BOARD OF STUDIES
NEW SOUTH WALES

HIGHER SCHOOL CERTIFICATE EXAMINATION

1995

SHEEP HUSBANDRY AND WOOL TECHNOLOGY

2 UNIT

Time allowed—Three hours
(Plus 5 minutes' reading time)

DIRECTIONS TO CANDIDATES

- Write your Student Number and Centre Number at the top right-hand corner of this page, and on each Writing Booklet.

- Board-approved calculators may be used.

Section I (20 marks)

- Attempt BOTH questions.

- Answer the questions in the spaces provided in this paper.

- Allow about 30 minutes for this Section.

Section II (50 marks)

- Attempt ALL questions.

- Answer the questions in the spaces provided in this paper.

- Allow about 90 minutes for this Section.

Section III (30 marks)

- Attempt BOTH questions.

- Answer each question in a *separate* Writing Booklet.

- Allow about 60 minutes for this Section.

EXAMINER'S USE ONLY

Section	Question	Mark
I	1	
I	2	
II	3	
II	4	
II	5	
II	6	
II	7	
III	8	
III	9	

SECTION I
SPECIAL TOPIC
(20 Marks)

Attempt BOTH questions.

Each question is worth 10 marks.

In each question, parts (a), (b), and (c) are of equal value.

Answer the questions in the spaces provided in this paper.

QUESTION 1

(a)   (i)   Define the following terms.

1.   Exotic disease ....

....

....

2.   Quarantine..

....

....

(ii)   What do the following abbreviations stand for?

1.   AQIS ....

....

2.   EXANDIS ....

....

(iii)   Indicate THREE objectives of the EXANDIS program.

1.   ....

2.   ....

3.   ....

QUESTION 1. (Continued)

(b)   (i)   Select TWO of the following exotic diseases and complete the table below.

- foot-and-mouth
- scrapie
- blue tongue
- sheep pox.

	Disease 1 Name:	*Disease 2* Name:
Symptom in sheep		
Major consequences of entry to Australia		
Current Australian policy on control		
Two regions or countries where the disease is endemic		

QUESTION 1. (Continued)

(c)   (i)   Indicate FOUR of the most likely means of exotic diseases entering Australia.

1.   ....

2.   ....

3.   ....

4.   ....

(ii)   Name TWO breeds of sheep that have been recently introduced into Australia.

1.   ....

2.   ....

(iii)   Briefly describe the procedure for the introduction of sheep to Australia.

....

....

....

....

QUESTION 2

(a) (i) Why have recent unauthorized arrivals of people caused so much concern for quarantine authorities?

....

....

....

(ii) When stock are destroyed because of exotic disease:

1. who compensates the owners?

....

2. how is the compensation price determined?

....

(iii) What threat do feral-animal populations pose to the control of exotic diseases?

....

....

....

....
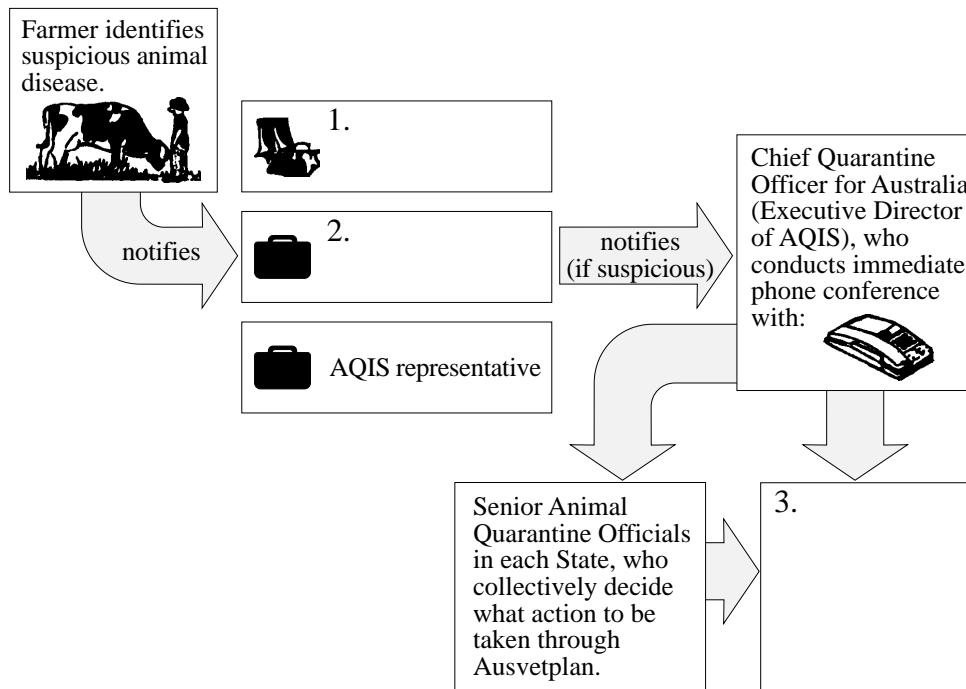
(iv) List FOUR feral animals that could be implicated in the spread of exotic disease.

