LUI ☐☐☐☐☐☐☐☐☐☐ School code ☐☐☐☐

School name ☐

Given name/s ☐

Family name ☐

Attach your
barcode ID label here

Book ☐ of ☐ books used

External assessment

Agricultural Science

Paper 1

Time allowed

- Perusal time — 10 minutes
- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- QCAA-approved calculator permitted.
- Planning paper will not be marked.

Section 1 (20 marks)

- 20 multiple choice questions

Section 2 (44 marks)

- 10 short response questions

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Section 1

Instructions

- Choose the best answer for Questions 1–20.
- This section has 20 questions and is worth 20 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○

Do not write outside this box.

Section 2

Instructions

- Write using black or blue pen.
- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.
- This section has 10 questions and is worth 44 marks.

QUESTION 21 (4 marks)

Use an example to explain the process that an agricultural plant product undergoes between harvest and sale to the consumer.

QUESTION 22 (4 marks)

A producer has a 10-ha paddock with 2000 kg DM/ha of feed available.

Calculate the number of 300-kg steers the producer could run in the paddock for 25 days. Assume these steers have a pasture intake of 10 kg DM/head/day and that pastures should be destocked to prevent over-grazing when they are at a mass of 1000 kg green DM/ha. Show your working.

QUESTION 23 (6 marks)

Foot and mouth disease (FMD) is a severe, highly contagious disease of cloven-hoofed animals such as cattle, sheep and pigs.

The most common signs of FMD are fluid-filled blisters and ulcers in the mouth and on the feet, lameness, excessive salivation, and loss of appetite.

There is no specific treatment for FMD. If an outbreak were to occur in Australia, movement control measures would need to be initiated. All infected animals would need to be destroyed.

Draw three conclusions about the impact of an FMD outbreak on Australian livestock industries. Provide reasoning to support each of your conclusions.

QUESTION 24 (4 marks)

A cattle producer has a creek running through their property. The creek provides water for cattle and the irrigation of fodder crops and improved pastures to boost animal production. After experiencing a year with significantly less than average rainfall, the producer notices that native vegetation along the creek bank is dying off, the creek water is more discoloured than usual, and the leaves in the fodder crops and improved pastures are yellowing.

Explain two strategies the producer could implement to reverse the processes that are occurring on the property.

QUESTION 25 (4 marks)

The table contains mean values for feed intake, feed conversion ratio, average daily weight gain and end-of-trial fat depth of feedlot lambs that were given feeds formulated at different energy levels.

Feed	Intake (kg/day)	Feed conversion ratio	Average daily gain (g/day)	Fat depth (mm)
Low energy	2.3 ± 0.5	5.1 ± 0.6	476 ± 30.0	6
Medium energy	1.8 ± 0.9	4.1 ± 0.5	512 ± 30.1	11
High energy	1.7 ± 0.3	3.9 ± 0.6	528 ± 31.4	15

Contrast the results of using the different feeds. Draw conclusions about the best feed for fat lamb production.

QUESTION 26 (4 marks)

a) What is a tariff?

[1 mark]

_____

_____

_____

b) What is a free trade agreement?

[1 mark]

_____

_____

_____

_____

c) Explain why the European Union (EU) currently has a tariff on Australian lamb and beef.

[1 mark]

_____

_____

_____

_____

d) Explain the impact that a tariff as high as 50% has on the sale of Australian goods in the EU.

[1 mark]

_____

_____

_____

_____

Do not write outside this box.

