

Price Signals Required to Alter the Seasonal Turn-Off of Lamb

Report of a MIDAS Analysis

for the Department of Agriculture & Food WA

Sheep Industry Business Innovation project

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## Executive Summary

The lamb production system in WA is characterised by a large supply of lambs finished on green feed during spring and then a reduction in supply through summer, autumn and winter. This pattern of supply reflects the cost of finishing the lambs, with it being cheapest finishing on green feed and progressively more expensive as the season progresses. It would be advantageous for the processing sector to have a more even supply of lambs through the season, because this would allow them to supply markets on a consistent basis through the year and also to better utilise the capital invested in abattoir facilities. Higher prices are offered for out of season lamb, however, historically these premiums have not been sufficient to entice farmers away from the sucker lamb production system.

This addresses 4 questions

1. What prices are required later in the season for produces to breakeven with turning off lambs earlier?
2. How do the breakeven prices compare with the historical prices?
3. Is there an incentive for producers to alter TOL if they are targeting a later turn-off?
4. If producers supply at a later time what effect will this have on current supply?

The analysis was carried out with the MIDAS suite of wholefarm optimisation models, using the Great Southern and Central Wheat belt regional versions. The MIDAS model is suited to this analysis because the wholefarm and wholeyear feed budget can evaluate the trade-off between the extra feed required by the carry over lambs and the lower average diet quality.

In each region, 4 turn-off times were compared for each of 2 lambing times. The analysis was done assuming that breeding, backgrounding and finishing is all done on the same farm and that extra profit from altering the turn-off of lamb in response to changing prices is captured by the one farm. In practice it is possible that this will be spread across 2 or even 3 farms, however, the extra profit to be shared will be as for the single farm (minus some transaction and transport costs). The allocation of extra profit between the farms will be determined by the price of the store lamb.

The system selling the maximum possible draft of lambs as suckers off their mothers at weaning is the lowest cost system and the carryover systems require a higher price in order to have equal profitability. This breakeven price for carry-over lambs was calculated to provide the same profit as the base case sucker system. The carry-over options examined involved an earlier weaning (approx. 3mo) than the sucker system, followed by either a 4, 6 or 8 month (approximately) phase of backgrounding and finishing. The later that lambs are turned off, the higher the breakeven price.

In the Great Southern the price of lamb in May/June would need to be between $6.25/kg DW and $6.55/kg DW for farmers to be enticed to produce carry-over lambs at this time rather than producing suckers at $4.50/kg to $5.00/kg in Nov/Dec. In the Central Wheatbelt the range in the prices required to breakeven is slightly greater, $6.10 to $7.10, but the prices are comparable and cluster together at a level above the historical market average.

The increase in the price required to make equal profit from turning off lambs one month later varies from $0.15 to $0.51/kg DW/month. This is greater than the 5 year average of $0.16/month. This is consistent with producer decisions of not having widespread adoption of the carry over lamb system and indicates that to entice more carryover production larger seasonal differences in price are required. Furthermore, a larger price increase per month than that calculated may be required to achieve practice change on farm because of the risk associated with carrying the lambs longer. The risks include both production and market risk. The market risk could be reduced if processors introduced a strong forward pricing mechanism that farmers believed and could plan their production around. In the absence of a forward pricing mechanism farmers will require much larger premiums but it is difficult to calculate the level.

With less crop, the increase in the breakeven price is greater because less stubble is available to background the lambs that are being carried over. This result indicates that crop residue handling systems, such as chaff carts, that increase the accessibility of crop residue to animals and thereby increasing animal performance are likely to reduce the increase in breakeven prices required . This is an area that needs more evaluation.

The breakeven price results and the calculated farm profitability indicates that the decision to move into a carryover lamb system is not affected by the time of lambing. Although the early lambing system is suited to producing sucker lambs from the spring flush, this green feed can also be used to background the carryover lambs so that less grain is required in the finishing phase. However, it is likely that producers who are lambing later have less focus on producing a finished lamb and therefore may be more likely to adopt a system in which the lamb is sold as a store to another producer who backgrounds and finishes the lamb.

Although the carryover system requires more feed per lamb, converting a proportion of the WA flock from producing sucker lambs in spring, to producing carry-over lambs in autumn and winter would only have a small impact to reduce the total number of lambs produced. Total weight of lamb produced may increase due to the larger carcasses produced for a carry-over lamb compared to a sucker lamb. Furthermore, creating a stronger processing sector with a forward pricing mechanism may entice more farmers into a lamb production system and lead to an increase in total lamb supply.

