MEAT & LIVESTOCK AUSTRALIA

# Production feeding for lamb growth

## A guide for producers

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### Acknowledgements

MLA acknowledges the matching funds provided by the Australian Government to support the research and development detailed in this publication.

**Original publication**

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Published by Meat & Livestock Australia Limited – Printed June 2017

**Revised publication**

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Published by Meat & Livestock Australia Limited – Printed January 2020




Government of South Australia

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# Contents

# Introduction

Interest in intensive lamb finishing, defined as any system that aims to optimise lamb growth, has increased across Australia in recent years. While industry demand for information is increasing, the number of evidence-based recommendations and guidelines available to producers and industry are limited. This guide provides information on the most important aspects of intensive lamb finishing specifically relating to growth. Key topics include running a viable finishing system, nutrition, animal health and welfare, management and marketing.

# Running a viable finishing system

## Key factors influencing cost efficiency

Intensive finishing of lambs can be a high-risk enterprise, with high turnover and low margins. Producers who are finishing lambs need to be aware of the factors driving profit in the system and implement strategies to minimise risk within these areas. These factors are outlined below:

**Price margin** is the difference between the buy-in price of lambs entering the finishing system and the sale price of finished lambs. If the expenses incurred to finish lambs exceed the price margin the system will be unprofitable.

Image courtesy of AgriPartner Consulting

**Ration cost** is the total cost of feed to finish lambs, including introduction periods to new feedstuff. Feed is a major cost in feedlot systems accounting for around 58% of the total costs. Pasture-based systems are generally most cost-efficient, provided the pasture meets the lambs' nutritional requirements.

**Growth rate** is the rate at which lambs gain weight, expressed in grams per day. Lambs generally need to be growing in excess of 300g/day to be profitable.

The efficiency at which lambs convert feed to live weight gain further influences profitability. This efficiency is expressed as a feed conversion ratio (FCR) – the amount of feed eaten (on an 'as fed' basis) per kilogram of live weight gained. Growth rate is currently the major determinant of profitability, because the option to select animals on FCR is not currently available.

**Time on feed** is the time lambs spend in the finishing system. This is particularly important in systems with high feed costs. Time on feed is dependent on lamb entry weight, target market weight and growth rates.

Image courtesy of Productive Nutrition Pty Ltd

**Mortalities and poor performers** are costs incurred by animals dying or performing poorly, for example shy feeders. These animals may bring little or no return and can have a significant effect on profitability.

### Actions

- Identify key profit drivers of intensive lamb finishing.
- Complete a budget to determine profitability.
- Improve lamb management through monitoring performance.
- Implement risk management strategies including supply chain relationships and forward contracts.

## Budget

It is critical that a budget is completed prior to committing to intensively finishing lambs as the margins can be tight. The budget position should be monitored regularly to ensure profitable decisions are made. A finishing system budget should include:

### Costs per head

- **Initial lamb value** – the value of the lamb upon entering the finishing system. For lambs bred on- farm, use the market value of the lambs the day they enter the finishing system.
- **Transport costs** – the cost of transporting lambs to the finishing system and transport costs to market.

Image courtesy of Rural Solutions SA

- **Animal health treatments** – the cost of treatments administered to lambs in preparation for entering the finishing system and during finishing such as drenches and vaccinations.
- **Crutching and shearing** – cost of crutching and/or shearing lambs while in the feedlot. Lambs will commonly require a keyhole crutch to remove stained and/or soiled wool from the breech area at some stage prior to sale. Shearing may also be required to optimise skin value.
- **Feed costs** – total cost per tonne of feed for finishing lambs multiplied by the tonnes of feed fed per lamb. Feedstuffs grown on-farm to be used specifically for finishing lambs should be valued on the day that a decision is to be made whether to sell the lambs or to move them into an intensive finishing system (opportunity cost).
- **Fuel, oil and repairs** – fuel, oil and machinery repair costs associated with feeding lambs.
- **Water** – costs to source and supply water to lambs.
- **Agent commission** – cost of selling lambs through an agent.
- **Slaughter levy** – slaughter fee on all animals sold.
- **Labour and administration** – all labour associated with the finishing system, such as labour for feeding and checking lambs, including costs of employed and own/family labour.

