final report

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Redevelopment of UNE sheep production course materials and alignment with UNE teaching flock

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1 Abstract

The objective of this project was to support the updating of key sheep production units offered via UNE to 10 Australian universities to increase sheep meat production content. Another objective was to also utilise new teaching opportunities provided by the teaching flock being developed on campus at UNE. Complete reorganization of two sheep units occurred as result of the project and it supported development of teaching material (lecture notes, PowerPoint slides and practical notes) for the unit WOOL412 (Sheep Production) for delivery in both internal and external (distance learning) mode. A set of practical classes with supporting notes were developed using the demonstration sheep flock at Trevenna adjacent to the main campus at UNE that is currently part of the project B.CCH.1033 *Demonstration projects for on-farm practical methane management strategies – Trevenna*.

The outputs of this project will support Rural Science and Agriculture students from around the country to develop a more detailed and accurate understanding of the science of sheep and wool production and the current state of the Australian sheep industry. These students are likely to be working in the sheep industry in some capacity upon graduation so will have developed a base of knowledge they can use in their future careers.

2 Executive Summary

The objective of this project was to support updating and integration of key sheep production units – ANPR420 (Sheep Meat Production and Marketing - no longer offered), WOOL412 (Sheep Production) and ANPR450 (Managing Sheep Enterprises) – to redevelop course materials and integrate them with new teaching opportunities provided by the teaching flock being developed on campus at UNE. The background is that UNE had ceased to offer ANPR420 (Sheep Meat Production and Marketing) due to insufficient enrolments, leading to an imbalance in the teaching of the meat and wool aspects of sheep production.

Under the reorganisation prompted by this project the unit ANPR50 was altered to cover both technical and financial aspects of sheep flock management and renamed “Sheep Management”. WOOL412 (Sheep Production) was completely overhauled with a significant amount of material from the sheep meat unit included and the unit made available for internal as well as external (distance learning) delivery. A completely updated set of unit notes was developed for this unit together with a set of practical classes and accompanying notes. This material is currently being delivered to approximately 60 students enrolled in this unit in Trimester 1 2012.

WOOL412 is part of the Australian Wool Education Trust’s (AWET) Hub and Spoke Delivery of sheep and wool education resources administered through UNE. This means that UNE delivers these resources to ten other universities around Australia through cross-institutional enrolments. As such this unit will be undertaken by students, both undergraduate and postgraduate, around the country who will be able to gain a greater understanding of the Australian sheep industry. As these students are often in their final year of study they will soon be working in industry where they will have a solid knowledge base of factors affecting the sheep industry.

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4 Background

At the AWET meeting on Feb 5, 2010 the closure of ANPR420 (Sheep Meat Production and Marketing) was discussed together with a report on evaluation of the content of this unit and that of WOOL412 (Sheep Production) prepared by Profs Kevin Bell and Andrew Vizard. Trustees were advised that there was much to be gained by merging WOOL412 and ANPR420. WOOL412 was light on information for prime lamb producers. There were some badly written chapters and some overlap between the two units. Trustees concluded that merging ANPR420 into WOOL412 would provide a wool unit which better reflected the current market requirements. As such AWET and MLA provided support to update and merge these two units to form a more comprehensive Sheep Production unit.

At UNE a new development has been the establishment of a teaching flock at Trevenna adjacent to the main campus. The aim is to have students engage more closely with a production flock on campus for their prac work and to involve them more in practical flock management and decision-making. At the moment the flock comprises 144 Merino ewes joined to Border Leicester rams in April as part of the B.CCH.1033 *Demonstration projects for on-farm practical methane management strategies – Trevenna*. A further development at UNE is pressure from internal UNE students to have WOOL412 offered in "internal" mode so that students are not obliged to give up part of their holidays/prac work to attend intensive residential schools. This requires face-to-face delivery of lectures and practical classes. This pressure can be expected to increase in the future with the introduction in 2011 of a 4-year Animal Science degree with specialisation in sheep and wool available within the degree. This project also supported the development of teaching materials to offer WOOL412 in both internal and external mode.

5 Project Objectives

The objective of this project is to support updating and integration of key sheep production units – Sheep Meat Production and Marketing, Sheep Production and Managing Sheep Enterprises – to redevelop course materials and integrate them with new teaching opportunities provided by the teaching flock being developed on campus at UNE.

6 Methodology and Results

This project was carried out with the assistance of a teaching fellow, Ms Rachelle Hergenhan, appointed as the Sheep and Wool Curriculum Development Officer. Her role was to work with the academic staff involved to determine which aspects of the unit notes required updating, addition or removal according to the current state of the industry. Once the topics for inclusion had been decided on authors were commissioned to update the information in these topics where appropriate or to rewrite complete topics. The structure of the unit notes was changed from a series of topics to a series of lectures to facilitate the transition from external only to external/internal mode. Authors were commissioned from various parts of the industry including NSW DPI, Sheep Genetics, University of New England and sheep producers. The complete set of updated unit notes is included as a separate attachment.

A series of practical classes were also developed to give internal students a hands on experience of some of the concepts learnt during the theory sessions. External students will also participate in some of these practicals when they attend the intensive residential school. Practicals include measuring wool quality traits, assessing sheep and lambs for sale or inclusion in breeding programs, selecting sires, using web based tools for management decisions, grazing management, precision sheep management and whole farm management. Detailed practical class notes are given in Appendix 1.

As part of the practical schedule for the internal students, they will be required to take part in a rotating roster of animal husbandry procedures. Initially, it was intended that students would be able to make management decisions for this flock however it is part of a current research project (B.CCH.1033 *Demonstration projects for on-farm practical methane management strategies – Trevenna*) and as such the management of these animals is pre-determined. Students will still be able to participate in the implementation of these decisions and to make an assessment of these decisions. It is anticipated that in the future this project will cease and the animals will be run as a dedicated teaching flock enabling more detailed management decisions by the students. As such a detailed management plan has not been developed for this flock as the needs of students and research groups when the current project ceases will need to be taken into consideration. A proposal for how the teaching flock will run and the units that will make use of this flock is given in Appendix 2.

