Government of **Western Australia**
School Curriculum and Standards Authority

ANIMAL PRODUCTION SYSTEMS

ATAR course examination 2023

Marking key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

Section One: Multiple-choice **20% (20 Marks)**

Question	Answer
1	c
2	a
3	d
4	d
5	c
6	a
7	b
8	b
9	d
10	a
11	b
12	c
13	c
14	a
15	a
16	b
17	a
18	b
19	d
20	b

Section Two: Short answer **50% (106 Marks)**

Question 21 **(13 marks)**

(a) Identify an example of a gastric and a microbial digestive system in an animal to then complete the table. (6 marks)

Description	Marks
For each example of a gastric and a microbial digestive system (6 x 1 marks)	
Identifies a correct answer in the table	1
Total	**6**

Answers could include:

- Example: gastric – horse or rabbits
- Example: microbial – cows, sheep or goats
- Location of cellulose digestion: gastric – colon/caecum; or none
- Location of cellulose digestion: microbial – rumen
- Main source of protein: gastric – food
- Main source of protein: microbial – microbial protein.

Sample answer:

	Gastric	Microbial
Example (animal)	horse	cow
Location of cellulose digestion	Colon/large intestine	rumen
Main source of protein	food	rumen microbes

Accept other relevant answers.

(b) (i) Identify **two** gases produced in the rumen as by-products of cellulose digestion. (2 marks)

Description	Marks
methane	1
carbon dioxide	1
Total	**2**
Note: accept chemical formula if given	

Question 21 (continued)

(b) (ii) State what happens at each of the following steps of digestion in a microbial digestive system. (5 marks)

Description	Marks
Mastication – the animal ingests the food into the mouth which is then mixed with saliva in the mouth and then swallowed	1
Fermentation – the food is mixed with the rumen contents by the muscular contractions of the rumen wall/microorganisms in the rumen ferment the food, breaking down complex carbohydrates into simpler compounds, such as volatile fatty acids, and gases	1
Regurgitation – the partially digested food is regurgitated via the oesophagus back into the mouth in the form of cud, to re-chew and further grind the food	1
Nutrient absorption – nutrients are absorbed mostly via the small intestine/where nutrients cross the walls of the duodenum/jejunum and ileum into the blood stream/remaining food passes via the caecum into the large intestine, which absorbs the remaining water and nutrients in the same way	1
Elimination – any undigested food left after the remaining water and nutrients are absorbed by the large intestine/eliminated as waste via the rectum	1
Total	**5**
Accept other relevant answers.	

Question 22 **(19 marks)**

(a) Contrast the legal requirements for using feed additives as against HGPs in livestock feeding programs. (4 marks)

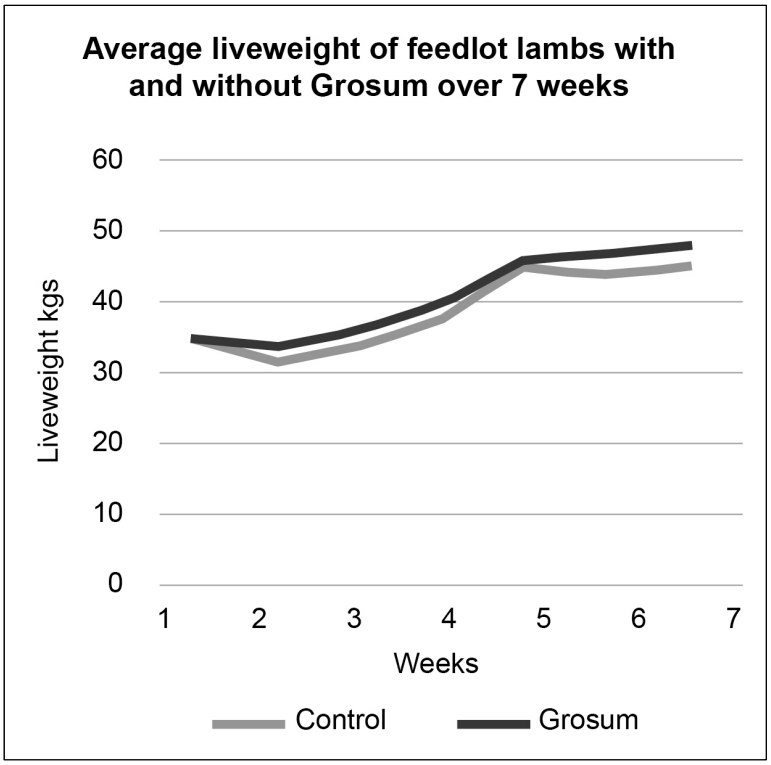
Description	Marks
Contrasts the legal requirements for using additives as against HGPs	4
Describes the different legal requirements for using additives as against HGPs	3
Outlines the different legal requirements	2
States a legal requirement	1
Total	**4**

Sample answer:

The legal requirements for keeping records are more stringent for HGPs. Feed additive recording is good practice under quality assurance, whereas HGP requires statutory declaration reporting use, triangle mark in the ear, and declared on a national vendor declaration.