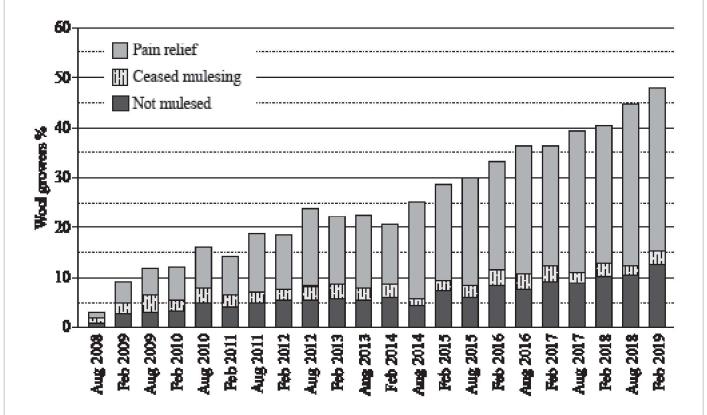## QUESTION 27 (4 marks)

A trial was conducted to determine the efficacy of treatments for the Varroa mite in honey bees.
Four treatments were used: the control, fungus *Metarhizium anisopliae* and pesticides (Product A and
Product B). The table shows the mean values for each treatment.

Treatment	Mean values for mite infestation of adult bees (%)		Mean values for mites remaining in the hive after treatment	Honey extracted (kg)
	Before treatment	After treatment		
Control	1.55 ± 0.68	1.93 ± 0.38	56.79 ± 8.59	6
Metarhizium	1.28 ± 0.45	0.32 ± 0.03	21.14 ± 4.79	9
Product A	0.87 ± 0.01	0.02 ± 0.01	0.71 ± 0.10	12
Product B	0.92 ± 0.05	0.03 ± 0.01	0.81 ± 0.15	14

Use the table to draw a conclusion about the most effective treatment for the control of the Varroa mite in
honey bees. Provide three pieces of evidence from the data to support your conclusion.

QUESTION 28 (7 marks)

Mulesing involves the removal of wool-bearing skin from the breech area of a sheep. In 2008, over 95% of wool growers used this technique (without pain relief) to prevent flystrike in their flocks. The graph shows the change in the percentage of wool growers who either do not practise mulesing, ceased mulesing or use pain relief with mulesing. The table shows how long it would take to improve resistance to flystrike in sheep using an alternative method to mulesing.

Wrinkle score	Risk	Proportion of flock (%)		
		Start	5 years	10 years
1	Resistant	5	15	30
2	Low risk	24	38	40
3+	At risk	71	47	30

Note: An assessment of wrinkle score will provide an indication of breech flystrike risk. 30% at risk can be culled and maintain a stable flock.
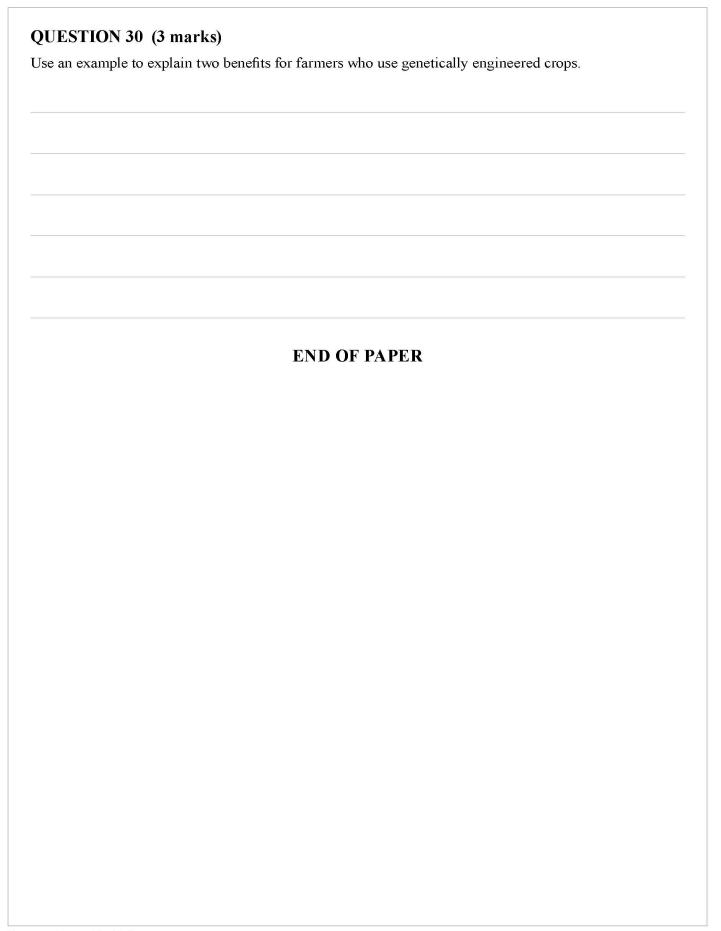
a) Use the graph to calculate the percentage change in producers who practised mulesing with pain relief between February 2009 and February 2019. Show your working. *[2 marks]*