1. ....

2. ....

3. ....

4. ....

QUESTION 2. (Continued)

(b)   (i)   Examine the partial flowchart below.

Australian farm Journal, April 1992.

STEPS IN EXOTIC-DISEASE DIAGNOSIS

Identify the missing personnel in the flowchart.

1.   ....

2.   ....

3.   ....

(ii)   Outline TWO benefits of early detection of exotic diseases by a farmer.

1.   ....

2.   ....

(iii) How would exotic diseases affect:

1.   domestic markets?

....

....

2.   export markets?

....

....

QUESTION 2. (Continued)

    (iv)   Briefly describe the impact that the introduction of exotic diseases may have on society.

....

....

....

(c)   (i)   What action is taken by Australia to prevent the introduction of exotic diseases through the normal ports of entry?

....

....

    (ii)   List THREE factors that have led to Australia's being one of the few countries in the world that is free of exotic diseases.

1.   ....

2.   ....

3.   ....

    (iii)   What is 'Ausvetplan'?

....

....

....

    (iv)   List FOUR roles of the Australian Animal Health Laboratory located in Geelong, Victoria.

1.   ....

2.   ....

3.   ....

4.   ....

SECTION II

(50 Marks)

Attempt ALL questions.

Each question is worth 10 marks.

In each question, parts (a), (b), and (c) are of equal value.

Answer the questions in the spaces provided in this paper.

QUESTION 3

(a)   Consider this map of Australia showing the different wool-growing areas, and answer the questions that follow.

'Australian Wool Industry', Philips et al, AWC, Melbourne.

WOOL-GROWING IN AUSTRALIA

QUESTION 3. (Continued)

Complete the following table by:

(i)   naming the THREE wool-growing areas indicated on the map;

(ii)   naming the most common strain of sheep in each area;

(iii) indicating TWO characteristics of these animals.

Wool-growing area	Most common strain of sheep	TWO characteristics of these animals
■	....	1. .... 2. ....
▬	....	1. .... 2. ....
▬	....	1. .... 2. ....

(iv)   Which of the above wool-growing areas is likely to have the highest stocking rate per hectare?

....

QUESTION 3. (Continued)

(b)   Examine the following table, and answer parts (i) and (ii).

REGION	1993–94		1994–95 (FORECAST)		Percentage change in production (1993–94 to 1994–95)
	Wool production (million kg)	*Average cut/head (kg/hd)*	*Wool production (million kg)*	*Average cut/head (kg/hd)*	
Northern NSW	41·2	4·30	36·1	4·22	–12·4
Central-Western NSW	40·4	4·85	36·7	4·75	–9·1
North-Western NSW	55·4	4·71	48·8	4·60	–11·9
Southern NSW	46·6	4·51	44·3	4·36	–4·9
Riverina	73·7	5·09	65·2	4·91	–11·5
TOTAL / AVERAGE NSW	257·3	4·74	231·1	4·61	–10·2

Dalgety 'Wool Supply outlook', October 1994.