Accept other relevant answers.

(b) Use the data in the table above to graph the liveweight of feedlot lambs. (6 marks)



Description	Marks
Title accurately reflects the content of the data	1
Both axes are correctly scaled, with numbers placed correctly	1
Data points are placed correctly on graph	1
Each axis labelled with both the correct title	1
Each axis labelled with both the correct units	1
The lines are distinct and there is a clear key	1
Total	**6**

Question 22 (continued)

(c) (i) State a valid hypothesis for the trial in part (b) on page 10. (2 marks)

Description	Marks
States a valid hypothesis containing an independent and dependent variable	2
States a hypothesis containing a valid independent or dependent variable	1
Total	**2**
Answers could include: Lambs fed the additive Grosum will grow faster than lambs without the additive.	
Accept other relevant answers.	

(ii) Outline a conclusion you could draw from the trial in part (b) on page 10. (2 marks)

Description	Marks
Outlines a valid conclusion that could be drawn from the data	2
Makes a comment about the data	1
Total	**2**
Answers could include: Grosum assists lambs to grow faster and heavier in comparison to lambs who had no additive.	
Accept other relevant answers.	

(d) How could a producer use the results of this trial in part (b) on page 10 when trying to sell lambs at the market specification liveweight of 50 kg. (3 marks)

Description	Marks
Describes a benefit that growing faster would provide to the producer	3
Outlines a benefit that growing faster would provide to the producer	2
Makes a statement about a benefit of growing faster to the producer	1
Total	**3**
Answers could include: Lambs being fed Grosum would grow faster so will reach 50 kg earlier. Therefore these lambs being fed Grosum can be sold earlier, resulting in lower-feed costs, and at a better price, if supply is limited.	
Accept other relevant answers.	

(e) States **two** potential sources of bias that could be relevant to this trial. (2 marks)

Description	Marks
For each potential source of bias that could be relevant (2 x 1 marks)	
States a statement about a potential source of bias	1
Total	**2**
Answers could include: • breed of lambs (e.g. crossbreds selected for one treatment, merinos for another) • sex of lambs • layout of the feedlot (position of shade/shelter, soil type, additional feed available) • method of weighing • method of data collection.	
Accept other relevant answers.	

Question 23 **(15 marks)**

(a) Outline a critical ingredient that must be included when mixing a finishing ration that is suitable for cattle, but not pigs. (2 marks)

Description	Marks
States these livestock have different digestive requirements, and ruminants require roughage/hay for digestion	1
States hay/roughage	1
Total	**2**
Accept other relevant answers.	

(b) Calculate a two-ingredient ration for pigs using the Pearson square method and the following criteria.

Ration protein % = 16

Wheat – 15%
Barley – 12%
Lupins – 30%
Hay – 10%

State the two ingredients as a percentage of the total ration (to the nearest whole number). (7 marks)

Description	Marks
Correct selection of both ingredients (lupins and either wheat or barley) demonstrated on the left of the square	1–2
Correct calculations of both ingredients written on the right of the square	1–2
Correct % calculations of both ingredients	1–2
Statement summarising the ration with both ingredients displayed as a whole number	1
Total	**7**

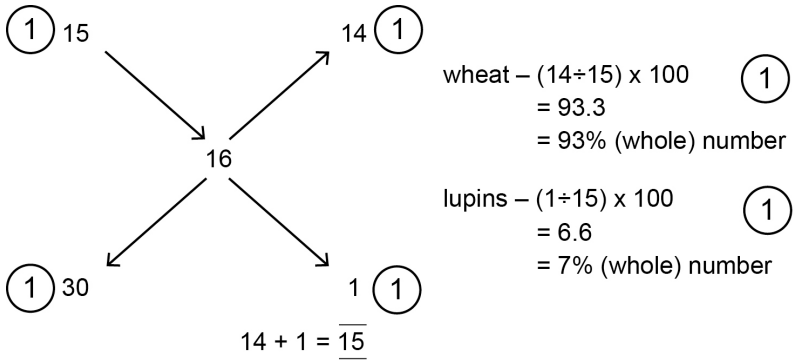
Question 23 (continued)

Answers could be either of 2 possible rations:

- Wheat/lupins 93/7%
- Barley/lupins 78/22%.

Marks for each Pearson square component are circled on the diagram below.

Wheat and lupins example



This ration should include 93% wheat and 7% lupins.

Barley/Lupins calculations:

For barley: 16% - 12% = 4%, difference = 14%
For lupins: 30% - 16% = 14%, difference = 4%

For barley: 14% / (14% + 4%) = 77.8% = 78%
For lupins: 4% / (14% + 4%) = 22.2% = 22%.

This ration should include 78% barley and 22% lupins.

Note – do not accept for wheat/barley (% protein too low) or if hay is used (unsuitable for pigs).
Follow-on marks are awarded for correct calculations of the Pearson square (e.g. if hay is incorrectly chosen for pigs).