## Background

The lamb production system in WA is characterised by a large supply of lambs finished on green feed during spring and then a reduction in supply through summer, autumn and winter. This pattern of supply reflects the cost of finishing the lambs, with it being cheapest finishing on green feed and progressively more expensive as the season progresses.

It is advantageous for the processing sector to have a more even supply of lambs through the season, because this would allow them to supply markets on a consistent basis through the year and also to better utilise the capital invested in abattoir facilities. Higher prices are offered for out of season lamb, however, historically these premiums have only been sufficient to convince a small proportion of producers to switch their production systems to focus on later turn-off times.

The profitability of the sucker system compared with a carry-over system is expected to be impacted by a number of factors:

1. Weaning weight and post weaning growth rate of lambs: The growth rate of carry-over lambs can be compromised due to weaning and this would reduce the weight of the carry-over lambs compared with sucker lambs of the same age. However, sucker lambs can have a higher worm burden due to the higher larval uptake from increased consumption of pastures that have been contaminated by the ewes.
2. Ewe feed requirements and LW profile: The earlier weaning that occurs in a carry-over system increases the time available for the ewe to recover from weaning to next joining. If offered a similar quantity of feed, a late weaned ewe producing a sucker lamb will be lighter at the following joining than an earlier weaned ewe producing a carry-over lamb.
3. Husbandry cost and labour: The expense and workload associated with retaining animals beyond weaning includes both the extra feeding and monitoring time required due to the lambs being on the farm for a longer period, and also the extra husbandry operations that need to be carried out. The extra husbandry may include shearing, crutching and extra drenching.

The change in profitability from delaying the turn-off of carryover lambs is a trade-off between a numbers of factors:

1. The change in price received for the lamb
2. The amount and quality of feed required for backgrounding and finishing the lamb and the timing of the demand. Delaying the turn-off, spreads the energy demand for the growth of the lamb and this reduces the average diet quality required, however the delay increases the total amount of energy required because of the extended period of time over which there is a maintenance requirement.
3. Husbandry cost and labour: The expense and workload associated with retaining animals for later turn off includes both the extra duration of feeding and monitoring required and the extra husbandry operations that need to be carried out. The extra husbandry may include crutching and extra drenching.
4. Wool Income: Delaying the sale of carry-over lambs increases the quantity of wool grown. Carry over lambs are often shorn at the time of entry to the feedlot, or in March, whichever is earlier. Shearing no later than March ensures that the late turn-off lambs have sufficient insulation during feed lotting so that energy expenditure on thermoregulation is not excessive.
5. Death Rates: Retaining lambs on farm increases the chance of deaths.

This analysis includes the above factors and addresses 4 questions

1. What prices are required later in the season for produces to breakeven with turning off lambs earlier?
2. How do the breakeven prices compare with the historical prices?
3. Is there an incentive for producers to alter TOL if they are targeting a later turn-off?
4. If producers supply at a later time what effect will this have on current supply?

## Method

The analysis was carried out with the MIDAS suite of wholefarm optimisation models, using the Great Southern and Central Wheat belt regional versions (Table 1). The MIDAS model is suited to this analysis because it can evaluate the trade-off between the extra feed required by the later carry over lambs and the lower feed quality. MIDAS includes a whole year and whole farm feed budget that can quantify the cost of the extra feed demand and the lower average diet quality.

In each region, two times of lambing were evaluated for the ewes mated to a terminal sire and 4 turn-off times were compared for each time of lambing. The lambing time for the merino – merino flock was at the later of the 2 merino- terminal times. Profitability, sensitivity to lamb price received and the level of lamb supply were evaluated for each combination of lambing time and turn-off time. For 1st cross lamb production the earlier lambing time evaluated is more common in practice, which contrasts with economic analysis that has shown that the later lambing time is more profitable.

The livestock enterprise in the Great Southern model was calibrated to represent the productivity of the average client in the Icon Agriculture database that is centred on Darkan in the 600mm rainfall zone. The Central Wheatbelt model was calibrated to represent a typical farm in the 375mm rainfall zone. The crop area in each regional version was optimised for each price and production scenario.

