Te Kura
Te Aho o Te Kura Pounamu
THE CORRESPONDENCE SCHOOL

TE MATAURANGA AHUWHENUA, AHUONE

AGRICULTURE AND HORTICULTURE

AG3043

LAMB PRODUCTION

NCEA LEVEL 3

2013/1

AGRICULTURE AND HORTICULTURE

NCEA LEVEL 3

Expected time to complete work
This work will take you about 20 hours to complete.

You will work towards the following standards:
Achievement Standard 91531 (Version 1) Agricultural and Horticultural Science 3.4
Demonstrate understanding of how the production process meets the market requirements for a New Zealand primary product
Level 3, External
4 credits

In this booklet you will focus on the following learning outcome:

- understanding how the production process meets the market requirements for a New Zealand primary product (lamb).

CONTENTS

HOW TO DO THE WORK

When you see:

Complete the activity.

Check your answers.

Your teacher will assess this work.

Use the DVD.

Use the Topic webpage or the Internet, if possible.

You will need:

- a pen or pencil and a ruler.

Resource overview

Each lesson should take you about 1.5 hours.

Write your answers in this booklet. Add in additional pages if you do not have enough space to write everything in the spaces provided in this booklet.

When you see the 'tick icon', mark your answers from the answer guide at the back of the booklet. Put a tick or a cross by your answers and add in any corrections that you need.

Return this booklet and any extra answers you wrote to your teacher for marking.

Standard Overview

For this standard you are looking at demonstrating understanding of how the production process meets the market requirements for a New Zealand primary product.

For Achieved you need to demonstrate understanding of how the production process meets the market requirements for a New Zealand primary product

For Merit you need to demonstrate in-depth understanding of how the production process meets the market requirements for a New Zealand primary product.

For Excellence you need to demonstrate comprehensive understanding of how the production process meets the market requirements for a New Zealand primary product.

1 LAMB PRODUCTION AND MARKET REQUIREMENTS

LEARNING INTENTION

In this lesson you will learn to:

- describe the aspects of lamb production and market requirements that are relevant to Achievement Standard 91531.

INTRODUCTION

This booklet looks at how the processes involved in producing lambs on the farm meet the market requirements for lamb meat, especially export lamb. In this lesson you will look at the meaning of the terms used in the achievement standard.

TERMS USED IN ACHIEVEMENT STANDARD 91531

NEW ZEALAND PRIMARY PRODUCT

You are required to study a New Zealand primary product. For this standard, this means, a **nationally significant agricultural and/or horticultural product** in unprocessed or processed form that earns significant export earnings, or allows for self-sufficiency within New Zealand, or employs a significant workforce during production and processing.

These lamb carcasses have been graded and are ready for export. However, very little lamb (about 3%) is actually exported in the whole carcass form.

Export lamb carcasses.

Most is processed into the 'cuts' of meat wanted by certain markets, for example racks of lamb for overseas restaurants.

A rack of lamb.

Lamb meat is an ideal product to study as it is a major New Zealand export earner and fits all the requirements. In the year ended 2011, 19.7 million lambs were processes in export plants or abattoirs. This produced 355 tonnes of lamb and 92% of this was available for export.

LAMB

For meat production, lamb is a young sheep which is under 12 months of age, or which does not have any permanent incisor teeth in wear.

At birth, or within a week or two, a lamb has small front teeth on its bottom jaw.
These first teeth are called milk teeth and will last for about year (photo below left).

Between 12 and 18 months the lamb will grow two new permanent incisors. Once these permanent incisors are in use the lamb can no longer be sold as 'lamb' (photo below right).

Lambs about five months old.

Lambs mouth showing the milk incisor teeth.

A new permanent incisor growing up to replace the milk tooth. This sheep is still classified as a lamb because the incisor is not in use.

A 'two-tooth' with two permanent incisors in use. This sheep can no longer be classified as a lamb.

PRODUCTION PROCESS

Production process refers to the sequence of farm management practices from establishment until harvest. The order of the production processes is sometimes called a schedule of operations. In the case of lamb management practices include everything from establishing the breeding flock of ewes to getting the lambs ready for transport.

Production is everything the farmer does to the lambs on the farm, but not things that happen once the lambs leave the farm. What happens at the meat processors (meat works or abattoirs) would not be included.

An example of a farm management practice is shown in this photo, drenching lambs.

Drenching kills internal parasites that affect:

- lamb health (lambs can die from having too many internal parasites)
- growth rate (lambs grow faster and bigger).

Drenching lambs is an example of a farm management practice.

MARKET REQUIREMENTS

Market requirements are the things that the market wants in the lamb. This includes:

- quality
- attributes such as flavour, tenderness, colour, size, amount of fat
- consistency
- uniformity
- presentation
- quantity (how much of the product is needed)
- timing (when the product is required)
- price.

Many farm practices manipulate the production of lamb to meet the market requirements.

For example, drenching will have a direct affect on lamb size (quality) and numbers sold from the farm (quantity).

Healthy lambs.

MARKET REQUIREMENTS

LAMB FOR THE LOCAL NEW ZEALAND MARKET

Lamb is a very well-liked meat in New Zealand and is in demand throughout the year. Roasts are especially popular in winter, and chops and other cuts are popular for summer barbeques. About 28,000 to 30,000 tonnes of lamb (bone-in weight) is consumed locally each year. This is about 8% of New Zealand's total lamb production and works out to around 7.5 kilograms (kg) per person per

year. New Zealand producers aim to supply fresh lamb for most of the year since the demand is there.

Red meat has many health benefits, such as being a source of iron. However, consumers are increasingly looking for lean meaty lamb to help avoid too much fat in their diet.

Farmers need to produce meaty carcasses with a low fat cover to meet these market requirements.

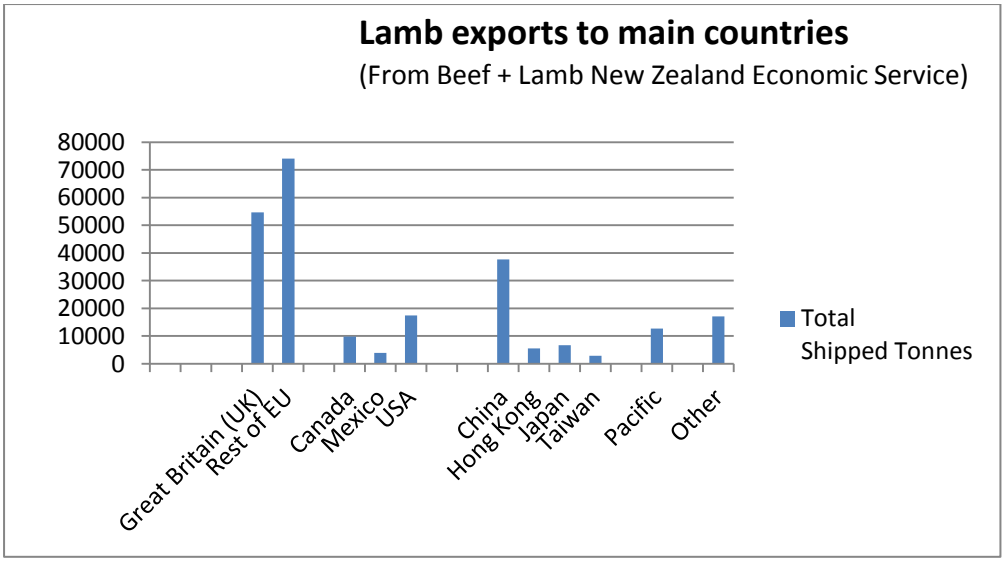
LAMB EXPORTS

Around 92% of New Zealand's lamb meat is exported. Very little of the export lamb is actually exported as whole carcasses (3%). Most export lamb (97%) is exported in added value bone-in, or boneless cuts. These can be high-valued chilled product instead of frozen product, particularly to the European Union (EU) countries and North America.

Different value cuts go to different markets, which maximises the financial returns from lamb. The European Union (excluding the United Kingdom) and North American markets take high value cuts from the lamb carcass. An example of a high value cut shipped to the USA, is chilled lamb racks. These are a large component of that market. In contrast, China buys cheaper value cuts like shanks.

In today's export market, a lamb carcass will be sold in many markets when cut (processed) into its marketable components (boneless, bone-in, high value, lower value). The meat itself can be exported in chilled or frozen form. High value chilled lamb exports in 2010-11 made up 25% of exports.

Lamb exports to main countries



MAIN MARKET REGIONS FOR EXPORT LAMB

Beef + Lamb New Zealand Economic Service 24-Jun 12

2010-11 Export Lamb - Main Market Regions

September Year*	World Region	Main Countries	Total Value# $ (000)	Total Shipped Tonnes	$ per Shipped Tonne
		Great Britain (UK)	535,657	54,688	9,795
		Rest of European Union	967,747	74,076	13,064
	European Union		**1,503,404**	**128,763**	**11,676**
		Canada	104,922	9,738	10,774
		Mexico	22,808	3,919	5,820
		United States of America	283,376	17,449	16,240
	North America		**411,107**	**31,106**	**13,216**
	Middle East		**148,860**	**23,198**	**6,417**
		China (Peoples Republic)	171,826	37,679	4,560
		Hong Kong	33,733	5,551	6,077
		Japan	61,104	6,688	9,136
		South Korea	3,310	452	7,324
		Taiwan	23,178	2,895	8,005
	North Asia		**293,152**	**53,265**	**5,504**
	Pacific		**71,678**	**12,711**	**5,639**
	Other		**156,981**	**17,069**	**9,197**
2010-11			**2,585,181**	**266,113**	**9,715**

* September ending years are New Zealand meat export years.

This is the total value of the tonnes of lamb sent to that market including the cost to the buyer of the shipping.

LAMB PRODUCTION AND MARKETS

Using the Export lamb market table above and the graph on the previous page, answer the following questions.

1. Which group of countries buys the largest quantity of New Zealand lamb?

_____

2. Which group of countries returns the greatest total export earnings for New Zealand lamb?

_____

3. Which country buys the most expensive cuts of New Zealand lamb?

_____

4. How many tonnes are shipped to the United States of America?

_____

5. Which Asian country buys the most expensive cuts of New Zealand lamb?

_____

6. Which Asian country buys the cheapest cuts of New Zealand lamb?

_____

Check your answers.

MARKET TIMING

The volume of lamb exported to particular markets is a combination of the market requirements for timing and New Zealand's supply capacity.

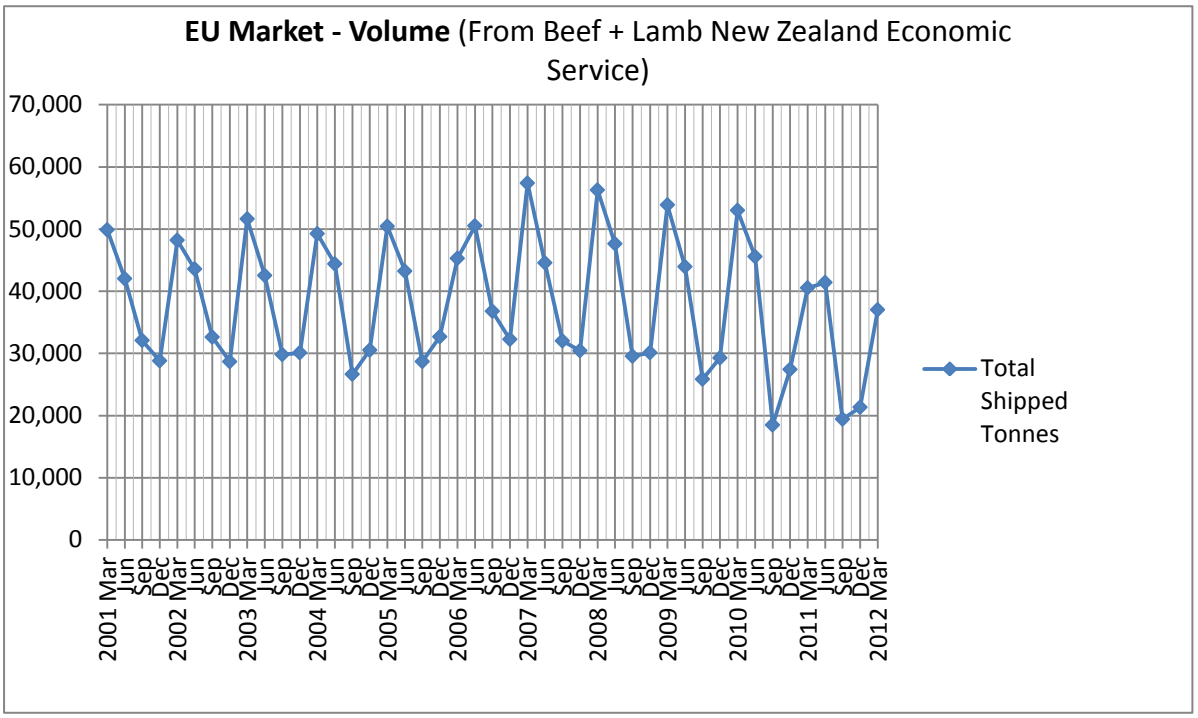
Markets want certain amounts of product at certain times. Product sent to a market when it is not wanted will not be sold, or could be sold very cheaply.

The following graph, of lamb supplied to the European Union, shows the volume supplied over each three monthly quarter for 10 years. Although the volumes each year vary, the pattern of timing throughout the year is the same.

Each plot shows the lamb shipped for the three monthly periods. In the graph, the years start at March and there are plots at June, September and December.

New Zealand consistently exports most lamb in the March quarter.

TIMING OF LAMB EXPORTS TO THE EUROPEAN UNION (EU)



The table below shows the actual volume of tonnes shipped to the EU for the years 2009 to 2011.

Three monthly quarter ending	Tonnes shipped in 2009	Tonnes shipped in 2010	Tonnes shipped in 2011
March	53,876	52,998	40,530
June	43,940	45,565	41,403
September	25,846	18,483	19,417
December	29,273	27,414	21,332

TIMING FOR THE EU MARKET

The tonnes shipped show that March is usually the biggest shipment quarter for lamb. The EU demand for lamb at Easter time is very strong and lamb sent in the March quarter meets that demand.

It also coincides with a time of:

- High production in New Zealand. New Zealand lambs are five to eight months old in the March quarter.
- Low production on the northern hemisphere. The March quarter is the northern hemisphere spring and lambs are only being born then, so most are not at a saleable size.

There is also strong demand for chilled lamb at Christmas in the UK market.

SCHEDULE PRICES

The price paid by New Zealand meat processors varies through the year and reflects the prices they can get by sending the lamb overseas to reach markets for certain times. Timing to meet the peak demand will result in higher per kilogram (kg) prices.

Lamb schedule prices (cents per kg) tend to fall from December to March. Farmers considering growing lambs for these later months need to make sure that the increase in lamb weights is faster than the cents per kg drop in meat price.

Early season lambs (July, August and September) usually command a premium price per kg because of the scarcity of young killable lamb at that time of year.

Schedule prices also reflect the size of carcasses wanted for certain market opportunities. For example, the United Kingdom retail specifications for lamb are between 15–21 kg of dressed weight. If a meat processor is buying lambs for export to that market the price per kilogram, set for that weight range, will attract a premium. Carcasses that are too small or oversized for that market will have a lower schedule price.

KEY POINTS

- Lamb for the meat trade is a young sheep less than 12 months of age, or which does not have any permanent incisor teeth in wear.
    - Production of lamb is everything the farmer does on the farm, but not things that happen once the lamb leaves the farm.
    - Production involves farm management practices and manipulations to meet the market requirements.
    - Market requirements are the things the market wants in the lamb. These include:
        - quality
        - attributes such as flavour, tenderness, colour, size, amount of fat
        - consistency
        - uniformity
        - presentation
        - quantity (how much of the product is needed)
        - timing (when the product is required)
        - price.
- Most New Zealand lamb is exported:
        - in higher value cuts rather than whole carcasses
        - in the March quarter
        - to the EU (including UK).

2 ESTABLISHMENT

LEARNING INTENTIONS

In this lesson you will learn to:

- describe the production processes for lamb in the establishment stage
- explain why these production processes are needed.

INTRODUCTION

Establishment is the starting point of the production of the product. In the case of lamb it starts with the ewes flock and the rams that will sire the lambs. Before choosing the ewes and rams the farmer should have a clear idea of the target market.

CHOOSING A MARKET

The choice of market will help to determine the production process (schedule of operations) for the production of prime lamb. Most lambs in New Zealand are produced for our southern hemisphere's summer killing season.

The two main export markets are driven by the demand of the European Union (EU), where their winter Christmas market and the Easter market are both times when early season lamb is traditionally in high demand.

