BOARD OF STUDIES
NEW SOUTH WALES

STUDENT NUMBER

CENTRE NUMBER

HIGHER SCHOOL CERTIFICATE EXAMINATION

1998

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.
- You may ask for extra Writing Booklets if you need them.
- Allow about 60 minutes for this Section.

MARKER'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.

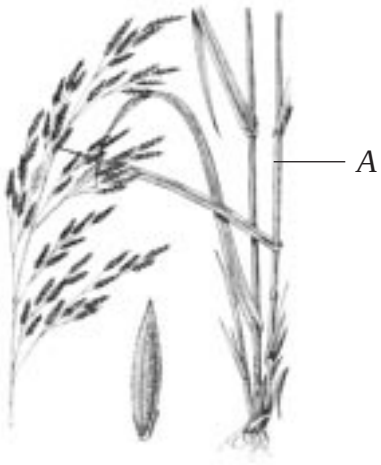
In each question, parts (a), (b) and (c) are of equal value.

Answer the questions in the spaces provided in this paper.

QUESTION 1

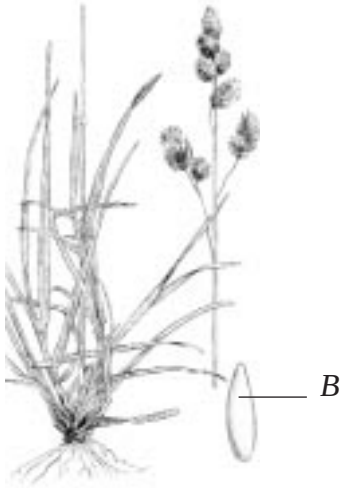
(a) (i) Identify each of the following pasture species by its common name.

1.



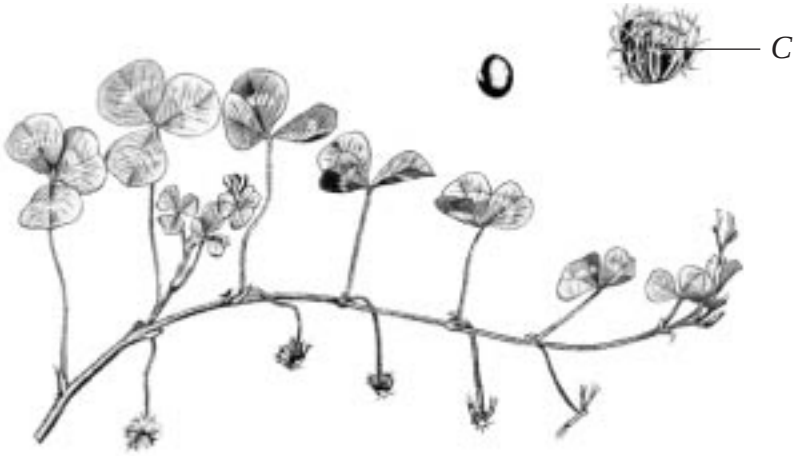
Common name .....

2.



Common name .....

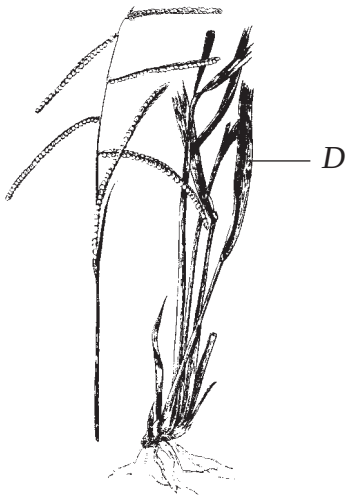
3.



Common name .....

QUESTION 1. (Continued)

4.



Common name .....

5.

Common name .....

6.

Common name .....

(ii) Name the plant parts labelled *A*, *B*, *C* and *D* on the given diagrams.

A .....

B .....

C .....

D .....

(iii) Why are legumes included in a pasture mix?

.....

.....

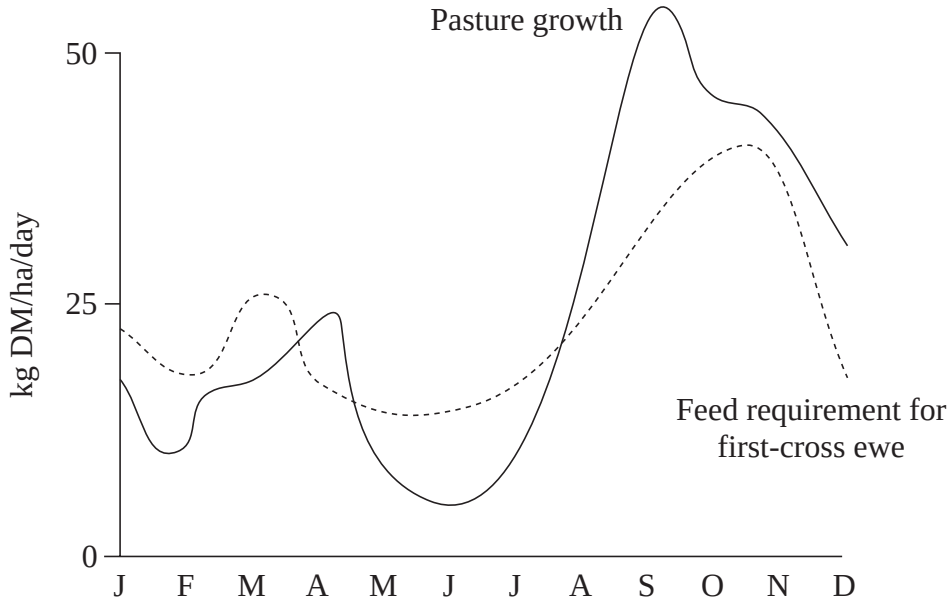
.....

Question 1 continues on page 4

QUESTION 1. (Continued)

(b) (i) Use the following graph as an aid to answer parts (1) to (4).

SEASONAL PASTURE GROWTH ON THE NORTHERN TABLELANDS OF NSW



1. In which season of the year is there maximum pasture growth?

   .....

2. During which months might the sheep require supplementary feeding?

   .....

   .....

3. What is the main limiting factor to pasture growth in July?

   .....

   .....

4. Why do the feed requirements of the first-cross ewe increase in March?

   .....

   .....

   .....

QUESTION 1. (Continued)

(ii) List FOUR possible advantages of improved pastures over native pastures.

1. .....

2. .....

3. .....

4. .....

(iii) What is the role of seed inoculation in pasture establishment?

.....

.....