Table 1: Farm Size and land use, and sheep enterprise parameters for the base case sucker production enterprise.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Great Southern | | Central Wheatbelt | |
|  |  | June | Aug | May | July |
| Farm Size | (ha) | 2130 | | 3200 | |
| Area of Crop | (%) | 36 | 37 | 83 | 75 |
| Stocking Rate | (DSE/WG ha) | 11.3 | 11.0 | 6.0 | 7.8 |
| Grain Feeding | (t) | 450 | 445 | 126 | 260 |
| Number of  1st cross Lambs | (hd) | 3540 | 3540 | 800 | 1600 |

### Genotype and Flock Management

The merino genotype was a fast growing, medium wool sheep (Table 2). Production levels were set to reflect the average of the Icon database and the same values were used in each model. Variation in wool production and weaning percentage with age was based on the standard MIDAS assumptions from the Katanning base flock. The flock examined in each instance was a self-relacing merino ewe flock with surplus ewes mated to a terminal sire, producing a first cross lamb. This base case turnoff time was turning off the majority (80%) of lambs as sucker lambs at weaning (about 4mo) and the remainder after approximately a further 1 month of feeding (5mo). The exact timing (see Table 3) varied with the regional version and the time of lambing based on the definition of the time periods used in that model (which are used to calculate the pasture growth rates).

Table 2: Summary of the genotype used in this analysis which is typical of clients of Icon Agriculture. Production levels are based on a typical merino wool production flock structure with 65% ewes. See Table 4 for Weaning % for Merino-Terminal matings.

|  |  |  |
| --- | --- | --- |
| Trait | Units | Production level |
| Standard Reference weight | kg | 52 |
| Fleece Weight | kg greasy / DSE | 3.5 |
| Fibre Diameter | µ | 20 |
| Weaning percentage  Merino-Merino | Lambs weaned / ewe joined | 87% |

Table 3: Average lambing, weaning and sale dates for the systems analysed in each region

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Great Southern | | Central Wheatbelt | |
|  | Early | Late | Early | Late |
| Lambing date | 12 Jun | 7 Aug | 10 May | 19 Jul |
| *Sucker system* |  |  |  |  |
| Sale/weaning date | 30 Oct | 25 Dec | 11 Oct | 6 Dec |
| Sucker Carry-overs sold | 27 Nov | 22 Jan | 1 Nov | 5 Jan |
| *Carry-over system* |  |  |  |  |
| Weaning | 4 Sep | 30 Oct | 2 Aug | 11 Oct |
| Turnoff option 1 | 22 Jan | 9 Mar | 6 Dec | 1 Mar |
| Turnoff option 2 | 9 Mar | 24 Apr | 1 Mar | 26 Apr |
| Turnoff option 3 | 15 May | 12 Jun | 26 Apr | 14 Jun |

It is assumed that the flock is self-replacing and this implies a maximum proportion of the flock that can be mated to terminals without leading to a reduction in the size of the flock in the following year. For this flock the options to increase the supply of finished 1st cross lamb include:

1. Altering the land use to increase the area of pasture, or increasing stocking rate with extra grain feeding to increase the number of ewes carried.
2. Increasing the proportion of ewes mated to the terminal sire by increasing the age that ewes are culled-for-age.
3. Altering the nutrition of the ewe flock to increase the reproduction rates. This increases the number of lambs per ewe mated to the terminal sire and also increases the proportion of ewes that can be mated to the terminal.

The farm was assumed to have access to an unlimited supply of casual labour, so the number and type of lamb produced was not limited by the labour available on the farm.

The nutrition of the ewes was altered to reflect likely variations due to time of lambing and sucker vs carryover lamb production (see Table 4). The profiles examined are in line with recommendations in the LTEM course; the profile for the earlier lambing maintains condition from joining to lambing because there is unlikely to be sufficient green feed to gain condition in late pregnancy, the late lambing profile has slow weight loss in early pregnancy and then weight gain in late pregnancy. The ewes producing carryover lambs and those producing sucker lambs both have the same CS targets, but the ewes producing suckers are fed more during lactation and post weaning so they achieve the same joining weight the following year. The late lambing ewes have a lower target for joining weight than the early lambing ewes because there is less high quality feed available post weaning with late lambing. However, even with the lower joining conditions these ewes are scanning at higher rates because joining is occurring closer to the true breeding season.