PRIME MARKET

Prime lambs are sold directly from the farm to meat processing/slaughter companies.

Export lambs are paid according to a schedule of prices for export weights and grades set by the meat processors.

An export meat processing plant.

Local stock sales in main centres sell prime lambs by auction. The meat may be bought for export or local consumption but these sales help set market values. Weekly stock sale values are reported in the newspapers and websites.

STORE MARKET

Store stock are lambs not in prime killable condition which farmers, or companies, buy to finish or grow on to prime condition.

These are often sold at local sales yards. Stock agents auction them to the highest bidder at the sale.

Store lambs are also sold directly from one farm to another by stock agents who negotiate a price between the seller and the buyer.

Store lambs for sale by auction.

Lamb supply can also be contracted. Farms take up contracts to supply certain quantities of lambs to meat processors. Prices for store stock vary during the season and from district to district. The prices received for store stock are affected by supply, pasture availability and market prospects. The prices are normally lower that prime stock prices to make sure there is a profit margin for growing them to a killable size and/or condition.

OUT-OF-SEASON MARKETS

With increasing use of meat and year-round markets wanting 52 weeks supply for chilled product, contracts are offered for out-of-season lambs. For example, premiums can be paid for lambs available from July–October before traditional killing begins. To achieve this early lamb, hormone treatments can be used so that ewes can be mated outside their normal breeding season. Breeds like Dorset and Finn have a naturally extended breeding season that can be an advantage for growing lamb for this market. This early lambing can have advantages for areas with dry summers but good autumn/winter feed is essential.

Alternatively, to meet the out-of-season demand, late lambs can be finished in the following winter/spring, but these are not as sought after as new season lamb in some markets.

BREED SELECTION

In order to produce quality prime lamb, a major decision is the choice of ram and ewe breed (or cross-breed).

Farm location, type of country, farm policy (breeding own ewe replacements, for example) farmer preference and market signals all affect this decision.

Rams

The choice of ram will provide most of the genetic improvement for optimum lamb production. The choice of ram breed will determine if the lambs:

- are faster growing
- are earlier maturing
- produce heavy carcass weights
- are lean (have a low fat depth on the carcass)
- have a high muscle area on cuts like chops.

Rams can be selected to produce replacement ewe lambs for the flock or be terminal sires where the lambs are only bred for their meat. The lambs will not be kept as replacements and will be killed for the meat trade.

Breeds such as Texel, Suffolk, Poll Dorset and Dorset Down produce large lean carcasses. The last three all have low carcass fat depth. Breeds can be crossed to incorporate desirable features from each breed. Cross breeds made up from several different breeds are called composites.

Terminal sires (photo right) are used to produce meaty lambs that will be killed for the meat processing market.

These sires will be bred to have desirable carcass qualities like low fat and a high muscle ratio.

When crossed with the ewes the resulting lambs will have characteristics wanted by the meat trade.

A composite (bred from several breeds) terminal sire breed.

Ewes

Ewes vary in their ability to have:

- twins or triplets (fecundity)
- high milk production
- lambs with high growth rates
- lambs with good carcass composition (weight, fat).

Selecting ewes with good lamb production characteristics and culling low producers results in increased flock performance.

Cross-breeding with Finns (Finnish Landrace) and East Friesians, which have a high lamb drop of about 260%, can introduce high fertility genes into a flock. This results in an increase in lambing by up to 20% or more.

A high-fertility crossbred ewe with triplets.

Ovulation rate and reproductive performance are heritable. Ewes with the Booroola and Inverdale genes have higher ovulation rates, but there are management issues in using these genes.

Characteristics of some sheep breeds

Breed	Characteristics
Finnish Landrace	High fecundity, newborn lamb hardiness and good potential for lamb growth. Decreases the fat in lamb carcasses.
East Friesian	High fecundity and high milk-producing ability, resulting in good lamb growth rates.
Texel	Newborn lamb hardiness and improved lamb carcass composition.
Poll Dorset	Good milk production and fertility, ability to lamb out of season, improved carcass composition.

High-milk producing breeds, like the East Friesian, can increase lamb weaning weights by as much as three kilograms carcass weight, in comparison with low-milking ewes.

GETTING THE EWES AND RAMS READY FOR MATING

Two major factors that affect lamb production before mating occurs are:

- day-length (light) which influences ram and ewe fertility
- nutrition which influences ovulation in ewes and ram fertility.

EFFECT OF LIGHT ON FERTILITY

Most breeds of sheep do not reproduce until the days become shorter in autumn. This is nature's way of making sure that lambs are born in spring, when there is plenty of grass for lactating ewes to eat. (The gestation period for sheep is nearly five months.)

In both ewes and rams there is a hormonal response to decreasing amounts of daylight. Day-length affects sheep because:

- The brain has an internal clock, which is set by light levels. When the days get shorter, the amount of melatonin produced by the pineal gland changes.
- The change in the amount of melatonin stimulates the pituitary gland.
- The pituitary gland then produces hormones that stimulate the reproductive organs.

In rams, semen volume and quality increase. In ewes, ovulating or 'cycling' begin.

Each cycle of 16−20 days consists of a brief period of oestrus or 'heat' (ovulation or egg release) lasting 24 to 72 hours, when mating can occur. If the ewe does not become pregnant in this time, she will cycle again.

NUTRITION

The amount and quality of feed are the end result of environmental inputs. Stock nutrition has a major influence on flock productivity and lambing percentage. Well-fed rams perform better. It takes approximately 50 days for sperm to develop and mature. So, when preparing for mating, improved feeding should start about two months before mating (January/February). Ovulation in ewes can be affected by long-term feeding levels and also changes in feeding levels. In general, higher ewe liveweight gives a higher rate of twinning.

The type of feed affects ovulation too, as it can be depressed by grazing ewes on some legume cultivars.

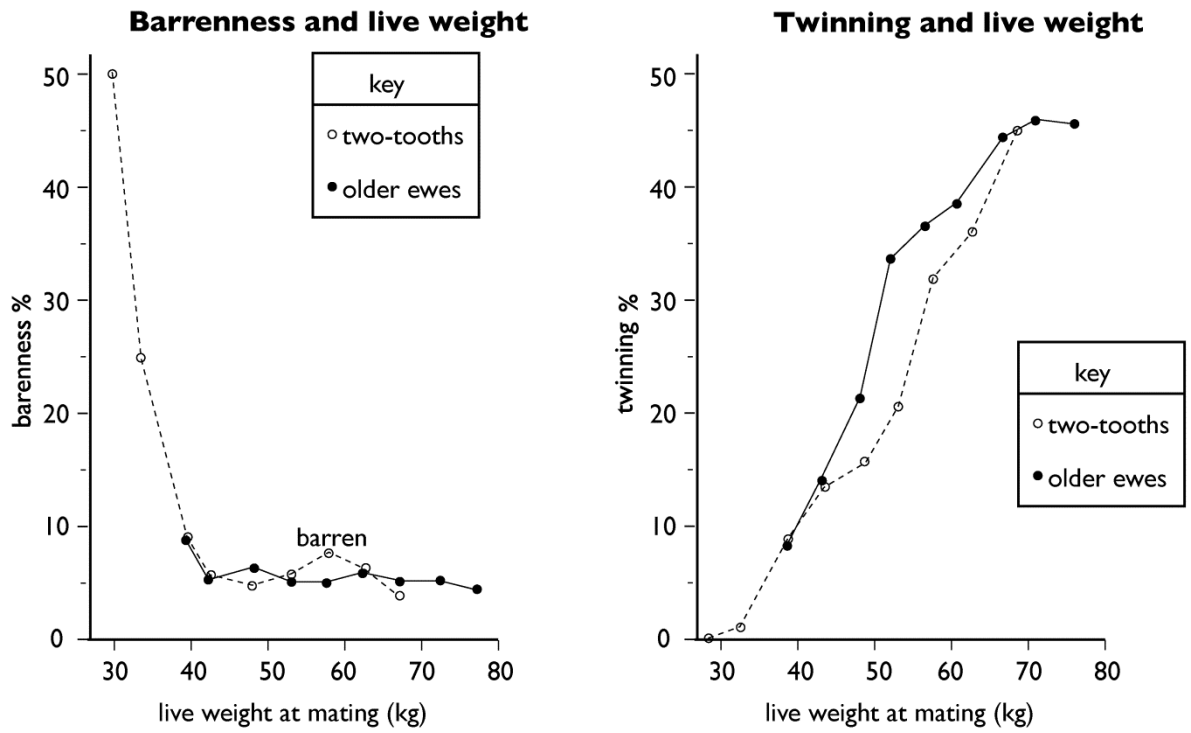
FLUSHING

Increasing feed levels is called flushing. It is carried out for 2–3 weeks before mating and can continue for a month after the rams are running with the ewes, depending on feed availability.

When ewes have higher bodyweights at mating time they are more likely to release eggs and conceive. So the number of ewes in lamb increases and the number of ewes with twins and triplets also increases.

2A FLUSHING

Use the two graphs below to answer the following questions. The left-hand graph shows the proportion of ewes that are barren (ewes that don't get pregnant at all). The right-hand graph shows the effect of the weight of ewes on the likelihood of twinning (carrying twins). Note: Two-tooths are 12–18 months of age, older ewes are over 18 months old.



1. a. What percentage of two-tooth ewes, with a liveweight of 40 kg at mating, are pregnant with twin lambs?

b. What percentage of two-tooth ewes, with a liveweight of 60 kg at mating, are pregnant with twin lambs?

_____

c. What is the trend in the twinning rate of liveweight at mating of two-tooths?

_____

_____

_____

d. How does liveweight at mating affect barrenness of two-tooth ewes?

_____

_____

_____

e. Does increasing the live weight of older ewes at mating increase the number of twins?

Yes No (Circle the correct answer.)

f. Is there an upper limit to how heavy ewes should be at mating? Say why you think there is, or isn't an upper limit.

_____

_____

Check your answers.

SYNCHRONISATION

Synchronisation is getting ewes in a flock to ovulate at the same time. This is done to:

- make ewes breed out of season
- get an early lamb crop
- shorten the period of lambing.

Introducing a ram, usually a vasectomised ram or teaser, early in the breeding season will encourage ewes to ovulate within 3–6 days but not get them pregnant. Hormones can also be used to achieve synchronisation.

RAM AND EWE HEALTH

In the establishment/pre-lambing stage there are inputs that can improve the chances of a large healthy lamb crop. These include improving and maintaining both ram and ewe health.

RAMS

Rams need to be fit, healthy and keen as tupping (mating) ewes is physically demanding work. Rams must be physically and reproductively sound.

Veterinarians can check ram fertility. Infertility can be temporary or permanent. Permanent infertility can be caused by a bacterium *Brucella ovis*, which causes brucellosis. Temporary infertility can be caused by stress from treatments like dipping and shearing or conditions like footrot. Shade should also be available for the animal in hot weather.

Shearing rams before mating increases their general mobility, although some wool helps to carry male pheromones, which help to bring the ewes into cycle. Ram testes must remain cool for the best sperm production and survival. Shearing the crutch before mating helps keep the testes cool.

All rams should be palpitated before selection for mating to make sure that they are healthy. All treatments should be completed well before mating.

HEALTHY EWES AND LAMBS

FERTILITY

Fertilisation of ewes may not occur if:

- there is no tupping or mating at all
- ewes have extremely low liveweights (they may not ovulate)
- sperm do not fertilise the egg (rams are infertile)
- rams are put out too early when ewes aren't in oestrus.

Other reasons for not producing a lamb may be due to the death of a fertilised egg or embryo. This can happen:

- when multiple ovulations occur
- in very young or very old ewes
- due to disease like brucellosis
- due to a nutrient deficiency, such as lack of selenium
- stress from factors such as high temperatures, poor nutrition and shearing.

Ewes that don't produce a lamb are called 'dry' or 'empty' ewes. Lamb losses from disease can be prevented by vaccination to protect both ewes and lambs from bacterial diseases like tetanus and blood poisoning.

Blood poisoning

Blood poisoning is a common disease of all ages of sheep, caused by the organisms *Clostridium chauvoei* and *Clostridium septicum.* These organisms enter the body either through wounds or by being swallowed. When they are swallowed, they can stay dormant until activated when the sheep suffers injury or severe exercise. This creates suitable conditions for their growth, and the disease

appears within one or two days. Outbreaks of blood poisoning in sheep may follow docking, shearing, dipping, vaccination and assistance at lambing.

Prevention: A single vaccination with a combined vaccine will give lifelong immunity, except when sheep are first vaccinated as hoggets, in which case a second vaccination is necessary when they are two-tooths. To protect lambs, the ewes must be re-vaccinated annually about three weeks before lambing to boost the antibodies. These are absorbed by the lamb in the colostrum from the vaccinated ewe.

FERTILITY, HEALTH AND LAMB NUMBERS

1. a. Why must rams be physically fit in the mating season?

b. What professional help can be used to test ram fertility?

c. What bacterium in rams can cause infertility in ewes, and what is the disease called?

d. Briefly explain the effect that reduced fertility could have on farm income?

2. a. Give two reasons for the non-fertilisation of ewes.

b. What are two possible reasons for a fertilised egg not developing?

3. Vaccination against blood poisoning protects the ewe. What needs to be done to protect her Lambs, and how is this protection obtained?

_____

_____

_____

Check your answers.

TUPPING (MATING)

RAMS AND MATING

The topography and size of the paddock as well as the age, number and genetics of the rams available all influence the optimum ram to ewe ratio. Using fewer quality rams with a proven production record can increase production. A ram : ewe ratio of 1 : 150 can be used for well prepared rams on flat land, However, a ratio of 1 : 100 is more common, especially for younger or older sheep. Ram hoggets are mated at a 1 : 50 ratio.

Mating groups should have several rams so that if one fails there is a chance the ewes will be covered by another ram. A ewe will take several rams.

CYCLING

Ewes normally cycle every 16−20 days for about three months. The rams are often left in for two cycles (5−6 weeks plus two weeks) so a ewe not tupped in the first cycle has a second opportunity. Rams can be left for three cycles but leaving them for this long results in an extended lambing period.

To identify ewes that have mated, harnesses with coloured crayon are put on the rams. The crayon rubs off on the ewe and shows whether it has been tupped or not.

By using different colours for each cycle, it shows in which cycle she was tupped. This is useful for identifying groups for lambing and dry (non-pregnant) ewes.

The ewe (on the left) has a blue mark from the ram (left). This shows the ewe has cycled and mated with the ram but at this stage it isn't known whether the ewe is pregnant.

Ewe with blue crayon mark from ram on right.

Dry ewes will either have:

- no crayon marks at all (showing she never cycled and/or didn't mate with a ram)
- lots of different coloured crayon marks (showing that she mated in different cycles but didn't get pregnant).

Shearing may stress ewes and prevent cycling, so it should be avoided before mating.

SCANNING

Some farmers use ultrasound to determine which ewes are:

- pregnant
- empty, or
- carrying multiple lambs.

If ewes are scanned then harnesses are not usually used as well. Empty ewes can be culled and those carrying twins can be separated from the rest of the flock and given appropriate feed.

The number and weight of lambs produced directly influence the gross income and profit potential. Heavy ewes have a higher percentage of multiple ovulations, and ewe weight and percentage of lambs weaned are directly linked. Individual lambs in multiple births may be lighter than single lambs, however, the total production will be higher per ewe with multiple births.

To achieve optimum ewe weight a farmer may need to:

- save feed especially for flushing
- irrigate pasture
- give ewes a larger grazing area
- speed up grazing rotation
- give ewes supplementary feed or crops, under difficult conditions.

RAMS AND TUPPING

1. Choose a common mature ram:ewe ratio for mating from: 1 : 50 1 : 100 1 : 300. (Circle your choice.)

2. a. For how many cycles are rams commonly left with the ewes?

_____

b. What are two advantages of choosing this number of cycles?

_____

_____

3. What is one method of identifying when ewes have been mated?

_____

4. What is one method of identifying if ewes are definitely pregnant?

_____

Check your answers.

FEEDING PREGNANT EWES

After flushing, ewe weight and condition are maintained throughout mating. Ewes need to be in good condition and have a high liveweight for high ovulation rates to occur at mating. High ovulation rates lead to a higher lambing percentage.

After two cycles, a winter feed programme begins. There are many variables in a winter feed programme:

- seasonal growth
- weather
- supplementary feed
- farm practices like slowing down the speed of rotational grazing and break feeding.

Nutrient deficiencies, such as selenium and iodine, should be avoided to prevent lamb deaths after birth.

