

Topic 7: Sheepmeat Production Systems

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Learning Objectives

On completion of this topic you should be able to:

- Demonstrate an understanding of the different requirements for supply of lamb and mutton for the domestic or export markets
- Describe the different production systems used to meet requirements for supply of lamb and mutton

Introduction

As consumers have become more discerning in their preferences for meat consumption, meeting market specifications for sheep meat production has become more important. This has meant that producers have had to change their production systems to ensure they are meeting specifications for carcass weight and fat depth to continue to be profitable.

7.1 Lamb market specifications

Domestic lamb markets

There are a number of different categories in Australian lamb markets and their specifications are as follows:

- *Domestic trade lambs* (17 – 24 kg, GR fat 6 – 15 mm) are the most common specifications. The supermarket share of the domestic lamb industry has been expanding. Second cross and first cross lambs are preferred.
- *Supermarket trade lambs* (18 – 24 kg, GR fat 8 – 12 mm) are preferred by more progressive retailers due to higher carcass yields with more versatility and range in available products. This market demands high value for money. The retailers expect to receive lamb with very good meat and fat colour and muscularity, consistently throughout the year. This is a specialist market suited to second cross lamb producers.
- *Food service* (20 – 25 kg, GR fat 7 – 15 mm, with 15 mm the absolute maximum). The lamb preferred by the high value food service operators, such as restaurants, is lean and high yielding. Weight variation is limited to a range of 2kg as consistent “serve size” is extremely important at the top end of this market. Processors and boning rooms now specialize in the supply of portion controlled cuts to meet these requirements. Other food service operators accept a wider range in specifications. They receive comparatively lower prices from their clients and are prepared to trim over fat carcasses. At the bottom end of this market are the “pub and club” suppliers who buy heavy lamb with more fat – they tend to sell whole legs and provide a product which is comparatively cheap. Many food service companies buy primal cuts of lamb (leg, rumps, loins, racks) instead of full carcass.
- *Other domestic markets* include retailers and small goods manufacturers who specialise in using lamb which is not suitable for the above markets. These firms generally purchase lambs by price and buy from any supplier when the product is cheap enough.

Export lamb markets

- *Heavy export* (20 – 30 kg, GR fat 6 – 20 mm) The Northern American market continues to expand requiring a consistent supply of high quality lamb throughout the year. The US market is targeted for most of the “prime” lamb cuts such as racks, loins and boneless legs.
- *Light export* (10 – 14 kg, GR fat to 10mm) The Middle East, particularly the United Arab Emirates, is the volume market and requires whole carcasses that are lean, almost “store-like.”

Demand is price sensitive and supply driven. If producers have adequate feed supply, they are unlikely to target this market. Lambs sold into these markets are generally Merino weaners.

7.2 Mutton market specifications

The supply of mutton is a function of flock structure and size, which is driven by wool and lamb prices. The domestic market for mutton is declining with only 2.3kg of mutton consumed per capita in 2004 (MLA 2005) while exports have increased to 74% of production. Domestic markets for mutton can be broken into three categories:

1. Manufacturing – this is generally processed smallgoods, pies, sausage rolls etc. and typically uses lightweight carcasses (<20kg HSCW)
2. Retail – hoggets are often sold as half carcasses, better quality mutton can be sold in retail as select cuts
3. Hotels, Restaurants and Institutions (HRI) – Asian, Indian and Middle Eastern style restaurants and in fast food outlets.

Major mutton export destinations include the Middle East, Asia and North America. Carcasses heavier than 20kg are required for most export markets. Carcasses for export markets are treated as follows (McLeod et al. 2010):

- Heavy export carcasses – boned and boxed in primal cuts
- Medium weight carcasses – broken into 6 segments, boxed and chilled or frozen for export
- Light carcasses (<20kg) – bagged and frozen prior to export to lower value markets

7.3 Live export market

Initially the demand for Australian sheep in the Middle East was for larger older animals as these represent the best value in terms of dollars per kilogram live weight. As markets have matured, there has been an increasing emphasis on quality and meeting the Middle East preference for leaner animals. As a consequence, most countries now seek to import younger animals, although there remains a strong commercial emphasis on the cost per kilogram live weight.

