Lamb Finishing Systems

Maximising the margins on grain finishing lambs

A report for

by James Male

2011 Nuffield Scholar

August 2012

Nuffield Australia Project No 1115

Sponsored by: Meat & Livestock Australia

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Foreword

With the past decade delivering the challenges of droughts, floods, a global financial crisis and fickle grain prices, the one constant has been historically high prices for lamb and mutton. In line with the inconsistencies of the seasons and grain prices, many producers have turned to grain finishing lambs to increase and, in some cases, maintain the viability of their farm.

A number of producers have ventured into this enterprise of grain finishing lambs without doing the necessary groundwork to establish if it is a profitable enterprise. As a result, there have been a number of producers who have endured a negative return on investment, once the cost of labour and infrastructure has been included.

There are a number of resources available for people who wish to venture down the path of starting their own lamb feedlot, with detailed costings and potential risks. In this report it is not my aim to reproduce this, but to outline methods and ideas that can contribute to improving the margins on grain finished lambs.

It is my aim that some of the ideas and thoughts contained with this report go towards assisting anyone interested in incorporating a lamb feedlot into their farming enterprise or a producer looking to maximise the margins on their lamb feedlot.

Profitability has to be the driver in any agricultural pursuit, and incorporating a well organised and managed lamb feedlot can assist with driving profit in a mixed farming system.

Lambs are efficient convertors of grain-to-weight-gain and can adapt to any number of feed types. As a result, they provide a real alternative for producers who are trying to value-add 'out of specification' grain.

Lamb is a niche product and although demand for lamb is increasing, sheep numbers throughout the world are on the decline. Australia is extremely well placed to take advantage

of this situation, provided we do not become complacent and we continue to improve through innovation; quality assurance and by providing a consistent, high quality product.

I am grateful to Nuffield Australia and Meat &Livestock Australia (MLA) for affording me this incredible opportunity to research this topic.

Acknowledgements

I would like to acknowledge the following people and organisations for their support. Without it, I would not have had this opportunity.

- To my brother, **Greg,** and the boys, **Yoshi, Josh, Laurent and Tom**. Thanks for your understanding and patience whilst I have been travelling and, at times, all consumed with the Nuffield experience

- **Jim Geltch and the Nuffield Board** for having the confidence in me to be worthy of a Nuffield Scholarship

- My sponsor **Meat & Livestock Australia** – it was a privilege to be sponsored by them. Also a special mention to some of the MLA team, **Peter and Sharon Dundon** (Bahrain) and **Stephen Edwards** (Washington DC), for their generous hospitality and insights whilst in these countries.

- To the numerous people who hosted, fed, housed, interpreted and guided me throughout my travels. In particular I would like to acknowledge **Sarah Singla** in France; **Don Gnos and the Oxarango family** from the USA and **Ian Knowles** from New Zealand

- And finally to my fellow Nuffield Scholars on our Global Focus Tour group. To **Rob Blatchford, Rob Nicholls, Clint Scharfe, James Robertson, Adam Jenkins, Kelvin Meadows and Nicola Waugh -** thanks for the laughs and a lifetime of memories. I couldn't have possibly hand-picked a better group to travel with.

Abbreviations

FCE	Feed Conversion Efficiency
cwt	Carcase weight
lb	Pound
kg	kilogram
USA	United States of America
F1	Feed 1 – Barley
F3	Feed 3 – Barley
ME	Metabolisable Energy
EID	Electronic Identification
MLA	Meat & Livestock Australia
TMR	Total Mixed Ration

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Executive Summary

Lamb feedlots are a relatively new enterprise in Australia. In real terms, intensive grain finishing of lamb lags significantly behind our beef, chicken and pork counterparts and is comparable to where these industries were 30 years ago.

As market conditions constantly change the challenge is to maximise the margins and become more efficient in every aspect of production. This includes breed selection, use of technology, feeding systems, quality assurance, nutrition and marketing

Australian producers are renowned as innovators adept at tackling challenges head on. The past decade has reinforced this reputation as drought, fickle grain prices and a need to maintain profitability during difficult times has forced many to think outside the square. As a result, incorporating a lamb feedlot into a mixed farming system has been a natural fit for many producers.

The aim of this study was to focus on the export lamb industry with an emphasis on maximising the margins on grain finishing lambs, exploring various finishing strategies and investigating the future for the Australian lamb exports.

As a producer of wheat, barley, canola and lupins, we inevitably end up with a percentage of downgraded, low-value grain. Part of the aim was to explore the various options used around the world for value adding by-products and out-of-specification grain. I have had the opportunity to visit feedlots and sheep producers in USA, France, the Middle-East and New Zealand ranging from large scale commercial feedlots of in excess of 100,000 head in Colorado, to small grass finished flocks in Southern France. The one constant with all of the producers I met, was their drive to return a profit..

I have also been fortunate to meet with some of the world's best feedlot nutritionists and sheep extension officers. My discussions and interviews with these experts and the various

producers; the observations of individual enterprises and the inevitable comparisons that I have been able to make, have all contributed to this report.