_____

_____

_____

_____

b) Use the table to identify the alternative method to mulesing. *[1 mark]*

_____

_____

c) Draw a conclusion about how willing wool producers were to adopt this method. Use data to justify your conclusion. *[4 marks]*
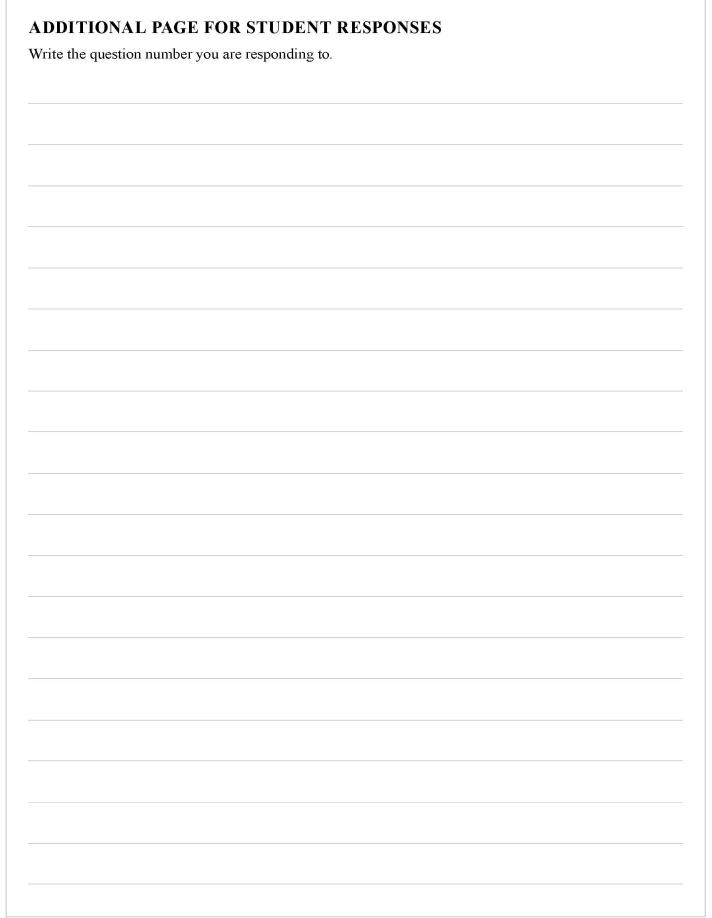
_____