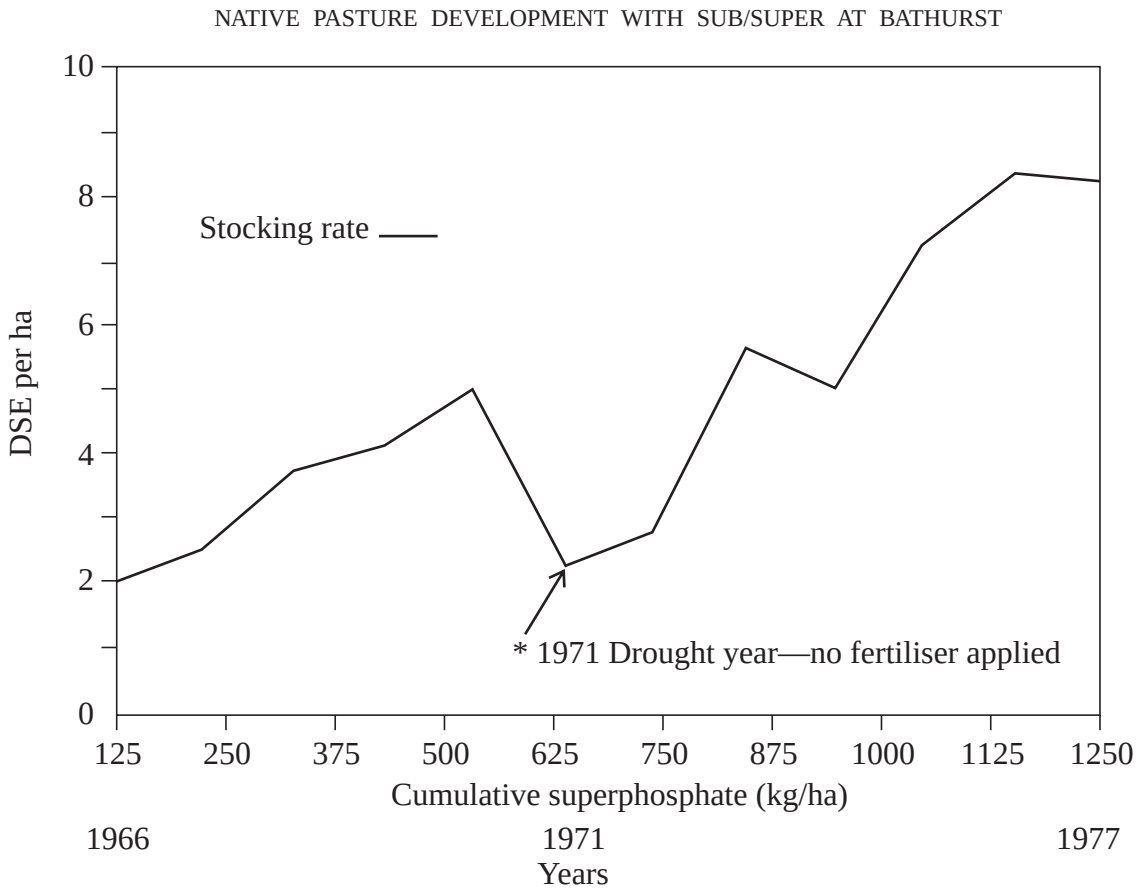
.....

.....

Question 1 continues on page 6

QUESTION 1. (Continued)

(c) Use the following graph to answer parts (i) to (iii).



(i) What is the effect of a build-up of superphosphate in the soil on stocking rate?

.....

.....

.....

.....

(ii) Indicate the stocking rate in each of the following years.

1. 1966 .....

2. 1977 .....

QUESTION 1. (Continued)

(iii) Calculate the fall in stocking rate (in DSE per ha) that occurred because of the 1971 drought.

.....

.....

.....

.....

(iv) Describe what is meant by one dry sheep equivalent.

.....

.....

.....

.....

(v) Name the TWO principal plant nutrients in superphosphate.

1. .....

2. .....

(vi) What is the possible effect of superphosphate application on:

1. pasture yield?

.....

2. soil pH?

.....

QUESTION 2

(a) Use the following table as a guide to answer parts (i) to (iii).

Grazing system	*Grazing period*	*Rest period*	*Labour input*
Set stocking		—	
Slow rotational grazing	3 months*	*	Low
Fast and fixed rotational grazing		*	Moderate
Cell grazing (time controlled grazing)		3–12 weeks*	
Controlled grazing (block grazing, strip grazing)		3–120 days*	High
* Depends on the number of paddocks in the system and pasture growth rates.			

(i) Fill in the table above to show an appropriate grazing period for:

1. a set stocking system;
2. a fast rotational grazing system;
3. a cell grazing system;
4. a controlled grazing system.

(ii) Complete the table by showing the labour input required for:

1. a set stocking system;
2. a cell grazing system.

QUESTION 2. (Continued)

(iii) 1. Which zone of NSW would you expect to be mainly set stocked?

.....

2. Of the grazing systems named in the table, which is particularly suited to the management of lucerne pastures?

.....

3. In the context of grazing management, what is meant by ‘rest period’?

.....

.....

.....

4. Why is there a high labour input required for a controlled grazing system?

.....

.....

Question 2 continues on page 10

QUESTION 2. (Continued)

(b) (i) Describe a yearly routine for a set stocking system.

.....

.....

.....

.....

(ii) Describe a yearly routine for a rotational grazing system.

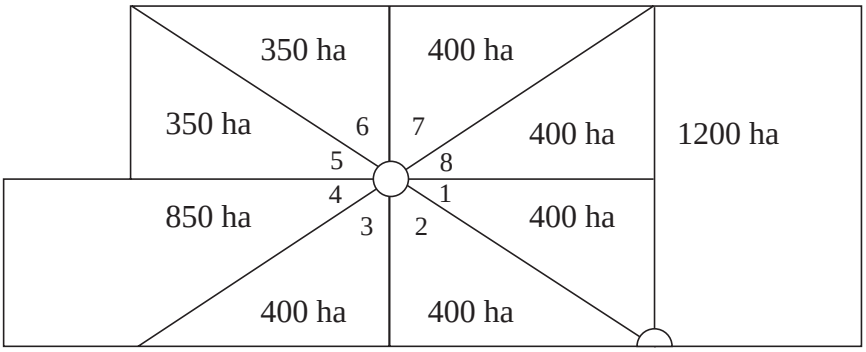
.....

.....

.....

.....

(iii) With the aid of the diagram below, explain the routines of a cell-grazing system.



.....

.....

.....

.....

.....

(iv) What is a major principle governing the use of the different grazing systems?

.....

.....

.....

.....

QUESTION 2. (Continued)

(c) (i) In which TWO states of Australia would you be most likely to see farmers conserving fodder?

1. .....

2. .....

(ii) In which season of the year is the most fodder conserved?

.....

(iii) In south-western NSW, in which season would you expect conserved fodder to be fed out to sheep?

.....

(iv) On the northern tablelands of NSW, in which season would you expect conserved fodder to be fed out to sheep?

.....

(v) What is the most common form of fodder conservation in Australia?

.....

(vi) Name TWO other forms of fodder conservation.

1. .....

2. .....

(vii) For the form of fodder conservation you have named in part (v), what is the most appropriate stage in a plant's growth cycle for it to be harvested?

.....

.....

.....

.....

SECTION II

(50 Marks)

Attempt ALL questions.

Each question is worth 10 marks.