It is hoped this research is not only beneficial to my own business but to other producers either thinking of starting a lamb feedlot enterprise or a current operator looking to increase their efficiency and maximise their returns.

Key Findings

- Lamb is and will remain a niche product.
- Lamb feedlots can be a profitable addition to a farming enterprise if done properly
- There is massive variability within individual animals in regards to their FCE (feed conversion efficiency).
- There is great potential for genetic improvement in the lamb industry.
- Feedlot lambs are more efficient when on self feeders than when hand-fed twice daily.
- Lambs fed whole grain have better performance than those fed grain which is rolled or ground.
- Meeting protein, energy, vitamin and mineral requirements is essential for profitable lamb finishing.
- There is a need to focus on $ of feed cost/kg liveweight gain not on FCE.
- Focus on which market you are targeting and hit the specifications of that market.

Introduction

In partnership with my brother Greg, we operate a mixed farming enterprise on 5 properties totalling 4600 hectares (ha). We own 1400 ha at Yerong Creek in Southern NSW. A further 1200 ha is leased or share-farmed in our immediate district whilst the balance of 2400 ha is a property we sharefarm at Urana, 110 km west of our home base.

The main part of our business has always been crop production, producing wheat, barley, lupins and canola. Prime lamb production has always been a part of our farming system, but was not a significant contributor until recently.

As was the case of many producers throughout South Eastern Australia, the prolonged and devastating drought from 2001-2010 motivated us, out of necessity, to re-evaluate our farming practices and explore new opportunities to remain financially viable.

One of the major decisions we made was to develop a feedlot to finish our lambs.

Our motivations were:

1. To protect the ground cover of our existing pastures by concentrating our lambs in feedlot paddocks.
2. To take advantage of historically high prices for finished lamb
3. To utilise the land that would have been allocated to finishing lamb to either more crop or run more ewes.
4. To value-add downgraded grain which was severely discounted in price.
5. To start utilising our cereal straw which is a by product of our cropping enterprise.
6. The relatively low set-up costs in comparison to other enterprises.
7. Good access to markets, processors, feed sources and water.
8. To utilise our experience in sheep husbandry.

What started as an ad-hoc, opportunity feedlot has slowly developed into an important part of our overall farming enterprise.

Needless to say, the mistakes have been plentiful and as the price of lamb has deteriorated and the price of grain has risen, the need to continually find ways to improve our efficiency in every aspect of production has been paramount.

The lamb feedlot industry is a relatively new industry when comparing with the intensive finishing systems of the beef, pork and chicken industries. As a result, there is huge potential to realise significant gains.

The purpose of my studies was to focus on the grain finishing systems that are used around the world and to glean from them and sheep nutrition experts. By taking in this information and making it available to others it will hopefully assist with keeping Australia at the forefront of finishing lambs.

Photo of our feedlot at Yerong Creek

Finishing Systems

There are effectively three forms of finishing systems for lambs – pasture finishing, crop finishing and grain finishing or a combination of any of these.

Throughout my travels grain finishing systems were almost non-existent in New Zealand and Europe. There were three main reasons for this.

1. The maximum carcase weight of lambs for slaughter before being discounted is 23kg in New Zealand and 22kg in Europe. The discount on the whole carcase for lambs above this weight is up to $1/kg. As a result there is a huge disincentive to take the lambs to any higher weights (Knowles, 2012).

2. In the softer climates of Europe and New Zealand the producers are generally able to take their lambs to slaughter weights without the need to supplementary feed them.

3. Grain prices are too high. As an example, feed wheat proces (F1 grade) in Australia at April 2012 were approximately AUD$130 on farm. In Canterbury, New Zealand, the same grain is worth approximately AUD$350 per tonne on farm (Knowles, 2012).

Conversely, in the USA, up to 90% of lambs are finished on grain (Hasbrouck, 2012). There are two main reasons for this

1. Lambs can reach higher weights before being discounted. At Superior Meats in California, the premium price paid was for lambs up to 150lb (68.18kg) liveweight. For lambs in excess of this weight, the producers were discounted US$0.30/lb (US$0.66/kg) (Ahart, 2012). This discount only applied on the excess weight above 150lb. As a result most of the lambs were taken up to very high weights as the price (even with the discount), could justify the grain fed to them. Tours of abattoirs in both Colorado and California revealed most carcases weighed an astonishing 40-50kg. It was interesting to note, in the USA, lambs were bought on liveweight and not on a carcase weight. There wasn't the incentive to produce lean lambs.

110lb cwt (50kg) carcase at Superior Meats, Dixon, Ca USA

2. USA has an abundance of cheap feed grains. Corn is the mainstay of the grain finishing systems in the USA. Of the feedlots I visited the feedlot mix consisted of cracked corn, distillers corn, ground hay, corn silage and soy hulls. The feedlots however were not locked into one feed type. They would secure whatever was the most cost-efficient in terms of protein and energy (Neil, 2012).

In Australia, we are placed somewhere between these two. We are fortunate to have a strong domestic market taking lambs up to 24kg cwt and an export market securing lambs up to 32kg cwt. Generally speaking the price for the domestic lamb is in the vicinity of 10-20% higher per kg cwt than the export lambs.