The development of the trade has resulted in significant adjustments within the Australian sheep industry. The live sheep export trade has provided a base in prices for surplus wool-growing wethers and thus higher on-farm profitability. Western Australia has supplied the majority (55 to 80%) of live sheep to Middle Eastern markets because of its proximity to the markets (less steaming time), more live sheep loading ports and a focus on supplying to the markets specifications.

Producers considering supplying sheep to the trade should consider:

- The location of their nearest live sheep export port. Transport costs to the port of \$5 to \$15 per head could negate any benefit over the mutton trade
- Market requirements such as preferred breeds, live weights and fat scores (see Table 7.1 below)
- Meeting other quality assurance specifications such as entire male lambs or hoggets and scabby mouth vaccination
- Pre-conditioning animals to feedlot rations.

The market is attracting an increasing number of young sheep as well as fat-tailed sheep originating from the Middle East and Africa such as the Damara, Awassi and Karakul. Some special conditions apply such as the requirement for long tailed sheep and lighter sheep for the Saudi market leading up to the Haj festival.

Table 7.1 The common specifications for live sheep to various destinations. (Duddy et al. 2009)

Country	Weight	Breed	Age	Sex
Middle East	50 – 60 kg	Wethers	Up to full mouth	Castrated males
	34 – 37 kg	Merino lambs	Lambs	Castrated males
	34 – 37 kg	XB lambs	Lambs	Castrated males
	55 – 65 kg	Rams	Up to full mouth	Males
	36 – 40 kg	Damara F1 ram lambs	Lambs	Males
Saudi	36 – 38 kg	Any ram lamb with tail	Lambs tooth	Males
	42 – 45 kg	Ram hoggets/with tail	Max 2 tooth	Males
	48 – 50 kg	Rams	Up to 4 tooth	Males
	35 – 40 kg	Damara fattail	Up to 4 tooth	Males
	50 - 60 kg	Wethers	Up to 6 tooth	Castrated males
Kuwait	52 – 62 kg	Wethers	Up to full mouth	Castrated males
	44 – 50 kg	Young wethers	2,4,6 tooth	Castrated males
Jordan	45 – 52 kg	Wethers	Up to 4 tooth	Castrated males Sheep
Egypt	50 - 55 kg	Merino wethers	Lambs - Up to 4 tooth	Castrated males

7.4 Production systems for meeting market specifications

Sheep and lambs to meet the markets outlined above are sourced from a variety of production systems. They may be cull for age animals, surplus Merino weaners or wethers or from specialist lamb producers to most accurately meet the market requirements for a consistent product in terms of both quality and supply. The types of production systems include but are not limited to:

- Self-replacing flock breeding store lambs
- Crossbred flock for store lambs (1st or 2nd cross)
- Crossbred flock for breeding and finishing (1st or 2nd cross)
- Feeder lamb finishing systems (grass or feedlot)

The type of production system used will depend on location, infrastructure, financial and management constraints. Extensive crossbreeding is used in the lamb industry. Meat rams, maternal (eg. Border Leicester) or terminal (eg. Poll Dorset) breed rams are mated to Merino ewes to produce first cross (1stX) lambs. The 1stX ewe progeny from the maternal breeds (eg. Border Leicester x Merino or BLxM) are generally retained or sold for breeding to a terminal sire ram to produce second cross (2ndX) lambs for slaughter. The 1stX lambs by terminal sire rams and the wether 1stX lambs by the maternal sire rams are slaughtered.

Generally 2ndX lambs have higher growth rates than 1stX lambs which are higher than Merino lambs when grown under the same management and nutrition. Results from research at Cowra (Fogarty *et al.* 2000) show the differences in post weaning weight that could be expected under good growth conditions between 2ndX, 1stX and medium wool Merino lambs (Figure 7.1). The heavier weight of the 1stX compared to the Merino lambs reflects the better genetics for growth of the meat rams

compared to the Merino rams used, as all these lambs were from the same Merino ewes. The higher weight of the 2ndX compared to the 1stX lambs is due to two factors. Firstly, better genetics for growth passed on from the meat genes in the crossbred mother. Secondly, the better maternal environment for growth (milk production and nurturing etc) provided by the crossbred ewe.