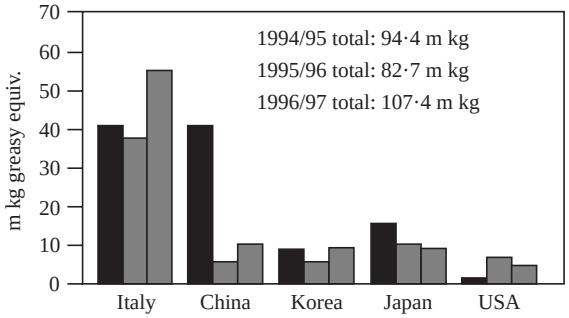
In each question, parts (a), (b) and (c) are of equal value.

Answer the questions in the spaces provided in this paper.

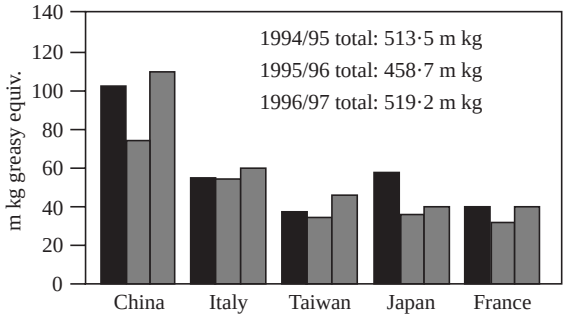
QUESTION 3

(a) The charts below show international wool sales over three years, of wools of different fibre diameter. Use these charts to answer parts (i) to (iv).

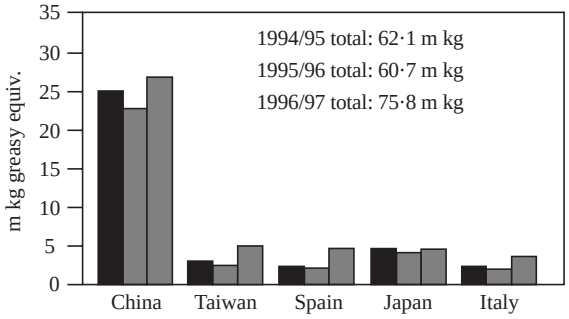
19 μm and finer



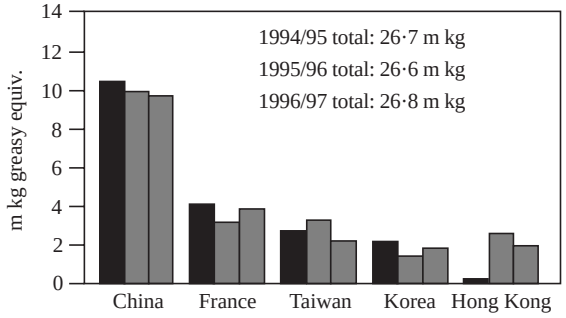
20 to 23 μm



24 to 27 μm



28 μm and coarser



KEY

1994/95

1995/96

1996/97

QUESTION 3. (Continued)

(i) Which country is Australia's major customer for superfine wool?

.....

(ii) Which country significantly reduced its purchase of superfine wool after 1994/95?

.....

(iii) Which country is Australia's major customer for broader styles of wool?

.....

(iv) Which fibre diameter range constitutes the highest volume of sales of wool to Australia's leading customers?

.....

(v) Indicate TWO breeds/strains of sheep that produce wool of:

1. 19 μm and finer;

   (I) .....

   (II) .....

2. 28 μm and coarser.

   (I) .....

   (II) .....

(vi) Name the agricultural zone where the majority of sheep that produce wool of 19 μm and finer are located.

.....

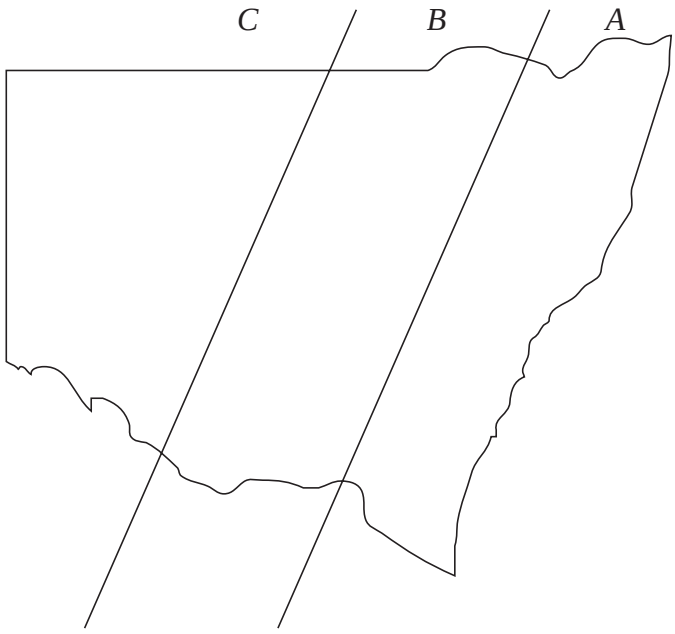
(vii) What is the other major product of sheep that produce wool of 28 μm and coarser?

.....

Question 3 continues on page 14

QUESTION 3. (Continued)

(b) The map below shows THREE representative areas of NSW.



(i) Match the type of sheep production enterprise with the corresponding area of NSW (*A*, *B* or *C*) where it predominates.

Sheep production enterprises	*Area*
Merino fine wool	
Prime lambs	
First-cross ewe	
Merino strong wool	
Merino medium wool	
Carpet wool	

(ii) Indicate why first-cross ewe production is found in the area you nominated in part (i).

.....

.....

(iii) For prime lamb production to be found in area *B*, what special conditions are necessary?

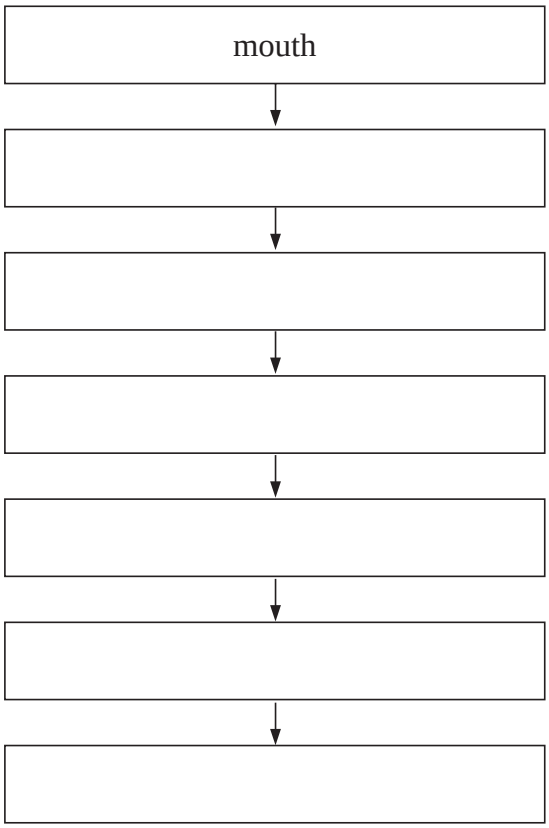
.....

.....

QUESTION 3. (Continued)

(c) (i) Place the names of the sections of the ruminant digestive tract from the following list in the correct order in the diagram.