### Returns per head

- **Carcase value** – hot standard carcase weight multiplied by the per kilogram price received. Carcase weight is determined by the live weight multiplied by the dressing percentage.
- **Skin value** – price received for the skin and any wool returns from shearing.
- **Lambs outside market specification** – lambs that fail to meet market specification and/or are sold early. These lambs need to be accounted for as they will have contributed to overall costs.
- **Gross margin** – the profit/loss per head calculated by total return per head (including adjustment for lambs outside market specification) minus total cost per head.
  An example of a simple gross margin budget, with lambs growing at 250g/day, is illustrated in Table 1. If lamb growth rate was increased to 300g/day in this example, reducing the number of days in the feedlot to 56 (instead of 70 days) with all other variables staying constant, the profit per head would be $11.63.

**Table 1: Example of a simple gross margin budget**

| Budget for finishing crossbred lambs growing at 250g/day. | | |
|---|---|---|
| **Costs*** | | **Cost per head ($)** |
| Purchase price | 38kg live weight lamb | 119.00 |
| Transport to property | cost per lamb | – |
| Drench | cost per lamb | 0.21 |
| Vaccination | cost per lamb | 0.24 |
| Crutching and shearing | cost per lamb | 2.70 |
| Feed | 1.8kg @ $0.32/kg x 70 days in feedlot | 40.32 |
| Fuel, oil, repairs | cost per lamb | 0.05 |
| Water | cost per lamb | 0.01 |
| Transport to market | cost per lamb | 2.00 |
| Commission on sale | 5% of $182 lamb return | 9.10 |
| Slaughter levy | cost per lamb | 1.50 |
| Labour and administration | cost per lamb | 3.30 |
| **Total cost per head** | | **178.43** |
| **Returns per head** | | |
| Carcase value | 25kg carcase weight @ $7.00/kg | 175.00 |
| Dressing percentage | 45% | |
| Skin price | price per lamb | 7.00 |
| **Total return per head** | | **182.00** |
| **Profit/(loss) per head** | | **3.57** |

* Costs for specific expenses associated with intensively finishing lambs change frequently and can vary between states.

The figures used in this sample budget are provided as an example of how to set up a budget; relevant costs for your situation should be sourced and used.

# Nutrition

## Intake

Dry matter intake is a key determinant of growth. Lambs consume, on average, 3.8–4.2% of their body weight daily on a 'dry matter' basis. For feed budgeting purposes, intake must be calculated on an 'as fed' basis.

## Energy and protein

Requirements of individual animals vary according to their age and weight, making it difficult to provide specific recommendations for fast-growing lambs.

Producers are encouraged to seek professional advice, monitor lamb performance and adjust the ration as required.

## Fibre

Fibre is essential for optimal function of the digestive system in ruminants and assists in preventing health problems. Fibre stimulates rumen motility and saliva production, providing natural buffering (maintaining required pH levels) of the rumen environment.

Effective fibre is provided from roughage such as hay, silage or straw and should make up a minimum of 10% of the total ration. Effective fibre refers to the percentage of fibre that effectively promotes chewing and saliva production, which is determined by fibre length. Processing roughage (for example into a pelleted form) limits the effectiveness of the fibre as the particle size is reduced.

In addition, the total diet should contain a minimum of 30% neutral detergent fibre for effective rumen function.

Image courtesy of AgriPartner Consulting

## Minerals and vitamins

Fast-growing lambs require a diet with balanced vitamins and minerals. Producers are encouraged to seek independent advice about requirements before purchasing mineral concentrates.

**Calcium:** Calcium and phosphorus are required in the diet at a ratio of 2:1. Grain diets are naturally high in phosphorus and deficient in calcium. Supplementation for lambs on grain-based diets is usually required unless legume hay or silage is a major component of the diet.