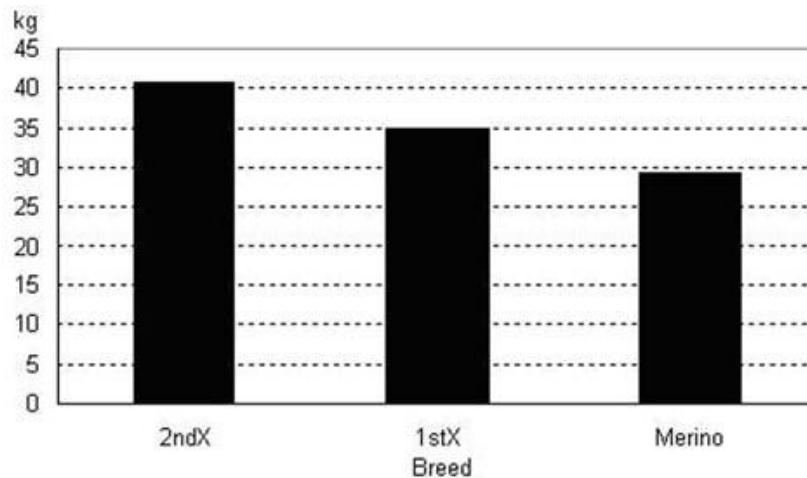


Figure 7.1: Post weaning weight of crossbred and Merino lambs (Fogarty *et al.* 1998).

Feeder lambs

In areas less suited to finishing lambs the production of feeder lambs is another option for improving profitability of the sheep enterprise. These areas are commonly known as pastoral areas and typically receive low rainfall, have shorter growing seasons and large seasonal variations. They are usually unable to finish lambs or take full advantage of their genetic potential. Pastoral areas are more suited to breeding feeder lambs for finishing in higher rainfall areas. Some producers in higher rainfall areas believe it is more efficient to convert valuable pastures into kilograms of finished lamb rather than running a breeding ewe flock.

Pastoral zone production systems need to cope with the extreme variation between seasons and years for pasture growth, and the unreliability of rainfall. The main benefit of feeder lamb production is that lambs are removed from the production system when feed supply is limiting. It has been predicted that in pastoral areas of Australia, this system would work 3 in every 5 years, as opposed to a finishing system of 1 in every 5.

Feeder lamb production is becoming more attractive due to higher lamb prices and the expectation that they will remain high for some time. Feeder lamb production has the following benefits:

- Potential for increased income as lambs are turned off earlier allowing for increased carrying capacities
- Potential to be paid for what is produced, lambs are commonly sold on a cents per kilogram liveweight basis
- Potential for increased income as the value of first cross lambs is generally higher than for pure Merinos for meat
- Potential for reduced costs, as lambs generally do not need mulesing, crutching or jetting
- Opportunity for traditional wool producers to diversify without making major changes to existing enterprises or handling facilities
- Low risk as demand exists year round
- Production of feeder lambs is ideally suited to the climatic conditions of pastoral areas
- Ready access to superior genetics identified through LAMBPLAN and MERINOSELECT
- The lamb finisher may have the flexibility to receive lambs earlier than normal if seasonal conditions deteriorate unexpectedly in the breeding zone
- Low impact on existing Merino breeding enterprise
- Broad weight specifications in 'grass finishing' systems.

How to produce feeder lambs

Feeder lamb production is generally based on mating a proportion of a self-replacing Merino flock to terminal or maternal sires. This system continues to produce high value Merino wool while capitalising on the strong lamb market.

To mate 15 to 20% of an existing Merino breeding enterprise to short wool meat breeds, a weaning percentage of 85% or more is needed to maintain Merino breeding numbers. When weaning percentages fall below this figure, ewes may need to be kept a year or two longer than usual to ensure the system is sustainable. Alternatively, feeder lamb production can be based on all ewes being mated to non-Merino sires. In this system replacement Merino ewes need to be purchased which has the advantages of every sheep having an adult wool clip and potential to rear a lamb. In any of these systems, weaning rate drives profitability.

Feeder lamb production should be timed so lambing occurs when pasture quantity and quality is greatest. This usually results in the sale of lambs at the time when feed quantity and quality has diminished. With feeder lamb production, there is also the added potential to capitalise on exceptional rainfall years, by retaining and finishing some of the lambs.