In early pregnancy, the energy requirements of the foetus are small and useful food or metabolisable energy (ME) requirements are similar to a non-pregnant ewe. Underfeeding can cause embryonic death, or more often a low birth weight where the lamb will not survive past birth. Ewes need 1.0−1.3 kg of pasture dry matter per day at this stage to maintain body weight.

In late pregnancy, energy demands of the foetus can increase by 50%−100% over the maintenance requirements of the ewe. It is important at this stage to allow the ewe to maintain condition, keep healthy and prepare for lactation. Ewes, especially those with more than one lamb, often cannot eat enough to meet their energy requirements, as their gut space is restricted. Their own body reserves are used up and pregnancy toxaemia or ‘sleepy sickness’ can result from sudden or severe under-nutrition. Lack of nutrients, such as magnesium and calcium, cause metabolic diseases such as milk fever.

Underfeeding in the last stage of pregnancy can result in poor udder development and low milk production after lambing. Lambs with low body fat have less chance of surviving.

Overfeeding in late pregnancy can cause problems too. Large lambs can have a difficult birth and sometimes ewes straining to empty out can force the vagina or uterus to the outside causing a

'bearing' or prolapsed uterus. Fat ewes can become cast (unable to get up by themselves) and will die if not found by the farmer.

Protein supplements during the last stage of pregnancy can allow the ewe to produce more colostrum after lambing.

LAMBING

Ewes lamb 145−150 days after tupping. Lambing should be timed to begin at the same time as the increase in pasture growth in spring.

$$\text{Lambing percentage (\%)} = \frac{\text{number of lambs docked}}{\text{number of lambs mated}} \times \frac{100}{1}$$

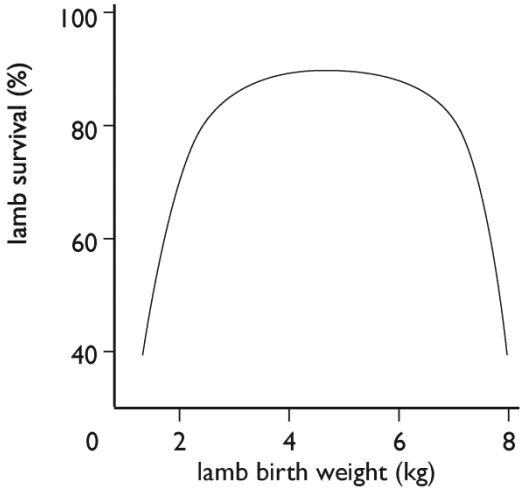
Farmers growing a lamb crop for the early season chilled lamb market will need to lower the stocking rate or bring in extra feed so there is enough for ewes and lambs during the lambing period. Husbandry inputs during lambing can range from intensive shepherding with 'lambing beats' twice daily to 'easy or natural care' where lambing ewes are left undisturbed. Over time, easycare lambing eliminates stock prone to birthing difficulties and increases survival rates.

The optimum lamb birth weight is 3.5−5.5 kg. Lambs born in autumn and winter have lower birth weights. Low birth weight lambs grow at a slow rate until 20 kg.

This graph shows that small lambs and very large lambs are less likely to survive.

Small lambs are weak, have difficulty feeding and are more likely to die from cold wet conditions.

Very large lambs are more likely to have, and cause, birthing difficulties which means more of them are likely to die.



SHELTER AND WEATHER

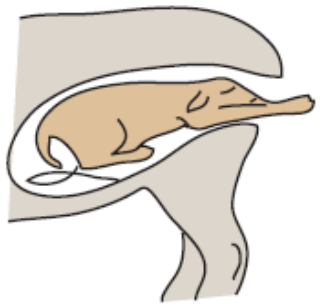
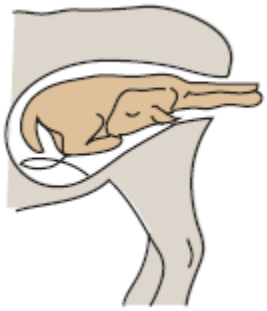
Where possible easier, more gently sloping land with shelter is used for lambing. In steep paddocks, twins can more easily get mismothered and bad weather can result in lambs losing body heat. This reduces the suckling drive. Suckling soon after birth is important as antibodies in the colostrum (milk formed in first few days that is rich in protein and antibodies) are absorbed in the first 12 hours.

Smaller lambs lose heat more rapidly and exposure deaths are more common in twins or where birth weights are low.

Ewes should not be disturbed from their lambing site so that bonding between the ewe and her lambs can take place. This results in less mismothering and lambs can find a teat and suckle milk quicker.

DIFFICULT BIRTHS

Difficult births or 'dystocia' are caused by either the ewe having a pelvic opening being too small for the size of the lamb (especially large single lambs), or the lamb being positioned incorrectly. The following illustrations show how some problems can occur.

 Normal position	 Head back	 Legs back

2D FEEDING AND LAMB SURVIVAL

1. Levels of feeding are important throughout pregnancy.
   a. In early pregnancy, how large are the demands of the foetus?

   _____

   b. What effect could severe underfeeding in early pregnancy cause?

   _____

   c. What conditions can be brought on by underfeeding in late pregnancy?

   _____

   _____

d. In late pregnancy, what can restrict adequate food intake (apart from feed shortage)?

_____

2. Lamb deaths are most likely to occur at birth and up to three days old.

a. In single lambs, dystocia is a common cause of death. What is dystocia and why should it affect singles more than twins?

_____

_____

_____

b. What is the biggest cause of death for twins?

_____

Check your answers.

KEY POINTS

- Markets for lamb include: prime market, including export, store, and contract.
- The market chosen will determine the schedule of operations.
- Breed selected will help determine the quantity and quality of lambs produced.
- Factors that affect lamb production before mating are nutrition, light levels and the health of both ewes and rams.
- High ewe liveweight gives a high ovulation rate and therefore a higher lambing percentage.
- Ewe : ram ratio at tupping depends on: breed, age of sheep, condition of both ewes and rams, and environmental conditions.
- Scanning is a useful tool to divide the flock into dry ewes, those carrying multiple lambs and those carrying singles.
- Nutritional requirements of ewes change throughout pregnancy.
- Lambing should be timed to coincide with spring pasture growth.
- Shelter for lambs and ewes in a quiet area improves chances of lamb survival.

3 LAMB GROWTH

LEARNING INTENTIONS

In this lesson you will learn to:

- describe the production processes for lamb
- explain why these production processes are needed.

INTRODUCTION

After birth, lamb growth goes through two phases:

- birth to weaning
- weaning to point of sale, either for slaughter, or as stores (lambs not ready for killing that are sold to other farmers), or for the live meat trade (not a current market but under review).

BIRTH TO WEANING

In the first three to five weeks, milk is the lamb's main diet.

Growth depends on two important factors:

- birth weight
- amount of milk it receives from the ewe.

Ewes do best on high quality legume pasture, as it is rich in protein which helps milk production and subsequent lamb growth. The breed of ewe also has an effect on the level of milk production. Lambs start nibbling grass when they are two to three weeks old. When ewes reach their peak of lactation, at about four weeks after lamb birth, their lambs are eating increasing amounts of pasture. After this, milk production begins to drop off. By weaning time, around 12 weeks, half the lamb's food intake can be grass. A good growth rate for lambs before weaning is 300 grams (g) per day but 500 g/day is possible.

Lambs eat more grass as they age and develop into a full ruminant. Twins will eat pasture earlier than single lambs.

WEANING

As ewe milk production declines and pasture becomes the major food intake for lambs, there is grazing competition between ewes and lambs. Pasture quality can also begin to decline at this stage and lambs require high quality for growth. To reduce competition lambs are weaned, that is, they are removed from the ewes and no longer have milk as part of their diet. The lambs and ewes then feed on different pastures.

Weaning lambs allows the grower to reduce the feed for the ewes and increase the feed volume and quality for the growing lambs.

If ewes are in poor condition, lambs can be weaned earlier to remove the competition between the ewes and lambs. This allows the ewes to gain weight and get back into condition before any adverse summer feed conditions caused by drought. The amount of feed, needed by the ewes after weaning, drops 20%.

The time of weaning can vary from 8–16 weeks after birth, but actual timing is dependent on:

- amount of feed available
- ewe weight (condition)
- lamb condition
- competition between lambs and ewes for feed
- desired growth rate of the lambs (they may still grow faster on the ewe).

Lambs can be weaned early, if a high quality legume pasture or forage crop is available and lambs have reached a liveweight of about 16 kg. However, this practice should be avoided, unless heading into a drought. Lamb target weights are about 25 kg. Lambs weaned younger than eight weeks old grow slower than if they were still feeding off their mothers.

Weaning often causes a temporary check (the lamb may lose condition) in lamb growth rates. When growth rates are high, lambs can achieve killable weights before weaning.

The timing of weaning should be aimed at slaughtering as many as possible as milk lambs (just off the ewe). Once weaned, their yield (carcass weight in proportion to liveweight) drops and they are less likely than an unweaned lamb to achieve a liveweight gain of 200 g per day. Costs, such as drenching and dipping, are also kept low if lambs are slaughtered early as milk lambs.

LAMB GROWTH

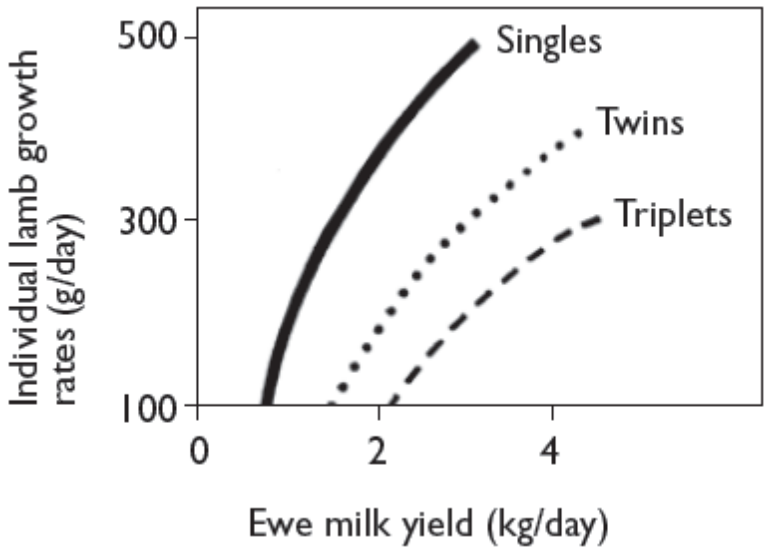
1. In the three to five weeks after birth, what are two factors that affect lamb growth?

2. What sort of pasture should ewes feed on and why?

3. When do lambs start nibbling pasture and at what stage is their diet approximately half milk and half grass?

4. What is a good growth rate for lambs before weaning?

5. Use the graph below to answer questions 5.a, and b.



Relationship between milk yield and lamb growth.

a. What effect does the number of births per ewe have on ewe milk yield per day?

b. How are individual lamb growth rates affected by the number of lambs born and surviving to each ewe?

6. a. What is weaning?

b. Why is it necessary?

c. When does weaning take place?

_____

d. Weaning can cause a check in growth rates unless lambs have plenty of nutritious feed to go onto. Use the table to answer the question below it.

Early and late weaning effects on lamb weight on hill country lambs			
	Lamb weight (kg)		
Time of weaning	November	December	January
November (10 weeks)	19.3	23.8	26.9
December (14 weeks)	19.3	24.6	27.9

c. Which time of weaning (10 weeks or 14 weeks) most affects lamb growth rates? Support your answer with figures from the table.

_____

_____

_____

Check your answers.

PASTURE AND LAMB GROWTH

After weaning, lambs are dependent on pasture as their main food source.

LAMB FEED REQUIREMENTS

The amount of food energy an animal needs, so that it is neither gaining nor losing weight, is called maintenance. Food energy above maintenance is changed into fat or protein for growth.

As their liveweight increases, lambs become less efficient at growing. In other words, they need more food energy to gain the same amount of weight each day because they require more energy for maintenance as body size increases.

The sex of the lamb also affects growth rates. Ram lambs, on average, have a 15% higher growth rate than ewes and they grow differently as they lay down less fat, and more protein and water than ewes.

Lambs average about 150 grams per day of liveweight gain in New Zealand.

PASTURE FOR LAMB GROWTH

For growth, lambs need to get energy and protein from pasture. The ideal pasture is one that provides high energy (from the grasses in the pasture) and high protein (from the legumes, usually

clover, in the pasture). The higher the protein value in the pasture, the more muscle (meat) a lamb will develop.

Lambs will grow at a faster rate if the pasture has high dry matter (DM) and a high energy content (metabolisable energy or ME).

Dry stalky summer pasture contains a high percentage of DM (28 per cent) but its ME is very low (ME of 8). This pasture contains only 10% crude protein so its quality is very low and, overall, is poor feed for growing lambs on.

Lambs can eat about 4.5% to 5.5% of body weight per day. They couldn't eat enough of this pasture to grow.

Dry pasture with high DM content but low ME.

'Mixed length leafy' is a good quality pasture as it has a very high protein value (25%) and the DM (15%) has a high ME concentration (11%).

Lambs will grow well on short leafy pasture (over 200 grams increase in liveweight per day).

Nutritious leafy pasture.

PASTURE MANAGEMENT

Short, leafy pastures are best for raising lambs on. To achieve this:

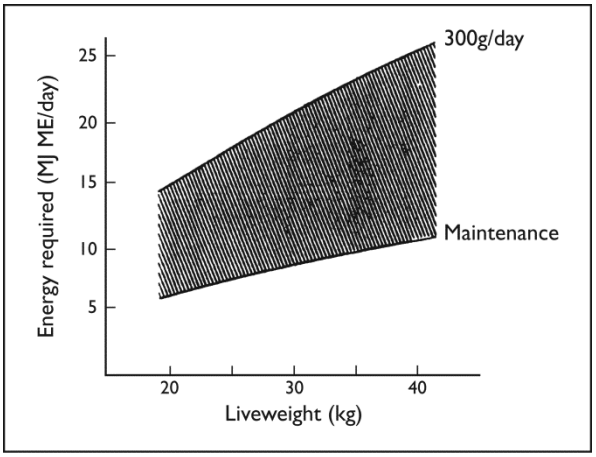
- the lambs graze with other stock, such as cattle, that will eat the longer, poorer quality feed
- or the lambs graze by themselves, then other classes of stock (such as cattle or older sheep) are moved in to graze off any longer grass. When the paddock recovers to the short leafy stage, it is ready for the next rotation of lambs.

3B LAMB GROWTH AND FEED REQUIREMENTS

1. What does the term 'maintenance' mean?

2. How does the sex of the lamb affect its growth?

3. Use this graph to answer questions a to e.



a. For a lamb at 20 kg liveweight, what is the energy requirement for maintenance? Give your answer in MJ ME/day (MJ measures the energy in megajoules).

b. For a 20 kg liveweight lamb, what is the energy requirement for a growth rate of 300 g/day excluding maintenance? Give your answer in MJ ME/day.

c. For the same 20 kg liveweight lamb, what is its total energy requirement, including maintenance, if it is to achieve a growth rate of 300 g/day?

d. For a 35 kg liveweight lamb, what is the energy requirement for a growth rate of 300 g/day? Give your answer in MJ ME/day.

e. From your answers to the above questions, what effect does increasing liveweight have on the energy requirements of a lamb?

Check your answers.

ALTERNATIVE FEEDS FOR LAMBS

When there are feed shortages, farmers can use forage crops to increase lamb growth.

Plantain, chicory and brassicas (such as kale, turnips, and swedes) can be used when grass pasture yield and quality are low. They are often used to finish lambs in summer because the quality is higher than that of many summer pastures.

Weaned lambs on a ryegrass/plantain mix.

The brassicas should be mature before they are fed to stock to prevent nitrate toxicity. They also need to be added to the diet gradually so the rumen has time to adjust to the new food. This helps to achieve high growth rates more quickly. Mixed feeding of hay and brassicas can also give high growth rates, as can other alternatives such as chicory and sulla.

LAMB HEALTH

Lambs need quality feed and good health to grow quickly from birth to harvest.

The main inputs to keep lambs healthy are:

- some aspects of docking
- parasite control
- disease control
- providing safe/clean pasture.

DOCKING OR TAILING

Docking describes five operations on lambs. These are:

- removing tails or tailing
- marking their ears to identify them (and often to mark their age)
- castrating male lambs so that they cannot breed
- vaccinating
- drenching.

Docking should be done when lambs are small, about three weeks old, because the stress of docking on bigger lambs is more severe and the check on growth is greater. However, the majority of the lambs need to be mobile enough to be able to be mustered so some will be older than three weeks.