Table 4: CS profiles during pregnancy & weaning rate for the ewes producing suckers or carryover lambs for the early and late lambing times

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Great Southern | | Central Wheatbelt | |
|  | June | August | May | June |
| CS Joining | 3.2 | 3.0 | 3.4 | 3.2 |
| CS Mid Pregnancy | 3.2 | 2.8 | 3.4 | 3.0 |
| CS Lambing | 3.2 | 3.0 | 3.4 | 3.2 |
| Merino-Terminal |  |  |  |  |
| Scanning Percentage | 121 | 128 | 127 | 133 |
| Weaning Percentage | 97 | 101 | 101 | 104 |
| Weaning Weight |  |  |  |  |
| Suckers 1 | 40/35 | 40/35 | 42.5/37.5 | 40/35 |
| Carry Over | 26 | 30 | 26.4 | 29.7 |

1 80% of the suckers are sold at the heavier weight and 20% of the ‘suckers’ are retained and grown out starting at the lower weight.

Estimates of birth weight and weaning weight are based on values from the LTW trials with adjustments made to reflect the different merino genotype and terminal sire, and the different ages at weaning.

The post-weaning nutrition of the carryover lambs was managed to achieve a turn off weight of 48kg yielding a 22kg carcass. The later carryover lamb had a period of backgrounding with a target growth rate just above maintenance then finished with growth rates above 150g/hd/d. The profiles are presented in Figure 1, Figure 2, Figure 3 & Figure 4. The growth paths for the early lambing includes a period of fast growth post weaning which is being achieved on green feed, this period on green feed is much shorter for the later lambing.



Suckers weaned

Figure 1: Growth profile of lambs carried over to different ages in the Great Southern with May/June lambing



Figure 2: Growth profile of lambs carried over to different ages in the Great Southern with Jul/Aug lambing.



Figure 3: Growth profile of lambs carried over to different ages in the Central Wheatbelt with May lambing



Figure 4: Growth profile of lambs carried over to different ages in the Central Wheatbelt with July lambing

### Analysis

The analysis was done assuming that breeding, backgrounding and finishing is all done on the same farm and that extra profit from altering the turn-off of lamb in response to changing prices is captured by the one farm. In practice it is possible that this will be spread across 2 or even 3 farms, however, the extra profit to be shared will be as for the single farm (minus some transaction and transport costs). The allocation of extra profit between the farms will be determined by the price of the store lamb.

The breakeven price for carry-over lambs was calculated to provide the same profit as the base case sucker system. The carry-over options examined involved an earlier weaning (approx. 3 months of age) than the sucker system, followed by either a 4, 6 or 8 month (approximately) phase of backgrounding and finishing. The exact turn-off time varied with the model and the turn-off dates are correctly represented in the graph of break-even price by turn-off date (Figure 5).

The breakeven prices were calculated for both the Great Southern and the central Wheatbelt, and for the Central Wheatbelt the impact of altering the proportion of the farm cropped was also examined to determine if the availability of stubbles impacts on the profitability of delaying turn off of finished lamb.

Specific assumptions made addressing the issues outlined in the Background section are:

1. The average sucker lambs at weaning is 2 - 3kg heavier than the average carry-over lamb fed for an early turn-off time.
2. The ewe producing a sucker lamb was fed extra during summer to achieve the same condition as the carry-over ewe at the next joining. For the later lambing time it was also necessary to feed supplement to the sucker ewes in late lactation to ensure milk production was not compromised when pasture quality begins to decline.
3. The weaning weight of the early weaned carry-over lambs was varied between the early and late lambing. With early lambing the FOO during lactation is lower and this reduces weaning weight compared with the later lambing for which lactation is occurring with higher FOO. The weaning/sale weight of the sucker lambs is less affected by lambing date because with the extended lactation period each time of lambing has a period of reduced pasture availability. The early lambing has low FOO at the beginning of lactation and the late lambing has reduced digestibility at the end of lactation.
4. 0.25% of lambs die each month (3%/yr)

### Prices

The wool price was set to achieve an average wool price of $7/kg greasy for a typical merino flock structure with 65% ewes, this price reflects the average price achieved by the Icon Agriculture clients over the last 5 years, and the fibre diameter premium was set at levels typical of the last 5 years.