(i)   Which region had the lowest wool production (million kg) in 1993–94?

....

(ii)   1.   Which region has the highest average cut/head (kg/hd) in 1993–94?

....

2.   Outline reasons for this higher average cut/head.

....

....

....

....

(iii)   Describe TWO reasons for the forecast change in production between 1993–94 and 1994–95 for the whole State.

1.   ....

....

2.   ....

....

(iv)   State FOUR grazing-management strategies a sheep producer would use to overcome the yearly feed gap.

1.   ....

2.   ....

3.   ....

4.   ....

QUESTION 3. (Continued)

(c)   (i)   Complete the two missing boxes in the following diagram.

Gross energy (= heat of combustion) GE

1.

digestible energy (DE)

urine
energy
(4%) (GE)

methane
energy
(6%) (GE)

19% of DE

heat increment (HI)

net energy (NE)

used for
maintenance (NE$_m$)

2.

total heat production (H)
of animal (15–30%) (GE)
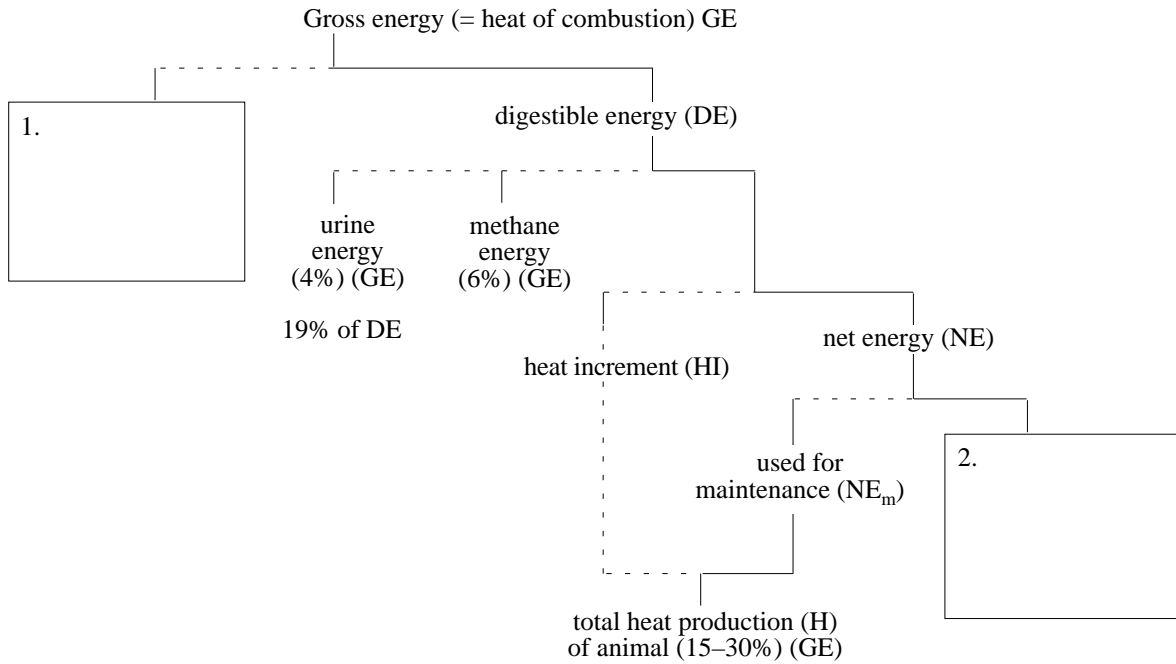
(ii)   Outline the difference between production feeding and survival feeding.

....

....

....

(iii) Using the following information, calculate the cost of drought-feeding 1000
wethers for 100 days. (Show working.)

• One DSE requires 7·5 MJME per day.

• Sheep nuts (15 MJME/kg) @ $300 per tonne.

