August had lost some condition from the spring peak through to joining in late February & March. The early lambing flocks did have lower lamb survival particularly of twins because the ewes lost weight from joining to lambing and this compromised lamb birth weight, however, the higher condition at conception and the extra scanning percentage was a bigger influence.

Table 2.3: Description of the Angus cattle genotypes & costs in the analysis. Note: this information was based on the RedSky benchmarking and discussions with Paul Omodei (*pers. comm*).

SRW	(kg)	500
Reproductive Rate	(weaned/cow joined)	90
Husbandry	$/DSE	16.00
Supplement	$/DSE	4.20
Pasture Costs	$/ha	165

Husbandry costs for the cattle enterprise was based on information from Red Sky benchmarking on 8 beef properties (see separate report for details on the benchmarking). The sample size was limited, which reduced the possibility for separating properties based on being beef only or mixed beef/sheep and based on time of calving. Therefore there are potential sampling errors in these assumptions.

Husbandry costs for the sheep enterprises were handled in more detail by separating husbandry activities based on sheep age group. The resulting overall flock husbandry costs were similar to the information from Red Sky benchmarking from the 5 sheep properties.

2.3 Pastures

The standard pasture is a productive clover and ryegrass pasture with best practice management with active grazing practice. The costs associated with reseeding the

pastures have been included assuming the improved pastures need to reseeded once every 10 years.

The growth rate of the pastures has been based on simulations by Paul Sanford (*pers comm.*) using the GrassGro model with climate data from the Manjimup weather station. Results from a typical run of the GrassGro model are presented in Table 2.4. Further work is planned by Paul Sanford to better calibrate the GrassGro model to the Manjimup region and add a range of pasture species and this could be incorporated in subsequent MIDAS analyses when it is completed.

Table 2.4: Growth rate & pasture quality for typical grazing pressure (calculated in the GrassGro model and used to calibrate the MIDAS pasture growth module).

Period	Date	PGR (kg/ha/d)	DDM (%)
1	8 April – 5May	19	79%
2	6 May – 23 June	38	79%
3	24 June – 4Aug	41	79%
4	5Aug – 20 Oct	52	77%
5	21 Oct – 17 Nov	58	66%
6	18 Nov – 22 Dec	26	59%
7	23 Dec – 21 Jan		49%
8	22 Jan – 18 Feb		45%
9	19 Feb – 17 Mar		42%
10	18 Mar – 7 April		40%
Total Pasture growth (kg/ha)		10 600	

The break of season is in early April and pasture stops growing in mid December, although pasture quality is declining from the end of October. Pasture growth rate during May, June and July are above 35kg/ha/d and this allows high stocking rates to be carried if supplementary feed is provided during the summer dry period when pasture quality is poor.

2.4 Labour

Labour was represented in the MIDAS model as described by Young & Bathgate (2012). Labour requirement of the sheep enterprises was based on information generated in that previous project. The standard assumption for labour in the analysis is that producers are willing and able to hire labour if the action is profitable. The situation was also examined if the farmer was limited to just the owner operator and that the number of livestock had to be limited to what the farmer could manage on their own.

3.0 Enterprise Comparison

3.1 Profitability

The lamb production systems are all more profitable than beef production (Table 3.1). This is partly because of the extra income received from wool which is $89 000 for the composite maternal genotype and $199 000 for the merino. The gross income from meat sales is similar for each system ranging from $306 000 for the merino system up to $362 000 for the beef system. The wool income for the maternal genotype is 27% of the meat income so having the dual income source is similar to a 27% increase in the meat price.

Table 3.1: Profitability of each farm type.

	Maternal[1]	Merino[1]	Dorper[1]	Beef[2]
Profit ($/farm/yr)	148 000	142 000	103 000	73 000
Meat Income	334 000	306 000	323 000	362 000
Wool Income	89 000	199 000	0	0
Wool income as % meat income	27%	65%	0%	0%
Stocking Rate	10.6	13.6	10.3	15.7
Supplement fed (t)	187	489	113	260
(kg/DSE)	29.4	60.0	18.0	28.0

[1] Based on analysis done using MIDAS
[2] Based on gross margins analysis

The profitability of the Dorper is calculated to be higher than beef and there is no wool income from the Dorper. The extra profit is because the husbandry, supplement & pasture costs of the Dorper are less than the beef. The source of the information on the husbandry costs and stocking rate was different for the beef operations and the sheep operations and therefore this conclusion is not robust. However, the average over all the properties in the Red Sky benchmarking data does support the position that the costs of sheep production are lower than beef production, however, it wasn't the case on the 4 mixed farms that run both sheep and cattle.