Lambs are docked in paddocks because the ground is cleaner than dusty or muddy yards. Temporary yards are set up in suitable position in the paddock. The risk of infection through wounds made on the lambs is higher in permanent yards.

At three weeks old, they are also difficult to muster so the job is easier done in the paddock.

Docking in temporary yards.

Each lamb is caught and either positioned on a board mounted on a fence post, or placed in a docking cradle or chute.

TAILING

The tail is removed to:

- prevent build-up of dags (droppings) that make the wool dirty
- prevent flystrike (where flies lay eggs that develop into maggots which feed on the lamb's flesh)
- make the animals easier to manage at shearing.

By putting a rubber ring around the tail, the circulation of blood is stopped. This causes the tail to drop off later.

Docking using a rubber ring.

Some farmers prefer to burn it off with a hot iron that seals the wound and prevents bleeding.

This photo shows a lamb being docked in a chute with a hot gas scissor iron.

Docking using a scissor iron.

MARKING

Marking is where a piece of the lamb's ear is removed with a cutting punch. The ear marks can identify lamb ownership, sex and age. A marked left or right ear usually defines sex. Ear tags can be used too.

CASTRATING

Castrating is removing or destroying the testicles of male lambs. It is important when ram lambs may be on the farm at tupping time and could cause unwanted matings.

The testicles can be cut out with a knife, or dealt with by putting a rubber ring around them. The purse with the dead testicles inside will fall off later.

Castrated male lambs are called wethers.

Castrating a lamb with a rubber ring.

NON-CASTRATION

Most male lambs are tailed and castrated to make management easier, but leaving ram lambs entire can have advantages such as:

- faster growth than either wethers or ewe lambs
- carcasses that have more meat and less fat.

VACCINATING

Vaccinations give animals immunity (protection) against certain diseases. Immunity occurs when antibodies in the lamb fight the disease causing organisms. Immunity has two forms:

- active immunity (when exposure to a disease organism triggers the immune system to produce antibodies to that disease)
- passive immunity (when an animal is given antibodies to a disease, rather than producing them in its own immune system).

The most common of these diseases are tetanus and pulpy kidney. Other vaccines can also include blood poisoning and black leg. All of these diseases can be fatal to lambs.

The injection is given in a part of the lamb that will not blemish the carcass. When ewes have been vaccinated they are able to pass on some immunity to their lambs.

Vaccinating a lamb.

Active immunity

At docking, lambs are commonly given an injection containing toxoids. Toxoids are weakened toxins from a disease like pulpy kidney that are no longer toxic but that can still stimulate the animal to produce its own antibodies. These antibodies will then give the lamb active immunity to that disease. The immunity will not be immediate as it takes the body a little while to build up enough antibodies of its own.

Passive immunity

Ewes can be vaccinated for the diseases that affect lambs, such as blood poisoning and pulpy kidney. The ewes are given an injection late in pregnancy and this allows the lamb to gain protection as it drinks the ewe's colostrum. Lambs get antibodies from the colostrum for the diseases that the ewes have been vaccinated against.

If ewes are not vaccinated for tetanus then the lambs are given an injection of tetanus anti-toxin. This works immediately against the poisons that tetanus bacteria can produce without having to wait for the lamb to build up enough antibodies of its own.

IMPROVING HEALTH

Apart from feed, the main manipulation to achieve suitable killable weights and grades is to improve lamb health. This will increase growth rates and carcass quality. Lamb health can be improved through:

- drenching
- external parasite control
- facial eczema control
- ryegrass staggers control
- preventing mineral deficiencies.

PARASITES

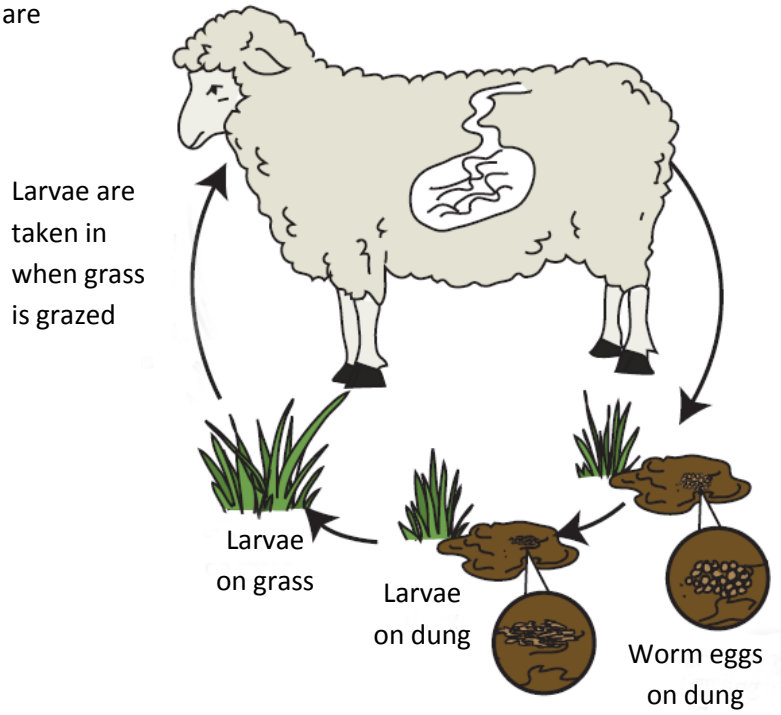
Some kinds of parasites live inside lambs (internal parasites), other kinds of parasites live on the outside of the skin (external parasites). Parasites, both internal and external, reduce productivity on sheep farms.

INTERNAL PARASITES

There are several types of internal parasites but the most economically important are roundworms. Roundworms are found in the abomasum (fourth stomach) and small intestine of lambs. Roundworms suck blood from the abomasum wall and the lamb reacts to the presence of the parasite in the gut. This causes the disease and reduces the lamb's growth. Signs of infection include reduced growth, reduced appetite, weight loss, anaemia, and diarrhoea/scouring. Scouring is a symptom of an allergic reaction caused by the presence of the parasite. Anaemia is caused through the blood loss.

Worm larvae are picked up when the lambs graze infected pasture. The larvae develop into adults in the lamb's gut. The adult worms lay eggs, which pass out in the faeces (dung).

These stages for roundworms are shown in this diagram.



Lifecycle of roundworms

3C CONTROLLING ROUNDWORMS

1. How do lambs get infected with roundworms?

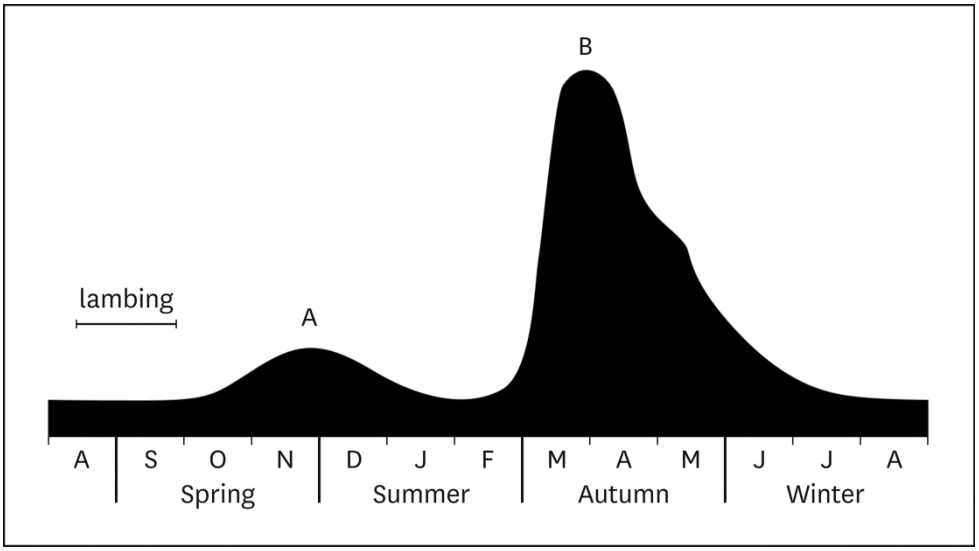
2. The following table shows the effect of roundworm infection on lambs. Both groups of lambs were fully fed. Protein deposition is a measure of the amount of muscle development in the lambs.

Physical attribute	**Worm-free lambs**	**Infected lambs**
Liveweight gain (%)	100	48
Fat deposition (%)	100	58
Protein deposition (%)	100	49

What effects do roundworms have on lamb growth?

3. What are four signs of possible roundworm infection in lambs?

4. Look at the graph below which shows the seasonal pattern of infective larvae on pasture.



Briefly explain the two peaks (A and B) in the graph.

Check your answers.

EXTERNAL PARASITES

Dipping is carried out to control sucking and biting lice and other pests which reduce wool quantity and quality, and damage skins.

Blowflies are a pest as they 'blow' (lay their eggs) on sheep. The blowflies are attracted by the smell of wet urine and faeces-stained wool.

When the eggs hatch, the maggots feed on skin and flesh. This is called 'flystrike'.

Maggots feeding on the skin of a lamb.

Production losses occur because flystrike can:

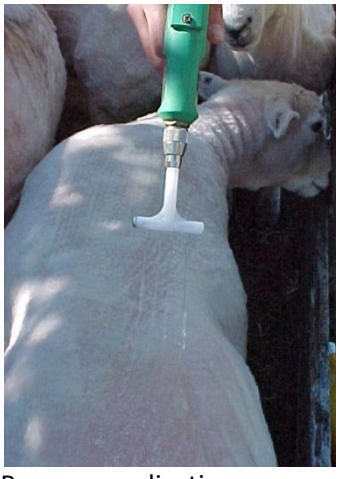
- cause animals to lose weight rapidly
- cause wool wastage
- cause pelt damage
- kill a sheep within three to four days.

It is an incapacitating disease and a serious animal welfare issue.

CONTROLLING EXTERNAL PARASITES

These are controlled by applying insecticides as:

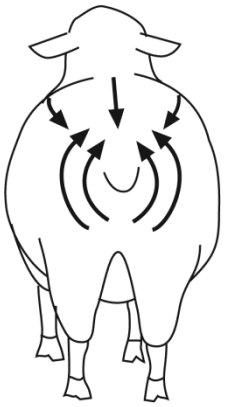
- dips and showers
- pour-ons and sprayers
- jetting or spraying with hand guns onto selected parts of the body.



Pour-on application.

In all systems, the shorter the wool, the easier it is, to wet the sheep.

Where sheep are flystruck, the wool around the affected area is clipped or shorn and the insecticide liberally applied. The picture shows the rear view of a sheep and the main sites to spray for blowfly.



Blowfly control application sites.

FUNGAL DISEASES

Two other important diseases, other than worm larvae, are found in pasture. These are facial eczema and ryegrass staggers.

FACIAL ECZEMA

In late summer and autumn, dead litter (leaves and stalks) builds up in the base of the pasture. In warm (days over 20°C and nights over 14°C), humid conditions, a fungus grows rapidly on the litter. The fungus produces a toxin called sporidesmin, which causes liver injury and photosensitivity in sheep. The common name for this condition in sheep is facial eczema.

Facial eczema control

Warm, humid conditions favour spore production and this can be followed by an outbreak of facial eczema. Farmers can identify danger areas by spore counting. To reduce the amount of spores that lambs take in with their diet and prevent the disease, farmers can:

- change grazing management and use safe paddocks
- spray pasture with fungicides
- dose lambs with zinc salts
- add zinc salts to troughs or feed.

The ultimate control of facial eczema will be to breed animals with genetic resistance to the disease. Resistance is highly heritable and there is wide variation in breeds and individual sheep.

RYEGRASS STAGGERS

In late summer, an endophyte fungus that grows inside ryegrass produces toxins. These toxins cause a nervous disease in sheep called ryegrass staggers. The staggers not only cause reduced growth rates but, with the resulting lack of coordination, may make farm activities such as stock movement, drenching and drafting impossible.

Ryegrass staggers control

Farmers can reduce ryegrass endophyte on their farm through pasture management. In summer and autumn, animals should not graze the bottom 2 centimetres of pasture, seed heads and stem.

New pastures species now have an endophyte that gives pest resistance but does not cause staggers, for example AR1.

Grazing clean pastures allows animals to metabolise fungal toxins and recover.

Other pasture types can be used, such as Italian and hybrid ryegrasses, or tall fescue, chicory or any non-ryegrass species that don't have endophyte problems. Having these types of pastures on a part of the farm allows farmers to graze susceptible animals on clean pasture at critical times.

EXTERNAL PARASITES AND FACIAL ECZEMA

1. List three ways of applying insecticides to control external parasites.

_____

_____

_____

2. When facial eczema spore counts are high, what can farmers do to reduce the effects of the spore toxin called sporidesmin?

_____

_____

_____

3. What can farmers do long term to reduce the facial eczema risk?

_____

_____

_____

Check your answers.

USING DIFFERENT PLANT SPECIES FOR FEED

It is not only the amount and quality of feed that affects growth rates. The species present also has an effect.

For example:

- Hybrid ryegrass such as 'Galaxy' and 'Maverick Gold' are produced by plant breeders by crossing annual or short-rotation ryegrass with perennial ryegrass. These varieties are used in summer wet areas where Argentine stem weevil is not a problem. These grasses are long-

lasting and give good winter feed production. ‘Maverick Gold’ does not contain endophyte and ‘Galaxy’ has good disease resistance.

- Impact ryegrass with ‘Plus AR1’ endophyte is ideal for finishing lambs in the autumn. This combination provides fast growing pasture with good winter growth and feed quality.

The trialling and use of new cultivars continue to be developed, not only of grasses and clovers but of other plants, such as chicory.

Chicory is a leafy tap-rooted herb which produces high quality summer feed. It also has a high mineral content compared to ryegrass and clover.

Chicory growing well in dry summer conditions.

Other supplementary feeds that can increase lamb growth rates include lucerne, turnips, rape, chou moullier and non-endophyte ryegrass. All of these improve lamb quality through better health because ryegrass staggers are avoided. (The endophyte fungus causing the disease is absent in these supplementary feeds.)

PREVENTING MINERAL DEFICIENCIES

Lambs get their minerals from the pasture they eat. However, there are four minerals or elements that lambs need in tiny amounts that plants do not need for healthy growth. These are the trace elements of cobalt, copper, molybdenum and selenium. These may not be present in some New Zealand soils.

Selenium is particularly important to lambs as it:

- prevents white muscle disease (which damages body and heart muscle)
- maintains disease resistance
- increases growth rates on soils like pumice.

It can be added to the soil as selenium prills (granules).

The amount of selenium that is available in pasture plants can be reduced by:

- high rainfall, especially in spring
- acid pH of soil
- legume dominant pastures, which are lower in selenium than grasses.

Cobalt, copper and molybdenum are usually added to fertilisers before they are put onto the soil. These minerals are then incorporated into the pasture plants that the lambs eat. These trace elements can also be given to lambs in oral drenches or sometimes by injections.

Selenium is needed in very small amounts (for instance 1−2 milligrams (mg) for one-month-old lambs) and in excess it is toxic. It is usually supplied as a drench, as an additive to a worm drench, or injected, and can be injected when using a lamb vaccine with selenium in it.

MONITORING GROWTH RATES

Growth rates can be monitored by regularly weighing samples of the lamb crop. This is usually done at drenching time (about every three weeks). Their weight grade as a carcass can then be estimated. To increase growth rates, factors such as stock health and feed management can be manipulated. Planning for ways to increase the growth rates of next season's lambs, such as choice of breed, pasture composition and leaving rams entire, can also begin.

LIVEWEIGHT GROWTH

1. A farmer wants all the lambs drafted off the farm in the next two months (60 days). Weighing has shown that liveweight (LW) is increasing at 180 g/day.

a. When is this weighing usually done?

_____

_____

b. If their average liveweight (LW) is 30 kg at the present time, what will their LW be in 60 days time?

_____

c. If carcass weight is 40% of LW, what would their carcass weight be in 60 days?

_____

d. If the growth rate had been increasing at 200 g/day, what would the LW be in 60 days?

_____

e. If the growth rate had been increasing at 200 g/day, what would the carcass weight be in 60 days?

_____

2. List four manipulations that may increase yield, quality and market opportunities.

3. If you wanted to increase your lamb growth rates what might you be able to do:

a. this season (after weaning)?

b. next season?

4. a. Fill in the table below, naming four trace elements, not always present in New Zealand soils and plants, that lambs need in their diet? How are they added to the lamb's diet?

Trace element	**How it is added to the lamb's diet.**

b. Why is selenium particularly important to lambs?

Check your answers.