....

....

....

....

(iv) Outline why it is important to introduce grain to sheep slowly.

....

....

....

QUESTION 4

(a)   (i)   List FOUR management strategies to improve the survival rate of new-born lambs.

1.   ....

2.   ....

3.   ....

4.   ....

(ii)   List TWO advantages of the ram effect for a first-cross-lamb producer.

1.   ....

2.   ....

(iii)   List FOUR factors that must be considered when deciding the optimum ram percentage.

1.   ....

2.   ....

3.   ....

4.   ....

(iv)   Outline a prejoining strategy for maiden ewes in order to achieve a high lambing percentage.

....

....

....

....

(v)   Name the parts labelled 1 and 2 on the diagram of the mammary gland below.

1. ....

lactiferous duct

gland cistern

2. ....

streak canal
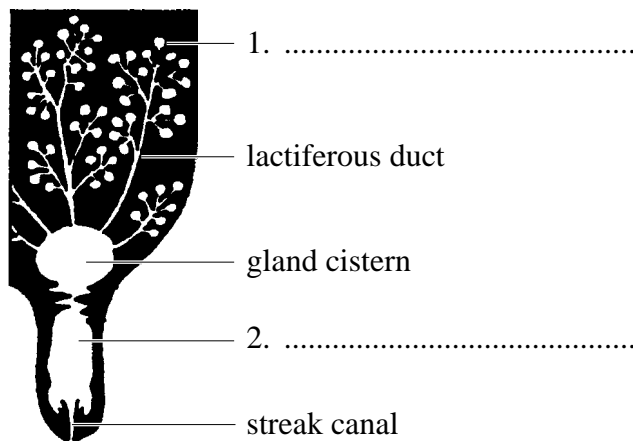
QUESTION 4. (Continued)

(b) Study the following table and use it as an aid in answering parts (i) and (ii) below.

GROWTH RATE AND FAT DEPTHS OF PRIME LAMBS

Sire breed	Growth rate (grams per day)	GR tissue depth (17 kg carcass weight)
Texel	158	5·3
Suffolk	164	7·3

(i) Which sire breed produced the faster-growing lambs?

....

(ii) Which sire breed produced lambs with leaner carcasses?

....

(iii) Outline TWO advantages to the producer of faster-growing lambs.

1. ....

....

2. ....

....

(iv) Outline TWO effects that sex of lambs has on carcass characteristics.

1. ....

....

2. ....

....

(v) Outline FOUR lamb-meat requirements of the modern household.

1. ....

2. ....

3. ....

4. ....

QUESTION 4. (Continued)

(c)   Examine the diagram below and answer parts (i), (ii), and (iii).

Central nucleus   10 000 ewes mated

♀   ♂

Regional ram-breeding cooperatives   45 000 ewes

♀   ♂

Contributors' flocks   1 150 000 ewes

'Sheep breeding', G. Jones et el, Butterworth 1979.
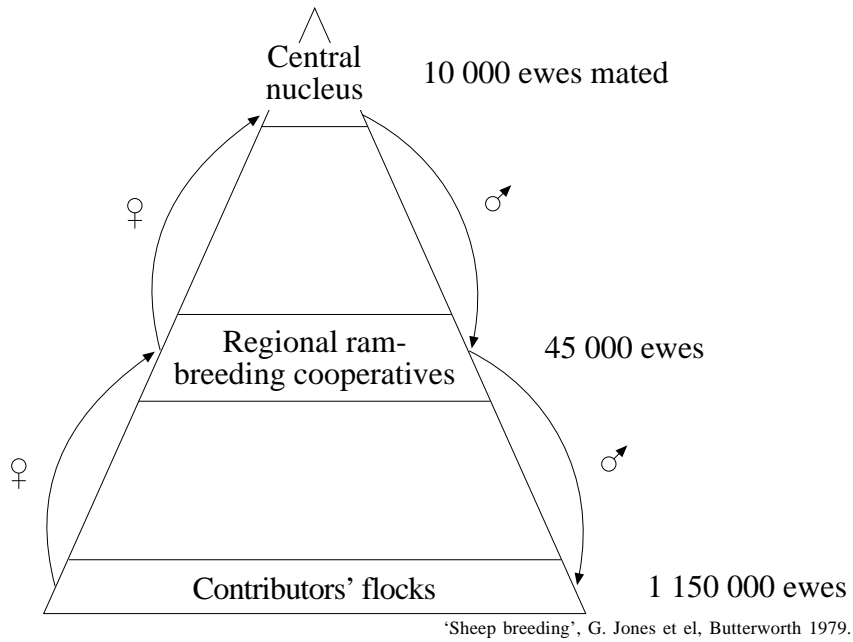
(i)   Name the above breeding system.