Whilst grain finishing lamb is becoming increasingly popular in Australia, the margins are diminishing. Throughout the world, the profit drivers of a lamb feedlot enterprise are essentially the same. There is no ‘silver bullet’: rather a need to getting all the factors right

Buy-in price of lambs

This is of course the biggest outlay for any feedlot enterprise.

A big mistake many producers make is not placing a value on their own lambs on entry to the feedlot. It may be a more viable option to sell them as store lambs.

In the USA, many of the feedlots custom feed for lamb owners. As a result the operators don't have the outlay for the lambs and are paid on a per head plus feed consumed basis (Hasbrouck, 2012).

Generally speaking, the price of store lambs tracks comparatively with the price for the finished product. The problem arises when there is a huge price shift in the period from when the lambs were bought to when they are marketed.

There is no crystal ball as to what the lamb market is going to do in the future. Lambs that are bought in April could prove to be extremely cheap or extremely expensive by the time July comes around.

This is where the use of forward selling contracts becomes an essential tool in marketing lambs.

Contracts vs Cash

It was surprising there was little forward selling of lambs in New Zealand and USA. This increases the risk substantially.

In Harper's Feedlot at Greeley, Colorado, there were lambs on limited feed intake because there was no kill space to process them. This was a result of the product not moving after processing (Neil, 2012). Without either a price or kill date contract there was the risk of the lambs getting too big and out of specification, and also the possibility of them cutting their teeth.

In the Poukawa region of New Zealand, I visited a progressive lamb producer and finisher. He had tremendous pastures and had lambs exceeding 300gms liveweight gain/head/ day. Despite these great growth rates, due to a falling market, the lambs were worth less than what he paid for them five weeks earlier.

The buy-in price is almost irrelevant. It is the ability to be able to secure a price and kill space at the other end that reduces risk and enhances profitability.

As producers we need to constantly work with the buyers and processors, and continue to emphasise the importance of contracts. As producers, we cannot be expected to assume all of the risk. If you are buying in lambs without the security of a forward price and kill date your exposure to market fluctuations is too great.

There are considerable advantages for the processor as well. Security of numbers and a fixed price and weight range ensures maintenance of consistent throughput without the risk of having too many or not enough lambs to process. Transparency and honouring the contracts are essential in ensuring this system can be functional.

The biggest factor in this is relationships. If, as a producer, you can form an ongoing relationship with an agent or processor who has confidence in your product, there is a far better chance of securing ongoing forward contracts.

A good example was Landcorp Farming Ltd. in New Zealand. Landcorp Farming Limited is a corporate agribusiness and New Zealand's largest farmer. In contrast to the vast majority of New Zealand producers who shun the thought of forward contracts, Landcorp Farming negotiated to forward contract 170,000 lambs to Silverfern Farms from October, 2011, through to June, 2012. Landcorp Farming was pro-active in initiating this contract and it was pursued as a course of action purely to take the speculation out of the equation and ensure a profitable return. (Kelly, 2012)

Feed Types/price

Following the buy-in price of the lamb, the feed price is the most significant cost in grain finishing lambs. As a result, having a ration that maximises the FCE is a major profit driver.

Industry advisers recommend a feed ration between 10.5 to 11 ME and 14-16% crude protein. Most commercial pellet formulations (Milne Feeds, WA; Coprice Feeds NSW; Laucke Mills, SA), are within this range.

Recommended nutrient levels for growing lambs are listed in Table 1. In a feedlot ration, it can be easier to purchase a supplement or pellet to mix in your ration that ensures lambs are

getting the right nutrients. It can also be beneficial to ensure that a grain buffer is included to reduce the incidence of acidosis.

Table 1: Recommended nutrient levels for 32kg finishing lambs (dry-matter basis).	
	%
Crude protein	12-14
Sodium	.04-.10
Calcium	.21-.52
Phosphorus	.16-.37
Magnesium	.04-.08
Potassium	.50
Sulphur	.14-.16

Source: (LeValley, 2012)

Locally sourced feed is a key factor. Transporting of feed great distances can substantially inflate the price of a ration. Of all the feedlots visited around the world, being able to source the cheapest local feed source to reach the recommended protein and energy levels required was a priority.

In the USA, feedlots around Greeley, Colorado, this consisted of cracked corn, distillers' corn, ground hay and soy hulls. This can change depending on availability and season.

In our region of Southern NSW, barley and lupins are generally the most common options however feed wheat, triticale, corn and oats are all used successfully.Lambs are extremely adaptable and can be finished using any number of feed types, providing the feed type isn’t changed midway through the finishing phase.

All of the major feedlots concurred that changing the feed type on lambs almost always involves a setback to some degree and so ensuring you have enough of the initial feed you use to take them through to sale is essential.