**Sodium:** Lambs on cereal grain-based diets require additional sodium, provided as sodium chloride (salt) at a minimum of 1% and maximum of 3% of the dietary dry matter.

**Potassium:** Supplementation may be required for lambs backgrounded on potassium deficient pastures. Care should be taken with supplementation as excess potassium can reduce magnesium absorption.

**Magnesium:** Supplementation is seldom required in feedlots, but may be required in pasture based finishing systems. Deficiencies may also occur in response to high levels of rumen ammonia on high protein pasture diets. Magnesium supplementation may also be beneficial during stressful periods such as feedlot induction or following transport.

**Sulphur:** Additional sulphur is required when urea is added to the diet as a source of non-protein nitrogen. The desired ratio of urea to sulphur is between 10:1 and 13:1.

**Selenium:** Lambs on cereal grain-based diets are at risk of selenium deficiency. Care should be taken if supplementing from additional sources such as inclusion in drenches and vaccines.

**Cobalt:** Deficiency is common in newly weaned lambs from spring pastures in high rainfall areas, and can occur in lambs on grain-based rations. Cobalt is required for the synthesis of vitamin B12.

**Zinc:** Deficiency can occur in lambs from the pastoral areas of southern Australia or the wheat-sheep zone.

**Vitamin A:** Lambs without access to green feed for two months prior to entering a feedlot are at risk of vitamin A deficiency.

**Vitamin B1:** Deficiency can occur in lambs that experience a sudden change in diet.

**Vitamin B12:** Deficiency is caused by lack of cobalt in the diet. If cobalt requirements are met, vitamin B12 levels should be adequate.

**Vitamin D:** Sunlight is the main source of vitamin D. Deficiencies are rarely seen in Australian outdoor finishing systems. Lambs in sheds may be at risk and advice should be sought.

**Vitamin E:** Deficiencies are generally observed in lambs denied access to green pasture for extended periods or following extensive grazing of wheat stubbles, particularly in WA.

### Key practices to manage vitamin and mineral requirements of lambs in intensive finishing systems include:

- providing a balanced, cost-effective mineral concentrate for lambs on grain-based diets
- analysing pastures for mineral deficiencies prior to finishing lambs to determine mineral requirements
- injecting all lambs with vitamin B12 to stimulate appetite and avoid unknown deficiencies prior to finishing
- injecting all lambs with vitamins A, D and E before commencing on grain-based finishing rations
- injecting all lambs with vitamins A, D and E if lambs are deprived access to green pasture for more than two months prior to intensive finishing
- treating lambs with a known vitamin E deficiency with an oral dose of vitamin E (an injected dose can be immobilised at the injection site for long periods and may not overcome the deficiency).

## Water

A continual supply of good quality water is essential. Clean troughs regularly to ensure water is not contaminated with feed, dust and faeces. Water sources should contain less than 3,500 parts per million soluble salts.

Water intake is dependent on ambient temperature, shearing, water quality and availability, salt content of water and feed, water temperature, familiarity with water delivery devices, trough size, flow rates, genotypes and dry matter intake. Typical water intake rates vary between 3–5 litres/head/day, however rates of more than 8 litres/head/day can be observed in hot weather.

Image courtesy of AgriPartner Consulting

### Ration design

Production rations for finishing lambs may include a high quality pasture base, complementary feeding on dry pastures or stubbles and feedlot rations. These rations can take the forms of:

- loose grain mixes or single grains with ad lib access to pasture or hay
- grain-based pelleted diets plus ad lib hay or silage
- roughage-based pelleted diets
- total mixed rations.

There are two key factors relating to ration design – cost-efficiency of the ration and the ration effect on lamb health.

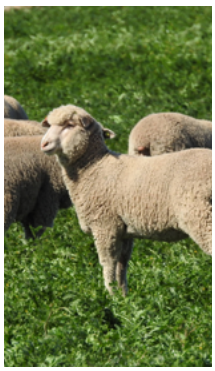
For a ration to be cost-efficient it must be economical on a cost per nutrient unit basis and meet the nutritional requirements of the lambs. This will maximise lamb growth and minimise the time lambs spend on feed and total feed costs.