....

(ii)   List THREE advantages of this breeding system.

1.   ....

2.   ....

3.   ....

(iii)   State TWO disadvantages of the above system, compared to the traditional stud system.

1.   ....

2.   ....

QUESTION 4. (Continued)

(iv) Name TWO reproductive technologies currently widely used in breeding genetically superior animals, and give TWO advantages of each technology.

Name ....

Advantages

1. ....

2. ....

Name ....

Advantages

1. ....

2. ....

QUESTION 5

(a)   (i)   Outline FOUR strategies that allow a producer to improve intestinal-worm control.

        1.   ....

        2.   ....

        3.   ....

        4.   ....

    (ii) Outline FOUR strategies to minimize the risk of importing foot-rot onto your property.

        1.   ....

             ....

        2.   ....

             ....

        3.   ....

             ....

        4.   ....

             ....

    (iii) Explain TWO chemical-free practices used to prevent diseases in sheep flocks.

        1.   ....

             ....

        2.   ....

             ....

    (iv) Disease is one important aspect of flock health. Define 'disease'.

           ....

           ....

QUESTION 5. (Continued)

(b)   Study the graph and answer parts (i), (ii), (iii), and (iv).
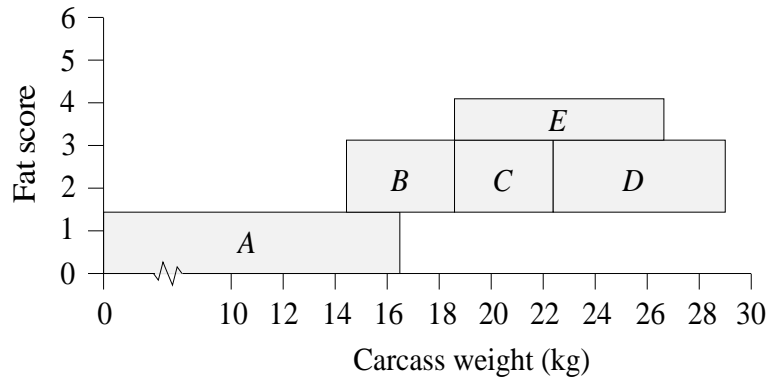
Australian Farm journal December 1994.

KEY

A   Middle East

B   Supermarket (trade)

C   Trim Lamb

D   Elite Lamb

E   Fresh Australian Range Lamb

(i)   Outline the specifications needed for a producer to supply trade lambs.

....

....

(ii)   Name the most common way farmers determine fat score.

....

....

(iii)   What is the minimum *live weight* and fat score required for the Elite Lamb market?