KEY POINTS

- Lamb growth – important points:
  - First diet is colostrum and then milk.
  - Begin to eat pasture at 2–3 weeks.
  - At weaning, move onto an all pasture diet.
  - Weaning time depends on: feed available, ewe and lamb condition.
  - Weaning can slow down lamb growth.
  - Lambs can be slaughtered as milk lambs.
  - Need a feed level above maintenance to maintain growth.
  - Growth rate depends on age, sex and nutrition of the lamb.
  - Pasture should be high in protein – contain legumes.
  - Growth can be increased by forage crops, such as brassicas and chicory.
  - Have increased growth rates when healthy. This involves pest and disease control, safe pasture and docking.
  - Docking includes: tailing, marking, castrating and vaccinating.
  - Growth rates can be manipulated by: not docking, monitoring growth rates to help with feed management decisions, using different pasture species, maintaining good health.

4 HARVESTING LAMB

LEARNING INTENTIONS

In this lesson you will learn to:

- describe the production processes involved in harvesting lamb
- explain why these production processes are needed.

INTRODUCTION

As lambs grow, farmers need to decide when to sell and to which market, and then prepare them ready for sale.

WHEN TO SELL

This will depend on:

- availability of feed
- condition of the lambs
- what the market returns are.

These factors will determine whether to sell the lambs early at lighter weights, to the freezing works, or to other growers as stores, or later at heavier weights.

CHOICE OF MARKET

Decisions made during the establishment and growth stages in production, such as the timing of lambing and docking, affect the harvest of lambs. Rearing lambs is a financial risk, because market prices can change during the production process. Having a contract to supply lambs to a processor at an agreed price is one way of ensuring a guaranteed price. The majority of farmers don't have fixed contracts so need to constantly re-evaluate possible market opportunities during production. Part of this process involves keeping up-to-date with the movement of market prices.

Most farmers time lambing and rate of growth to hit a target weight on a particular date for a particular market. Choosing a market is usually done well before mating. However, farmers do have alternatives if the market returns shift during production. For example, if there is good pasture growth in an area near where the lambs are grown, then the decision may be made to sell the lambs on the store market. However, if there is good pasture growth where they are being raised, they may be kept to gain weight before being sold. Prime lambs can also be sold by auction at local sales where local butchers and meat processing companies will compete for killable stock.

CHOICES OF MARKETS

1. What are the three main factors that determine when lambs will be sold?

2. Name two market opportunities available if lambs are sold early at a lighter weight.

3. What are two common ways to sell prime lamb?

4. Lambs sold on the store market may be in demand. What market or other forces could affect price?

Check your answers.

GETTING LAMBS READY FOR SALE

There are manipulations at the harvest stage that can affect the yield, quality and profit of the lamb harvest. These can include:

- timing of weaning
- whether to shear or not
- skill at drafting
- practices that increase carcass quality.

Coordinating the sale or harvest of lambs at the best possible price determines the profitability of an enterprise. Preparing stock for sale is the last time the grower has an input into the lamb production.

TIMING OF WEANING

The timing of weaning needs to take into account when the lambs are going to be sold. Lambs go backward in condition just after weaning and it may take a few weeks for them to get back to

their pre-weaning weight and condition. If lambs are within 2–3 kg of target liveweight then they should not be weaned before selling. If they were weaned it would delay the sale date and more feed would be used feeding them.

SHEARING

Lambswool is a by-product of the lamb meat trade. It can be profitable to shear lambs with longer wool, if the value of the wool is greater than the costs of shearing.

If shearing is profitable, then there are other advantages because shearing:

- stimulates the appetite so that lamb growth is increased
- reduces the risk of dags, stained wool and reduces flystrike
- reduces carcass contamination (some processors offer premiums for shorn lambs or lambs that have had their belly wool shorn).

INCREASING CARCASS QUALITY

Practices that increase carcass quality include:

- keeping lambs clean and healthy
- observing withholding periods for drenches and dips
- allowing time after shearing for wool regrowth and healing of all cuts and bruises
- careful handling of lambs to avoid injury in yards or from dogs
- keeping lambs stress-free; chemical changes due to stress can reduce meat quality by affecting colour, texture or tenderness and keeping ability
- allowing lambs to empty out in yards before going to the works helps to keep the carcasses clean.
- crutching lambs, so they are clean around the belly and breech. Most processors will charge penalties for lambs that need to be dagged before they can be killed.

SKILFUL DRAFTING

Drafting is selecting lambs suitable for slaughter. The person drafting needs to be able to predict the carcass weight and fat cover from the live lambs. Using the drafter's skill and weighing scales, can help ensure the accurate selection of lambs at target weights and grades.

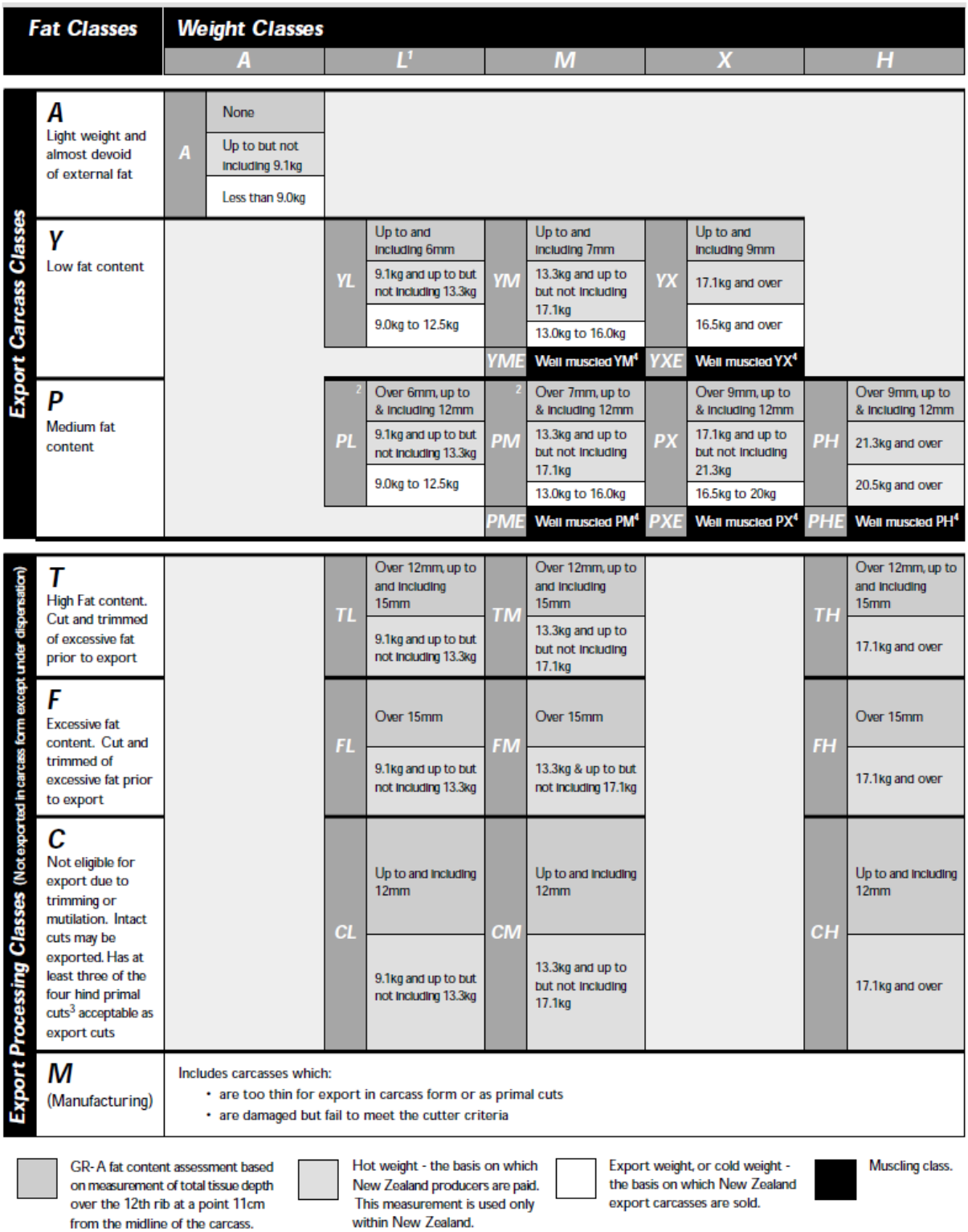
The time the lambs spend being drafted needs to be as short as possible, within 24 hours. Lambs can't feed during drafting so growth can be affected. In the first 12 hours, most weight is lost is due to passing urine and faeces. After 12 hours weight is lost from the carcass.

LAMB CARCASS GRADING

Producers are paid according to schedules based on the grading criteria shown below. Prices can change from week to week and from one processor to the next. Lambs are graded according to two main criteria and sometimes muscling:

- fat content – assessed by measuring the fat depth at a specific point on the carcass (GR measurement)
- carcass weight (hot and cold weights).

Lamb carcass grades



Fat Classes	Weight Classes									
	A		L[1]		M		X		H	
Export Carcass Classes										
A Light weight and almost devoid of external fat	A	None Up to but not including 9.1kg Less than 9.0kg								
Y Low fat content			YL	Up to and including 6mm 9.1kg and up to but not including 13.3kg 9.0kg to 12.5kg	YM	Up to and including 7mm 13.3kg and up to but not including 17.1kg 13.0kg to 16.0kg	YX	Up to and including 9mm 17.1kg and over 16.5kg and over		
					YME	Well muscled YM[4]	YXE	Well muscled YX[4]		
P Medium fat content			PL[2]	Over 6mm, up to & including 12mm 9.1kg and up to but not including 13.3kg 9.0kg to 12.5kg	PM[2]	Over 7mm, up to & including 12mm 13.3kg and up to but not including 17.1kg 13.0kg to 16.0kg	PX	Over 9mm, up to & including 12mm 17.1kg and up to but not including 21.3kg 16.5kg to 20kg	PH	Over 9mm, up to & including 12mm 21.3kg and over 20.5kg and over
					PME	Well muscled PM[4]	PXE	Well muscled PX[4]	PHE	Well muscled PH[4]
Export Processing Classes (Not exported in carcass form except under dispensation)										
T High Fat content. Cut and trimmed of excessive fat prior to export			TL	Over 12mm, up to and including 15mm 9.1kg and up to but not including 13.3kg	TM	Over 12mm, up to and including 15mm 13.3kg and up to but not including 17.1kg			TH	Over 12mm, up to and including 15mm 17.1kg and over
F Excessive fat content. Cut and trimmed of excessive fat prior to export			FL	Over 15mm 9.1kg and up to but not including 13.3kg	FM	Over 15mm 13.3kg & up to but not including 17.1kg			FH	Over 15mm 17.1kg and over
C Not eligible for export due to trimming or mutilation. Intact cuts may be exported. Has at least three of the four hind primal cuts[3] acceptable as export cuts			CL	Up to and including 12mm 9.1kg and up to but not including 13.3kg	CM	Up to and including 12mm 13.3kg and up to but not including 17.1kg			CH	Up to and including 12mm 17.1kg and over
M (Manufacturing)	Includes carcasses which: • are too thin for export in carcass form or as primal cuts • are damaged but fail to meet the cutter criteria									

GR- A fat content assessment based on measurement of total tissue depth over the 12th rib at a point 11cm from the midline of the carcass.

Hot weight - the basis on which New Zealand producers are paid. This measurement is used only within New Zealand.

Export weight, or cold weight - the basis on which New Zealand export carcasses are sold.

Muscling class.

You can see in the table above that the fat classes and their descriptions run down the left-hand side (increasing in fat as they go down the column). Carcass weight classes go across the top, increasing in weight to the right. The fat (in millimetres, mm) and carcass weight (in kilograms, kg) limits are given next to the grades. For example, an FL carcass weighs between 9.1 kg and up to, but not including, 13.3 kg, and can have fat over 15 mm.

4B LAMB CARCASS GRADES

Use the table to answer the following questions.

1. What is the description of the P carcass grade?

_____

_____

2. What is the weight range and fat of a PM carcass?

_____

_____

Check your answers.

Watch the DVD AG3043DV on lamb production.

KEY POINTS

- When to sell depends on availability of feed, condition of lambs, market returns.
- Lambs can be shorn before they are sold.
- Lambs should be free from injury, stress, dags and dirt, and withholding periods should be observed.
- Lambs should be drafted into groups of similar body weight and condition.

5 MANIPULATIONS TO INCREASE QUALITY

LEARNING INTENTION

In this lesson you will learn to:

- describe and explain manipulations used to increase the quality of lamb produced.

INTRODUCTION

In this lesson you will look at some of the manipulations that increase the quality of lambs for certain markets. Examples of these manipulations are:

- genetic improvement of the flock
- artificial insemination (AI)
- scanning ewes for muscle and fat
- using terminal sire rams
- raising cryptorchids
- feeding appropriately and monitoring liveweights.

GENETIC IMPROVEMENT

A commercial farmer can make permanent improvements in a flock by using genetic improvement. Good traits introduced into a flock will be passed on over generations of sheep. Over ten years, this can mean tens of thousands of dollars of extra profit for the farmer.

Genetic improvement in a flock used for lamb production is achieved by:

- buying good quality rams each year, or buying semen for AI (artificial insemination)
- measuring performance, for example, weighing carcasses, measuring muscling and fat content when meat is produced
- culling low-performers (usually smaller animals or ewes with low fertility)
- keeping better ewes and ewe hoggets for breeding.

Commercial sheep farmers usually buy rams from a sheep breeder (stud farm). A commercial farmer can make more money by buying rams that are:

- structurally sound, fertile and
- carrying good traits that are likely to increase production, or decrease costs.

Good rams contribute to 80% of the improvement of a flock, because they sire so many lambs. This is why it is important for a sheep farmer to carefully consider which rams will be used in the flock each year, or which rams are going to be used to artificially inseminate the ewes.

TRAITS THAT MAKE MONEY

The characteristics that will make money for a sheep farmer producing lambs for the meat trade are:

- the number of lambs born
- the number of lambs that survive until weaning
- the growth rate of lambs
- the amount of muscle and fat on a carcass
- disease resistance.

Some traits are more likely to be passed on to the young than others. Traits that are highly likely to be inherited have high heritability.

Heritability is the strength of inheritance of a trait from 0% (weakly inherited), to 100% (strongly inherited).

Heritability	Traits
High or strong (over 50%)	Carcass leanness
Medium (25%–50%)	Lamb weaning weight Liveweight
Low or weak (under 25%)	Survival rate of lambs Fertility

Note: although fertility usually has low heritability, some breeds or strains of sheep have high fecundity traits which have very high heritability.

Lamb survival until weaning has low heritability. This means that there is some genetic influence, but management of ewes before, during and after lambing is more likely to influence the lamb survival rate.

ARTIFICIAL INSEMINATION

Artificial insemination (AI) is one way of making genetic improvement in the ewe flock. AI involves taking semen from superior rams (often called elite rams) and artificially introducing it into ewes. Some of the advantages of doing this are:

- The flock can make good genetic progress for some chosen traits by using semen from valuable high genetic worth rams. The commercial farmer can use semen from very expensive rams without having to buy the ram itself.
- The genetic advantage of a superior ram can be spread over more ewes than the ram would be able to mate with naturally. This could be a farmer's own rams or semen from an AB (artificial breeding) company.

Artificially inseminating sheep is not as easy as AI in cattle. The techniques used for cattle don't suit sheep because of their smaller size of sheep and the complex structure of the ewe's cervix. These make it difficult to place the semen into the uterus.

Although there are two different types of AI used on sheep in New Zealand (cervical and laparoscopic AI), only cervical AI is likely to be used on commercial sheep farms.

CERVICAL AI

This is a relatively inexpensive procedure, so can be used by commercial sheep farmers. Fresh semen is normally used and the semen is put into the first fold of the ewe's cervix.

Steps in cervical AI

The ewes to be inseminated are run with a vasectomised ram*. The ram wears a harness with a raddle marker. The raddle leaves a mark on the ewe he has mated. This identifies the ewes that are in heat.

The ram will mate with the ewe but cannot fertilise her. He has left a blue crayon mark on the ewe's rump.

Ram (on right) with harness.

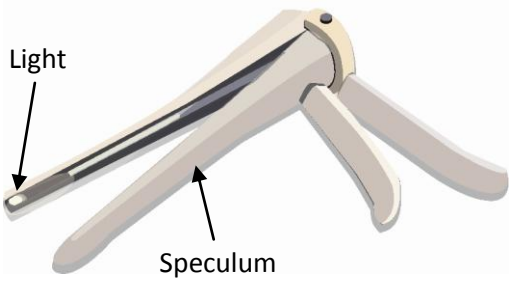
*A **vasectomised ram** has had its vas deferens (the tube that takes the semen to the penis) cut. The ram still has its testes producing hormones and so will want to mate; however, it will not be fertile.