For efficient and profitable feeder lamb production, producers need to:

- Identify and target the required market specifications
- Access climate forecasts and predict available pasture (quality and quantity)
- Plan the numbers of ewes to be joined to Merino, maternal or terminal sires
- Select an appropriate joining time to ensure the best feed is available at lambing
- Plan lamb turn-off dates and set growth targets to meet specifications in full
- Select high performance LAMBPLAN tested rams
- Monitor lamb weights against growth targets
- Investigate the opportunity to develop a formal breeder/finisher alliance
- Be flexible in production and marketing objectives.

Efficient feeder lamb production relies on high lambing percentages and targeted growth rates. It is obvious that the higher the lambing and weaning percentage and the heavier the weights the more money is received. To maximise returns, lamb producers will need to select their best paddocks and use proven sires. In most cases it will take time for producers to gain confidence with meeting specifications and fulfilling supply agreements.

The benefits for specialist lamb finishers

Lamb producers in higher rainfall areas have driven feeder lamb production. It has been calculated that the breeding ewe consumes approximately 70% of the feed required to produce a prime lamb. Producers in high rainfall areas believe they can finish at least three lambs with the same feed used to breed and produce one lamb in a conventional system of breeding and finishing. The role of the specialist finishing system is to use high quality pastures more efficiently, resulting in greater profits.

Feeder lamb finishers are looking to the drier pastoral regions for the following reasons:

- There is a low risk of buying lambs carrying infectious diseases such as ovine Johne's Disease and footrot
- There is a lower risk of buying lambs carrying drench resistant worms
- The large mob sizes, common to the region, reduce transport costs and simplify logistics
- The large framed pastoral Merino ewe is well suited to breeding quality 1st cross, terminal and maternal lambs
- There is a reliable feeder lamb supply, as pastoral areas are less suited to finishing lambs, reducing the chance lambs will be sold direct to market
- There are decreasing numbers of sheep in the cereal and higher rainfall zones.

Benefits common to feeder lamb producers and finishers

- Opportunity for sale contracts, reducing price variation and improved budgeting
- Opportunity to form alliances
- Opportunity for lamb finishers to assist with the purchase of superior genetics
- Flexibility through negotiation as alliances are based on open communication
- Potential for increased lamb value with 'feedlot finishing' systems.

7.5 Finishing systems

There are two types of specialist finishing systems, one based on pasture and the other based on grain in feedlots. The weight and age specifications vary between the two systems, with pasture finishing systems requiring younger, lighter lambs and feedlots requiring heavier, older lambs. The two systems complement each other, giving feeder lamb producers the option of targeting a finishing system most suited to their individual circumstances. Some producers are able to target both systems increasing their options as seasons fluctuate.

Breeder/finisher alliances

Lamb alliances link lamb breeders to producers, skilled in finishing lambs to specifications. For this arrangement to be successful it is necessary to deliver a quality product over an agreed time.

Alliances take time to develop and work best through value based trading, commitment, honesty and communication. But once operating successfully members are rewarded with the opportunity of:

- improved price
- increased number of lambs meeting specifications
- increased flexibility
- reduced risk
- reduced price volatility.

Specifications vary between the two finishing systems. It is essential that graziers contact potential lamb finishers to obtain their specifications, develop a working relationship and a possible forward sale agreement. As seasons can vary, it is important to have an agreed plan when a season turns for the worse.

Below are some general specifications for the two finishing systems:

Grass finished lamb

- Age of lambs varies between 10 to 25 weeks
- It is important that lambs experience minimal nutritional stress during grow out
- Weight of lambs varies between 15 kg to 38 kg liveweight
- Shearing is generally negotiable.

Feedlot finished lamb

- Age of lambs varies between 20 to 40 weeks
- Weight of lambs varies from 30 kg +
- Ideally lambs should be one month off shears.

Specifications common to both systems

- Lambs are generally bred from large framed Merino ewes (live weight 55 kg +)
- Terminal breeds such as Poll Dorset, Texel, White Suffolk or White Dorper are in most demand
- Maternal breeds such as Border Leicesters are less suitable but demand exists for the ewes
- The rams should be LAMBPLAN tested with high lean growth characteristics

- Lambs generally need to be fully drenched and vaccinated with 6 in 1.
- In general there are no fat restrictions
- Minimal grass seed contamination, which tends to be district and seasonally related.

The breeder/finisher system effectively eliminates the difficulties faced by pastoral producers attempting to finish lambs in a dry variable climate. In turn, the lamb finisher is assured of a consistent supply of quality feeder lambs.