Consideration must be given to the effect of the ration on the health status of lambs. Selecting feed solely on a cost per nutrient basis ignores the cost of digestive disturbances and mortality associated with high starch grains and the additional costs of treatments to counteract the effects of these grains.

Conduct feed tests on every new source of feed to determine the nutritive value of the ration. Avoid using average figures for individual feedstuffs as they can vary greatly.

Be aware of the water content of feeds. Nutrients are predominantly contained within the dry matter (DM) portion of the diet. Where feedstuffs have similar energy value but differ in DM content, more of the lower DM feed will be required to achieve the same level of metabolisable energy in the diet.

Ration formulation is complex. Seek appropriate expert advice when formulating rations.



Left and middle images courtesy of AgriPartner Consulting.
Right image courtesy of Rural Solutions SA.

## Feeding options

A wide range of feeding options and feeding equipment are available for use in lamb finishing systems. Broadly categorised these options include ad lib access (self-feeders/troughs), restricted feeding (troughs) and choice feeding.

Currently there is insufficient evidence to justify the use of one feeding method over another or a specific design.

## Feedlot design

A wide range of feedlot designs operate across the industry and further research is required to make clear recommendations on the ideal feedlot design. However, common design features used by many feedlots are as follows:

- 2–6% slope across the pen to allow water to run off the site
- provide a minimum of 15cm/head for restricted feed access systems (i.e. daily trough feeding), or a minimum of 3cm/head for ad lib feeding systems (i.e. self-feeders). Greater feed access could be beneficial and is likely to reduce the incidence of shy feeders and poor doers
- provide a minimum of 30cm plus 1cm per head water trough length
- feed and water should be located as far apart as possible in the pen to minimise contamination of water troughs with feed
- 3 to 5m$^2$/head space allocation
- adequate shade and shelter should be provided to sheep in feedlots.

## Animal health and welfare

Underperforming lambs can be costly in an intensive finishing system. Appropriate preventative strategies should be put in place to minimise animal health issues. Monitor lambs closely to identify problems early, enabling prompt action to be taken.

A veterinarian should be retained to advise on all aspects of animal health and welfare. A good way to ensure that health risks have been considered and addressed in a systematic way is to develop a sheep health management plan in consultation with the veterinarian.

Common diseases of intensive finishing systems are outlined in Table 2.

**Good management practices include:**

- introducing grain and changes in diet slowly and providing a palatable roughage source during the introductory period
- balancing grain-based rations with calcium
- vaccinating lambs against scabby mouth at marking in high risk areas
- vaccinating lambs against cheesy gland at marking
- vaccinating lambs with a minimum 3-in-1 before a major change in diet
- investigating the worm history and status (worm egg count) of lambs and applying appropriate treatment prior to entering the intensive finishing system
- injecting lambs with vitamins A, D and E if they have had no access to ‘green feed’ for eight weeks prior to finishing
- adding lasalocid sodium to the ration of lambs considered at risk of coccidiosis infection
- providing shade and shelter to protect from heat and cold stress.

Unshorn sheep have a wider thermo neutral temperature zone (the temperature range at which they are most comfortable or likely to optimise productivity) compared with shorn sheep and are able to insulate against heat and cold stress. While shearing of lambs prior to finishing is a common industry practice, there is very little evidence to support routine shearing as best practice to increase growth rates of intensively finished lambs. Energy maintenance requirements are also lower for unshorn lambs compared to those that are

shorn. Lambs should only be shorn to optimise wool length and skin value. If lambs are shorn, use a snow or cover comb, which leaves a small amount of residual wool cover, reducing exposure to heat or cold stress.

Image courtesy of Productive Nutrition Pty Ltd

## Stock medicines and chemicals

It is vitally important that product integrity be protected by ensuring residues from sheep treatments do not enter the food chain. This is important for food safety, but also for combating antimicrobial resistance, a major public health threat.