- abomasum
- caecum
- oesophagus
- omasum
- reticulo-rumen
- small intestine



Question 3 continues on page 16

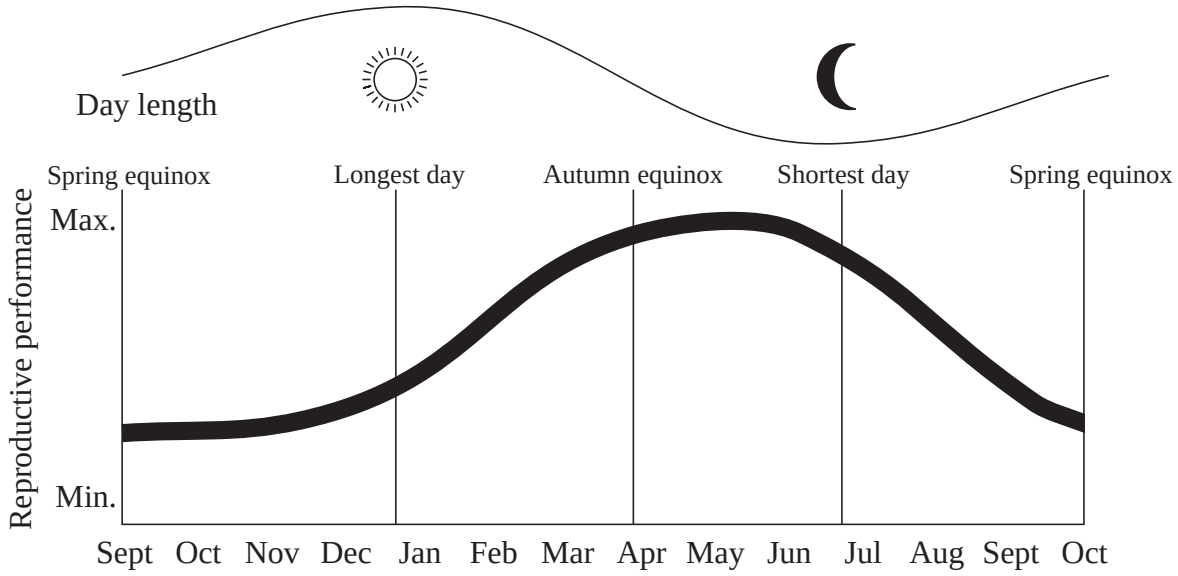
QUESTION 3. (Continued)

(c) (ii) In the table below, indicate the range of values of metabolisable energy (MJ/kg DM) and protein (% of DM) that are applicable for a sheep at maintenance, and for a growing sheep.

	Metabolisable energy (MJ/kg DM)	*Digestibility*	*% Crude protein*
Maintenance		60–65%	
Optimum growing/finishing		70–80%	

QUESTION 4

(a) Study the following graph of the breeding activity of sheep and use it in answering parts (i) and (ii).



(i) Name the month of maximum breeding activity.

.....

(ii) Name the major environmental factor responsible for this breeding pattern.

.....

(iii) State THREE other factors that influence reproductive performance in ewes.

1. .....

2. .....

3. .....

(iv) List the management procedures a farmer should undertake to maximise fertility of individual rams.

1. .....

2. .....

3. .....

4. .....

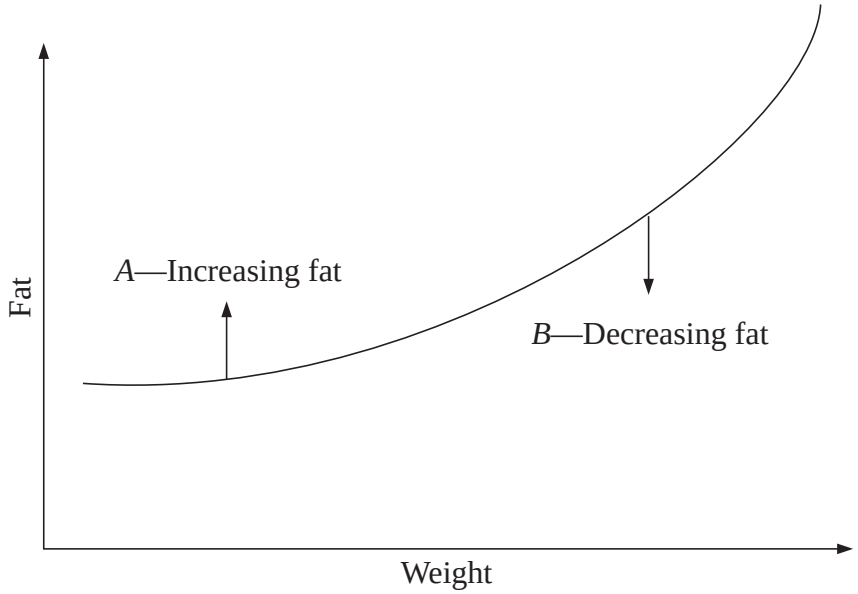
(v) Ram percentage is often described as 1% plus one. Calculate the number of rams required for 500 ewes.

.....

Question 4 continues on page 18

QUESTION 4. (Continued)

(b) (i) With reference to the diagram, use the letters *A* and *B* to indicate against the list below which SIX factors may influence increasing fat in lamb carcasses, and which SIX factors may influence decreasing fat in lamb carcasses.

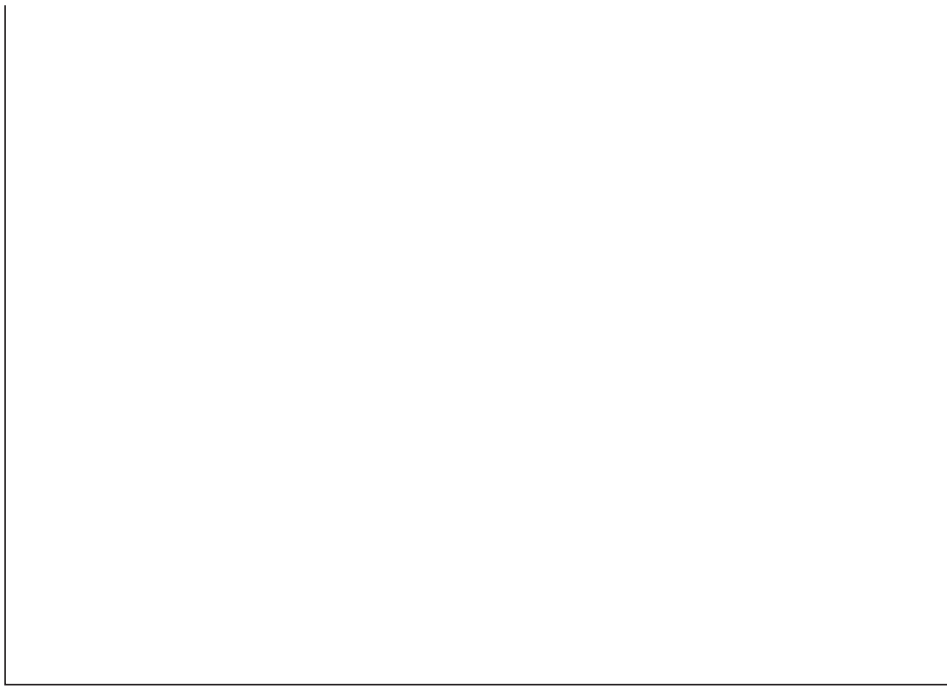


Factors	*Letter*
Cryptorchid and ram lambs	
Early weaning	
Ewe lambs	
Large-framed dams	
Lush, high quality feed	
Manipulate growth path	
Poor quality feed: slow growth	
Rapid growth: grain diets	
Shearing lambs	
Sires with –ve EBV for fat	
Sires with +ve EBV for fat	
Small-framed dams	

QUESTION 4. (Continued)

(ii) Use the data in the table below to construct a graph of liveweight growth for early and late weaned lambs on the axes provided.