....
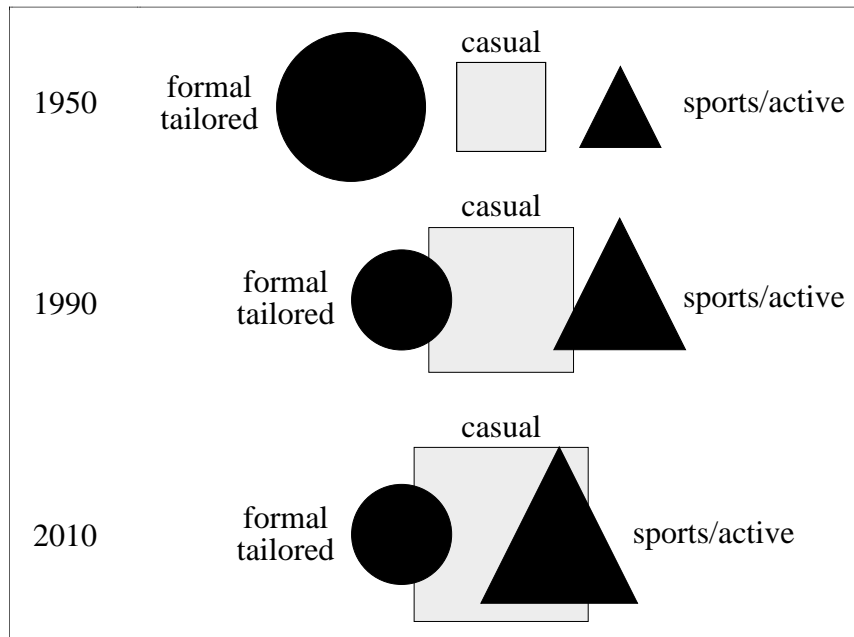
(iv)   In the table below, calculate for each lamb its hot standard carcass weight (HSCW) and suggest a suitable market for each.

	Live weight (kg)	Fat score	Dressing %	HSCW	Market
Lamb A	45	2	45		
Lamb B	56	2	48		

QUESTION 5. (Continued)

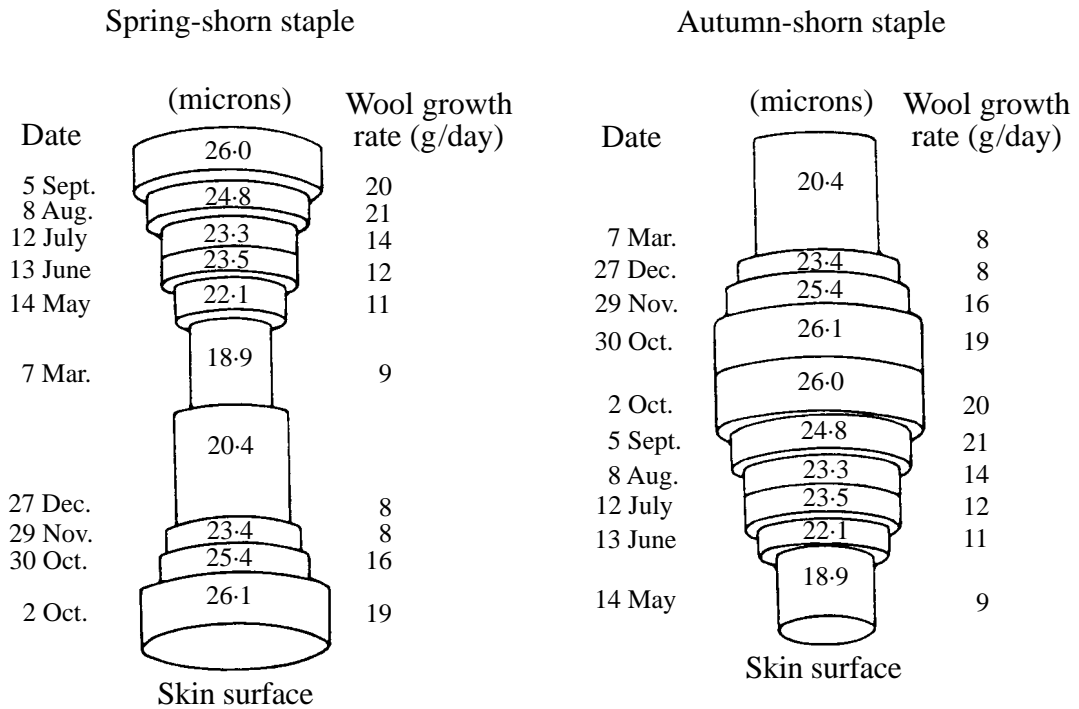(c)   Study the figure and use it as an aid in answering parts (i), (ii), and (iii).