Calculating the exact cost of your ration is also essential. It was constantly reinforced to me not to concentrate on FCE but rather to concentrate on the actual feed cost/kg liveweight gain. The Double J feedlot in USA worked on this theory. It was achieving a 7:1 FCE (7kg of feed for 1kg weight gain) from a $180/tonne ration formulated from distillers corn, cracked corn and ground hay. Compared to a much more impressive FCE of 4:1 using bought in pellets, the

buy-in price of these at $400/tonne made them a less profitable alternative. In terms of actual return, their ration was costing $1.26/kg liveweight gain compared to the bought in pellet costing $1.60/kg liveweight gain, despite the much better FCE (Hasbrouck, 2012).

The need to constantly evaluate the value of your inputs is, therefore, essential.

One of the great advantages of a lamb feedlot however is the ability to use low grade out-of-specification-grain to value-add. Our experience has us currently using barley that didn't even meet F3 (Feed 3) specifications - almost an unsaleable product. The lambs, whilst not converting anywhere near their potential are still value adding this grain, in effect converting $80/tonne grain to $250/tonne.

Badly weather damaged barley and lupins used successfully
for finishing lambs (Elamville feedlot, Yerong Creek, NSW)

As most feedlots in Australia use their own grain it is imperative to keep a close eye on the physical grain market as it doesn’t take much price movement in the grain market to turn a profitable exercise into a loss making exercise.

The importance of roughage

As with all ruminants, lambs need roughage to stimulate the growth and development of the rumen during the pre-weaning phase, and once weaned, to stimulate rumen motility and saliva production to provide natural buffering (maintenance of rumen pH) of the rumen environment (LeValley, 2012).

In a total mixed ration or with a pellet it is easy to have the necessary roughage in the ration. This usually comprises 10-30% of the finishing ration. In self-feeding systems it is difficult and costly to mill and mix in the roughage and it has difficulties flowing through the feeders. The cheapest alternative is having low cost cereal straw readily available for the lambs. This does not have to be high quality and the lambs self-regulate their fibre needs and intake. Using straw rather than higher value hay also eliminates the problem of lambs filling up on the hay alone.

Some advise the roughage can be completely removed after several weeks. A number of producers who I spoke to who have done this disagree, having had problems with acidosis.

Should grain be processed?

The simple answer is **no**.

The effect of barley processing on lamb performance was evaluated in a Canadian study. Lambs fed whole barley had significantly higher average daily weight gains than lambs fed either rolled or pelleted barley (Table 2). In the same study in comparing wheat and barley, wheat had a slight advantage in average daily weight gain; however barley had an advantage in feed efficiency.

(Table 2) Effect of barley processing on lamb performance			
Item	**Whole**	**Rolled**	**Pelleted**
Ave. daily gain (lbs)	.64	.55	.48
FCE	3.85	4.43	3.98

(Tait, 1973)

Feedlot Type

The majority of lamb feedlots have been established on an opportunity basis and as such, there is a wide variation around two types of systems. Anecdotally, most of these designs function quite effectively.

An example of a line feeding system

- Double J Feedlot, Ault, Co USA

An example of a self feeding system

- Elamville feedlot, Yerong Creek NSW

The two main types of feedlot systems used are either line feeding or self feeding.

Line feeding is most popular with the larger commercial feedlots and refers to having a total mixed ration which is generally fed twice daily into troughs or on the ground. A self feeding system refers to a system whereby the lambs are gradually brought up to a medium to high concentration ration continuously available to the lambs.

Both systems have their advantages and limitations. in a line feeding system the advantages include that you don't need feeders; roughage is incorporated into the mix; you don't have to induct the lambs so stringently; the ration can be cheaper; you have the ability to add many different protein or energy sources without the worries of feeders blocking up; it is easier to isolate 'shy' feeders and you can regulate intake. The major drawback is it is more labour intensive and the mixers are expensive. The labour component is a major consideration in Australia, which does not have access to a cheap labour source compared to many other countries. It is also a consideration to farmers who would like to take a weekend off without having to worry about feeding. The cost of purchasing a mixer capable of doing a total mixed ration (TMR) is another major factor, considering many producers run a feedlot on an opportunity basis and would not be able to justify the expense.

In regards to self feeders, whilst relatively expensive, the major advantages are you don't have to worry about feeding every single day and, once fully onto self feeders, lambs will gain weight quicker than line feeding.

A study, conducted in 1972 at the University of Minnesota, compared the two feeding systems (Table 3). One group of lambs were on self-feeders whilst the other group were hand-fed twice daily with the same ration. Those lambs on the self feeders consumed more and put on significantly more weight than the hand-fed lambs. In addition to this, feed conversion also improved significantly with the lambs on self feeders.

(Table 3) Method of feeding and lamb performance		
	Hand-fed 2x/day	**Self-fed**
Ave daily gain (lbs)	0.58	0.75
Daily intake (lbs)	3.27	3.53
FCE (kg feed/kg wt. gain)	5.64	4.71

(Stanton, 2006)

The ideal lamb to put into a feedlot

Weight and Age

There is no evidence of an ideal age or weight for a lamb to be at its peak feed conversion. It is generally considered, however, that a lamb between four and eight months and in a 30-40kg liveweight range is ready to go onto a full feedlot ration. Lambs older than this have a tendency to lay down fat rather than muscle and will subsequently yield less and are discounted in price. Lambs younger than this generally do not have their rumen developed enough to handle a high protein and energy grain diet. This is not to say lambs cannot be put onto a feedlot at an early age and weight, if care is taken in developing the rumen.