Early consultations for the unit ANPR450 (Commercial Sheep Management) resulted in a change of name and structure to this unit. It is now named Sheep Management and includes information on the technical and financial aspects of sheep management as detailed in Appendix 3. Changes and material development of this unit were not resourced by this project however they contribute to the overall outcome.

7 Appendices

Appendix 1 – Practical Class Notes

Whole Farm Management

Objectives

- Understand decision making processes for various management decisions
- Justify the current husbandry calendar and management practices used on the property
- Develop and articulate improvements to the current management system to improve productivity

Method

Visit a local sheep enterprise and discuss current practices with the owner/manager/consultant. During the visit you will be required to find out information on the current management practices and why they are used. Following the visit you will be required to analyse this information in more detail using the knowledge you have gained throughout the unit. You will be required to justify any changes you would make to management practices or why you would not make changes.

Resource People

Owner/manager/consultant

Activity

Detail in the table below the current management practices used on this property in relation to their sheep enterprise.

Management area	Current practice
Husbandry calendars	

Management area	Current practice
Grazing	
Parasites	
Product marketing	
Breeding and selection	
Other	

Further Research Questions

- Write a summary of the current management practices of the property.
- Explain why current practices are used and what impact this has on productivity/profitability.
- Detail strategies that could be used to improve productivity or justify why the current management practices should remain the same.
- Explain other factors that influence management decisions besides profitability.

Sire Selection

Objectives

- Gain experience in selecting sires for commercial sheep production using ASBVs
- Understand why ASBVs should be used alongside visual assessment
- To determine what traits are important for different breeding objectives

Method

Use the Sheep Genetics database to select sires for the scenarios outlined.

Resource People

1. Sam Gill
2. Luke Stephen
3. Rachelle Hergenhan

Activity

Commercial breeders are dependent on the ram source for the majority of the genetic progress in their flocks. The current production level and the effectiveness of the breeding programme being used at the ram source are the driving forces of genetic progress. For regular clients of a ram breeder the genetic response in the clients flock will be dictated by the genetic response being made in the ram breeding flock.

In today's practical, there will be a number of breeding objectives to consider. You will be required to choose suitable rams to meet these breeding objectives using the Sheep Genetics database.

Breeding Objective 1: (Merino flock)

- To increase fleece weight by 5% over the next ten years.
- To reduce fibre diameter by 1.5 micron over the next ten years.
- To improve wool style.
- To maintain reproductive performance.
- To maintain body weight.
- To maintain structural soundness traits.

Breeding Objective 2: (Merino flock)

- To increase body weight by 1 kg over the next ten years.
- To increase reproductive rate by 3% over next ten years
- To increase worm resistance at 25% of its maximum rate.
- To maintain fleece weight.
- To maintain fibre diameter.
- To maintain structural soundness.

Breeding Objective 3: (Meat breed flock for lamb production – you choose a breed)

- To increase reproductive rate by 5%
- To increase body weight by 1.5kg
- Improve growth rates
- Improve muscling
- Maintain structural soundness traits
- Maintain worm resistance at current levels

Selecting Terminal Sires

For this task choose appropriate terminal sires to be used over a Merino flock and a Border Leicester cross Merino flock to maximise growth and reach carcase specifications for supermarket trade lambs in the New England area.

Some Suggestions:

- Make a list of the ASBVs required to make a decision to meet the breeding objective
- For each ASBV make a judgement as to how important it is in meeting this objective i.e. give it a weighting

Further Research Questions

- What other factors would a producer need to consider besides those listed in the breeding objectives?
- What level of importance is placed on the ewe flock for each of the breeding objectives?

Grazing Management

Objectives

- Understand how to design a simple 4 paddock grazing rotation for sheep
- Assess the suitability of the rotational grazing management strategy used at Trevenna

Method

This practical involves two sessions. In the first you will be designing a simple rotation system. In the second you will assess the current rotation system used at Trevenna following a visit to the site. You will need your grazing management lecture notes for reference.

Resource People

1. Clare Edwards
2. Neil Baillie
3. Malcolm McPhee
4. Rachelle Hergenhan

Activity

Activity 1: Setting up a four paddock rotation system

Working in groups of 4 – 5, discuss the factors involved in setting up a simple four paddock rotation system to optimise lamb and/or wool production while maintaining pasture composition. Use this discussion to fill out table 1 and to write up your rotation system.

Table 1: Factors to consider when designing a four paddock rotation system.

Factor	Description/example

Activity 2: Assess the grazing rotation used at Trevenna

Visit the Trevenna methane project to observe a simple rotation system that is currently in place. Using the information and data given to you during this visit assess the effectiveness of the rotation system in terms of sheep production and the maintenance of the pasture. Justify why or why not the current rotation being used is appropriate.

Further Research Questions

- How could the tools used to assess the pastures be incorporated into a non-experimental rotation system?
- How could the information being collected at Trevenna be better utilised to improve the rotation system?

Precision Sheep Management

Objectives

- Gain an understanding of the various precision sheep management tools available to sheep producers
- Understand the potential uses of precision sheep management tools that are currently at the experimental stage
- Outline the benefits and costs associated with the use of precision sheep management tools and justify your position on their use in commercial sheep enterprises

Method

A number of guest speakers will be presenting information on various precision sheep management tools including those at the experimental stage.