_____

_____

_____

_____

_____

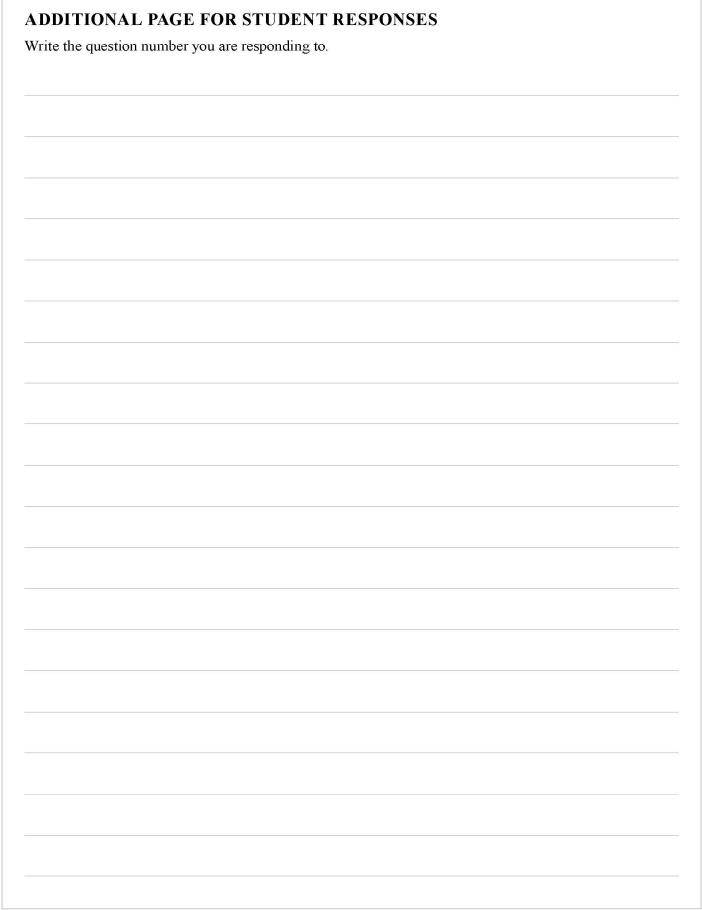_____

_____

QUESTION 29 (4 marks)

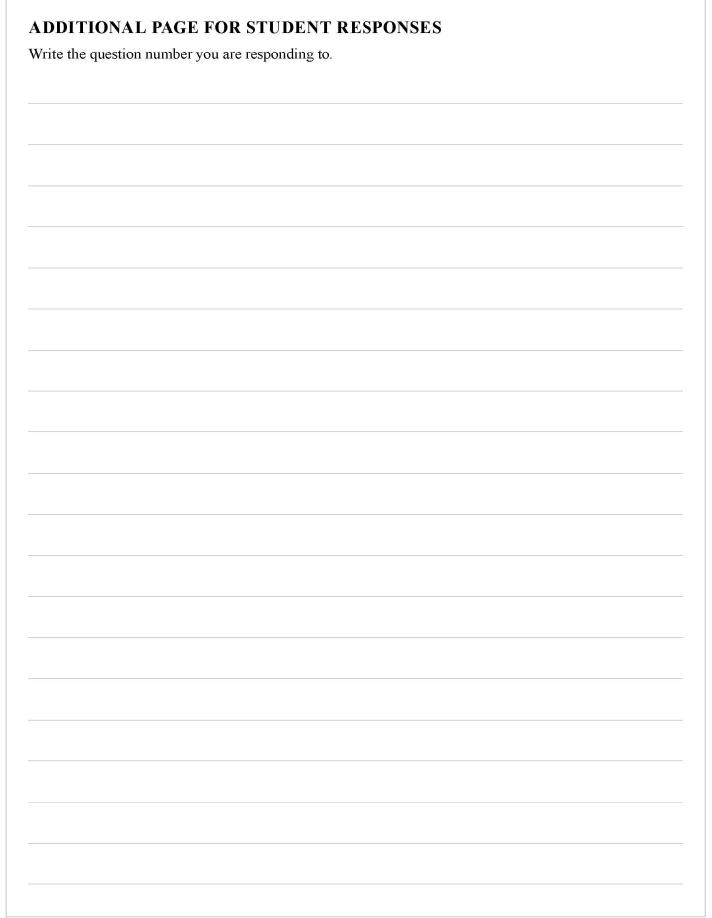The table shows data from a greenhouse trial, which was conducted to compare hydroponic and soil-grown strawberries.

