

90454



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Agricultural and Horticultural Science, 2009

90454 Describe manipulations to influence growth and development, and productivity, in livestock or plants

Credits: Four

9.30 am Tuesday 24 November 2009

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Answer ***EITHER***: ALL questions in Section A – Agricultural Science (pages 2–7) (Tick one box)
OR: ALL questions in Section B – Horticultural Science (pages 9–15).

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–16 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

<i>For Assessor's use only</i>	Achievement Criteria		
Achievement	Achievement with Merit	Achievement with Excellence	
Describe the effect of factors on growth, development, and productivity of livestock or plants. <input type="checkbox"/>	Explain how factors influence the growth, development, and productivity of livestock or plants. <input type="checkbox"/>	Explain how factors influence the growth, development, and productivity of livestock or plants. <input type="checkbox"/>	
Describe manipulations of factors used to influence the growth and development, and productivity, of livestock or plants. <input type="checkbox"/>	Explain how manipulations of factors influence the growth and development, and productivity, of livestock or plants. <input type="checkbox"/>	Explain how manipulations of factors influence the growth and development, and productivity, of livestock or plants. <input type="checkbox"/>	
		Justify manipulation(s) used to influence growth and development, and the productivity of a livestock or plant production system. <input type="checkbox"/>	
Overall Level of Performance (all criteria within a column are met)			<input type="checkbox"/>

You are advised to spend 40 minutes answering the questions in this booklet.

EITHER:

SECTION A: AGRICULTURAL SCIENCE

QUESTION ONE

Farmer Wilson mates Romney rams with Romney ewes on a farm that is medium to steep hill country with limited lamb-fattening ability. The farm is prone to drought, and production of good lambs is dependent on the Nov–Dec rainfall. The farmer finishes 75% of the lambs averaging 38 kg liveweight off the property by Christmas.

Source (adapted): "Straight Furrow", Sept 2008.

(a) Explain why it is difficult to finish all lambs before Christmas on Wilson's farm.

In your explanation, consider:

- the breed of sheep
- physical conditions affecting the farm.

It is important that Farmer Wilson sends away lambs that are close to 38 kg and with a low fat cover. The farmer has two **drafting** management practices to consider:

- weighing lambs and drafting those lambs that weigh 38 kg
- using a commercial lamb drafter at **one** time only, close to Christmas, to identify lambs that are close to 38 kg with a low fat cover.

(b) Farmer Wilson decides to use the **commercial lamb drafter**.

Justify Farmer Wilson's decision to use the commercial lamb drafter.

When justifying the management practice:

- describe where on the lamb's body the commercial lamb drafter would feel or look to assess fat cover
- explain the actions the commercial lamb drafter would take to identify the lambs of desired weight and fat cover
- explain why the use of the commercial lamb drafter would be the most **practical and effective** practice for drafting lambs of about 38 kg and low fat cover on this property.

QUESTION TWOAssessor's
use only

The dairy industry produces a large volume of New Zealand's beef. This beef comes from cull milking cows and dairy calves sold to beef producers, who grow them to market weight. Beef producers who purchase dairy calves prefer Friesian bull calves.

(a) Explain why beef producers prefer Friesian bull calves.

In your explanation:

- describe the growth rates and muscle to fat ratio of Friesian bull cattle
- explain how the growth and development of Friesian bulls produces a valuable carcass.

Many of New Zealand's sheep and beef producers farm in hill country areas. To achieve the fast growth rates **hill country** beef producers require, they can use some or all of the following management practices:

- feed cattle on grain as well as silage in winter
- drench cattle on a regular basis
- rotational grazing of cattle on leafy pasture throughout the year.

(b) Select the management practice that you consider will produce fast growth rates at **least cost** on hill country properties.

Selected management practice: _____

Justify the use of your selected management practice.

When justifying your selected management practice:

- describe how the practice would be carried out
- explain how the use of this practice helps produce fast growth rates
- explain why the selected management practice is more cost effective for producing fast growth rates than ONE of the other management practices listed.

QUESTION THREEAssessor's
use only

Birth weight has an impact on livestock survival and growth rates before weaning.
Lamb birth weights can vary from 2 kg to 5 kg.

(a) Explain why lamb birth weights vary from 2 kg to 5 kg.

In your explanation:

- describe TWO factors that would be responsible for variation in birth weight
- explain how EACH factor produces the variation in birth weight.