AGE (months)	WEIGHT (kg)	
	12-week weaning	*20-week weaning*
3	18	18
4·5	28	21
7	32	28
10	33	29
17	41	38



(iii) On the basis of the graph you have drawn, explain which form of weaning you consider to be preferable.

.....

.....

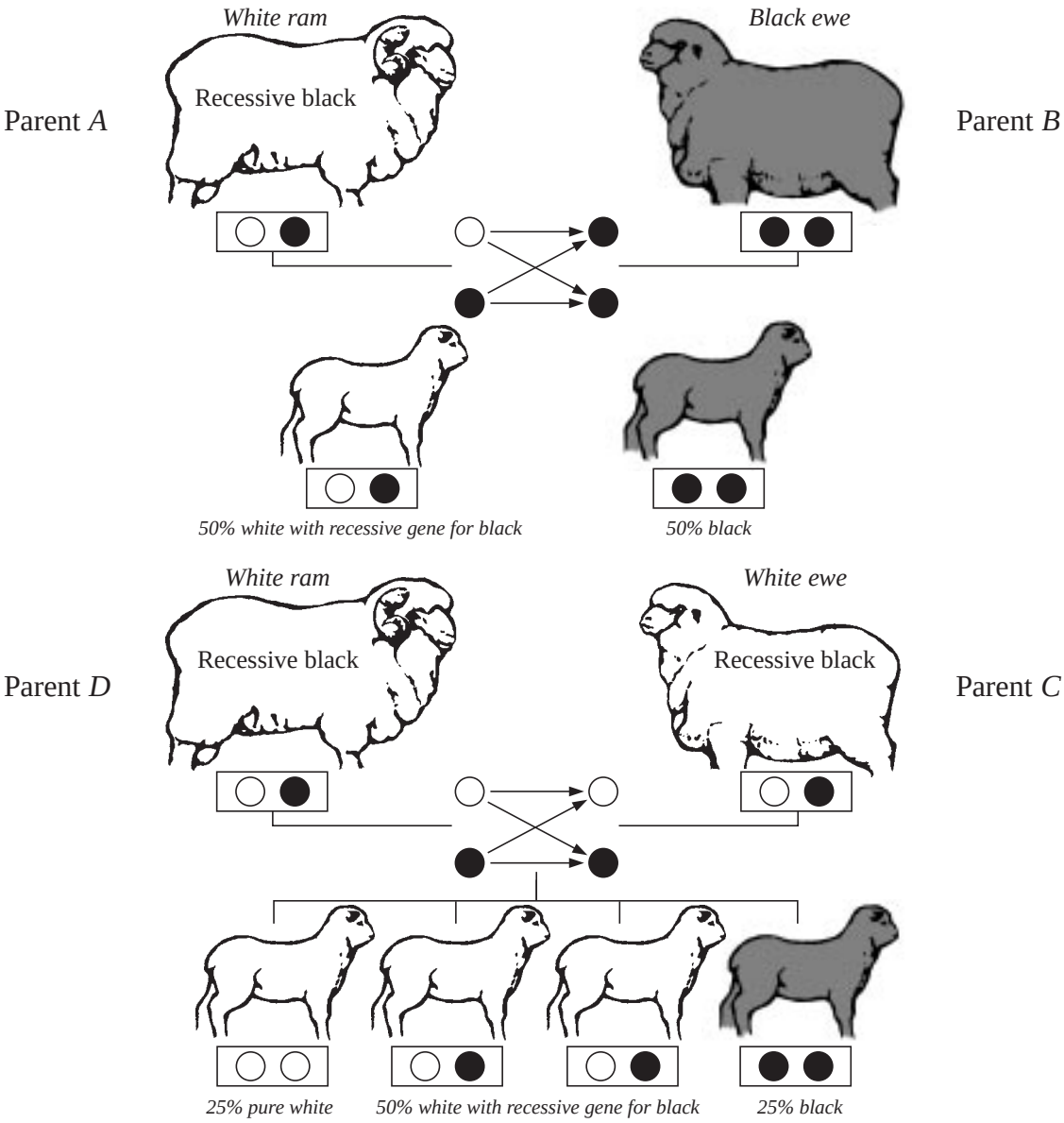
.....

.....

Question 4 continues on page 20

QUESTION 4. (Continued)

(c) Use the diagram below as an aid to answer parts (i) to (iv).



(i) Which gene is dominant?

.....

(ii) Which parent(s) is/are homozygous for black?

.....

(iii) In the diagram above, circle the progeny heterozygous for wool colour.

QUESTION 4. (Continued)

(iv) From a matching of Parent *D* and Parent *C*, what percentage of lambs born would you expect to have white wool?

.....

(v) Define the following terms.

1. Heritability .....

.....

2. Hybrid vigour .....

.....

3. Selection index .....

.....

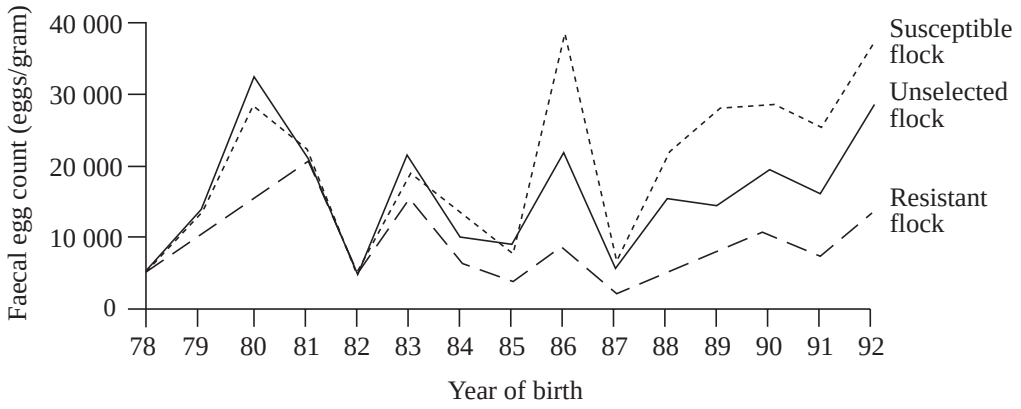
4. Inbreeding .....

.....

Please turn over

QUESTION 5

(a) Use the diagram below to answer parts (i) and (ii).



(i) What information on the diagram indicates that it is possible to breed for increased resistance to worms?