Records of all treatments must be kept under the requirements of Livestock Production Assurance (LPA) and also by law in some states/territories. Withholding periods and export slaughter intervals, where applicable, must be observed. If sheep are offered for sale while they are within a withholding period or export slaughter interval, that fact must be declared on the NVD and details of treated sheep provided.

Antimicrobials include antibiotics (such as penicillin) and ionophores (such as Bovatec® or Rumensin®). The need for antimicrobials should be minimised as far as possible by following the principles of good management listed above and by the application of good internal and external biosecurity (stopping diseases getting in and stopping them spreading). When antimicrobials are used, it is important to use them strictly as directed by the prescribing veterinarian, record all treatments and store unused product correctly.

# Management

## Dietary change

Introduction to new feed requires careful management to avoid digestive problems and health issues.

Introduce grain-based diets slowly over a minimum of 14 days, longer for high starch grains (21–28 days).

High quality roughage should also be provided during the introduction period. The acidosis risk of grains is dependent on their starch content. The order of risk from high to low is wheat, triticale, barley, beans/peas, oats and lupins.

Roughage-based pellets are less likely to cause acidosis than grain-based pellets.

Early signs of acidosis are stiff leggedness with lameness. Scouring is a late sign after rumen pH has fallen considerably. Other symptoms may include loss of appetite, evidence of pain and death.

**Table 2: Common diseases of intensive finishing systems**

| Disease | Predisposing causes | Management |
|---|---|---|
| Acidosis (grain poisoning) | Rapid introduction of grain to the diet, rapid change from low to high starch grains or overindulging in grain leading to accumulation of lactic acid. | Gradual introduction to grain and changing to different grains slowly. |
| Enterotoxaemia (pulpy kidney) | Rapid change in the diet causing toxins to be produced. | Vaccination and avoidance of sudden changes in the diet. |
| Urolithiasis (urinary calculi or bladder stone) | Imbalance of calcium in relation to phosphorus in the diet. | Provide calcium supplementa-tion to achieve a ratio for calcium to phosphorus of 2:1. |
| Scabby mouth | Infection occurs by a virus entering abrasions in the skin of the lips and hocks. | Vaccination of lambs following an outbreak on the property (as the vaccine is expensive). Outbreaks are rare; however the virus can survive in the soil and on infrastructure for many years. |
| Footrot | Predominantly seen in lambs born in high rainfall environments. | Source lambs from non-infected properties. |
| Cheesy gland | Bacteria causing abscesses in the internal organs and lymph nodes. | Only purchase sheep from vaccinated, uninfected properties. Ensure you vaccinate at lamb marking. |
| Internal parasites | Worm larvae contaminated pastures. | Develop drench programs on an individual basis to minimise drench resistance and optimise effective kill. |
| Pink eye | Irritation due to dusty conditions or grass seed infestation; vitamin A deficiency. | Minimise dust in the yards through pad structure and stocking density. |
| Pleurisy and pneumonia | The cause could be multi-factorial. Possible causes include hot or cold temperature extremes, poor nutrition, high stress levels or dusty feed. | Do not drench lambs in marking cradle; ensure handling device is correctly adjusted. Reduce dust and fines in feed. Provide adequate feed, water and shelter. |
| Coccidiosis | History of feedlot infection. Caused by protozoal parasites. | Inclusion of lasalocid sodium in rations of lambs considered at risk. |

## Adaptation

Lambs that take a long time or fail to adapt to the finishing system impact on profitability through poor performance and/or mortality. Management of lambs that have failed to adapt (shy feeders) after two weeks should be reviewed to avoid financial loss; for example, remove lambs from the finishing system and sell or commence on an alternative feeding regime.

The duration of the adaptation process and associated sub-optimal performance can be reduced by minimising stress on lambs, minimising negative experiences and where possible familiarising lambs with the environment, feed and equipment prior to finishing (preferably prior to weaning).

Feed should be highly palatable to encourage intake. Lambs experiencing negative effects from feed, such as toxins or acidosis, will be set back considerably and some do not recover.