Low calf birth weights are important in **beef** production when breeding from **heifers**. Many cases of calving difficulties result in the death of the calf and sometimes the heifer. To achieve low calf birth weights in heifers, farmers could consider the following management practices:

- wintering in-calf heifers on hill paddocks
- mating heifers with bulls that have low Breeding Values (BV) for calf birth weight.

Source: (adapted) "Countrywide", Oct 2007.

- (b) Select the management practice that you consider will be most practical and effective in producing low calf birth weights on hill country properties.

Selected management practice: _____

Justify your selected management practice.

In your justification:

- describe how the practice would be carried out
- explain how the management practice produces a **lower** calf birth weight
- give reasons why the selected management practice is **more practical and effective** for producing low calf birth weights on hill country properties.

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You are advised to spend 40 minutes answering the questions in this booklet.

OR:

SECTION B: HORTICULTURAL SCIENCE

QUESTION ONE

Many commercial orchards contain different cultivars / varieties of fruit trees.

(a) Explain how the cultivar / variety of the fruit tree influences the **growth habit or fruit characteristics** of the tree.

In your explanation:

- describe ONE effect that the **cultivar/variety** can have on the growth habit or fruit characteristics of the tree
- explain how the cultivar / variety produces this effect.

Table 1 shows the yield and revenue for 2008 and price forecast for 2009 for different apple cultivars/varieties.

Table 1: 2008 Apple Cultivar/Variety Yield and Revenue per Hectare and the Forecasted Prices for the 2009 season

Cultivar	Ripening period	Yield per hectare (TCE)	Export pack out (%)	Average export return (\$/TCE)	Non-export return (\$/TCE)	Revenue per hectare (\$)	2009 forecast average export return (\$/TCE)	2009 forecast average non-export return (\$/TCE)
Braeburn	March to April	3 626	66%	10.09	0.73	25 047	16.20	0.48
Royal Gala	February to March	3 069	77%	15.44	0.61	36 917	17.57	0.67
Fuji	April	2 918	63%	22.39	0.65	41 862	23.17	0.50

(TCE = tray carton equivalent)

A grower has decided to grow a number of cultivars/varieties of apple trees instead of just a single cultivar/variety. Use your own knowledge and the information in Table 1 to answer Part (b).

(b) Justify the grower’s decision to **use different cultivars/varieties** rather than a single cultivar/variety.

In your justification:

- describe TWO criteria the grower would use when **selecting apple cultivars/varieties**
- explain how cultivar/variety **selection** can be used to influence the **productivity** of an apple orchard
- give reasons why a **mix of cultivars/varieties** is desirable to **maximise orchard profitability**.

QUESTION TWO

Botrytis cinerea (or *Botrytis*), is an infectious fungal disease of crops such as berry fruit and lettuces. Such diseases decrease crop productivity.

- (a) Explain how a **fungal disease** such as *Botrytis* reduces financial returns.
In your explanation:

- describe how a fungal disease such as *Botrytis* affects plant growth
- explain how the influence of fungal diseases on plants **reduces** financial returns.

Media sterilisation and **humidity control** are two manipulations that would reduce fungal diseases such as *Botrytis cinerea* on lettuces.

A grower has decided to use humidity control to reduce *Botrytis cinerea*, so the grower can produce a **large quantity of disease-free** lettuces.

(b) Justify the grower's decision to use humidity control.

In your justification:

- describe how **humidity is controlled** to reduce *Botrytis cinerea* on lettuces
- explain how humidity control results in **disease-free lettuces**
- explain why **humidity control** is better than media sterilisation in terms of producing the largest **quantity** of lettuces **not affected** by *Botrytis cinerea*.

QUESTION THREEAssessor's
use only

Plant processes are controlled by several factors, including **natural hormones** such as **auxin** produced by the plant.

- (a) Explain how the levels (concentrations) of auxin affect the growth of a plant crop.
In your explanation:
- describe ONE physical effect that **auxin** has on plant cells
 - explain how the levels (concentrations) of auxin affect plant growth.

A lavender grower plans to establish a lavender oil distillery that requires a large number of plants for processing.

The grower decides to grow the plants from **cuttings** using root hormone and **pinching out** the shoots, another technique that affects the distribution of plant hormones. Using both these techniques should reduce the time required to produce well-established bushy plants suitable for processing.

(b) Justify the grower's decision to use BOTH techniques.

In your justification:

- describe **how** pinching out affects plant shape
- explain how the use of rooting hormone would reduce the **time** required to produce suitable plants
- give reasons why using **both** techniques will **work together** to produce the quality plants required for processing in a short timeframe.