Resource People

1. Graham Truscott
2. Mark Trotter
3. Dave Lamb

Activity

Make a list of the precision sheep management tools currently available. Choose two of these tools and investigate in further detail how they are implemented on farm and write a short summary on your findings (2 – 3 pages). In your summary outline the costs and benefits associated with the implementation of these management strategies. Justify your position on whether it is beneficial in terms of productivity and profitability to use these strategies.

Explain how some of the experimental tools presented may be useful in a commercial enterprise in the future.

Joining Management

Objectives

- Understand the different methods used to join ewes under both commercial and stud management systems.
- Participate in the assessment of rams for natural mating

Method

During this practical you will assist in assessing rams for natural mating and observe artificial insemination. The class will be split into two groups for this practical.

Resource People

1. Michael Raue
2. Sara Bowers
3. Geoff Hinch
4. Neil Baillie

Activity

Activity 1: Ram assessment

Rams must be in good physical condition for an effective mating. Prior to joining rams should be assessed to ensure they are in good working condition. For this practical a number of rams will be assessed to determine whether they are fit for joining. During this practical you should fill out the following table with the different factors that should be assessed.

Point of assessment	Reason

Activity 2: Artificial insemination

Artificial insemination (AI) is a reproductive technology used in the sheep industry for genetic improvement. This technology allows superior genetics to be used across many flocks without the purchase of rams for particular breeding objectives. AI is a labour intensive activity and is therefore only used in limited situations. In sheep AI is usually done via laparoscopic insemination using frozen semen although fresh can also be used.

During this practical you will help prepare frozen and fresh semen for AI and observe how AI is performed in sheep. While doing this, answer the following questions:

1. How is frozen semen thawed?
2. At what temperature is frozen semen thawed?
3. How is motility assessed?
4. What percentage of motile semen is required for successful AI?
5. Does frozen semen have a “used-by” date?

Further Research Questions

- What ram percentages are commonly used in industry?
- Does it vary across breeds or enterprise types?
- When might it be necessary to use higher or lower ram percentages?
- When would artificial insemination be a feasible option for joining? Why?
- What aspects of ewe management need to be considered at joining?

Pregnancy Scanning

Objectives

- Understand the benefits and costs associated with pregnancy scanning
- Understand the procedure involved in ultrasound scanning
- Identify critical features of an ultrasound image to identify pregnant ewes

Method

This practical will involve pregnancy scanning the ewe flock using ultrasound sonography. Students will assist in the handling of the ewes and will have the opportunity to operate the ultrasound. During this time students should attempt to identify the features of the images generated to identify if ewes are pregnant and how many lambs they are carrying.

Students will be split into four groups for this practical. Two groups will start the prac at 2pm and the next two groups will start the prac at 3:30pm. Please meet at the yards at Trevenna at your allotted prac time.

Resource People

1. Contractor
2. Geoff Hinch
3. Neil Baillie
4. Rachelle Hergenhan

Activity

Activity 1: Make a list of the benefits and costs associated with pregnancy scanning.

Benefits	Costs

Considering the benefits and costs, justify why pregnancy scanning should or should not be used in a commercial sheep enterprise.

Activity 2: Observe pregnancy scanning in action. What are the features used to assess if a ewe is pregnant and how do you know what these look like? When is the best time to pregnancy scan?

Further Research Questions

- Find out the level of uptake of pregnancy scanning in industry. Why do you think it is not more widespread and how could producers be encouraged to make more use of this technology?
- Besides ultrasound sonography what other methods are used to determine if ewes are pregnant? How accurate are they compared to scanning?
- How is scanning information used for changing management practices?

Animal Husbandry Rotating Roster

Objectives

- Gain experience in a range of sheep husbandry procedures

Method

This prac will run throughout semester and will involve each student participating in a rotating roster of animal husbandry procedures. This will be done outside of practical time slots in the students' own time in conjunction with technical staff. The class will be split into groups of 4 or 5 and each group will be responsible for the flock for a two week block. Groups will then hand-over to the next group explaining where management practices are up to and what is required of the next group.

Resource People

1. Neil Baillie
2. Rachelle Hergenhan
3. Steve Walkden-Brown
4. Michael Raue

Activities

1. Weigh and condition score ewes

Weighing and condition scoring is a useful method for monitoring the nutritional status of sheep. When sheep are under high nutritional demand such as pregnancy or lactation frequent monitoring is necessary to ensure ewes are receiving adequate feed and remain in an appropriate condition score.

For this task ewes will be weighed using the auto draft Ruddweigh scales and students will manually condition score according to the score outlined in Table 1. To condition score place your thumb on the backbone just behind the last long rib and your fingers against the stubby ends of the short ribs. Use half scores if necessary.

Obtain the .xlsx file of weights and condition scores and determine means, ranges and standard deviations.

Table 1: How to condition score (Source: Lifetime Wool)

Condition Score 1 	**Backbone** The bones form a sharp narrow ridge. Each vertebra can be easily felt as a bone under the skin . There is only a very small eye muscle. The sheep is quite thin (virtually unsaleable).	**Short Ribs** The ends of the short ribs are very obvious. It is easy to feel the squarish shape of the ends. Using fingers spread 1cm apart, it feels like the fingernail under the skin with practically no covering.
Condition Score 2 	**Backbone** The bones form a narrow ridge but the points are rounded with muscle. It is easy to press between each bone. There is a reasonable eye muscle. Store condition- ideal for wethers and lean meat.	**Short Ribs** The ends of the short ribs are rounded but it is easy to press between them. Using fingers spread 0.5cms apart, the ends feel rounded like finger ends. They are covered with flesh but it is easy to press under and between them.
Condition Score 3 	**Backbone** The vertebrae are only slightly elevated above a full eye muscle. It is possible to feel each rounded bone but not to press between them. (Forward store condition ideal for most lamb markets now. No excess fat).	**Short Ribs** The ends of short ribs are well rounded and filled in with muscle. Using 4 fingers pressed tightly together, it is possible to feel the rounded ends but not between them. They are well covered and filled in with muscle.
Condition Score 4 	**Backbone** It is possible to feel most vertebrae with pressure. The back bone is a smooth slightly raised ridge above full eye muscles and the skin floats over it.	**Short Ribs** It is only possible to feel or sense one or two short ribs and only possible to press under them with difficulty. It feels like the side of the palm, where maybe one end can just be sensed.
Condition Score 5 	**Backbone** The spine may only be felt (if at all) by pressing down firmly between the fat covered eye muscles. A bustle of fat may appear over the tail (wasteful and uneconomic).	**Short Ribs** It is virtually impossible to feel under the ends as the triangle formed by the long ribs and hip bone is filled with meat and fat. The short rib ends cannot be felt.