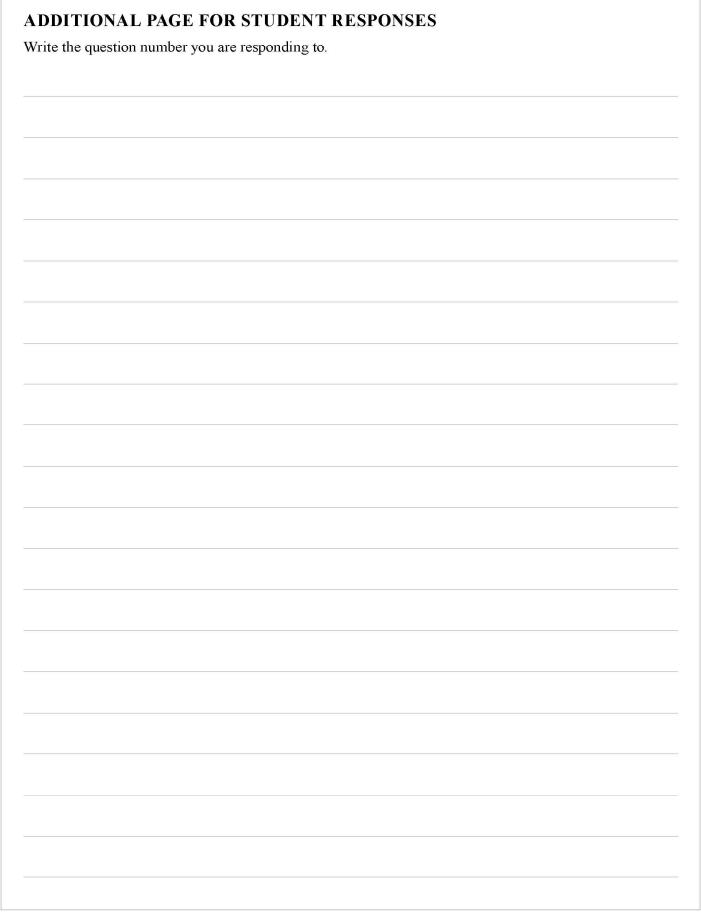| Production	Hydroponic	Soil-grown
Fixed costs	$593.80	$270.59
Variable costs	$47.38	$20.48
Total yield (n)	85	70
Mean mass of individual berries $\pm$ SD (g)	5.4 ± 3.0	7.1 ± 3.7
Water use (L)	1363	1968

Analyse the data to determine the best growing medium for strawberries in a market in which the price per kg is 10% higher for hydroponically grown strawberries.
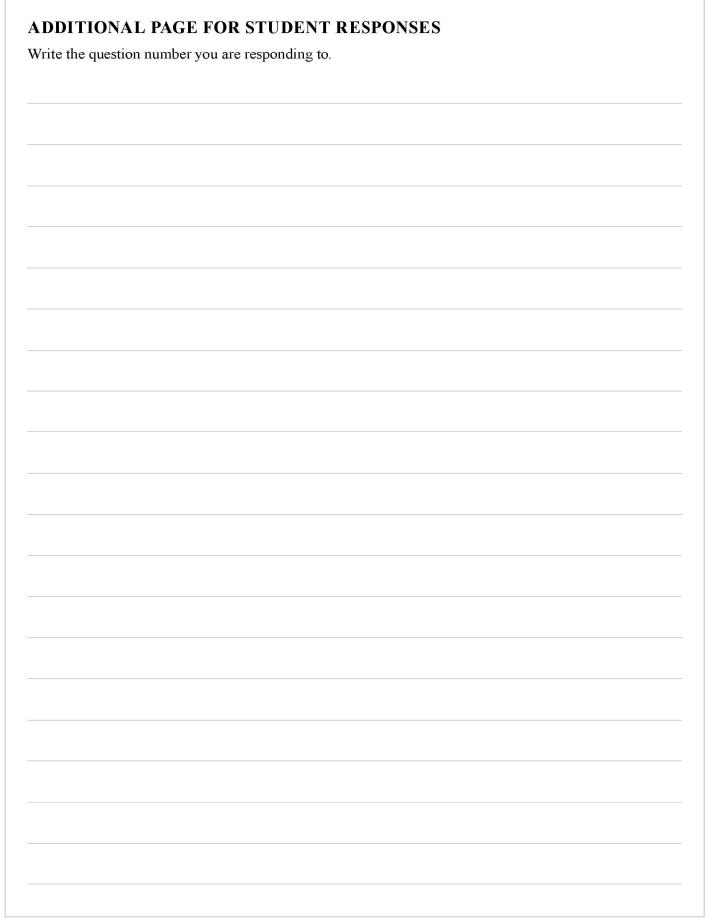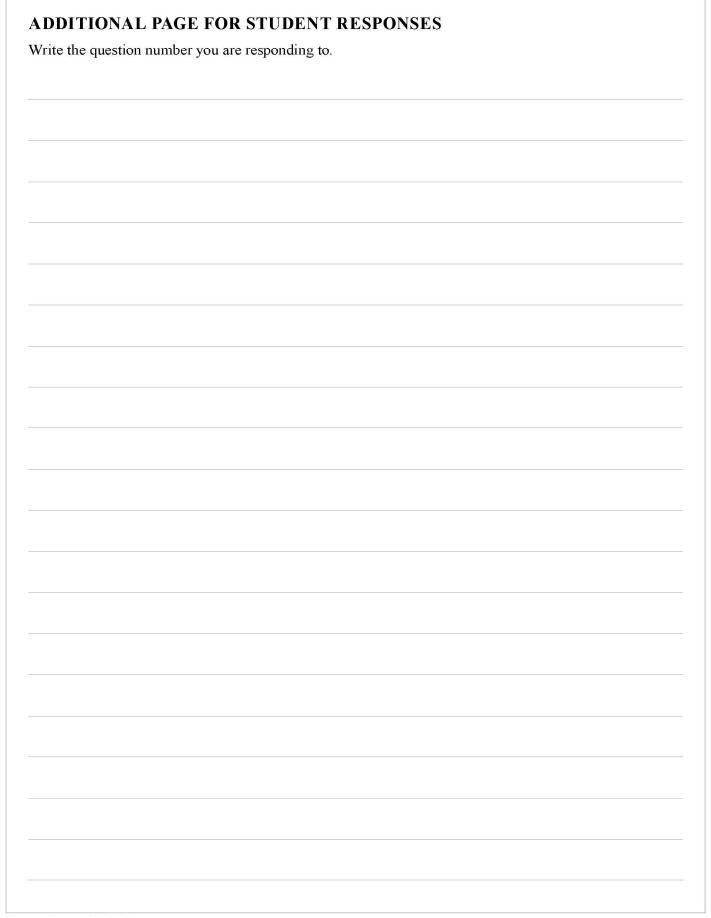
QUESTION 30 (3 marks)