Australian Farm journal December 1994.
International Wool Secretariat.

CLOTHING EVOLUTION 1950 TO 2010

(i)   Which style of clothing was in greatest demand in the 1950s?

....

(ii)   What is the predicted trend in the style of clothing towards 2010?

....

....

(iii) What relationships exist between the fibre diameter of wool and the type of apparel that may be produced?

....

....

....

....

(iv) What qualities of wool make it a more appropriate fibre for the sports/active market?

....

....

....

QUESTION 6

(a)   Use the following diagram to answer parts (i), (ii), and (iii).

Spring-shorn staple

Date	(microns)	Wool growth rate (g/day)
5 Sept.	26·0	20
8 Aug.	24·8	21
12 July	23·3	14
13 June	23·5	12
14 May	22·1	11
7 Mar.	18·9	9
	20·4	
27 Dec.		8
29 Nov.	23·4	8
30 Oct.	25·4	16
2 Oct.	26·1	19

Skin surface

Autumn-shorn staple

Date	(microns)	Wool growth rate (g/day)
	20·4	
7 Mar.	23·4	8
27 Dec.	25·4	8
29 Nov.	26·1	16
30 Oct.	26·0	19
2 Oct.		20
5 Sept.	24·8	21
8 Aug.	23·3	14
12 July	23·5	12
13 June	22·1	11
14 May	18·9	9

Skin surface

Wool Production Guide, Elders 1994.

GRAPH: FIBRE-DIAMETER VARIATION IN MERINO FLOCKS

(i)   Environmental effects are reflected in the animal's fibre diameter.

1.   List FOUR environmental factors that cause the micron profiles shown above.

....

....

....

....

2.   Explain how ONE of the factors you listed above affects micron profile.

....

....

(ii)   What are the likely wool-processing implications for the two flocks?

....

....

....

....

Question 6 continues on page 20

QUESTION 6. (Continued)

    (iii)   State the month in which shearing should occur to avoid processing problems, and explain why.

        Month..

        Explanation ....

        ....

(b)   Use the figure below to answer parts (i) and (ii).

∗ Mean price for GTM, B-length fault-free lots = 672 c/kg clean.

STYLE

spinners ⇐ +5% ∗ ⇒ best ⇐ +3% ⇒ good ⇐ −3% ⇒ average

Length

A   >90mm
B   80–90 mm
C   70–79 mm

LENGTH

A ⇐ +1% ⇒ B ⇐ −4% ⇒ C

Vegetable matter

FNF   ≤1·0% burr or seed
B   1·1–3·0% burr
S   1·1–3·0% seed
C   3·1–7·0% burr
L1   3·1–7·0% seed
D   >7·0% burr
L2   >7·0% seed

VEGETABLE MATTER

FNF ⇐ −1% ⇒ B ⇐ −11% ⇒ C ⇐ −8% ⇒ D

FNF ⇐ −1% ⇒ S ⇐ −9% ⇒ L1 ⇐ −8% ⇒ L2

Strength

Sound   >30 N/ktex
W1 (part tender)   25–30 N/ktex
W2 (tender)   18–24 N/ktex
V (very tender)   <18 N/ktex

STRENGTH

sound ⇐ −5% ⇒ W1 ⇐ −8% ⇒ W2 ⇐ −4% ⇒ V

Colour

H1—light unscourable colour
H2—medium unscourable colour
H3—heavy unscourable colour

COLOUR

none ⇐ −4% ⇒ H1 ⇐ −4% ⇒ H2 ⇐ −1% ⇒ H3

Australian Farm journal December 1994. International Wool Secretariat.

PRICE MARGINS BETWEEN GRADES OF MEDIUM (20·6–22·5 MICRONS)
MERINO-FLEECE WOOL IN PERCENTAGE TERMS

    (i)   Calculate the price of the following merino-fleece wools.