2. Monitor worm burdens

To control worms effectively drench programs based on actual worm burdens should be implemented. To do this worm burdens need to be monitored and worm egg counts (WECs) and larval culture and differentiation can be used to do this.

For this task you are required to collect a faecal sample and perform a WEC and larval culture and differentiation on this sample using the following procedure.

If drenching is required following the monitoring of worm burdens justify the choice and timing of drench.

3. Shift ewes through grazing rotation

In conjunction with Neil, monitor the pasture available for each group of ewes and shift ewes where appropriate. Provide justification for your decision.

4. Supplementary feeding

Carry out any supplementary feeding that is required. Monitor animals that are not eating the supplement. Justify the supplement being used and the amount of supplement offered to the ewes.

5. Other husbandry procedures

Make a note of any other husbandry procedures you have been involved in during your rotation. Why were these necessary?

Further Research Questions

- How can information on the weight and condition score of ewes be used to inform management decisions?
- Why is it important to monitor worm burdens and how can this impact on drench resistance?

Sheep Health – Managing Parasites

Objectives

- To become familiar with tools used to make management decisions regarding three major parasites
- To outline a management strategy for a case study on each of internal parasites, lice and fly management

Method

This practical will involve you using the following websites to make management decisions regarding the scenarios outlined below. You may work in groups but each of you will need to write up a response to each of the three scenarios. Alternatively you can outline a scenario from your own property or one you work on. You must include a description of this scenario in your write up. The websites you will need are:
Wormboss - http://www.wool.com/Grow_WormBoss.htm

LiceBoss - http://www.wool.com/Grow_LiceBoss.htm

FlyBoss - http://www.flyboss.org.au/

Resource People

1. Steve Walkden-Brown
2. Rachelle Hergenhan

Activity

For each website undertake the following

a) Initially explore the site and its structure and characterise what it offers (ie. does it just provide information, or does it also offer active decision-support).

b) Use the site to investigate the scenario set for it.

c) Write up a short report on one of the scenarios.

Scenarios

a) WormBoss

A sheep farmer near Guyra has had significant difficulties controlling worms over the past two years. He is concerned that drench resistance is the underlying factor for his worm control problems. Although he is yet to obtain his drench resistance profile, he actively rotates his drenches. He has had a busy year drenching. His drench history this year for the maiden ewes is:

12 January - Genesis

28 February - Virbamec

31 March - Paramax

30 April - Hatrick

14 August - Cydectin Eweguard

His maiden ewes are currently lambing on paddocks that he prepared by not grazing for the previous three months as advised by his local rural supplies shop. Lamb marking is in 3 weeks and he wants to know if he has to treat his lambs. Advise on his options for the lambs and provide a pathway towards better worm control using the information in WormBoss and lectures.

b) FlyBoss

A large grazing company has recently signed a lucrative contract to supply non-mulesed wool to an Italian mill. The farm manager is concerned how she will prevent increased incidence of flystrike on the companies two sites located at Pinnaroo SA and Rolleston QLD. Shearing at Pinnaroo must occur in July but can be varied at Rolleston. Suggest a management plan that will limit flystrike now and provide a pathway to long-term flystrike management.

c) LiceBoss

A producer at Texas QLD is concerned that a mob (n=1100) of his sheep have lice. Some of his neighbours sheep entered the mob in July and were removed in early September. There is evidence of some sheep rubbing on fences. He is 6 months away from shearing and is currently supplying to Landmark's 'ECO WOOL' label. He receives a price premium of 55 cents/kg clean for his wool meeting its requirements. His area has previously tried to eradicate lice on three occasions, the last being 2 years ago when Magnum IGR was used. Advise on the options available to him to treat the suspect mob and on a pathway to ensure his property is free from lice following shearing. Expected base wool price for 19μm wool is 1280 c/kg clean.

Sheepmeat

Objectives

- Develop proficiency in the live assessment of sheep and lambs for sale
- Understand the reasons for live assessment prior to sale
- Identify the different components of a carcase using CT scanning
- Analyse CT images to determine the relative contribution of each tissue type to the total volume of carcase

Method

Students will be split into two groups for this practical. One group will start on live assessment in the sheep yards and the move to the CT lab for CT scanning of sheep carcases. The second group will start in the lab then go to the sheep yards.

Resource People

1. Andrew Blakely
2. Chris Shands Jim Meckiff
3. Neil Baillie

Activity

Activity 1: Live assessment of sheep and lambs

Live assessment of sheep and lambs prior to sale is necessary to select the animals within the required weight and fat score specifications to target specific markets. The age of the animals will also affect the market they can be sold into.

Fat scoring can be done using manual palpation and scored on a 1 – 5 scale as outlined in Table 1. Each score refers to a certain fat depth range which can also be measured using ultrasound scanning. For this activity you will manually score the sheep and lambs using the scale in Table 1 and record the scores in the TruTest indicator. You will then participate in the ultrasound scanning to compare your scoring with the actual fat depth. Manual fat scoring is done at the GR site which is 110mm from the mid line over the 12th long rib.