A Merino ewe crossed with a short-wool ram (such as Poll Dorset or White Suffolk) is a good compromise for lamb production in this region. The lambs exhibit satisfactory growth rates and carcass characteristics, while the ewes are still able to produce finer, high quality wool. The lambs have a slightly lower growth rate and tend to lay down fat at heavier liveweights making them ideally suited to the export lamb market.

7.6 Lamb or sheep feedlotting

There are two types of production based grain finishing systems: opportunistic and commercial. Opportunistic systems are usually short-term feeding programs carried out when prices are low for both store lambs and grain. Commercial systems are generally established to supply a particular market specification. Commercial systems may also be used to meet breeding animals' maintenance requirements during periods of low pasture availability due to poor seasonal conditions or drought.

Infrastructure and management within grain finishing systems design

Feedlot design will depend on area available, personal preference, capital input, labour and equipment availability. While there is no perfect feedlot design there are basic design and infrastructure principles and recommendations that can be incorporated into any design chosen.

General design recommendations include:

- provide a minimum of 5m² per animal
- maximise the distance between water and feed troughs to minimise contamination of water from dropped feed particles
- provide adequate shade and shelter
- site feed troughs on the upward slope to minimise the risk of areas becoming boggy during periods of wet weather
- select a site that is well drained. Medium clay loams soil types are preferred (clay based sites dry slowly increasing odour and welfare problems and sandy/light soils have high infiltration rates and are prone to erosion)
- provide adequate trough space per animal (5-10cm if using self feeders, 10-15cm or more if using open trough systems)
- lift troughs so upper edges are 45-55cm off the ground surface. Doing so minimises contamination of grain ration through lambs pawing at the feed mix and/or defecating in troughs. Same applies to watering points.

Feeder types

There are two basic design systems available. These are open trough bunker style systems and self feeder systems. Both can provide total mixed ration (TMRs) where grain and fibre are combined in a single mix or separate grain and fibre feeding options depending on equipment available and personal preference.

Open trough systems may be cheaply constructed and may reduce the incidence or risk of acidosis when using TMR's. Unfortunately they require specialised equipment, are labour intensive (may require twice a day feeding) and may lead to a higher incidence of shy feeders if trough length per animal is limited.

Self feeder systems are generally preferred within industry. These systems ensure rations are available at all times, reduce the risk of shy feeders, reduce labour input and have been shown to increase intake, weight gain and feed conversion efficiency (FCE) provided adequate trough space is available. They can however be difficult to manage when changing grain types or mixes, do not generally enable the feeding of TMR's due to feed blockages and can be expensive to purchase.

Such systems usually require fibre to be fed separately, preferably in delivery racks that minimise spoilage and waste. Substitution of fibre for grain (reducing growth rates) and/or increased acidosis risk through grain engorgement are also possible.

Self feeders such as the Cowra Lick Feeder effectively restrict intake to short 'licking' bursts after which the lamb will tire, seek water and rest. This process minimises engorgement and reduces acidosis risk.

General management recommendations

On induction, lambs should be:

- vaccinated (5 or 6 in 1, Vitamin A,D and E)
- shorn (improves intakes, growth rates and skin values) and/or crutched depending on time of year and wool lengths
- drenched with an effective drench (reduces worm burdens)
- separated into weight groups (ease of management and marketing)
- fed a high fibre, low grain introductory ration. Ration mix should change over to high grain, low fibre mix used during the finishing phase of program within 10 – 14 days of entering the feedlot
- Monitored regularly

To ensure lambs and sheep from any of these production systems meet the required market specifications and achieve the best price, live assessment, quality assurance procedures and the appropriate selling method is also required. These will be covered in the following topics.

Readings

Chapter 29 of the International Sheep and Wool Handbook provides further information on this topic for those who are interested.

Revision Questions

1. What are the main markets for lamb and mutton and how do their specifications differ?
2. Describe the production systems used to produce lamb and mutton for these markets.
3. What are feeder lambs and how are they produced?
4. Outline some of the ways lambs can be finished for slaughter?

References

Fogarty, N.M., Hopkins, D. and Holst, P. 1998, *Lamb production from diverse genotypes – Final Report*, NSW Agriculture. <http://www.dpi.nsw.gov.au/agriculture/livestock/sheep/breed-select/meat/genotypes> - Retrieved 13 September 2013