Use an example to explain two benefits for farmers who use genetically engineered crops.

_____

_____

_____

_____

_____

END OF PAPER

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

ADDITIONAL PAGE FOR STUDENT RESPONSES

Write the question number you are responding to.

Do not write outside this box.

References

Question 25

Brand, TS, Genis, MP, Hoffman, LC, van de Vyver, WFJ, van der Walt, C & Jordaan, GF, 'Effects of dietary energy content and provision of β-adrenergic agonist on the production of feedlot lambs', *South African Journal of Animal Science*, vol. 43, issue 5, supplement 1, www.scielo.org.za/pdf/sajas/v43s1/27.pdf.

Question 27

Adapted by permission from Springer Nature Customer Service Centre GmbH, Springer Nature *Experimental and Applied Acarology*, 'Efficacy of strips coated with Metarhizium anisopliae for control of Varroa destructor (Acari: Varroidae) in honey bee colonies in Texas and Florida' , Kanga, LHB, Jones, WA & Gracia, C © Springer Science+Business Media B.V. 2006

Question 28

Adapted from FlyBoss 2020, 'Breeding to reduce flystrike susceptibility', www.flyboss.com.au/sheep-goats/breeding-and-selection/breeding-to-reduce-flystrike-susceptibility.php.

Sim, T 2019, 'Animal welfare groups seek new mulesing phase-out from AWI', *Sheep Central*, 15 March, www.sheepcentral.com/animal-welfare-groups-seek-new-mulesing-phase-out-timeline-from-awi.

Question 29

Treftz, C & Omaye, ST 2015, 'Comparison between hydroponic and soil systems for growing strawberries in a greenhouse', *International Journal of Agricultural Extension*, vol. 3, no. 3, pp. 195–200, https://pdfs.semanticscholar.org/d138/1ebcba5802c7d668d4940491857979e4a923.