Table 1: Fat score table (Shands *et al.* 2009).

	Fat Score				
	1	**2**	**3**	**4**	**5**
GR tissue Depth in mm	0-5	6-10	11-15	15-20	21 and over
Long ribs	Individual ribs felt very easily. Cannot feel any tissue over the ribs.	Individual ribs easily felt but some tissue present.	Individual ribs can still be felt. Can feel more tissue over the rib.	Can only just feel ribs. There is fluid movement of tissue.	Ribs can't be felt. Tissue movement very fluid.

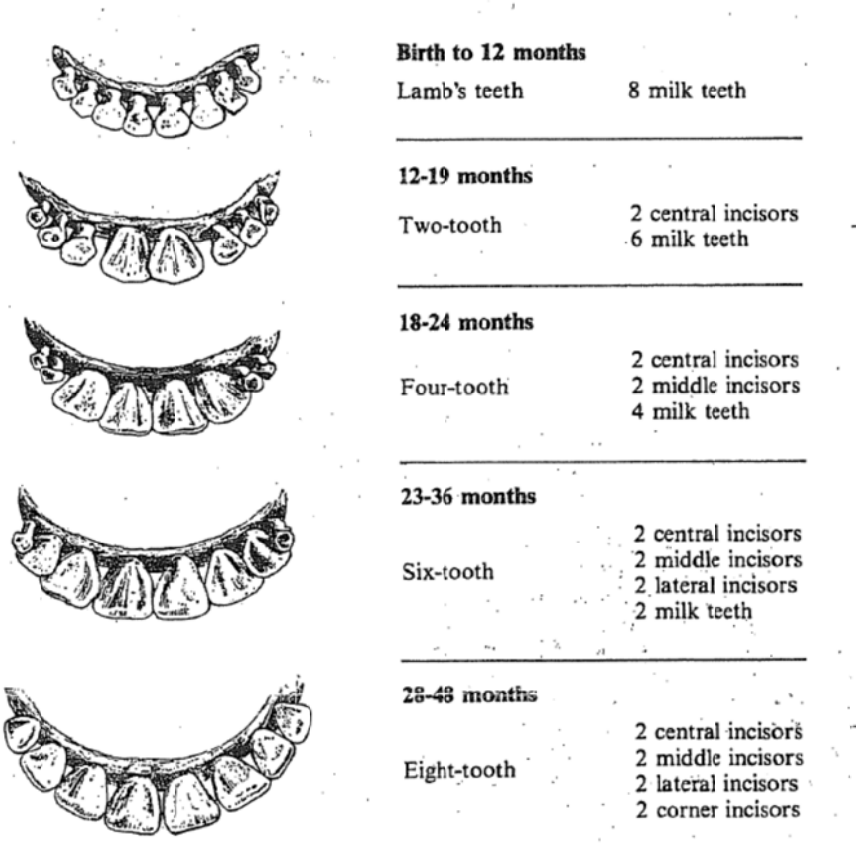
Live weights are also important for the live assessment of sheep. Estimating live weights is not good enough for meeting target market specifications, actual weights are necessary. Using the auto draft, weigh the animals and separate into live weight classes. Use the live weight data to estimate the carcase weight of the lambs using the formula: carcase weight = live weight x dressing percentage. Use Table 2 to estimate the dressing percentage of the animals.

Table 2: Dressing percentage of different classes of animals.

Fat score	Lambs		Sheep	
	Unweaned	Weaned	Wethers	Ewes
1	41%	39%	39%	38%
2	43%	41%	41%	40%
3	45%	43%	43%	42%
4	47%	45%	45%	44%
5	49%	47%	47%	46%

The age of the animal will affect the market it can be sent to. Using the mouthing chart below determine the age of the animals being assessed.

Guide to estimating the age of sheep by their teeth



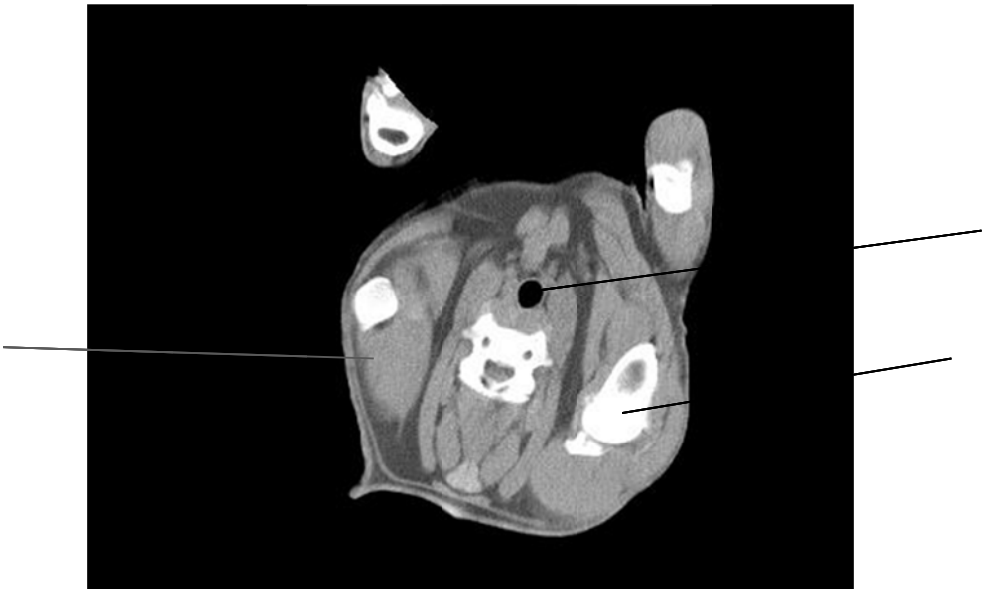
Birth to 12 months	
Lamb's teeth	8 milk teeth
12-19 months	
Two-tooth	2 central incisors 6 milk teeth
18-24 months	
Four-tooth	2 central incisors 2 middle incisors 4 milk teeth
23-36 months	
Six-tooth	2 central incisors 2 middle incisors 2 lateral incisors 2 milk teeth
28-48 months	
Eight-tooth	2 central incisors 2 middle incisors 2 lateral incisors 2 corner incisors