Likewise there was great variation in the benchmarking data on the comparative stocking rates for sheep and cattle. In the Red Sky data the stocking rates varied from 10 DSE/ha up to 20 DSE/ha and the MIDAS analyses is on the lower end of this range. This is not consistent with MIDAS analyses in other regions where the MIDAS optimum stocking rate is at the very upper end of what farmers are achieving. This difference appears to be due to the digestibility of the pasture late in the growing season and during summer that was calculated in the GrassGro modelling. The pasture quality during this time is very poor and supplementary feeding had to be at very high levels in order to have animals losing weight at a reasonable rate, particularly for the merino genotype.

3.2 Labour supply

The profitability of the Dorper genotype is lowest of the 3 sheep genotypes when the supply of labour is unlimited. However, the advantage of the Dorper is that it has lower husbandry costs not requiring shearing and crutching and it also has lower labour requirements and this can allow the owner operator to run more stock if labour is not available for hire. When the supply of labour is limited in the model the profitability of both the Maternal and the Dorper are reduced (Table 3.2). The cost of the reduced labour supply is slightly less for the Dorper but it is still less profitable than the Maternal breed.

The saving in labour from not shearing and crutching is not as great as expected because other critical operations are typically carried out when the animals have been mustered for shearing, such as the summer drench and vaccination, classing animals for sale and drafting animals for sale. These jobs mean that the Dorper animals still need to be mustered so the only saving is the work directly associated with moving sheep into the shearing shed and marketing the wool.

The impact of reducing the labour supply is greatest for the merino operation, for which SR is reduced by 3 DSE/ha and profitability is reduced by $47 000. Even with constrained labour, the profitability of the maternal composite breed is still greater than the beef cattle operation.

Table 3.2: Profitability of the Maternal, Merino and Dorper breeds when labour is restricted to just the owner operator.

	Maternal	Merino	Dorper
Profit ($)	111 000	95 000	71 000
Stocking Rate (DSE/ha)	9.1	10.5	8.9
Supplementary feed (t)	174	259	148

4.0 Critical Control Points for Lamb Production

This section outlines the sensitivity analysis undertaken using the model. Parameter values are changed systematically (and individually) while the others are held constant. In each case the most profitable system – the current "best bet" - was taken as the finishing point and the increase in profit from adopting optimal management was examined. Where possible the results are presented as the change in profit for a 10% change in the target parameter. For example when changing the feedbase through a change in winter growth rate the result is expressed as the change in profit that could be achieved if the growth rate of pasture during winter is increased by 10%. In the case of time of lambing a 10% change is not possible so the results are presented as the change in profit resulting from the management change.

The sensitivity analysis can be used to improve our understanding of the farming system by estimating the change in whole farm profit resulting from changes to different components of the system (or parameter values). This identifies parameters that are economically more important and thereby which components of the farming systems might be altered for the greatest economic gain. The important parameters are the critical control points for lamb production.

Table 4.1: Range of management and production variables examined in this analysis

Description	Detail
The feedbase	Vary pasture growth rate by 10% For Entire Growing Season During Winter only During Early spring only During Late spring only
Pasture utilization	Vary annual utilisation by 10% Reduce dry pasture carried into break of next season Reduce losses associated with grazing Better allocation of feed to grazing livestock
Reproductive rate	Vary % lambs marked by 10% By increasing lambs in utero By increasing survival
Mating ewe lambs	Mating ewes to achieve their first lamb at 12 months of age.
Time of Lambing	May c.f. July/Aug
Lamb Value	10% change in average price received
Ewe Value	10% change in average price received
Wool Value	10% change in wool price

While sensitivity analysis is a powerful tool, results must be interpreted with care. Model results indicate where management change has the greatest potential benefit, however the model results provide no indication of the ease with which the management change or increase in production potential can be achieved in the farming system (say an increase in winter pasture growth). For example a 10% change in winter growth may be more valuable than a 10% change in spring growth but it may be much more difficult (and costly) to achieve. A further consideration is the ease with which farmers may adopt prospective management changes. For example, to increase the number of lambs produced it is likely to be easier to get farmers to adopt improved management of their older ewes rather than getting them to mate their ewe lambs.