The ewes that are marked are drafted off from the others.

An AI technician visits the farm several times, and artificially inseminates the ewes that have been drafted (are in oestrus).

Drafting ewes.

The ewe is held securely and the technician uses a speculum to open up the vagina. Some speculums have a built-in light, otherwise the technician uses a separate light or head torch. These lights are shone into the vagina to help the technician find the opening of the cervix.



Speculum with in-built light.

The technician then carefully guides the inseminating gun through the cervix. The semen is released when the gun is just through the cervix and into the uterus.
Like all artificial insemination techniques, the position of where the semen is deposited is important. The correct position improves the chances of success of the animal becoming pregnant. The sperm have less distance to swim to reach an egg.

Using AI from a superior quality ram is a way many sheep farmers are making faster genetic progress with their flocks.

5A USING AI FOR SHEEP

1. Why is it safe to use a vasectomised ram to find ewes that are in oestrus?

2. Why do the ewes need to be in oestrus before being inseminated?

3. Explain why a farmer might use AI (rather than natural mating) from a ram that they own.

Check your answers.

SCANNING FOR MUSCLE AND FAT

Most consumers don't want much fat and prefer plenty of lean meat. Breeders of terminal sires, and dual purpose rams, breed rams to have less fat and more muscle. When these rams are mated to the ewes, they produce lambs with lower fat and higher muscle area. The breeders measure the fat depth and rib eye muscle area in their nucleus rams and the rams they breed for sale, so they can keep improving those traits. Fat depth and the amount of meat in the rib eye muscle (a 'chop') can be measured by ultrasound scanning the live sheep. These measurements are not the same as the GR measurement which measures fat on the processed carcass.

Commercial sheep farms can measure these characteristics in their ewe flock to ensure their lambs have the potential to meet the market requirements. These farms can improve the genetics of their ewes by using the scanning results.

Genetic progress is made by:

- culling ewes with poor muscle area or very high fat content
- mating with rams that have high muscle/low fat
- keeping replacement ewe lambs from ewes that have high muscle/low fat.

SCANNING PROCEDURE

Sheep are usually measured in the same area for these measurements. This means all sheep are compared on the same rib, usually T12. This makes any comparisons valid.

The operator uses the last long rib and the hip bone to locate the 12th rib, which will be nearly half way between those two points.

A piece of wire is used to part the wool over the rib area, and then special oil is squirted onto the skin so that the ultrasound scanner head will make good contact.

The eye muscle is measured on the screen by measuring the length of the muscle (A) and the depth of muscle (B).

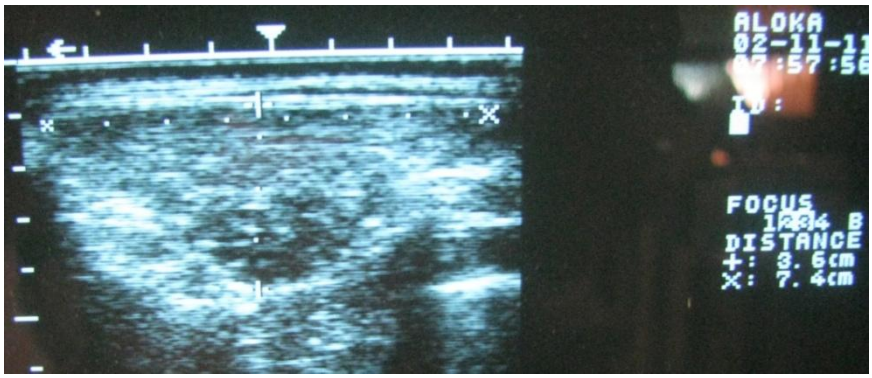
The scanner head is placed on the skin so the ultrasound waves go into the sheep.

The scanner is connected by cable to a screen and this shows the image of the rib eye area.

The eye muscle area can then be calculated by using a simple formula: A x B x 0.0077

The A length is between the x and X. In this scan it is 74 mm (7.4 centimetres).

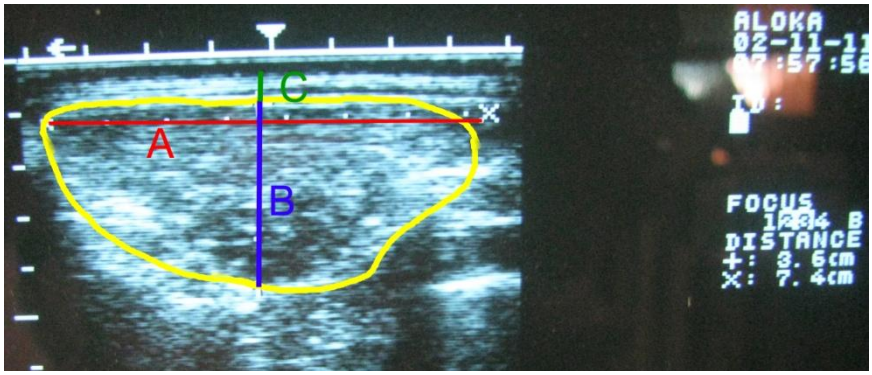
The B depth is measured between the two + symbols. In this scan it is 36 mm (3.6 cm).



The yellow line roughly shows the rib eye muscle.

The green line by the C shows the depth of fat that is measured.

On this ram it is 4 mm.



The identification number of the animal, its body weight and the rib eye and fat measurements are carefully recorded. These records and the rib eye area will be entered into a computer later.

Breeders can use the data to rank rams for these characteristics so they can make genetic improvement. Ram buyers can see the information and choose rams that will be useful in their flocks.

Commercial farms interested in producing high muscle/low fat lambs should buy proven rams that have been tested and bred for these features.

More meat, as well as better grade prices, means more money for those farmers when the lambs are killed.

5B SELECTING RAMS FROM MUSCLE AND FAT SCANS

The record sheet shows the A, B, and C scanning measurements in millimetres (mm) for rib eye and fat for five rams of similar weight. These come from a breeder of terminal sires who is keen to

increase the meatiness of the rams produced.

Ram number	Liveweight in kg	Length A in mm	Depth B in mm	Fat depth C in mm
417	84	76	40	7
609	83	80	42	6
536	82	68	35	6
477	84	81	43	5
495	83	70	30	8

1. a. Which ram do you think should be ranked the highest for meatiness?

_____

b. Briefly explain why you chose this ram.

_____

_____

2. a. Which ram would you cull because it is unsuitable for keeping and breeding for meatiness?

_____

b. Briefly explain why you chose this ram.

_____

_____

Check your answers.

USING TERMINAL SIRE RAMS

Terminal sires are rams that are used specifically to produce lambs for the meat trade. All the ewe lambs will be sold and none of them are kept as replacements.

Terminal sire rams are bred to have characteristics that are wanted for lamb production such as:

- high growth rates
- large frame but narrow shoulders for ease of lambing
- well-muscled carcasses
- low fat content.

A terminal sire ram.

RAISING CRYPTORCHIDS

Most male lambs are tailed and castrated to become wethers. This makes management easier as it avoids unwanted matings between wethers and ewe lambs. However, leaving ram lambs entire can have advantages such as:

- faster growth than either wethers or ewe lambs
- carcasses that have more meat and less fat.

Cryptorchids (pronounced *kripped – orchids*, like the flowers) have some of the advantages of both wethers and rams.

Cryptorchids are ram lambs which have had their testes moved back into the body cavity or held against the body wall by shortening the scrotum with a rubber ring. Body heat prevents testicle development so that the body growth and conformation of cryptorchids are part way between wethers and rams.

The testes are pushed out of the scrotum towards the body using one hand.

The rubber ring is then released trapping the testes against the body. The testes are too hot to produce fertile sperm.

Raising cryptorchids has several advantages:

- they can be grown to higher weights without excess fat. Cryptorchid lambs have 25% less fat than wethers.
- They can have a 15% higher growth rate than wether lambs (an extra weight gain of about 2 kg over 3 months).
- They grow like ram lambs, are infertile, and stay cleaner around the breech because they don’t have a long purse for the dung to stick to.

The amount of fat on a carcass can be measured by using the GR measurement. GR is the depth of fat over a rib measured in millimetres. This is usually measured on the carcass using a special probe. GR on the live lamb can be estimated by feeling for the fat cover over the bones.

5C COMPARING WETHER LAMBS, RAM LAMBS AND CRYPTORCHIDS

1. What are cryptorchids?

2. Use your knowledge and the table below to answer the following questions.

Comparison of some GR measurements in ewe, wether, cryptorchid and ram lambs GR (mm) adjusted to 16 kg cold carcass weight		
Ewe/Wether lambs	Cryptorchid lambs	Ram lambs
11.0	8.7	8.4
11.0	8.7	8.4
10.5	8.3	8.0
9.6	7.6	7.3
11.0	8.7	8.4

a. How does the GR (fat) measurement of cryptorchids compare with the GR of rams and ewes/wethers)?

b. What are two advantages of leaving ram lambs entire (non-castrated)?

c. What are three advantages of raising cryptorchids?

Check your answers.

FEEDING APPROPRIATELY AND MONITORING LIVEWEIGHTS

Feeding lambs appropriately is one of the most important things a farmer can do to increase the quality of the lamb crop. Lambs need to be fed so they can grow at their maximum potential. This means having adequate amounts of good quality pasture or other crops available. Quickly getting lambs to a killable size, for the chosen market opportunity, means the lambs are off the farm. This gives the farmer choices in using the remaining farm feed to grow out some of the smaller lambs or buy in store lambs.

GROWTH RATES

In spring, when pasture is growing quickly and is between 3 and 4cm long, there will be about 1300 kg of dry matter (DM) per hectare (ha). A lamb can eat 800 grams (g) of DM per day, and put on 160–200 g per day of liveweight.

In summer, pasture quality isn't quite as good as the lack of soil moisture slows growth and dries pasture. Pasture that is 2–3 cm long would produce 1400 kg DM/ha. A lamb eating 1 kg DM/day of this pasture would put on 130–150 g/day.

Farmers need to consider the quality of their pasture well in advance of growing the lamb crop. Supplying good quality, nutritious feed for lambs is very important and they may need to decide on whether pasture should be renewed or alternative crops grown. Average lamb growth on old pasture is 120g/day, whereas it is 200g/day on new pasture.

Monitoring lamb growth makes sure lambs are growing at the desired rate and that feed is not being wasted by being turned into excess fat.

Using electronic scales makes weighing lambs easy. Growth rates can be checked by comparing the present weights against the previous ones.

Feeling for fat cover gives the farmer an idea of how fat the lambs are.

When it comes to selling the lambs the carcass weights can be estimated from the liveweights so the best weight grades can be aimed for.

EFFECT OF FAT ON PRICES

It is important that lambs don't have too much fat as this would downgrade the carcass and lose money. If you look back at the 'Lamb carcass grades' table in lesson 4, you can see the range of fat for each grade. Exceeding 12mm of fat takes a lamb out of the P grade (medium fat) and puts it into T (high fat). Exceeding 15mm of fat takes a lamb out of the T grade and puts it into F (excessive fat).

5D EFFECT OF SCHEDULE PRICES

Use the table below to answer the following questions. This table shows one meat processor's schedule prices for P and F grade carcass weights.

Grade P									
from (kgs)	9.1	13.3	14.0	16.0	19.0	22.0	23.0	25.0	30.0
to (kgs)	13.2	13.9	15.9	18.9	21.9	22.9	24.9	29.9	
Cents per kg carcass weight	285	490	530	530	530	520	490	450	410
Grade F									
from (kgs)	9.1	13.3	14.0	16.0	19.0	22.0	23.0	25.0	30.0
to (kgs)	13.2	13.9	15.9	18.9	21.9	22.9	24.9	29.9	
Cents per kg carcass weight	225	450	500	500	500	490	430	390	350

1. a. In this particular schedule, what weights are paying the most per kg?

_____

b. In this schedule, what weight range gives the least return in the price per kg?

_____

c. From this schedule, can a carcass be too big to attract a high price per kg?

_____

_____

d. How much would a farmer lose per head by letting a 20 kg lamb go overfat? Show your working.

_____

_____

_____

Check your answers.

KEY POINTS

- Manipulations that increase quality are:
  - genetic improvement of the flock
  - artificial insemination (AI)
  - scanning ewes for muscle and fat
  - using terminal sire rams
  - raising cryptorchids
  - feeding appropriately and monitoring liveweights.
- Genetic improvement of the flock increases the effect of desirable genes for traits that the farmer is trying to improve on. This is achieved by:
  - buying good quality rams each year, or buying semen for AI (artificial insemination)
  - measuring performance, for example, carcass weights, muscling and fat content when meat is produced
  - culling low-performers (usually smaller animals or ewes with low fertility)
  - keeping better ewes and ewe hoggets for breeding.
- Artificial insemination (AI) allows a farmer to make good genetic progress in improving the flock by using semen from rams that they could not afford to buy, or from inseminating more ewes that the ram could naturally mate with.
- Scanning ewes for muscle and fat can improve the flock so that lambs will have more muscle and less fat.
- Terminal sires are used to produce lambs for the meat trade. These rams pass on useful meat characteristics like high growth rates, high muscle ratios and low fat content.
- Cryptorchids grow faster, leaner and have more muscle than whether lambs.
- Feeding appropriately and monitoring liveweights ensures lambs grow at their optimum and reach the desired target weight for the chosen market opportunity. It is important not to let lambs go overfat.

6 MANIPULATIONS TO INCREASE QUANTITY

LEARNING INTENTION

In this lesson you will learn to:

- describe and explain manipulations used to increase the quantity of lamb production.

INTRODUCTION

In this lesson you will look at some of the manipulations that increase the quantity of lambs for certain markets. Some of these quantity manipulations can also improve quality. Some important examples of manipulations that increase quantity are:

- breed selection
- genetic improvement of the flock
- flushing
- pregnancy testing.

BREED SELECTION

Some breeds naturally produce more lambs than others. Selecting a breed with high fertility will increase the number of lambs that are born. Breeds like Finns and East Friesians naturally produce more twins and triplets. The lambing percentage of these ewes is commonly 260%. The lambs must be fed well to ensure survival and good growth rates.

GENETIC IMPROVEMENT OF THE FLOCK

Having selected a breed and the characteristics that will increase the number of lambs born and surviving, the farmer can make genetic improvement in the flock. Careful breeding, measuring and selection will ensure the flock improves for the chosen traits like lambing percentages. Genetic improvement in a flock used for lamb production is achieved by:

- buying good quality rams each year, or buying semen for AI (artificial insemination)
- measuring performance, for example, the number of lambs docked, or the number of lambs weaned
- maintaining good records
- culling low-performers (usually smaller animals or ewes with low fertility)
- keeping better ewes and ewe hoggets for breeding.

FLUSHING

Flushing is a management practice that involves giving the ewes plenty of good quality feed around tupping time to increase the number of multiple lambs and overall lambing percentage.

Flushing starts at least three weeks before tupping when the ewes are given this better feed.

The feed must be of high quality (around 12 MJ or more of metabolisable energy).

Feed for flushing.

Increasing the bodyweight or condition of the ewe increases the number of eggs released from the ovaries.

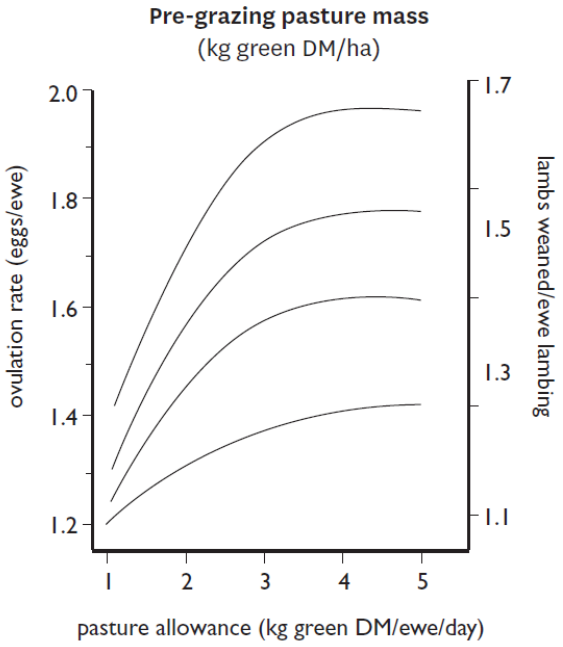
In a group of 100 ewes, there is likely to be up to 15 to 20 more lambs as a result of flushing.

Flushing increases the number of eggs released at mating time.