Table 5: Prices used in the analysis

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | Main line | Off spec animals | | Average net on-farm price |
|  |  |  | Proportion | Discount |
| CFA Ewe price | 5.5yo | $80/hd | 30 | 40 | 65.35 |
|  | 6.5 yo | $65/hd | 30 | 30 | 53.65 |
| Ewe hoggets | 1.5 yo | $85/hd | 30 | 50 | 66.10 |
| Export wethers | 1.5 yo | $90/hd | 25 | 35 | 80.50 |
| Suckers1  & early carryover2 |  | $4.50 or $5  Based on TOL | 5  30 | 25  45 | 74.75 or 83.35 |
| Carryover lamb |  |  | 20 | 45 | Varied |

1 Only 5% of suckers are off-spec because it is assumed the farmer is accurate in selecting animals to send as suckers and the discount is low because they are close to specification.

2 The early carryover lambs have a high proportion off-spec because this group of animals is the tail of the full lamb drop.

The standard sale sheep prices used in the analysis are outlined in Table 5. The price received for the sale animals is represented as the sale yard price of the main line and this is then reduced by the proportion of animals not making the specification and the discount received for these animals. Net on-farm prices are calculated by subtracting commission, levies, and freight.

The historical market price for lamb during the season was estimated from the MLA market database using the Saleyard Indicator value for heavy lamb (22+ kg carcass) in WA. Prices and the seasonal change in price varied each year and the 5 year average from 2010 to 2015 was used in this analysis. Using the 10 year average reduces the average price but has little impact on seasonal price variation.

## Results and Discussion

#### Breakeven Prices

The system selling the maximum possible draft of lambs as suckers off their mothers at weaning is the lowest cost system and the carryover systems require a higher price in order to have equal profitability. The later that lambs are turned off, the higher the breakeven price (Table 6: Break even prices $/kg DW, (variation from the standard price) for varying the turn-off time in each region and time of lambing & Figure 5). Appendix 1 for graphs of profit levels and change of price.

In the Great Southern the price of lamb in May/June would need to be between $6.25/kg DW and $6.55/kg DW for farmers to be enticed to produce carry-over lambs at this time rather than producing suckers at $4.50/kg to $5.00/kg in Nov/Dec. In the Central Wheatbelt the range in the prices required to breakeven is slightly greater, $6.10 to $7.10, but the prices are comparable and cluster together at a level above the historical market average (Figure 5).

Table 6: Break even prices $/kg DW, (variation from the standard price) for varying the turn-off time in each region and time of lambing

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Great Southern | | Central Wheatbelt | |
| May/June | July/Aug | Apr/May | June/July |
| Sucker Lambs (std) | 4.50 | 5.00 | 4.50 | 5.00 |
| Early Weaning  +4mths | 5.48 (+0.98) | 6.09 (+1.09) | 5.05 (+0.55) | 5.83 (+0.83) |
| +6mths | 5.92 (+1.42) | 6.51 (+1.51) | 5.75 (+1.25) | 6.57 (+1.57) |
| +8mths | 6.26 (+1.76) | 6.56 (+1.56) | 6.10 (+1.60) | 7.09 (+2.09) |

The increase in the price required to breakeven for each one month delay in turning the lambs off varies for the 4 region x TOL scenarios and when crop area changes (Table 7 & Figure 5). With early lambing in the Great Southern, each 1 month delay requires an increase in price of $0.21/kg to breakeven, whereas with later lambing a 1 month delay requires an extra $0.15/kg. The respective values for the Central Wheatbelt are higher ($0.23 & $0.36) and there is an effect of proportion of the farm cropped. With less crop, the increase in the breakeven price is greater (up to $0.50/kg month) because less stubble is available to background the lambs that are being carried over. These results indicate that crop residue handling systems, such as chaff carts, that increase the accessibility of crop residue to animals and thereby increasing animal performance are likely to reduce the increase in breakeven prices required. This is an area that needs more evaluation.



Figure 5: BE lamb price required for the Great Southern & Central Wheatbelt regions for each lambing time and the historical average price received for each turn-off time

In all but one scenario the increase in the breakeven price is greater than the average increase observed in the market over the last 5 to 10 years. This is consistent with producer decisions of not having widespread adoption of carry over lamb system.