The Roquefort region of Southern France is famous for the Lacaune milk sheep and the Roquefort cheese they produce. As a result of the ewes being milked the lambs are weaned as early as possible.

These lambs are on a full feedlot ration of pellets and ad-lib straw from one month of age (average 13.5kg liveweight). The pellet used, (depending on current available grain and prices), is generally based on barley, lucerne and lupins with additional vitamins and trace elements. It is 15% protein and 11% energy.

According to the director of the project, Didier Grasset, the male uncastrated lambs put on up to 400 gms/head per day, whilst the female lambs put on up to 300 gms/head per day, working on an FCE of approximately 4.5:1.

The interesting findings here were:

1. The uncastrated ram lambs were putting on 35% more weight than their female counterparts. There was no research done on how much more the ram lambs were consuming.

2. That a lamb as young as one month can go onto a full feedlot ration contradicts the conventional wisdom that young lambs are not going to adapt as well.

3. Lambs from this age are effective convertors and can put on as much weight per head per day as comparable lambs at an older age.

M. Grasset did mention that the ad-lib straw was essential and although they do have a few more losses with acidosis and other problems associated with their immaturity, their losses are still only between 2- 3% during their 87 days on feed (Grasset, 2012).

These lambs were being fed in an indoor facility. There were ten pens in each of four sheds. Each of these pens held 250 head at a density of three lambs/square metre.

Breed

A great way to start an argument is by categorically stating that one breed is superior to another in a feedlot situation. When buying in store lambs to finish on a feedlot, many people focus just on a certain breed. Typically any lamb crossed with a terminal sire is desirable.

Within our own feedlot, the second cross (F2) lambs with a Poll Dorset terminal sire have consistently been our best performers. Buyers have also shown a preference for this type of lamb, indicating their uniformity and consistency of high yield as desirable traits.

There is a massive variation in feed efficiency of individual lambs however, with trials showing FCE ranging from the most efficient being 2.5:1 (2.5 kg of feed for 1 kg weight gain) out to 14:1 (Grasset, 2012).

Trials have also indicated that there is a massive variation in sire groups for FCE which showed a range from 5.17:1 to 8.81:1. According to the results of these trials the second-cross lambs sired by terminal sires with a low breeding value for post-weaning fat cover were the more efficient convertors under grain finishing (Linden, 2012).

Background

Knowing the background of the lambs is an essential component in maximising the profitability of your enterprise. The less stress a lamb is subject to the better results they will have in a feedlot situation. The main forms of stress are from over-handling, shearing, time off feed or water, change in climatic conditions, change of environment and travelling. The fact the best results we have in our feedlot are from our own bred lambs is evidence of this.

This is also in line with trials undertaken at a feedlot in Eaton, Colorado. This research has indicated that lambs that were born and bred within 60 miles of the feedlot, have a tendency to perform better in the feedlot than those transported further. This is regardless of breed type and is attributed to less time required to acclimatise and less stress and time in transit (Neil, 2012).

In purchasing lambs, it is also preferable also to have had the lambs accustomed to grain before going into a feedlot situation. If lambs have been 'imprinted' with grain whilst still on their mothers, they will adapt much quicker onto a full feedlot ration.

There is also anecdotal evidence that there is a big 'line effect' in sheep and lambs. Sharon Dundon is undertaking a research project for MLA at the Bahrain Livestock Company feedlot in the Middle East. She has found more importantly than just identifying breeds, there are 'lines' of sheep that are just poor performers just as there are lines of sheep that 'do' better. With in excess of 1,000 sheep per week passing through the feedlot from any number of producers, Ms. Dundon consistently sees an abnormally high percentage from one or two lines contributing to the sick or poor lambs being culled. She maintains that if you could genetically identify the poor producers and thus avoid these' poor lines', you could increase your margins considerably. Equally, if you could identify where the good lines are coming from and even if you paid a premium it would add considerably to the profitability of any feedlot enterprise (Dundon, 2012).

Induction strategies

The most important time in a lamb's life in the feedlot is in the first two weeks.

Inducting lambs onto a high protein, high energy diet requires time and patience. If you are line feeding a TMR you have the option of gradually increasing the protein and energy of the ration over two weeks. If you are relying on self feeders than a gradual introduction to the mix is imperative. The major cause of deaths in lamb feedlots is acidosis, as lambs are pushed onto a 'hot' mix too quickly.

Practices I observed ranged from five days to 15 days to get lambs onto a full ration. Whilst the aim is to get lambs onto a full ration as quickly as possible, deaths and sick lambs quickly take profit out of the equation.

Best practice that I noted included:

- Inducting over seven-10 days
- Feeding twice daily, starting at 50gms per head per feed and working up to 400gms per head per feed.
- If possible induct in small mobs, preferably under 200.
- Have lambs weighed and running in mobs of similar weight range.