Style	Length	VM	Strength	Colour	Premium	Discount	Price
BTM	B	FNF	Sound	None			
GTM	B	2·9% shive	Sound	None			
GTM	B	FNF	15 N/ktex	None			
GTM	B	FNF	Sound	Medium unscourable colour			

QUESTION 6. (Continued)

    (ii)   Name TWO other wool characteristics (different from those shown above) that a buyer places discounts on when valuing wool.

        1.   ....

        2.   ....

(c)   (i)   Give TWO reasons for different yield percentages being shown on a Test Certificate.

        1.   ....

        2.   ....

    (ii)   Staple measurement has many benefits to processors, buyers, exporters, and wool-growers. Describe TWO benefits to processors, and TWO benefits to buyers and exporters.

        Processors

        1.   ....

           ....

        2.   ....

           ....

        Buyers and exporters

        1.   ....

           ....

        2.   ....

           ....

    (iii)   Explain why it is important to blend wool before any testing is undertaken.

        ....

        ....

    (iv)   State the standard conditions under which wool is tested.

        ....

        ....

QUESTION 7

(a)   You have been asked to class the wool clip from the following mob. Owing to drought conditions on the South-West Slopes, the owner has not bought any sheep during the last twelve months.

The self-replacing flock of medium-wool merinos consists of 3000 head of 2–4-year-old ewes, 50 rams, and 2000 lambs.

In the table below:

  (i)   write the Code of Practice bale descriptions for *all* lines you would expect to make for the adult sheep;

  (ii)   show the approximate number of 180-kilogram bales in each line;

  (iii)   write a description of the wool.

Bale-branding description	Approximate number of bales	Description of wool in each line

QUESTION 7. (Continued)

(b)   (i)   Explain the difference between 'Sale by sample' and 'Sale by description.'

....

....

....

....

(ii)   What attributes are measured when 'additional measurement' is requested?

....

....

....

....

(iii) 1.   What do the initials 'WI' stand for ?

....

2.   What is the main function of this organization?

....

....

(c)   (i)   Define early-stage processing of wool.

....

....

(ii)   List FOUR benefits of increased early-stage processing in Australia.

1.   ....

2.   ....

3.   ....

4.   ....

(iii) List TWO concerns with this development.

1.   ....

2.   ....

(iv) What is the term used for the measurement of the mean fibre length in the top?

....

SECTION III
ESSAYS ON SHEEP HUSBANDRY AND WOOL TECHNOLOGY
(30 Marks)

Suggested time: 30 minutes per essay.

Write TWO essays, choosing ONE from Question 8 and ONE from Question 9.

Both questions are of equal value.

Answer each question in a *separate* Writing Booklet.

Headings, diagrams, graphs, tables, etc. may be included in your essays.

QUESTION 8

EITHER

(a) Outline the main aims of sound grazing management. Compare and contrast FOUR grazing strategies.

OR

(b) Outline THREE factors that affect the rate of genetic gain in a flock. In your answer, describe FOUR types of breeding systems, and outline the advantages and disadvantages of each.

QUESTION 9

EITHER

(a) Discuss the advantages and disadvantages of FIVE options available when marketing wool.

OR

(b) Analyse the test results shown in the table below, and suggest future management strategies for this wool producer.

PARTIAL TEST RESULTS FOR A 1000-HEAD (35 BALES)
SELF-REPLACING MEDIUM MERINO FLOCK

	VMC	*SCH* Dry	*VMB*	*NET*	*MIC*	*S/L* mm	*S/L* CV%	*S/S* N/kt	*P* T	*O* M	*B* B	*BS*
AAA E	0·2	55·0	6·2	2250	21·5	60	29	14	2	90	8	10
	4·9											
	1·1												
PCS	3·0	40·0	26·1	1800	21·3	52	30	14	5	90	5	8
	15·6											
	7·5												

NOTE. These two lines do not represent the full clip.