Table 7: Increase in price required ($/kg DW) to achieve equal profit if turn-off is delayed by 1 month, early or late in the season.

|  |  |  |  |
| --- | --- | --- | --- |
| Region | Crop Area | Time of Lambing | |
|  |  | Early | Late |
| GSM | Optimum 35% | 0.21 | 0.15 |
| CWM |  |  |  |
|  | Optimum 80% | 0.23 | 0.36 |
|  | 50% | 0.40 | 0.42 |
|  | 20% | 0.36 | 0.51 |
| 5yr Market Average | | 0.16 | |

#### Carry over lamb production & time of lambing

The breakeven price results and the calculated farm profitability’s indicate that the decision to move into a carryover lamb system is not affected by when the flock lambs. The early lambing system is suited to sucker lamb production because the lambs can be finished on green feed, however, this green feed can also be used to background the carryover lambs so that less grain is required in the finishing phase. Nonetheless, it is likely that producers who are lambing later have less focus on producing a finished lamb and therefore may be more likely to adopt a system in which the lamb is sold as a store to another producer who backgrounds and finishes the lamb.

#### Number of lamb produced

Although the carryover system requires more feed per lamb, a similar number of carryover lambs are turned-off when compared to sucker production (Figure 6 and Figure 7). In both regions as the price of carryover lamb increases and farmers respond by producing more carryover lamb, this is mirrored by a reduction in number of sucker lambs produced. The level of the increase in carryover production for each unit of sucker production lost varied between region and time of lambing, however the average was above 90% (Table 8: The number of carry-over lamb supplied as a proportion of the sucker lambs that they displace. (This is the relative slopes of the relationships presented in Figure 6 & Figure 7).) there is an indication that the total number of lambs produced would only diminish marginally and this would be more than compensated by the extra carcass weight of the carryover lambs compared with the suckers.



Figure 6: Supply of sucker lambs & carry-over lambs during May in the Great Southern region when the price of carry-over lamb is altered.



Figure 7: Supply of sucker lambs & carry-over lambs during April in the Central Wheatbelt region when the price of carry-over lamb is altered.

Table 8: The number of carry-over lamb supplied as a proportion of the sucker lambs that they displace. (This is the relative slopes of the relationships presented in Figure 6 & Figure 7).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Great Southern | | Central Wheatbelt | |
| May/June | July/Aug | Apr/May | June/July |
| Early Weaning + +4mths | 86% | 104% | 89% | 99% |
| +6mths | 86% | 101% | 94% | 97% |
| +8mths | 84% | 95% | 94% | 92% |

## Conclusions

This analysis indicates that a price increase of $0.20 to $0.40/kg DW is required in order for farmers to make equal profit from turning off lambs one month later. This is greater than the 5 year average of $0.16/month during the period 2010 to 2015. This result, and the seasonal turn off pattern that is observed in the WA lamb industry, both indicate that to entice more carryover production that a larger seasonal difference in price is required.

Furthermore, a larger price increase per month than that calculated may be required to achieve practice change on farm because of the risk associated with carrying the lambs longer. The risks include both production and market risk. The production risk includes risks associated with animal health and increased death rates or reduced rate of liveweight gain in the feedlot. The market risk includes risks associated with the price of grain required for feedlotting and also the price received for the lamb. This later risk could be reduced if processors introduced a strong forward pricing mechanism that farmers believed and could plan their production around. In the absence of a forward pricing mechanism farmers will require much larger premiums, but it is difficult to calculate the level.

Converting a proportion of the WA flock from producing sucker lambs in spring, to producing carry-over lambs in autumn and winter would have a small impact to reduce the total number of lambs produced. Total weight of lamb produced, however, may increase due to the larger carcasses produced for a carry-over lamb compared to a sucker lamb. Furthermore, creating a stronger forward pricing mechanism from the processing sector may entice more farmers into a lamb production system and lead to an increase in total lamb supply.

## Appendix 1: Detailed Profit by Price Graphs



Figure 8: Impact on profitability from changing lamb price for each turn off time for a flock in the Great Southern region lambing in May/June. Comparison is with the standard profitability (of turning off sucker lambs)



Figure 9: Impact on profitability from changing lamb price for each turn off time for a flock in the Great Southern region lambing in July/Aug. Comparison is with the standard profitability (of turning off sucker lambs)



Figure 10: Impact on profitability from changing lamb price for each turn off time for a flock in the Central Wheatbelt region lambing in May. Comparison is with the standard profitability (of turning off sucker lambs)



Figure 11: Impact on profitability from changing lamb price for each turn off time for a flock in the Central Wheatbelt region lambing in July. Comparison is with the standard profitability (of turning off sucker lambs)