It is a good practice to give every lamb entering the feedlot a 6-in-1 (multi-valent) vaccination and drench with an effective broad-spectrum drench, keeping a close eye on the ESI (Export Slaughter Interval).

Vitamin A, D and E are important for finishing lambs and usually need to be supplemented in finishing rations. If this is not possible, injecting these into lambs upon induction is an alternative.

B12 is not usually needed unless lambs are sick, and their digestive systems are not functioning properly.

Temperature Stress

The majority of producer-owned opportunity feedlots in Australia are outdoors. As a result the lambs are at the mercy of the weather.

I was surprised by finding all of the large, outdoor commercial feedlots that I visited did not provide shade or wind protection for their stock. It is well documented that both heat and cold stress increases maintenance energy requirements, leaving less available for production.

The feedlots I visited in Colorado, just days after a blizzard saw healthy, contented stock, despite being outdoors with no shelter. Management of the feedlots agreed that during severe weather conditions the stock will consume more for maintenance; however they believe that within the feedlot environment the lambs are creating their own micro-climate with the density of 3-4 square meters per lamb creating warmth and protection for each other.(Hasbrouck, 2012).

More of a concern than cold weather was long periods of wet weather or when the spring thaw commences and the frozen pen floors become wet and boggy. This is balanced by only receiving approximately 11 inches of annual rainfall; they enjoy huge hours of sunlight and ensure that as the spring thaw approaches they have limited numbers on feed.

In Australia, it is the heat that is the major issue. Many feedlots do not use shade, insisting providing shade provides no extra liveweight gain. There is conflicting opinion in regards to the importance of shade and whether there is any correlation with providing shade and an increase in weight gain and feed consumption.

In my own experience, providing shade for the stock seems to reduce stress as they take refuge during large portions of the day regardless of the temperature. It is important, however, if shade is provided, that there is enough for all of the animals to eliminate a smothering effect if all the lambs are competing in a small area.

Use of stock agents

Australia is more reliant on the use of agents than any other country. In USA, New Zealand and France, only a small minority of lambs slaughtered are brokered through an agent. I would maintain a good agent should not only pay his way, but make money for you.

An agent should be pro-active in securing the best price possible for your lambs. Having a good 'feel' for the market and actively pursuing potential forward contract prices is essential. Another major advantage of a good stock agent is in procuring good quality store lambs. This comes down to relationship and confidence in your agent. The agent must know precisely the type of animal you are after in regards to weight ranges, breeds, background and price.

It is not possible to be at every market nor have the networks required to secure the right store lambs. Working closely with your agent and having them understand your goals is essential. Finally, an agent guarantees timely payment and can be an effective mediator in case of any discrepancies.

Use of Technology

Using technology to better market our sheep

Embracing technology is important if Australia wants to stay a world leader in lamb production. At the forefront is EID (electronic identification) tags.

The benefits of EID tags in livestock are fast accurate identification and the ability to retrieve data, such as birth date, inoculations, inspections, weaning and weight. This information is quickly retrieved with basic sheep management software. Reporting of animal movements is fast and reliable with an EID reader, which then sends the tag EID's to the sheep management software.

This information can be greatly beneficial in a feedlot situation as each individual lamb's weight gain can be recorded and analysed, leading to efficiency gains. It will also lead to improved producer feedback from the abattoirs. An analysis of each individual animal

processed will assist producers in determining the type of lamb which is most profitable and best suits their system.

More importantly, on the world stage, the importance of traceability cannot be underestimated. The use of EID tags in sheep allows lifetime traceability which is extremely important when trying to market a niche product such as lamb. Consumers are increasingly demanding, especially when purchasing a high end product such as lamb. The use of EID tags gives them the confidence of knowing the 'story' of the lamb. Countries such as Canada are making EID tags compulsory for all sheep and lambs that are processed after January 1, 2013. Despite the additional cost and workload associated with the tags, failure to embrace this technology could be to the Australian lamb industry's own detriment.

Using technology to better handle our sheep

Australian producers are notorious for being able to justify investing in new machinery. Investing in new sheep yards, woolsheds and sheep handling equipment is another matter. In comparison to our New Zealand counterparts, our uptake of sheep-handling technology is slow. Every sheep property I visited in New Zealand was taking advantage of this readily available technology. There were a number of variations in makes, models and features but most had the capacity to weigh and to auto-draft animals as well as restraining them for crutching, vaccinating or drenching. The labour saving potential in such handlers would certainly justify the investment, especially where large numbers are processed.

Interestingly enough, at the Double J feedlot in Ault, Colorado, I noticed a top of the range sheep handler valued at close to $25,000 sitting idle. Upon asking why it was not being utilised, I was told they can manually draft and handle the lambs quicker than using the sheep handler. Questioning the economics of this, Double J indicated they have a large, readily available, low-paid workforce making it quick and easy for them. In Australia, we don't have this option. Embracing such technologies is critical for our competitiveness.

Effect of shearing

Despite anecdotal evidence to the contrary, including my own experience, research suggests there are no weight gain advantages associated with shearing other than ensuring clean, even pelts. You should therefore only shear to optimise skin value.