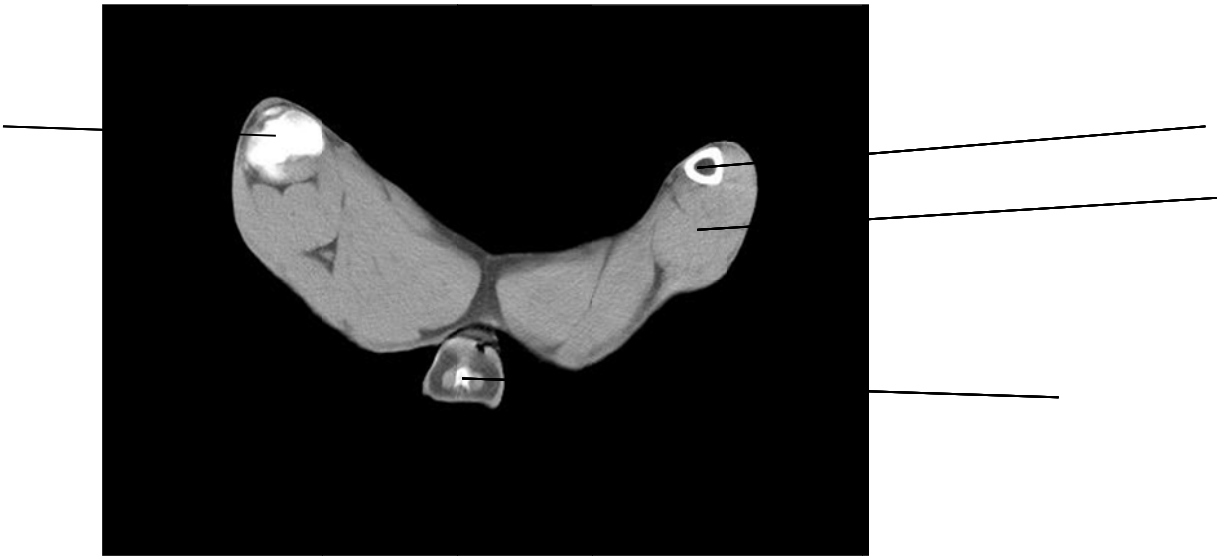
Activity 2: CT scanning

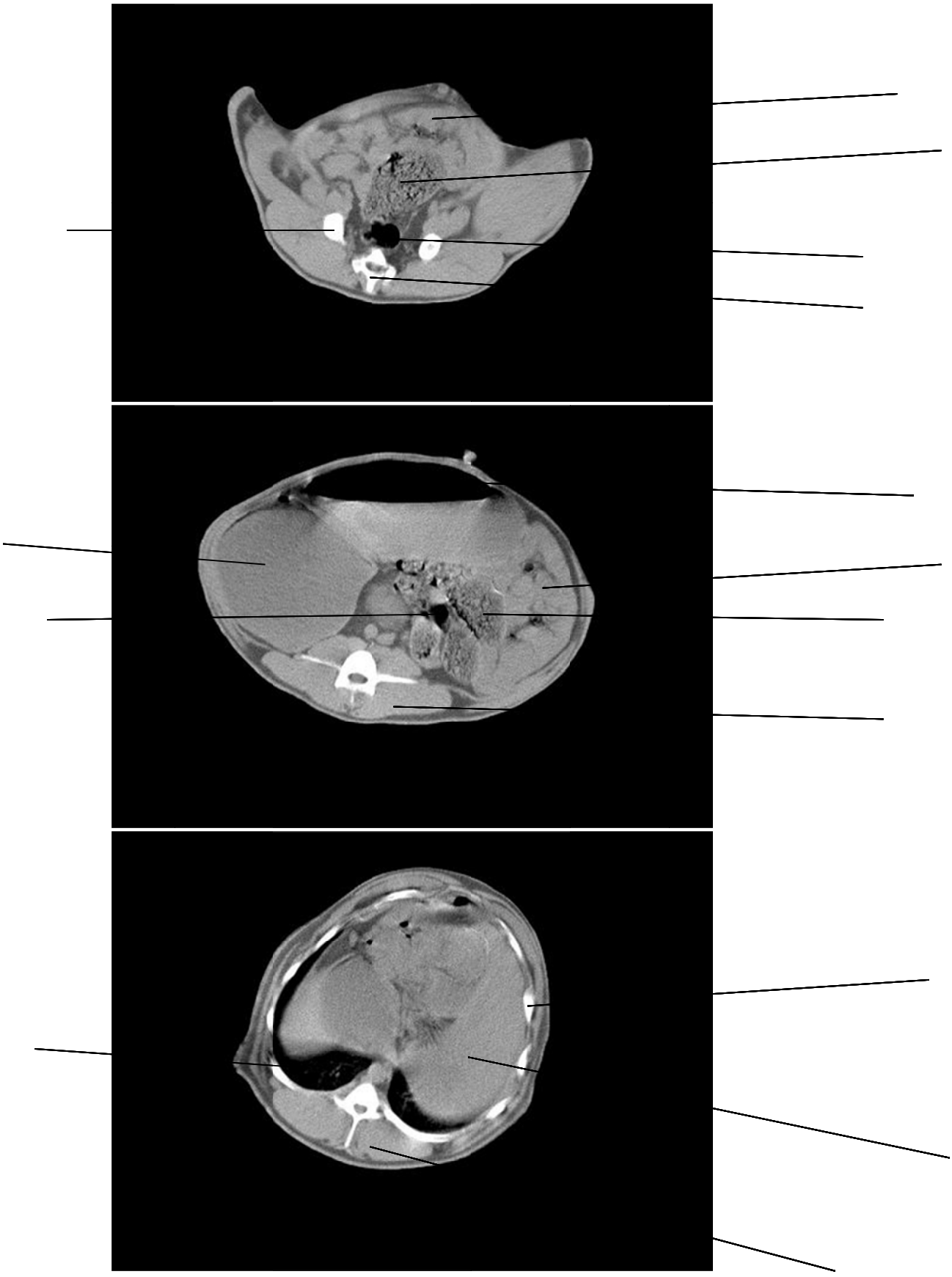
Computed tomography or CT scanning is a medical technology that can be used to determine the body composition of an animal or carcase. It uses low dose X-rays to produce cross-sectional images of the body which can then be used to calculate the relative proportion of bone to muscle and other tissues.