.....

.....

.....

.....

(ii) From the diagram above:

1. identify a year that appears to have been particularly wet;

   .....

2. identify a year that appears to have been particularly dry.

   .....

QUESTION 5. (Continued)

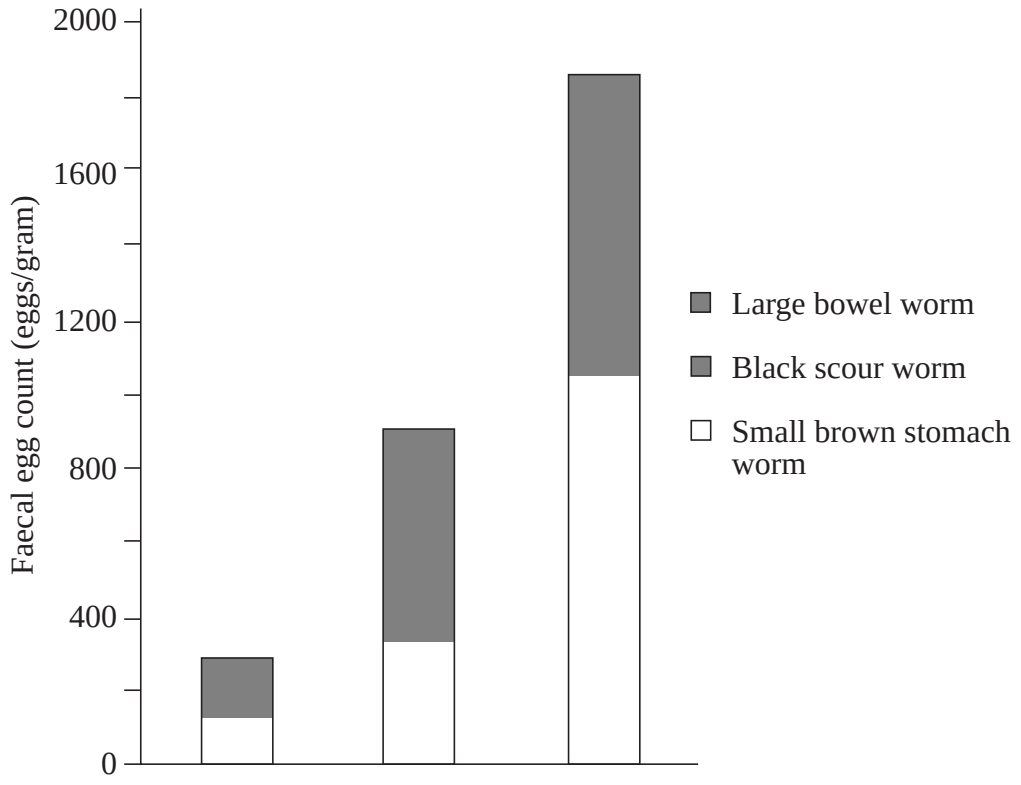
(iii) The diagram below presents data for weaners from the three selection flocks mentioned in part (a).

Label the columns of the graph to show which data come from:

1. susceptible weaners;

2. unselected weaners;

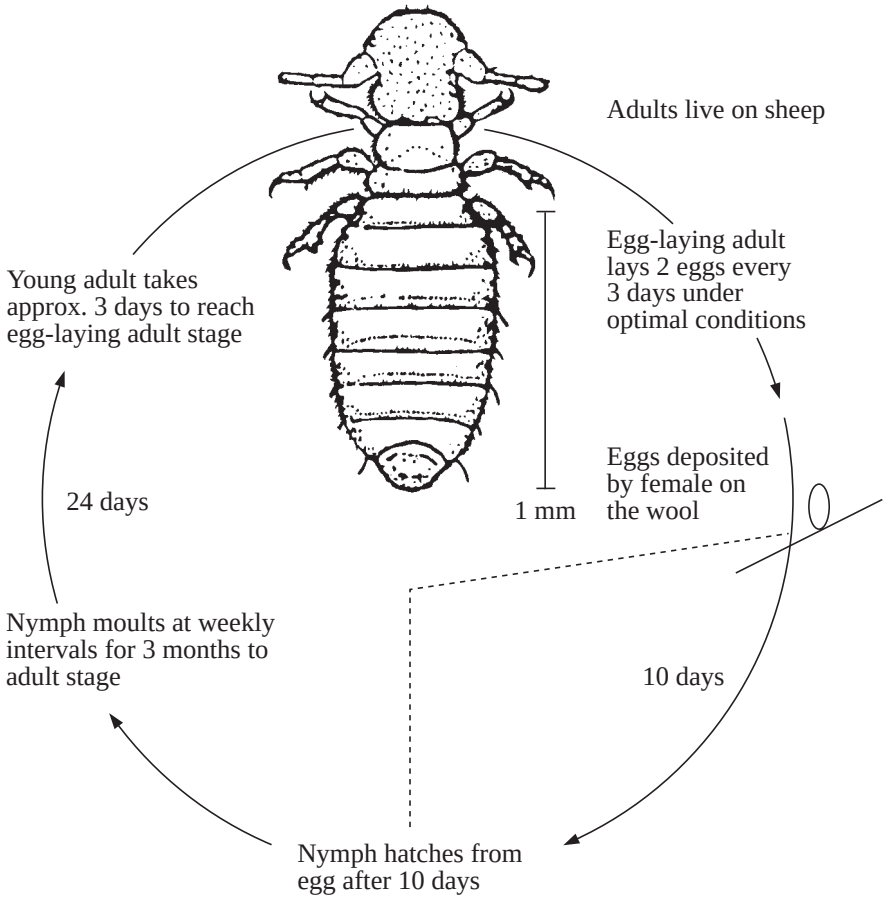
3. resistant weaners.



Question 5 continues on page 24

QUESTION 5. (Continued)

Use the diagram to answer part (iv).



(iv) At what stage of the life cycle is the sheep body louse most susceptible to control by jetting?

.....

(v) Name another method for control of body lice in sheep.

.....

.....

.....

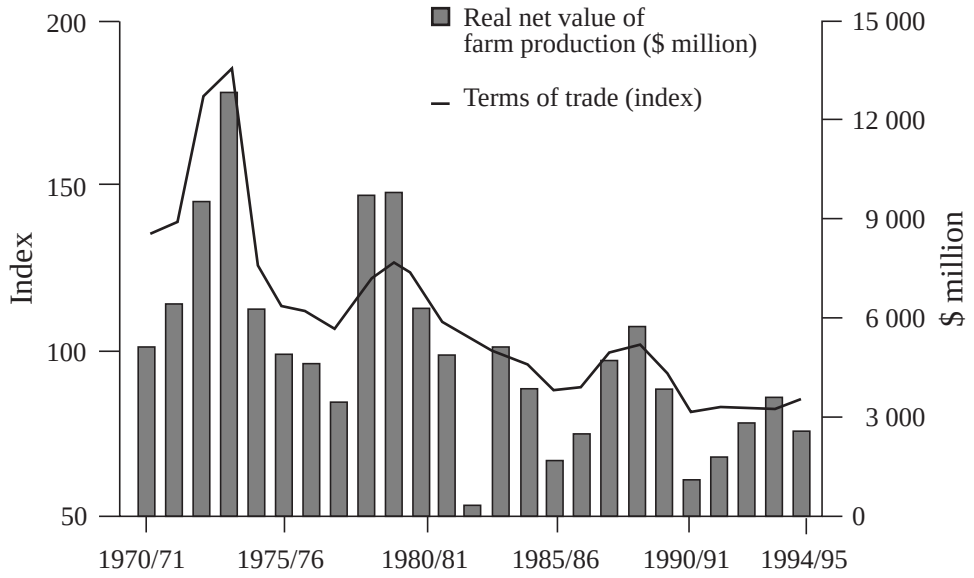
(vi) What is the main method of transmission of body lice between sheep?