A Weekly Times article (Clancy, 2011) referred to research done by Mackinnon Project consultant Dr. John Webb Ware. He indicated that through a series of trials there were no significant differences in the growth rates and weights of the shorn and woolly lambs. It was noted that whilst shearing might help beat grass seed or flystrike problems, the higher returns were more a reflection of skin values rather than carcass weights.

Maximising skin value

The skin value of the lamb can be the difference between profit or a loss. The price can be hugely variable and does not naturally follow the fluctuations of the wool market. Lambs skins sold out of our feedlot in February, 2011, made $26, compared to skins from similar lambs in July, 2012, making just $7.

Finding more long term sustainable markets is essential in contributing to a better skin value. In the eastern states of Australia the ideal wool length 3-4cm with financial penalties for wool length outside that range.With that in mind and working on wool length growth rate of approximately 0.4-0.5 mm per day, the ideal time to be marketing lambs is 60-100 after shearing.

There are a number of factors to getting the maximum skin value. These include:

- Shear lambs before putting them into the feedlot if on feed for 60+ days.
- Have lambs cleaned up with a ‘market crutch’, if required, ensuring not too much wool is taken off.
- Ensure shearers do a good, even job and do not leave ridges.
- Keep lambs free from seed and burrs.

In New Zealand there is no incentive to produce a good length, clean pelt as the price is included in the carcase weight, whilst in the USA lambs with extremely heavy faecal stain were still being processed and no apparent deduction from the skin value.

Shy Feeders

Regardless of how good a management practice may be, industry findings suggest that 5-10% of lambs will not adapt to the feedlot situation. The major factors which cause this include:

- unpalatable or unfamiliar feed
- acidosis
- social hierarchy and or dominance
- not enough trough space.

Limiting the factors that you can control will greatly reduce but not eliminate the incidence of shy feeders. Removing shy feeders from the feedlot is a recommended practice and, in time, most of these shy feeders will begin to resume weight gain.

Where will future gains come from?

Compared to our beef, pork and chicken counterparts, there is greater potential for efficiency gains than in these other industries. A major reason for this is that the lamb industry is literally decades behind these industries in regards to genetic gain, feed efficiency gains and research and analysis.

As an example, in 1991 there was a study of weight gain in chickens, comparing (under identical conditions) a modern 21st-century breed with a 1957 breed that had been kept going. It was found that, at six weeks of age, the modern chicken was six times as heavy and had 9% more breast meat. It was established that 85% of that improvement came from genetics and only 15% from better feed.

In the course of the study it was also found that a chicken reached the weight at which it would be killed in one-third of the time and after eating one-third of the food compared with

the 1957 breed (Havenstein, 1994). These sort of genetic gains are the envy of the lamb industry but proof that it can be done.

In France, much work has also been done on identifying the gene for feed conversion in sheep. This is considered the 'holy grail' by many, especially when one considers the massive variability in FCE of lambs from as low as 2:1 to as high as 14:1. Identifying this marker could have massive benefits to the lamb industry. The director of the project M. Didier Grasset indicated the research has shown it is an extremely heritable trait transmitted from rams to lambs (Grasset, 2012).

Part of the problem restricting potential gains is that many lamb producers in Australia also consider themselves wool producers. In some instances, there are obvious financial advantages of dual purpose breeds however you are not going to reach the full potential of either by going down this path. To meet the full genetic potential of a sheep, whether it is wool or lamb, producers need to narrow their focus on one enterprise or the other. Profit continues to be the driver for producers and the incentive may not exist to follow this course.

The use of more maternal composites is a growing trend and whilst it is a step in the right direction, the steps need to be carefully orchestrated. Tremendous gains are being had in New Zealand with the use of composites to increase fertility, vigour and weight. Producers, however, need to carefully consider the traits they are trying to improve as there are inevitable trade-offs.

The Future of the Australian Lamb Industry

We continually hear the world population is rocketing towards nine billion people by 2050. In this period, meat consumption is projected to increase from the current 280 million tonnes to 465 million tonnes. Of the meat currently consumed, sheep meat accounts for just 4.6% of this world consumption (Barnard, 2006).

If we can maintain this 4.6% share of total meat consumed, then Australian lamb producers are well placed to significantly benefit. We need to forget about lamb feeding the world and concentrate on providing a high quality eating experience to an ever-expanding world middle

class. It is a high value, niche product and will never compete on volume with chicken, pork or beef.

Our major competitor on the world stage is New Zealand. Whilst Australia produces approximately 8% of the world's lamb and mutton supply, it is second to New Zealand in world lamb exports. New Zealand has preferential access into the UK and European markets. However, the New Zealand breeders are disadvantaged in they can only grow their lambs out to 23kg cwt for this market, before being severely penalised. New Zealand lamb producers are also getting squeezed by the burgeoning dairy industry and as such in 2010-2011 recorded their lowest production in 50 years (MLA.com.au, 2012).

This is a double-edged sword. Whilst a diminishing world sheep flock should theoretically push up demand, the risk remains that if there is not enough supply, the all-important supermarket shelf space will be replaced by alternative meat products. This would have significant repercussions for the lamb industry.