In this sensitivity analysis MIDAS was used to detemine the profitability of the "Maternal' lamb production system (described in table 2.2) when each of the factors was varied independently. It was assumed that the management changes or production changes could be achieved with no cost other than costs associated with running extra stock or feeding extra grain (if either of these was required). For example, increasing pasture production in winter could be achieved with no extra inputs to the pasture but the extra stock that are carried do incur extra costs for husbandry and supplementary feeding.

4.1 The Feedbase

Table 4.2: Increase in profit ($/ha) resulting from increasing pasture growth during different periods by 10%.

Whole year	52
Winter	40
Early Spring	18
Late Spring	12

The most valuable time of year to increase pasture growth by 10% is in winter. This is the time of year that feed is most limiting and this impacts on the cost of carrying more stock. Extra pasture growth in spring is less valuable because the extra animals that can be carried at this time of the year must then be carried through winter and this requires extra supplementary feeding. However, the decision about when to concentrate on feed production is also impacted by the potential for increasing feed production and there is usually more potential in spring, because soil moisture and temperature aren't limiting at this time of year.

4.2 Pasture Utilisation

Previous analyses have shown that utilising a high proportion of pasture is a critical control point for merino wool producing flocks. Increasing pasture utilization has the highest value if it can be achieved by reducing the loss of pasture from trampling. Increasing utilisation by grazing harder and reducing the summer residual is of lower value. The reason for the higher value from reducing trampling is associated with the timing of the losses. Losses from trampling are occurring all year and reducing these losses in winter is of particularly high value. The lower value for reduced summer residual & better allocation is because the extra pasture grazed is predominantly from the spring flush and the extra animals carried to utilise this feed must be fed for the remainder of the year. Better decisions on allocation of pasture requires the manager to be more aware of the pasture and the grazing animals and have strategies and tactics to handle varying seasonal conditions.

Table 4.3: Increase in profit ($/ha) that is achievable if pature utilisation can be increased either by reducing loss of pasture due to trampling by stock, reducing the quantity of residual dry feed at the break of the season or improving allocation of the pasture to the stock during the year. Values are for the Maternal genotype lambing in July/August.

Summer residual	50
Trampling losses	82
Better allocation	42

4.3 Reproductive Rate

Reproductive rate is a combination of

1. fecundity – the number of lambs born per ewe mated
2. survival – the number of lambs alive at weaning per lamb born

Reproductive rate can be increased by improving the nutrition of the ewes, improving the genetic potential of the ewes or reducing the reproductive wastage caused by environmental factors. The extra profit from increasing reproductive rate is a tradeoff between the extra income achieved by having a flock with more surplus animals for sale and the extra costs associated with meeting the energy demands associated with more ewes pregnant or more ewes lactating.

For the flocks examined the increase in profit averaged $42/ha for a 10% increase in number of lambs weaned. Increasing survival and increasing scanning % both have a similar return (Table 4.4). This result is different to analyses recently carried for the National Reproduction strategy and the difference reflects the higher base lamb survival assumptions in this analysis.

Table 4.4: Change in profit ($/ha) resulting from increasing the number of lambs weaned by 10%.

Scanning %	42
Survival	43

4.4 Mating Ewe Lambs

Mating ewes younger so that have their first lambing opportunity is at 12 months of age increases profit by $37/ha. This is based on ewe lambs at 40kg achieving a weaning rate of 67%. If the young ewes achieve a higher or lower weaning rate then this will alter the value. The analysis includes the cost of feeding the young ewes to achieve 40kg when in the 'normal' management they would have been 34kg.