.....

.....

QUESTION 5. (Continued)

(b) Use the graph below as an aid to answer parts (i) to (iv).



(i) Make TWO observations regarding the real net value of farm production.

1. .....

2. .....

(ii) What is happening to farmers' terms of trade?

.....

(iii) What caused the dramatic fall in farm production in 1982/83 and 1990/91?

.....

(iv) Circle below, the approximate percentage increase in net value of farm production from 1977/78 to 1978/79.

50% 100% 200% 300%

(v) What is the difference in millions of dollars between net value of production in 1973/74 and in 1988/89?

.....

(vi) List FOUR advantages of providing shelter belts and trees on a farm.

1. .....

2. .....

3. .....

4. .....

Question 5 continues on page 26

QUESTION 5. (Continued)

(c) (i) For garments made of cotton, wool or synthetics, indicate for each property listed in the table the relative ranking (1, 2 or 3) of the three fibres. (1 indicates the highest/most desirable, as shown for price.)

PROPERTIES	FIBRE		
	Cotton	*Wool*	*Synthetics*
Price	2	1	3
Elasticity			
Uniformity			
Fire resistance			
Prickle factor			

(ii) What is the major use for superfine Australian wool?

.....

(iii) What is the major use for wool from Australian Tukidale sheep?

.....

(iv) Indicate TWO reasons for blending either cotton or synthetic fibre with wool.

1. .....

2. .....

QUESTION 6

(a) (i) Name the THREE types of follicles found in the skin of sheep.

1. .....

2. .....

3. .....

(ii) Indicate the follicle ratios for:

1. a fine wool Merino;

.....

2. a Border Leicester.

.....

(iii) Name THREE accessory structures that could be associated with any of the follicles listed in part (i).

1. .....

2. .....

3. .....

(iv) Staples are held together by fibres that pass from one staple to another. What is the name given to these fibres?

.....

(v) Describe a medullated fibre.

.....

.....

.....

Question 6 continues on page 28

QUESTION 6. (Continued)

(b) (i) List the FIVE main factors affecting the market value of wool.

1. .....
2. .....
3. .....
4. .....
5. .....

(ii) Calculate the clean price for wool sold for 630 c/kg greasy and yielding 70%. Show all working.

.....

.....

.....

.....

.....

(iii) Describe briefly how wool strength is tested:

1. in the shearing shed;

.....

.....

2. in the laboratory.

.....

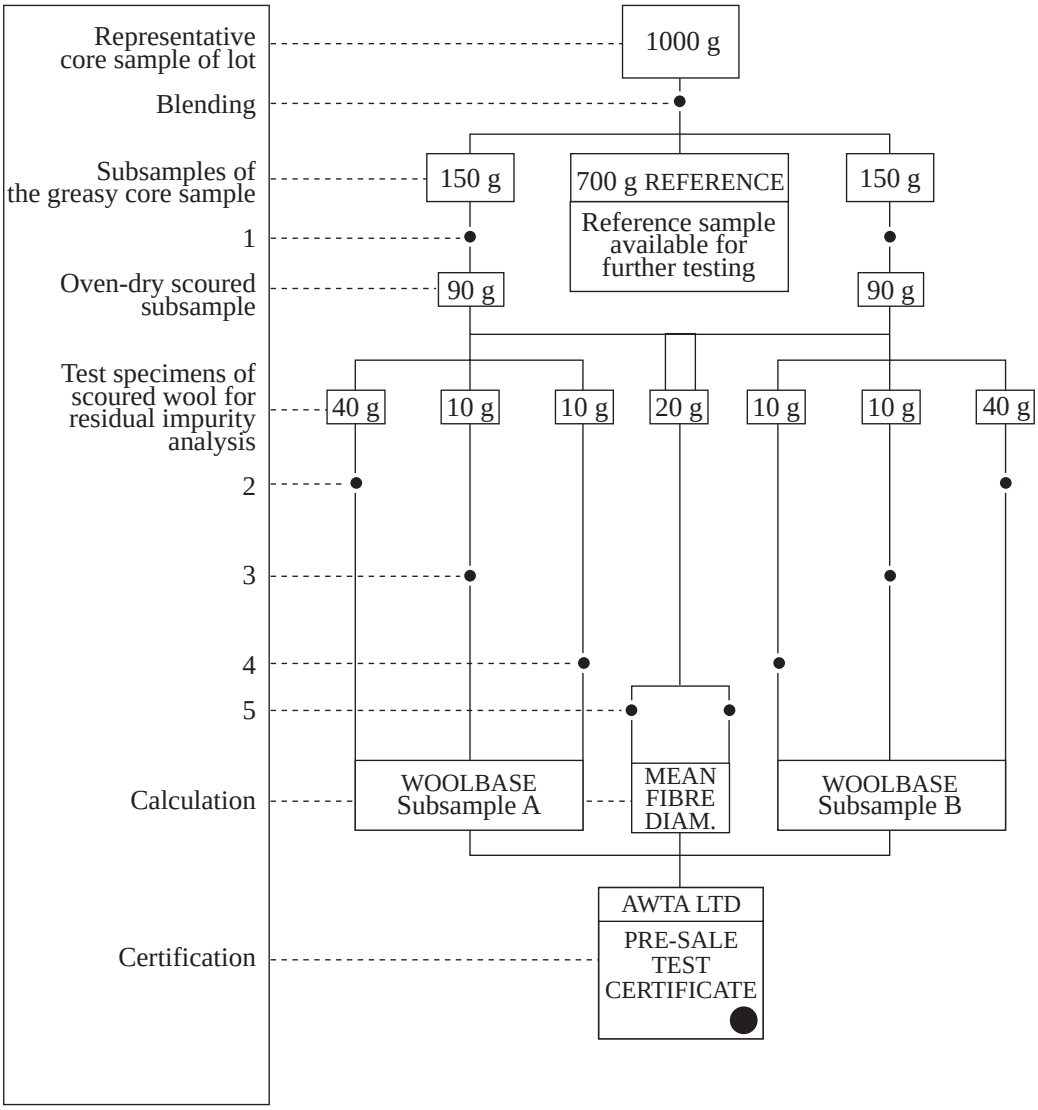
.....

.....

QUESTION 6. (Continued)

(c) (i) In the pre-sale measurement procedure chart shown below, name the relevant tests (marked 1 to 5 on the diagram) used to determine the information presented on a pre-sale test certificate.