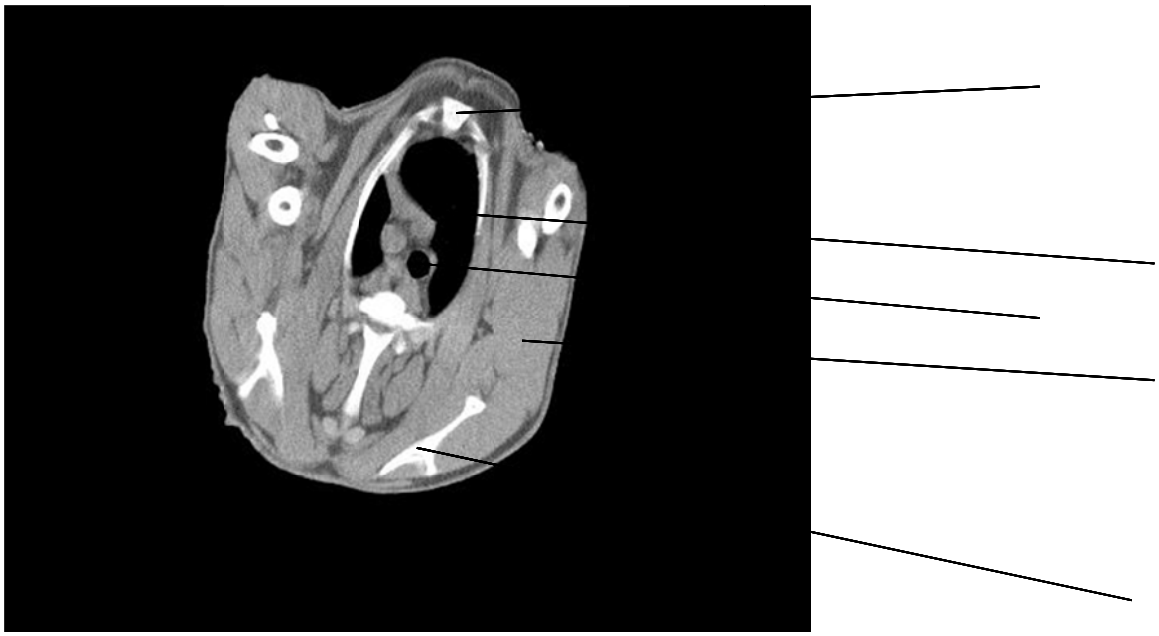
For this activity the use of CT scanning will be demonstrated on two sheep.

On the images below label each of the marked features and indicate the approximate position along the length of the sheep each image is taken from. Explain how the volume of various body tissues can be calculated using these images.









Further Research Questions

- What other factors besides liveweight, fat score and age need to be considered when targeting specific sheep meat markets?
- What are the applications of CT scanning for research and how can this be incorporated into sheep production?

Wool

Objectives

- Compare the differences in wool growth rates and quality traits between ewes on the low and high productivity systems in the Trevenna methane experiment using dyebands
- Compare wool quality measures using different within fleece sampling sites
- Learn how to perform wool quality measures

Method

For this practical you will use a number of techniques to measure wool growth and quality. The first activity will be done at the yards in Trevenna and the samples for the second activity will also be collected here. The measurements for activity 2 will take place in the wool lab downstairs in the woolshed building. You will do this prac in groups and use the same sheep (just opposite sides) for each activity. Make a note of the tag number of your ewe so you can identify her later during semester.

Resource People

1. Neil Baillie
2. Mick Raue
3. Rachelle Hergenhan
4. Sara Bowers

Activity

Activity 1: Measuring wool growth

Dyebands are a technique used to measure wool growth over a certain period of time. This technique involves dying a strip of wool at skin level then leaving the wool to grow. At a later time the length of the wool at this strip of wool is measured to monitor wool growth. This technique is often used in experiments to compare wool growth between treatment groups.

During this practical you will apply dyebands to a number of ewes in the high and low productivity groups at Trevenna at the sites shown in Figure 1. During the intensive school, external students will measure the length of wool using the dyebands and you will use this data to calculate differences in wool growth between the two treatment groups at each site. You will then compare the differences in wool growth between these locations and determine which location provides the best indicator of the average wool growth for each treatment group.

Normal hair dye will be used for the dyebands and will be applied to the wool at skin level in a 5cm strip. The spot the dye is applied will then be marked at the free end of the wool using a dot of stock mark so the dyeband site can be identified easily for later measurement.

Ewe tag number: _____

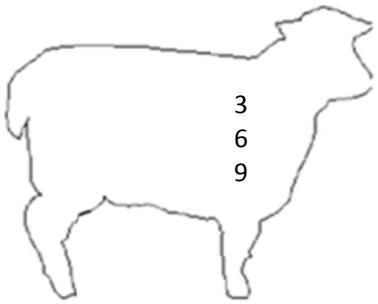


Figure 1: Sampling sites for fleece measurements.