Australia is fortunate to have a strong domestic market with Australians being among the highest consumers of lamb in the world with an average consumption of 9.1 kg per person per year. This is compared to USA, our second largest market, where the average lamb consumption rate is expected to remain steady at just 0.4kg per person in 2012 (USDA Livestock, Dairy and Poultry Outlook, 2011).

The huge price spikes for lamb in 2010-2011, whilst a massive fillip for producers at the time also came with consequences. Combined with the strong Australian dollar, Australian lamb became over-priced in many of our international markets. This was particularly the case in the US where lamb exports were the lowest since 2004 (MLA.com.au, 2012). Many restaurants took lamb off the menu due to the exorbitant prices and once removed it can take considerable time to be re-instated.

Lamb exports to the Middle East have increased significantly over the past decade. The most important aspect of this market is utilisation of the whole lamb carcase including offal. Significantly, sheep meat is a staple food in these markets. As a result, governments of many

of the Middle Eastern countries recognise this and subsequently Australian mutton is subsidised by these countries to make it affordable for their people. It is significant as this strong and consistent mutton market assists in underpinning the value of lamb.

The advantage of the North American market is it will take a heavier carcase of up to 32kg carcass weight before being penalised. The genetics and potential is there to grow out lambs to these heavier weights. Many of the world markets however, including our domestic market and the EU, only want a lamb less than 24kg cwt.

Our major challenges include:

- keeping lamb on supermarket shelves and on restaurant menus in our major export markets
- producing lambs to meet specific market requirements
- delivering consistent, high quality product
- be innovative with the available cuts and packaging of lambs to permit lambs to be grown out to higher weights
- remaining competitively priced in periods of a high AUD
- continuing to promote lamb in the emerging markets such as China
- continue to recognise the importance of the live sheep trade in underpinning lamb prices.

Recommendations

With lamb prices suffering a significant correction over the past 12 months and with current upward pressure on grain prices, the margins on grain finishing lambs are quickly diminishing. As a result, the recommendations from this report are as follows:

- Research is the key before undertaking a lamb feedlot.
- When trading lambs, it is extremely important to make use of forward contracts.
- Create close working relationships with processors, buyers and/or agents.
- Be specific on which market you are targeting and hit the parameters of that market.
- Invest in infrastructure that will improve efficiency and reduce stress.
- Know your feed costs, focussing on $/kg gained rather than FCE.
- Embrace the use of EID tags.
- If buying in lambs, target lambs sired by terminal sires with a low breeding value for post weaning fat.
- Target lambs that have been raised locally. Stress of long distance travel, time off feed and change of climatic environment can have an impact on weight gain.
- Target selling lambs with a good even pelt, free of stain, preferably 60-100 days post shearing.
- Take particular care when inducting lambs onto a grain ration.

A lamb feedlot can be a genuine opportunity for sheep and crop producers of Australia. It is a most viable option for value adding out-of-specification grain and converting it into a highly marketable, highly profitable product. Eliminating the mistakes, knowing the costs and doing the job properly are the real profit drivers of such an enterprise.

The future remains extremely positive for prime Australian lamb. Grain finishing of lamb is going to continue to grow and play an increasingly significant part of the future of the prime lamb industry.

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Plain English Compendium Summary

Project Title:	Lamb Finishing Systems: Maximising the margins on grain finishing lambs
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Scholar:	James Male
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Objectives	To investigate ways of maximising the margins on grain finishing lambs
Background	Severe drought; unprecedented high lamb prices and the desire to value add downgraded and out-of-specification grain has seen a massive swing towards grain finishing lambs. Grain finishing lambs is in its relative infancy in comparison to intensive feeding systems for poultry,pigs and cattle. As a result, I was challenged to learn more about this emerging industry and seek ways of improving efficiency and profit on such an enterprise.
Research	This study consisted of the Global Focus Programme visiting India, USA, France, Bahrain, Turkey and Ukraine. Following this saw return visits to USA, France, Bahrain and 2 weeks in New Zealand. In this time I visited some of the biggest lamb feedlots in the world and met and interviewed some of the world's foremost lamb producers, feedlot nutritionists and sheep extension officers.
Outcomes	Grain finishing lambs is an emerging industry that is here to stay. As research increases so will efficiencies in a grain finishing system. There are numerous types of grain finishing systems but the main profit drivers remain the same -the buy in price of lambs. being able to negotiate a forward contract, the price per kg liveweight gain and the FCE of different breeds and individual animals. A grain finishing system can be a profitable addition to a livestock or cropping enterprise providing all of the costs are thoroughly accounted for.
Implications	As farmers look at different ways of remaining profitable or explore options to value-add grain, an intensive livestock feeding system is a viable alternative. With a well established sheep industry with excellent infrastructure, volume of sheep with suitable breeding, established domestic and export markets leaves Australian farmers well placed to embrace grain finishing lambs. As increased numbers of lambs are grain finished this will have a flow-on effect to demand and prices of feed grains, which will benefit the grain industry.