Environmental conditions in autumn can be variable and, while ewe weights may be below optimum, an improving level of nutrition has a positive effect on ovulation and lambing percentage.

This graph shows the response in sheep of different ages to increasing the pasture allowance.

As available feed increases, ovulation rate increases as well.



Flushing continues until about three weeks after mating.

6A FLUSHING

1. Using the graph on the previous page to help you, describe the relationship between ovulation rate and the amount of pasture offered.

2. Using your knowledge, give two possible reasons why the number of eggs produced doesn't equal the number of lambs weaned.

Check your answers.

PREGNANCY TESTING

Commercial sheep farmers use ultrasound scanning to improve survival and birth weight of lambs. Small lambs at birth are less likely to survive, especially in cold wet weather. A scanning technician can scan over 200 sheep per hour, making it a reasonably inexpensive procedure.

Scanning ewes and feeding them correctly increases lamb survival and therefore increases the quantity of lambs produced on the farm.

ULTRASOUND PREGNANCY SCANNING

Ewes can be scanned with an ultrasound beam to see whether they are carrying one, two or three lambs.

The ewes should be scanned within 95–100 days of when the ram was put in, and within 45 days of the ram being taken out.

For accurate results the ewes should be yarded and off the grass for 6 hours.

The ewes are held in a special crate which gives the operator access from the side to underneath the ewes so they can be scanned.

The scanning technician (left) sits on a low chair and places the probe on the belly by the udder.

The scanner uses an ultrasound head or probe to ‘see’ inside the ewe.

The ultrasound head is connected by cable to a monitor screen which shows the images.

The probe also has a tube attached to spray water on the skin to make good contact for the ultrasound to penetrate.

The probe on the bare skin between the udder and the thigh.

The scanning technician is checking the monitor screen for the number of lambs in the ewe, or if the ewe is empty (has no lambs).

The screen is shaded by the blue panels so it is easy to read.

Technician viewing the screen while scanning.

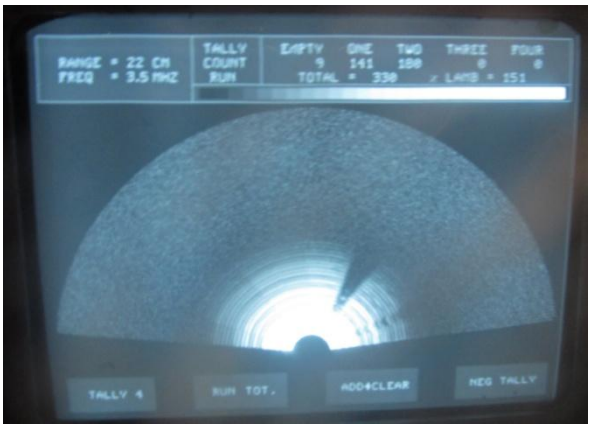
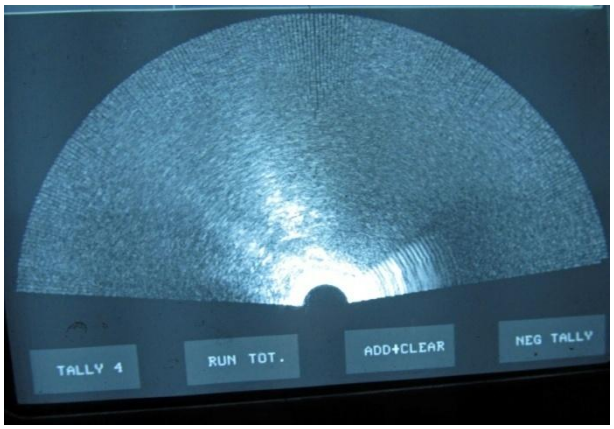
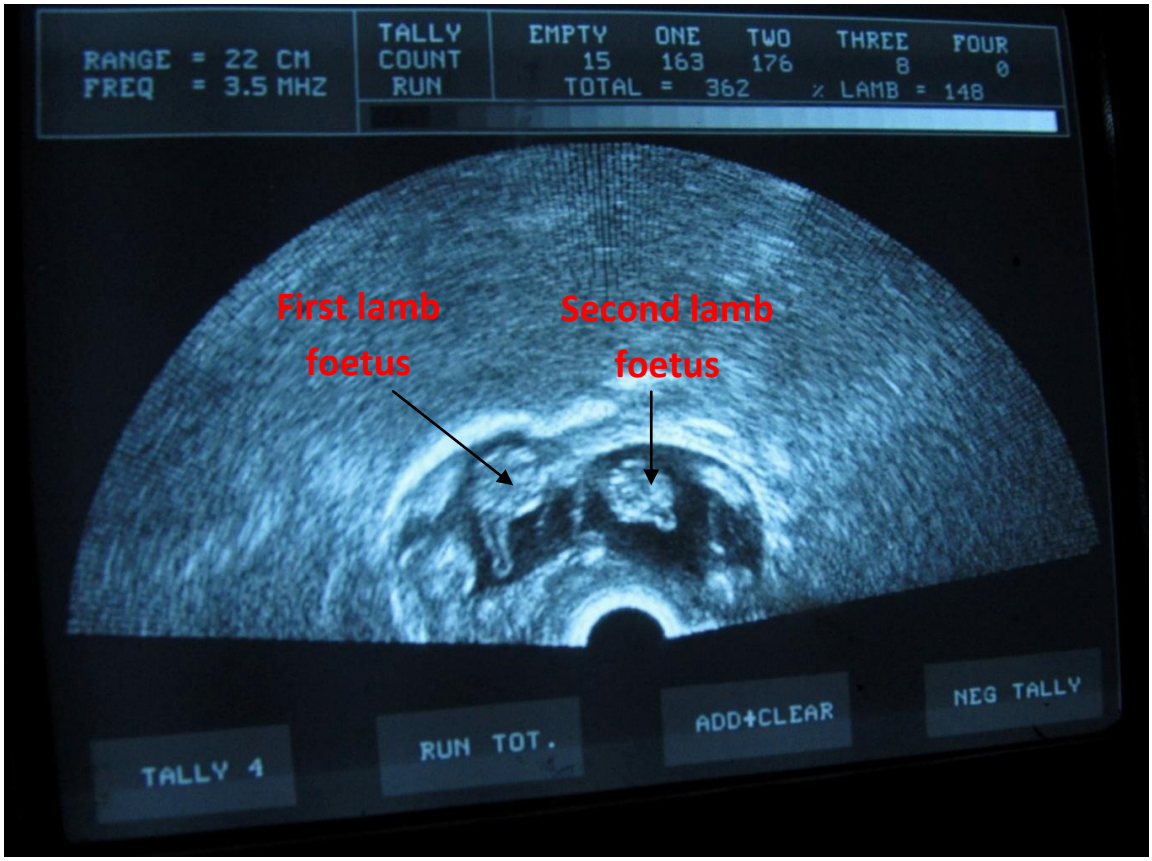


Image on the monitor screen when the probe is not being used.



An empty ewe (no lambs).



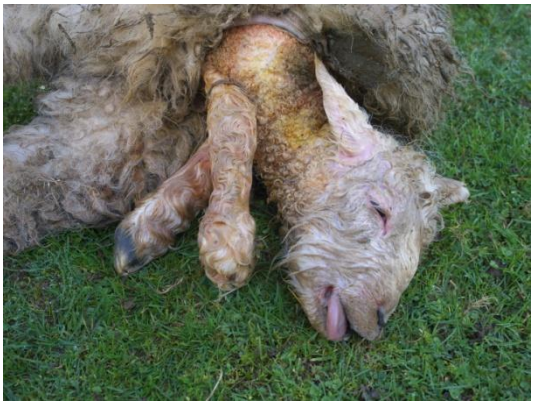
Twin lambs at a very early stage.

The farmer may sell the empty ewes now they are known to be dry rather than keeping them through the winter and not producing a lamb. This leaves more feed for the remaining sheep on the farm.

The ewes are marked and drafted immediately according to the number of lambs they are carrying (or if they are empty) and will be grouped into separate mobs. Sheep carrying more lambs are given more food by putting them on better quality pasture, feeding them winter crops and adjusting stocking rates. These twin and triplet lambs can now get more nourishment from the ewe and grow to higher birth weights. Larger twins and triplets are more likely to survive and not die from exposure than smaller multiple lambs.

Ewes with single lambs are fed less. This means single lambs are less likely to grow too big, avoiding birth problems (dystocia) for ewes.

Feeding ewes with single lambs the correct amount means more ewes and their lambs will survive since birth problems are reduced.


A large single lamb having trouble being born.

After the lambs are born, ewes with multiples are also fed more, so that they can feed their lambs well. Lactating ewes need to be fed well to produce a good milk supply for their lambs, as twins and triplets will need more milk.

Pregnancy scanning ewes allows the farmer to know how many lambs a ewe is carrying. This in turn means the famer can feed the ewes the optimum amount of feed to ensure lamb survival and a good growth rate. Scanning allows farmers to increase the number of lambs that survive (a manipulation of quantity).

Scanning also increases quality since feeding multiple lambs increases their size and subsequent growth rate. Low birth weight lambs grow slowly until 20 kg liveweight.

SCANNING EWES

In mid-June a farmer scans the ewes and drafts them into two mobs, single-bearing and twin-bearing ewes. At scanning they weigh about 62 kg. The farmer wants the single-bearing ewes to weigh about 65 kg, and the twin-bearing ewes about 67 kg at lambing time.

1. a. Describe how the farmer would achieve the weight differences between the twin-bearing and single-bearing ewes by lambing time.

b. Give two reasons why this farmer feeds the two groups differently.

c. Explain how this would improve the farmer's profits.

Check your answers.

KEY POINTS

- Examples of manipulations that increase quantity are:
  - breed selection
  - genetic improvement of the flock
  - flushing
  - pregnancy testing.
- Breed selection allows the farmer to choose desirable characteristics that can increase the number of lambs born and sold.
- Genetic improvement of the flock increases the effect of desirable genes for traits that the farmer is trying to improve on. This is achieved by:
  - buying good quality rams each year, or buying semen for AI (artificial insemination)
  - measuring performance, for example, the number of lambs docked, or the number of lambs weaned
  - culling low-performers (usually smaller animals or ewes with low fertility)
  - keeping better ewes and ewe hoggets for breeding.
- Flushing is a management practice of increasing the amount of feed given to ewes just before and just after mating. Giving the ewes an increased amount of high quality feed (around 12 MJ or more of metabolisable energy) increases the liveweight of ewes. This has the effect of making the ewes release more eggs resulting in more lambs born.
- Pregnancy testing ewes (using ultrasound scanning) allows:
  - farms to feed ewes the optimum amount of feed for the number of lambs they are carrying
  - the results of scanning and feeding to increase the survival rate of lambs and therefore increases the quantity of lambs produced
  - an increase in birth weights of multiple lambs which can also increase quality by increasing the lamb growth rates and their killable size.

7 MANIPULATIONS TO ALTER TIMING

LEARNING INTENTION

In this lesson you will learn to:

- describe and explain manipulations used to alter the timing of lamb production.

INTRODUCTION

In this lesson you will look at some of the manipulations that alter the timing of when lambs are available for certain markets. Most of the timing manipulations alter when the lambs are born. Three examples of these manipulations are:

- selecting breeds that can breed in the margins of the normal seasons, or out-of-season
- using hormones for out-of-season breeding
- accelerated lambing.

BREED SELECTION

Some breeds can breed over an extended breeding season, whereas others breeds have shorter defined periods that they can mate in. Several breeds are able to cycle and mate in the margins of the normal breeding season. Breeds like Finns, Dorset Horn and Polled Dorsets can produce lambs well outside the normal narrow seasons. Dorsets have well muscled carcasses and high growth rates, which also make them suitable for meat production. Lambs ready for slaughter in August attract a premium and breeds that can mate out of the normal season could be used to cash in on those higher prices.

Lambs ready for killing by September and October also attract a premium, so mating sheep slightly earlier than the normal season can bring increased profit if feed is available over the winter.

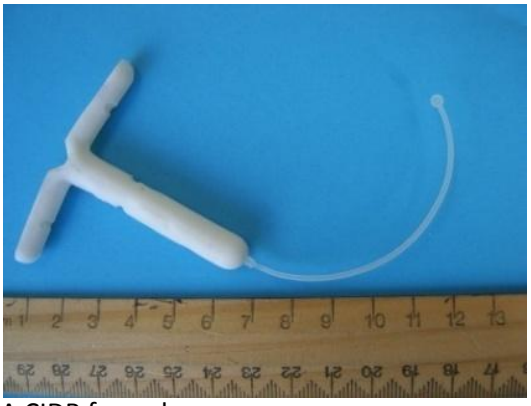
Later season lambs can be produced by mating hoggets. Their late lambs will still have the characteristics of lambs that are wanted by some domestic and export markets.

USING HORMONES FOR OUT-OF-SEASON BREEDING

Hormones can be used to get sheep to breed out of season, but this is not common in New Zealand. A breeder could do this to get an extra crop of lambs out of season, or lambs born in autumn, that could attract a premium payment.

Out of season ewes need progesterone treatment to help bring them into oestrus and synchronise the flock. To cycle normally, ewes need a period of high progesterone that then diminishes.

Progesterone is impregnated into a CIDR (**C**ontrolled **I**nternal **D**rug **R**elease device) and these are inserted into the vaginas of the ewes.



A CIDR for a sheep.

The sponges are removed after 7 to 12 days.

The ewes are then given an injection of a gonadotrophin, which starts the oestrus cycle. This is an intramuscular injection of eCG (equine chorionic gonadotrophin) also called PMSG.

The ewes come into heat a few days after the injection and all come into heat about the same time (synchronised). They are then ready to be mated and lambs will be born as normal about five months later.

Ewes in the yards for treatment.

When some breeds of rams are used, out of the normal breeding season, they also have to be given hormones to get them into top mating condition.

However, the cost of out-of-season hormone treatments, labour and having out-of-season feed available make this unattractive to most farmers.

ACCELERATED BREEDING

Accelerated breeding describes breeding more times than the normal once a year mating in the autumn and lambing in spring. In accelerated breeding ewes can lamb twice a year, or three times in two years, or many other increased combinations. Accelerated breeding systems involve altering the timing of mating and lambing, and also increase the number of lambs born over a time period.

Some matings will be normal and others will be timed for when ewes would not normally mate. Lambs cannot be weaned late otherwise the ewes will struggle to come into oestrus again. Apart from manipulating the mating times the farmer must have plenty of out-of-season feed available.

7A MANIPULATIONS TO ALTER TIMING OF LAMBING

1. a. What is one advantage of manipulating ewes to lamb out of season?

_____

_____

b. What are two things that have to be taken account of before manipulating ewes to lamb out of season?

_____

_____

_____

Check your answers.

KEY POINTS

Three manipulations that alter the timing of lambing are:

- selecting breeds that can breed in the margins of the normal seasons, or out-of-season
- using hormones for out-of-season breeding
- accelerated lambing.

8 PREPARATION FOR THE EXAMINATIONS

INTRODUCTION

Achievement Standard 91531 is externally assessed. You will need to sit the NZQA exam at the end of the year (usually in November) to have a chance of gaining the credits for the standard.

ASSESSMENT CRITERIA

These are the achievement criteria and what they mean, that apply to this standard.

Achievement criteria	What you have to be able to do
For Achieved you need to demonstrate understanding of how the production process meets the market requirements for a New Zealand primary product.	*Demonstrate understanding* involves: • explaining how the production process meets the specific market requirements for a nationally significant primary product.
For Merit you need to demonstrate in-depth understanding of how the production process meets the market requirements for a New Zealand primary product.	*Demonstrate in-depth understanding* involves: • involves explaining in detail how the production process meets the specific market requirements for a nationally significant primary product.
For Excellence you need to demonstrate comprehensive understanding of how the production process meets the market requirements for a New Zealand primary product.	*Demonstrate comprehensive understanding* involves: • involves using detailed explanations to justify how the production process used meets specific market requirements for a nationally significant primary product.

In the exams you need to be able to include specific detail in your answers. For example, if a question is asking for a description of the market opportunity, your answer will need to:

- identify the specific requirement
- provide some measure or data associated with the requirement.

General descriptions (eg 'low fat content', 'large size carcass') will only get the grade of Achievement at most.

PREPARATION BEFORE THE EXAMS

Before the exams you will need to research some up-to-date information on lamb, if that is the product you are going to use in the exam. This will help you get current specific detail on lamb.

Here are some examples of the sort of information you need:

- quantities of lamb exported to various markets
- actual market requirements (especially the size of carcass and fat content) for one or two markets
- schedule prices for lamb in common grades
- approximate costs of some farm practices/techniques that are used to manipulate the quality, quantity or timing of lamb.