PRE-SALE MEASUREMENT PROCEDURE FOR WOOL



1. .....

2. .....

3. .....

4. .....

5. .....

Question 6 continues on page 30

QUESTION 6. (Continued)

(ii) Use the diagram below to answer part (ii).

1. Name and describe the process being carried out in the diagram.

.....

.....

.....

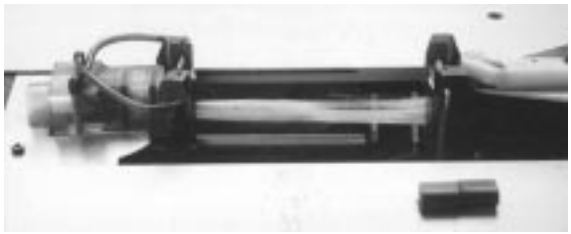
2. Why is the process undertaken?

.....

.....

QUESTION 6. (Continued)

(iii) In the diagram below:



1. what is being tested for?

   .....

   .....

2. what is the name of the machine?

   .....

Please turn over

QUESTION 7

(a) (i) Who is the first person with a major responsibility for preparing shorn wool for market?

.....

(ii) List THREE responsibilities of the person named in part (i) that will ensure the standard of preparation of wool leaving the shed.

1. .....

2. .....

3. .....

(iii) What assumption is made about the wool of a mob of sheep that have run together?

.....

.....

(iv) Name THREE contaminants that shed workers should aim to eliminate from bales of wool.

.....

.....

.....

(v) What are TWO pieces of information that you would expect to find on a classer's report?

1. .....

2. .....

QUESTION 7. (Continued)

(b) (i) List and describe FIVE selling options available to wool producers.

1. .....

.....

2. .....

.....

3. .....

.....

4. .....

.....

5. .....

.....

(ii) Define early-stage processing of wool.

.....

.....

(iii) What percentage of the Australian wool clip is early-stage processed within Australia?

.....%

(iv) What do you understand by *wool dumping*?

.....

.....

(v) How could the Asian economic crisis affect the Australian wool industry?

.....

.....

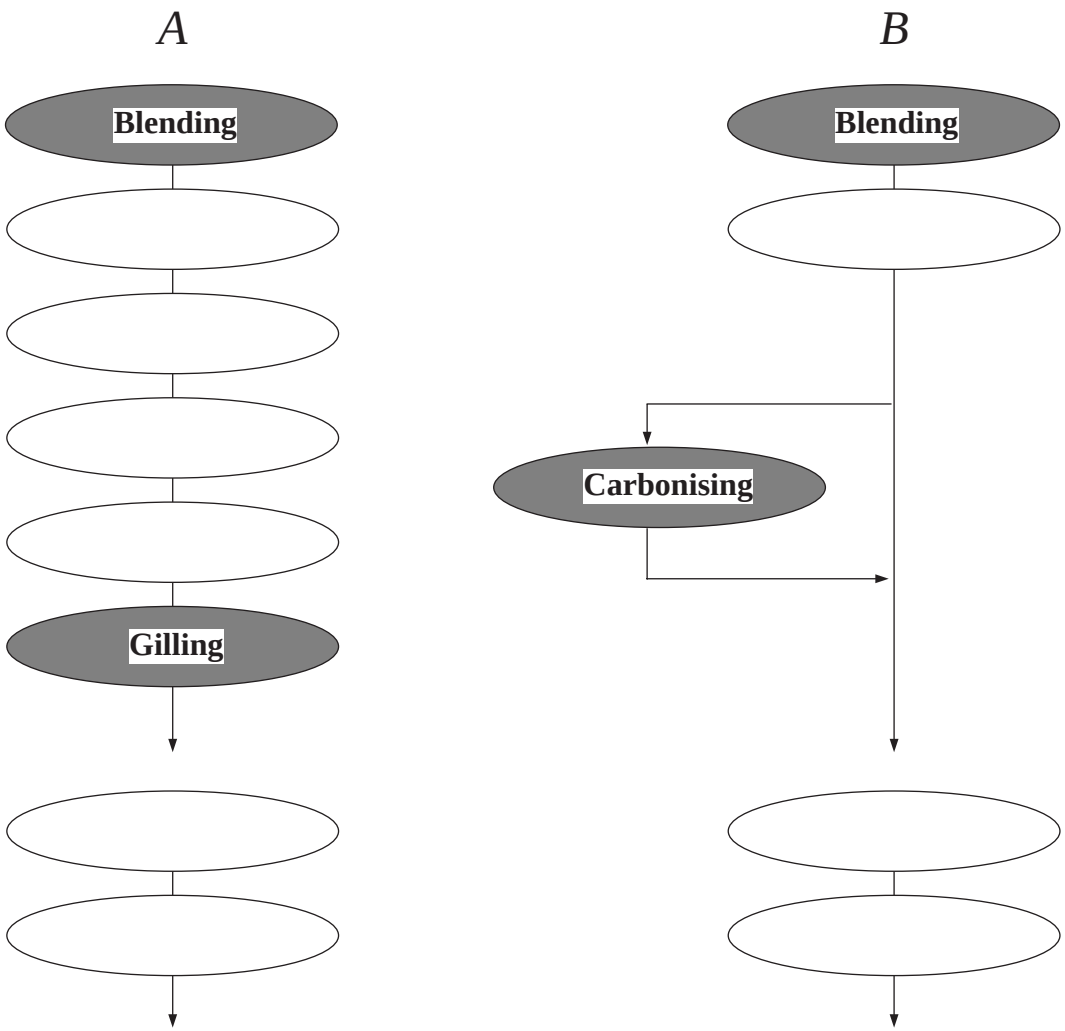
Question 7 continues on page 34

QUESTION 7. (Continued)

(c) (i) In the diagram below, *A* and *B* represent the two main wool-processing systems of woollen and worsted. Identify them.

A = ...

B = ...



(ii) In the processes illustrated, show where carding, scouring and spinning occur in the two sequences of events you named in part (i).

(iii) What type of wool is processed on:

System *A*? .....

System *B*? .....

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.

The questions are of equal value.

Answer each question in a SEPARATE Writing Booklet.

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

QUESTION 8

EITHER

(a) As a result of a good season, the mid-term scanning of your breeding ewes indicates that they will have 20% more lambs than in most years.

Discuss the changes to management practices you might apply late in pregnancy, and/or during lactation, to ensure that the maximum number of lambs born grow efficiently through to weaning.

OR

(b) Discuss ONE of the following conditions:

- Johne's disease
- foot rot
- sheep lice,

in relation to the following factors:

(i) farm management;

(ii) agistment of stock;

(iii) buying sheep from saleyards;

(iv) government policy on disease eradication;

(v) veterinary services.

QUESTION 9

EITHER

(a) Describe how the principles of total quality management (TQM) can be applied to the harvesting, transport and sale of Merino wool.

OR

(b) Discuss the possible impact of the following factors on the growth and strength of Merino wool:

(i) drought;

(ii) supplementary feeding;

(iii) reproduction;

(iv) internal parasites.

End of paper