Table 1: Results for wool growth

Site	**Length (cm)**
1	
2	
3	
4	
5	
6	
7	
8	
9	
Average	

Which sample site provides the closest estimate of the average length of the samples?

Given that the dyeband was applied 4 weeks ago, calculate the average growth rate of the fleece.

What might cause wool to grow at a different rate to that calculated? Either faster or slower.

Activity 2: Comparing fleece sampling sites for wool quality measures

Use clippers to collect a sample of wool from each of the 9 sites shown in Figure 1. Take these samples back to the lab ensuring that each is labelled with the appropriate site. On each of these samples measure greasy fleece weight, fibre diameter, staple strength and clean fleece weight.

Greasy weight

Remove one staple from each of your samples and keep in labelled trays for measuring staple strength. Weigh the remainder of each sample on the scales provided. After you have weighed your greasy sample you will need to wash, rinse and dry it. Washing is done using a normal household detergent in warm water. It is then rinsed in warm water and placed in the drier overnight.

Fibre diameter

After your wool sample has dried overnight you will need to weigh the dried sample for calculating washing yield. Then take a minicore of the sample to put through the OFDA100 to determine the fibre diameter of each of your samples.

Site	**Greasy weight (kg)**	**Fibre diameter (µm)**
1		
2		
3		
4		
5		
6		
7		
8		
9		
Average		

Staple length and strength

Use the Agritest machine to measure the length and strength of each sample. You will require one small neat staple of wool for this machine, without any "flyaway" pieces. You should have kept this staple from your original greasy wool sample.

Note: It will be easier to get a staple from your greasy sample.

Record Length, Force and weight (Base+ Tip) to determine strength = N/ktex
(calculate the strength at the end of this activity).

N.B **Ktex = total weight (mg)/length (mm)**

Sample	Length (mm)	Force (N)	Weight (base + tip)	k/tex (weight/length)	**Strength (N/ktex)**
1					
2					
3					
4					
5					
6					
7					
8					
9					
Average					

Washing Yield

Using the weight of your dried wool samples calculate the washing yield for each of your samples where washing yield=greasy weight/clean weight.

Assume a greasy fleece weight of 4kg and use the washing yield to calculate an estimate of clean fleece weight for each of the nine samples.

Sample	Clean weight (g)	Washing yield (%)	Clean fleece weight (kg)
1			
2			
3			
4			
5			
6			
7			
8			
9			
Average			

Further Research Questions

- Using the data you have collected, which site provides the best estimate of the average for each of the traits you have measured? How does this compare to what you expected from the literature?
- Using the data collected on all animals, was there any difference in wool quality traits between the high productivity and low productivity ewes? Why/why not?
- Which quality parameter is most important for wool price?

Appendix 2 – Proposal for Teaching Flock

The teaching flock will allow students to participate in the management of the flock through:

- Making management decisions
- Collecting data to inform management decisions
- Collecting data to assess the outcome of management decisions
- Learn skills involved in various management practices

The flock will be used across many units including:

Unit	Uses
WOOL412 – Sheep Production	Whole farm management, those outlined in Appendix 2
ANPR450 – Commercial management of sheep enterprises	Use data to understand economic implications of management decisions
ANUT321 – Animal nutrition	Ewe LW and CS, pastures cuts
ANPR415 – Constraints to animal production	Assessment of constraints to production in this flock
ANPR417 – Disease in animal production	Disease management and monitoring,
ANPR321 – Animal function health and welfare	Animal assessment, reproduction
ANPR211 – Animal production systems and products	Husbandry practices
GENE251 – Intro to breeding and genetics	Selection for particular traits measuring traits to assess changes due to genetic selection
ANUT300 – Applied animal nutrition	Assessing nutritional decisions

The flock, consisting of approximately 100 Merino ewes (or other breeds/crossbreeds depending on requirements), would be run in two management groups with differing husbandry calendars allowing most husbandry/management practices to be covered in both trimester 1 and 2 so that students can be exposed to all aspects of sheep production. Ideally, half the ewes would be joined in March/April to lamb August/September and the other half joined September/October to lamb February/March. Within each joining period both natural and AI mating would be used with a number of sires to result in purebred and crossbred lambs.

Ideally the flock will remain at Trevenna throughout the year so that it can be managed as a mini sheep farm requiring decisions on grazing management, supplementary feeding and animal husbandry to be made by the students. Decisions on weaning management and weaner management and sales would also be required if followers were maintained alongside the teaching flock. Students would have the opportunity to make decisions on when the best time is to off-load surplus stock according to markets and feed available.

Appendix 3 – ANPR450 Unit Outline

Topic	Title	Author	Source
1	Sheep Management (weaner and adult)	K Bell & A Campbell	ISWH Ch 17 & 12
2	Reproduction management	S deGraaf	ISWH Ch 9
3	Pregnancy and lamb production	P Cell & K Geenty	ISWH Ch10 & 11
4	Pasture Management	J Pratley	ISWH Ch 18
5	Sustainable land and water management	N Reid	ISWH Ch 19
6	Marketing of sheep and sheepmeats	B McLeod	ISWH Ch 29
7	Farm management methods	Terence Farrell	Topic 1 ANPR450
8	Economics of sheep production	Euan Fleming	Topic 2 ANPR450
9	Benchmarking and key profit drivers	Renato Villano & Sandy McEachern	Topics 3 & 20 ANPR450
10	Use of discounted cash flow analysis in the sheep enterprise	David Cottle and Euan Fleming	Topic 4 ANPR450
11	Managing risk in sheep production	Heidi Rogers	Topic 8 ANPR450
12	Legal issues and regulations	Brian Simpson	Topic 11 ANPR450