When you have that information you will be able to explain how the production process meets the market requirements. You will be able to calculate the extra value obtained from various manipulations. Some examples of evaluating various production practices could be done by comparing:

- Flushing versus not flushing: calculate the number of extra lambs that could be born multiplied by the price they could get.
- Raising cryptorchids instead of whether lambs: calculate the extra weight per lamb multiplied by the schedule price for lean lamb to see the extra profit that could be gained.
- Careful feeding and monitoring of lamb growth against not monitoring feeding and lamb weights: calculate the loss of income from letting lambs go over fat and therefore missing out on the higher prices for leaner lamb grades in the schedule.

EXAM ANSWERS

These are the differences between what is expected in Achieved, Merit, and Excellence answers,

ACHIEVED ANSWERS

In an Achieved answer, the advantages of using a particular part of the production process are explained, and also, how they meet the specific market requirement.

MERIT ANSWERS

In a Merit answer, the advantages of using a particular part of the production process are explained in detail, and also, how they meet the specific market requirement. General descriptions without a lot of detail wouldn't be acceptable in a Merit answer.

EXCELLENCE ANSWERS

Excellence answers need the detailed explanations as in Merit but also involve justifying why a particular manipulation (part of the production process) is the most important or effective in meeting that market requirement. Justifying will need a comparison to say why the chosen manipulation is better than the others.

Recommended: use the Topic webpage to access the links to help you study for the exam.

9 ANSWER GUIDE

1. LAMB PRODUCTION AND MARKET REQUIREMENTS

1A Lamb production and markets

1. Rest of the European Union or European Union (either is acceptable).

2. European Union.

3. United States of America

4. Tonnes shipped to the United States of America are 17,449.

5. Japan

6. China

2. ESTABLISHMENT

2A Flushing

1.a. About 9% of two-tooth ewes mated at 40 kg are carrying twin lambs.

b. About 33% of two-tooth ewes mated at 60 kg are carrying twin lambs.

c. The rate of twinning in two-tooths increases as the liveweight at mating increases.

d. If a two-tooth is under 40 kg the likelihood of barrenness increases dramatically (at 30 kg, 50% of two-tooths are barren).

e. Yes, the rate of twinning in older ewes increases as the liveweight at mating increases.

f. Yes, there is an upper limit on the weight at mating because once the ewes are just over 70 kg the rate of twinning starts to decrease.

2B Fertlity, health and lamb numbers

1. a. Tupping is physically demanding and they need to be fit to mate as many ewes as they can.

b. Veterinary checks can test fertility.

c. *Brucella ovis* causes the disease epididymitis in rams, which can cause infertility in ewes.

d. Reduced fertility can result in less lambs being born (lower lambing percentage) which means less lambs will be available to be sold so less farm income.

2. a. Ewes won't be fertilised if (two reasons from): they don't ovulate, they aren't tupped, eggs aren't fertilised, or an egg dies.

   b. Stress due to things like disease, shearing, high temperatures, poor nutrition and nutritional deficiencies can stop fertilised eggs developing.

3. Lamb protection comes from pre-lamb vaccination of the ewe and protection is transferred by colostrum (first milk) to the lamb.

Rams and tupping

1. A common ram : ewe ratio is 1 : 100

2. a. Ewes are commonly left with the ewes for 2 to 3 cycles.

   b. Two cycles gives a tighter manageable spread of lambs, but three cycles will make sure more ewes become pregnant.

3. Put harnesses with coloured crayon on the rams and they will mark the ewes when they mate them.

4. Ultrasound pregnancy scanning.

Feeding and lamb survival

1. a. Demand is low in early pregnancy.

   b. Severe underfeeding could cause embryo death or low birth weights (where lambs don't survive after being born).

   c. Pregnancy toxaemia (sleepy sickness).

   d. The expanded uterus with the lamb(s) inside it restrict the rumen and gut.

2. a. Dystocia is a difficult birth. It can be caused by the lamb being too big for the pelvic opening or the lamb being positioned incorrectly. Dystocia is more common in single lambs as they grow larger than twins.

   b. The biggest cause of death in twins is exposure as small lambs are weak, have difficulty feeding and more likely to die from cold wet conditions.

3. LAMB GROWTH

Lamb growth

1. In the three to five weeks after birth the two factors that affect lamb growth are the lamb's birth weight and the amount of milk it receives from the ewe.

2. Ewes should feed on high quality legume pasture as it is rich in protein, which helps ewe milk production, and this in turn increases lamb growth.

3. Lambs start nibbling pasture when they are two to three weeks old and by weaning time their diet is about half milk and half grass.

4. A good growth rate for lambs before weaning is 300 g per day.

5. a. The greater the number of births, the higher the ewe's milk yield per day. Ewes increase the amount of milk they produce when they have more lambs.

b. The more lambs that a ewe feeds, the lower the growth rates of individual lambs. A single lamb will have the highest growth rate, next are twins, and then triplets have the lowest growth rates.

6. a. Weaning is removing lambs from their ewes so that they no longer have milk as part of their diet.

b. It is necessary because otherwise there is grazing competition between ewes and lambs.

c. Weaning usually takes place between 10 and 16 weeks after birth (the length is dependent on the amount of feed available).

d. Weaning at 10 weeks has a greater effect on lamb growth rates than weaning at 14 weeks. The table shows:

- The lambs weighed the same in November.
- By December the unweaned lambs (still drinking milk) have increased their weight to 24.6 compared to 23.8 kg for the lambs that were weaned in November at 10 weeks.
- In January the lambs weaned at 10 weeks weighed 26.9 kg and the lambs weaned at 14 weeks weighed a kilogram heavier (27.9 kg).

Lamb growth and feed requirements

1. Maintenance means the amount of food energy an animal needs so that it is neither gaining nor losing weight.

2. The sex of the lamb affects growth in the following way:
- Ram lambs on average have a 15% higher growth rate than ewes.
- Ram lambs grow rather differently in that they lay down less fat and more protein and water than ewes.

3. a. About 6.5 MJ ME/day.

b. About 8.5 MJ ME/day (15 - 6.5 = 8.5).

c. About 15 MJ ME/day.

d. About 23 MJ ME/day.

e. As the liveweight of a lamb increases, its energy requirements also increase.

3C Controlling roundworms

1. Lambs get infected with roundworms when they eat pasture which has infective larvae on it.

2. The table shows that liveweight gain in infected lambs is only about half that of worm-free lambs. The worms also lower the amount of fat and protein laid down (deposited) in the lamb's body.

3. Signs of infection include: reduced growth, reduced appetite, weight loss, anaemia, and diarrhoea (scouring).

4. Peak A is in late spring and peak B is in the autumn. Both these seasons have the warm, moist weather conditions that favour the development of eggs into infective larvae. Summer is too dry for many eggs to develop on the pasture. Peak B is higher because worm numbers build up from the spring peak and then really increase with warm wet autumns. The long cold winter season reduces the number of infective larvae.

3D External parasites and facial eczema

1. Three ways of applying insecticides to control external parasites are:

- dips and sprays
- pour-ons
- jetting or spraying with hand guns onto selected parts of the body.

2. When facial eczema spore counts are high farmers can reduce the effects of the toxin sporidesmin by:

- changing grazing management and using safe paddocks
- spraying pasture with fungicides
- dosing lambs with zinc salts
- adding zinc salts to troughs or feed.

3. Farmers could breed a flock that is resistant to facial eczema by buying rams that have genes that give them resistance to facial eczema. These rams will pass on the resistance to the ewe lambs that are kept as replacements for the flock.

3E Liveweight growth

1. a. Weighing samples of lambs is usually done at drenching time (about every three weeks).

b. Weighing has shown that liveweight is increasing at 180 g/day, so in 60 days the average lamb weight will increase by 180 × 60 which equals 10,800 g or 10.8 kg. If their average LW at the present time was 30 kg, then in 60 days they will have an average LW of 40.80 kg.

c. Carcass weight is 40 per cent of LW, so 40 per cent of 40.80 kg = 16.32 kg.

d. If the LW had been increasing at 200 g/day, then in 60 days the average lamb weight will increase by 200 × 60, which equals 12,000 g or 12 kg. If their average LW at the present time was 30 kg, then in 60 days they will have an average LW of 42 kg.

e. Carcass weight is 40 per cent of LW, so 40 per cent of 42 kg = 16.80 kg.

2. Four manipulations that may increase yield, quality and market opportunities for lamb are:

- not docking wethers
- monitoring growth rates
- using different plant species for feed
- improving health.

3. a. If you wanted to increase lamb growth rates this season (after weaning) you might be able to manipulate factors such as stock health and feed management.

b. If you wanted to increase your lamb growth rates next season you could consider things like a different choice of breed, changing the pasture composition, when to wean, leaving rams entire.

4. a.

Trace element	**How it is added to the lamb's diet**
Cobalt	Added to fertilisers before being applied to soil so the pasture contains the element. Can be added to oral drenches or Cobalt bullets placed in the rumen.
Copper	Added to fertilisers before being applied to soil so the pasture contains the element. Added to oral drenches or can be injected.
Molybdenum	Added to fertilisers before being applied to soil so the pasture contains the element.
Selenium	Selenium is needed in very small amounts and in excess it is toxic so it is usually supplied as a drench or as an additive to a worm drench or can be injected using a lamb vaccine with Selenium.

b. Selenium is particularly important to lambs as it:

- prevents white muscle disease (which damages body and heart muscle)
- maintains disease resistance
- increases growth rates on soils like pumice.

4. HARVESTING LAMB

4A Choices of markets

1. Three factors that determine when lambs will be sold are the following.

- Amount of feed. This often depends on the climate during rearing. For example, drought reduces feed quantity and quality.
- Condition of the lambs.
- What the market is doing. Are prices low, high or going to change?

2. Two market opportunities for early light weight lambs are meat processors or selling as store lambs for example by auction at local sales.

3. Prime lambs are commonly sold direct to a meat processor, by contract to a meat processor, or by auction at local sales.

4. Market forces and other forces that increase store market demand, and therefore price, could come from:

- shortage of stock numbers
- prospect of higher prices
- plentiful supply of feed.

4B Lamb carcass grades

1. a. P carcasses are described as having medium fat content.
   b. The hot weight range and fat of a PM carcass is:
   - hot weight 13.3 kg and up to, but not including, 17.1 kg
   - fat over 7 mm, up to and including 12 mm.

5. MANIPULATIONS TO INCREASE QUALITY

5A Using AI for sheep

1. A vasectomised ram has his vas deferens cut which stops the sperm travelling all the way down to the penis and being able to be ejaculated. The ram still has the desire to mate (as its testes are intact) so will detect ewes in oestrus and 'mate' with them. However it can't fertilise the ewes since the semen can't be ejaculated.

2. The ewes need to be in oestrus because that is the time their bodies are getting ready to release eggs. If the ewe is not ready to release the egg then the semen will never be able to fertilise it as sperm have a very short life.

3. More ewes can be artificially inseminated by a ram than by natural mating. An elite ram's semen is used over more ewes. The farmer can buy and use semen from a ram that would be too expensive for them to own.

5B Selecting rams from muscle and fat scans

1. a. Ram 477

b. It has the longest A and B measurements (81 mm, 43 mm) and the least fat (C = 5 mm). These measurements make it the meatiest of these rams.

2. a. Ram 495

b. Ram 536 actually has the smallest A measurement (68 mm). However, ram 495 is second smallest with 70 mm and has a much smaller B measurement (30 mm, ram 536 is 35 mm) along with the biggest fat measurement (C=8 mm). This makes ram 495 the least meaty and most fatty of these rams so would not be good to keep and breed from to produce terminal sire rams.

Comparing wether lambs, ram lambs and cryptorchids

1. Cryptorchids are ram lambs that have had their testes either moved back into the body cavity or held against the body wall (by shortening the scrotum with a rubber ring).

2. a. GR (fat) measurement of cryptorchids is slightly higher than that of rams (for example 8.7 mm GR fat in cryptorchids, compared to 8.4 mm fat in ram lambs. However, cryptorchids have a considerably lower fat GR than ewe/wether lambs which have 11.0 mm fat.

b. Advantages of leaving ram lambs entire (non-castrated) are that, compared to wethers and ewes, they grow faster and their carcasses have more meat and less fat.

c. Three advantages of raising cryptorchids from:

- they have 25% less fat than wethers
- they can have a 15% higher growth rate than wethers
- can be grown to higher weights than wethers without excess fat
- they won't cause unwanted matings like ram lambs can
- they can grow like ram lambs but stay cleaner around the breech as the purse is so short.

Effect of schedule prices

1. a. Carcasses between 14 to 19 kg pay the highest cents per kg (530 c/kg for P grade).

b. Carcasses 9.1 to 13.2 kg pay the least for both P and F grades. Grade F in this weight range is lower than grade P (225 c/kg).

c. Yes, the price per kg starts to decline after 21.9 kg and has dropped a lot once over 30 kg.

d. To work out the loss per head you need to compare the P grade and F grade (excessive fat).

A 20 kg P grade carcass would return 530 c/kg compared to 500 c/kg as an F grade.

P grade: 20 x 530 = 10600c ($106.00)

F grade: 20 x 500 = 10000c ($100.00)

The loss would be $6 per lamb.

6. MANIPULATIONS TO INCREASE QUALITY

6A Flushing

1. There is a direct relationship between feed offered and ovulation rate. More feed available for the ewes increases the number of eggs released per ewe.

2. Two reasons from: eggs may not be fertilised, embryos may abort, still-born lambs, lamb deaths at birth, lamb deaths between birth and weaning.

6B Scanning ewes

1. a. The ewes with singles will have been stocked at a higher rate (more ewes per hectare) so they get less feed than the twin-bearing ewes. The twin bearing ewes will have been put onto good feed at a lower stocking rate so they get more feed.

b. Two reasons why the groups of ewes were fed differently:

- The twin lambs would have a heavier weight at birth. This improves lamb survival, and lambs have a higher weaning weight.
- The single lambs will not grow so big that they cause birth problems for the ewe.

c. This would improve the farmer's profits because more lambs can be sold. This is because more lambs survive at birth. The twin lambs can grow bigger inside the ewes and therefore are more likely to survive at birth, especially in bad weather. There should also be fewer deaths from difficult births in the singles. These can occur when single lambs grow too big inside ewes that are fed too much. Another reason for increasing the profit is that lambs with heavier birth weights have higher weaning weights (and so get a higher price when sold).

7. MANIPULATIONS TO ALTER TIMING OF LAMBING

7A Manipulations to alter timing of lambing

1. a. One advantage from: lamb can be sold at higher schedule prices, accelerated lambing would increase the total number of lambs sold.

b. Two things that need to be taken account of are: having enough out-of-season feed, and costs of getting the ewes to cycle (labour and hormone treatments).

ACKNOWLEDGEMENTS

Every effort has been made to acknowledge and contact copyright holders. Te Aho o Te Kura Pounamu apologies for any omissions and welcomes more accurate information.

Cover photo: Docking, all © Dave Jackson, Te Aho o Te Kura Pounamu, Wellington, NZ. Used by permission.

Export lamb carcasses; Rack of lamb; Lambs 5 months old; Lambs teeth; New permanent incisor; Two tooth; Drenching lambs; Healthy lambs; Lamb meat; Meat processing plant; Store lambs at auction; Composite terminal sires; Ewe with triplets; Ewe with ram in ram harness x 2; Ewe with newborn lamb; Dry pasture; Nutritious leafy pasture; Lambs on ryegrass/plantain; Docking in temporary yards; Docking using rubber ring; Docking using scissor iron; Castrating with rubber ring; Vaccinating a lamb; Flystrike maggots; Pour-on application; Chicory in summer; Drafting; Muscle scanning locating rib; Muscle scanning parting wool; Muscle scanning head on skin; Muscle scanner screen; Eye muscle screen shot; Eye muscle area; Scanned rams; Terminal sire ram; Pushing testes out of scrotum; Releasing rubber ring on cryptorchid; Automatic weighing; Feed for flushing; Ram at mating time; Pregnancy scanning setup; Probe on skin; Technician viewing screen; Image of ultrasound screen; Empty ewe screen; Twin lamb screen shot; Large single lamb; CIDR for sheep; Ewes in yards, all, © Dave Jackson, Te Aho o Te Kura Pounamu, Wellington, NZ. Used by permission.

Data: Lamb exports to main countries; Lamb exports to main market regions; Timing of lamb exports to EU, all from Beef & Lamb New Zealand.

Extract: New Zealand Meat – guide to lamb and mutton classification, lamb carcass grades from New Zealand Meat classification authority, Feb. 2004. Used by permission.

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