4.5 Time of Lambing

The profitability of lambing later is a trade-off between the lower energy demands of the ewes at the break of season and the higher energy demand of the younger and smaller progeny after weaning. Later lambing makes it possible to carry higher stocking rates through the feed shortage at the break of season and have more animals available to graze the spring flush. Earlier lambing reduces the cost associated with achieving target weights for the lambs, but it requires more supplementary feeding of the ewes at the break of the season. For the maternal system the difference in profit between July/August and May was $3000 ($5/ha), the stocking rate carried was slightly lower if lambing early but the quantity of supplementary feed required was more than double (Table 4.5).

Table 4.5: Impact on the farm system with July/August and May lambing.

	July/August	May
Profit ($/farm)	148 000	145 000
Stocking Rate (DSE/ha)	10.6	10.3
Supplementary feeding (t)	187	404

Note: Other analyses (Young *et al* 2010) have shown that if store lambs are being produced then the advantage of lambing later is increased.

4.6 Lamb & Ewe Value

Increasing the value of the sale lambs by 10% adds $50/ha to farm profitability. This indicates that concentrating on meeting the market specifications is an important control point for lamb producers, however, it needs to be managed with high pasture utilization in mind. Lamb value and pasture utilization have a similar value so achieving heavier lambs by reducing stocking rate is unlikely to be profitable.

Increasing the value of sale ewes by 10% only increases farm profit by 4% so it is not an important control point and should only be achieved if there is no cost to the other important control points.

4.7 Wool Value

The sheep flocks produce 20%, 40% & 0% of the total income from wool sales for the Maternal, Merino & Dorper respectively. So wool income can contribute to the overall profitability of the sheep enterprises. Increasing the value of the wool produced in the maternal flocks by 10% increased profit by $15/ha. So, although wool production is not a focus of producers with a composite genotype it is making a significant contribution to farm profit and a 10% increase in the value of the wool is a worthwhile addition.

5.0 Conclusions

The analysis shows that there could be potential to increase the profitability of farmers in the High Rainfall zone by increasing the adoption of lamb production systems in this region. The expected profitability of lamb production ($246/ha) is higher than the expected profitability of beef production ($122/ha). This finding is consistent with the benchmarking analysis carried out by Red Sky which showed that producers that had mixed sheep/beef properties that the sheep enterprise on their properties were $220/ha more profitable than their beef enterprises.

A comparison of possible lamb production systems shows that a self replacing system based on a maternal composite genotype has a similar profitability to buying in a dual purpose merino ewe and mating to a terminal sire to produce a first cross finished lamb. This finding is underpinned by the value of the wool produced by the merino ewe being much higher than for the composite maternal genotype and the Dorper ewe having no wool production. The practicality of the composite ewe system may be greater than the merino ewe system because it doesn't require having a supply of dual purpose ewes available from another region.

The Dorper genotype is least profitable because the loss of wool income is not fully compensated by lower husbandry costs, reduced workload and increased lambing percentage.

The findings regarding the profitability of the different sheep genotypes are dependent on the productivity of the different genotypes. The assumptions used are outlined in this document however, further benchmarking information where the 3 genotypes have been run in common and objectively measured would be useful to ensure that the assumptions are robust. This would increase the confidence that producers would have in this analysis.

The profitability of lamb production versus beef production is dependent on the prices received for lamb and beef. A detailed examination of the historical prices received for lamb and beef would add weight to the analysis findings and give producers more confidence in making the change. Also, calculating the correlation between the prices would allow examination of the amount diversification by including a combination of beef and sheep could reduce variation in profit (risk).

The critical ontrol factors for producers that are going to focus on lamb production are achieving:

6. high pasture utilisation ($40-$80/ha)
7. high value for lambs sold ($50/ha)
8. high reproductive rates ($42/ha)
9. high winter pasture growth rates ($40/ha), and
10. mating ewe lambs ($37/ha).

The factors examined that had a lower value were:

1. pasture growth in spring ($12-18/ha)
2. wool value ($15/ha)
3. time of lambing ($5/ha)
4. sale ewe value ($4/ha)

6.0 References

Young JM & Bathgate AD (2012). Scoping the benefits of saving labour in sheep enterprises in Australia. Report to Meat & Livestock Australia. Project B.LSM.0022. July 2012.

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