Reduce competition for feed to lessen the effect of social hierarchy or dominance within the mob. Feeders should be positioned away from heavy traffic areas such as laneways to avoid interfering with the enthusiasm of lambs to feed and therefore reducing feed intake.

Lambs purchased off-farm may have been subjected to prolonged periods of stress. These lambs should be allowed to settle for three days in a quiet and relaxed environment to encourage water and dry matter intake before introduction to the finishing system.

## Breeding and selection

Sires with above average Australian Sheep Breeding Values (ASBVs) for growth will produce progeny with above-average growth potential. Feeding and finishing of these lambs should be more profitable. Genetic information generated by Sheep Genetics through LAMBPLAN and MERINOSELECT is a tool that can be used by the sheep industry to improve the performance of lambs in intensive finishing systems.

It is the genetics that set the animal's performance potential, while the ability to achieve this potential is dependent on management and nutrition. Therefore, the advantages of using sires with higher growth and leanness potential may be reduced if nutrition is limiting and lamb growth restricted.

Breed and select lambs for intensive finishing systems from sires with above-average post-weaning weight ASBVs.

Lambs with higher birth weights have been shown to have reduced total feed intake, reach market weight earlier and be leaner, and are therefore more efficient.

However, lamb loss is significant with extreme birth weights; both high and low weights can contribute to lower lamb survival. Try to keep birth weight ASBVs between 0 and +0.5kg.

Where possible establish supply relationships which encourage two-way information flow. This will assist lamb finishers to source lambs with a known history of genetics, growth path, health, grass seed status (see image at right) and age for rapid growth and efficient conversion of feed to live weight gain. Such a relationship also provides greater opportunity to provide feedback to the breeder on lamb performance, encouraging the breeder to improve the lambs being bred for the intensive lamb finishing sector.

## Performance monitoring

Lambs should be weighed and fat scored regularly (see image below). Monitoring lamb performance enables more effective management and improvement. Problems and poor performing animals can be identified early and management adjusted accordingly. Bodyweights and fat scores are also critical in determining time of sale.

Individual animal performance and management can have a big impact on profitability. Consideration should be given to the opportunity cost of not individually identifying and weighing lambs. When lambs are considered as groups rather than individuals, many poor performing lambs are concealed by the averages.


Image courtesy of AgriPartner Consulting

Image courtesy of Rural Solutions SA

There is a perception that weighing causes lambs to become stressed and negatively impacts on performance, however monitoring is a key management tool as outlined above. As lambs become familiar with weighing equipment, stress is minimised. Good handling equipment, stockmanship and dog control can also reduce stress. Weighing after the induction period and then every three to four weeks can assist in ensuring that lamb performance is satisfactory.

# Marketing

The price margin achieved for lambs has a significant impact on profitability. Knowing cost of production is important to determine the minimum sale price required for the system to break even.

Reduce the price risk by securing forward contracts for the minimum number of lambs to cover cost of production. When entering into forward contracts, the ability to get a specified number of lambs up to market specifications within a specific timeframe is critical.

Monitor lambs to ensure they are on target to meet contract/market requirements and notify processors as early as possible if contract requirements may not be fulfilled.

Producers should be aware of and manage factors influencing dressing percentage as this affects the final payment received for lambs. These factors include fat score, fasting period, wool and skin weight, sex, breed, weaned or unweaned, extent of carcase trim and feeding regime.

Maximise potential returns by focusing on carcase and skin quality. Ensure lambs are presented correctly for sale and meet market requirements, minimise stress during handling (bruising), and minimise grass seed and faecal contamination.

Image courtesy of Rural Solutions SA

# Further reading

**Best practice for production feeding of lambs: a review of the literature**
Meat & Livestock Australia, March 2007
San Jolly, Productive Nutrition P/L
mla.com.au/feeding-lambs-lit-review

**National Procedures and Guidelines for Intensive Sheep and Lamb Feeding Systems**
Meat & Livestock Australia, June 2011
mla.com.au/intensive-sheep-feeding

**Sheep Genetics**
sheepgenetics.org.au

# Notes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