(c) (i) Calculate the cost of the ration devised in part (b) on page 12. (3 marks)

- Wheat – $500/t
- Barley – $400/t
- Lupins – $600/t
- Hay – $200/t

Description	Marks
Correct $/lupin ration calculation	1
Correct $/wheat or barley ration calculation	1
Correct total	1
Total	**3**

Answers could include:

- Wheat – 500 x 0.93 = 465
- Lupin – 600 x 0.07 = 42
- Wheat/lupin ration = $507/t

Note: if part (b) is incorrect, but candidates correctly calculate $/t ration from their answer, marks should be awarded, i.e. do not penalise for consequential errors.

(ii) Do you consider the ration devised in part (b) to be the least cost? Justify your reasoning. (3 marks)

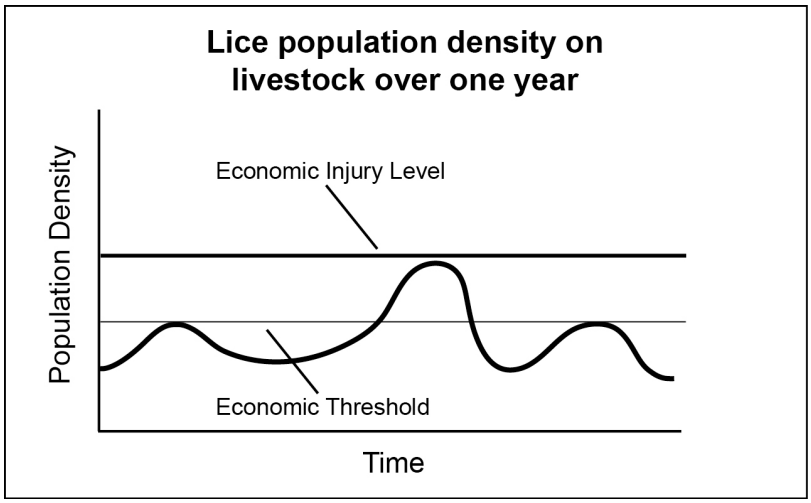
Description	Marks
States yes or no, and outlines the main ingredients, justifying their relative costs	3
States yes or no and justifies by saying needs to be compared to another ration with different ingredients	2
States yes or no	1
Total	**3**
The barley/lupin ration is the least cost in this scenario. Answer will depend on which ration is chosen. Sample answer: Yes, the barley/lupin ration calculated is the least cost ration. The barley/lupin ration is cheaper than the wheat/lupin ration, as barley is $400/t compared to wheat at $500/t. While the protein % of barley is also lower, at 12% to wheat's 15%, the difference is not big enough to make up for the difference in price.	
Accept other relevant answers.	

Question 24 **(16 marks)**

(a) Use the above graph to describe the economic effect of the lice on the livestock. (3 marks)

Description	Marks
Describes the economic effect of lice on the livestock	3
Outlines the economic effect of lice on the livestock	2
Makes a statement about the effect of lice on the livestock	1
Total	**3**
Answers could include: The second outbreak of lice is above the economic injury line where the cost of control is greater than the value of production. Control can still be undertaken, but would be at an economic loss.	
Accept other relevant answers.	

(b) (i) Redraw the graph to show how a lice outbreak should be managed (1 mark)

Description	Marks
Draws a curved line at or near ET line and below EIL line, should not hit base line	1
Total	**1**
	
Accept other relevant answers.	

(ii) Describe an action that could be used to support the prevention of a lice outbreak as in part (b)(i) on page 14. (3 marks)

Description	Marks
Describes a relevant action to support lice prevention	3
Outlines a relevant action to support lice prevention	2
States a relevant action to support lice prevention	1
Total	**3**
Answers could include: • quarantine and shear/treat all new sheep/livestock coming onto farm • inspect livestock on a regular basis to ascertain lice population • check boundary fences are well maintained to prevent strays from infecting other livestock • treat all sheep post shearing.	
Accept other relevant answers.	

(iii) Describe an action that could be used to minimise the risk of pesticide resistance in the lice population in part (b)(i) on page 14. (3 marks)

Description	Marks
Describes a relevant action to minimise pesticide resistance	3
Outlines a relevant action to minimise pesticide resistance	2
States a relevant action to minimise pesticide resistance	1
Total	**3**
Answers could include: • follow label directions for dose rate • application method and timing • rotate the mode of action of pesticide • check and calibrate application equipment to ensure correct dosages are applied.	
Accept other relevant answers.	

(c) Compare the strategies used to prevent an outbreak of a contagious disease, such as foot and mouth, at a local, national, and international level. (6 marks)

Description	Marks
For each level (3 x 2 marks)	
Outlines a relevant strategy	2
States a relevant strategy	1
Total	**6**
Answers could include: • local level – farmers can quarantine their stock, restrict entry to farm, register of visitors, vehicle wash down area • national – stock stand still order, NLIS tracing, state border checks • international – AQIS at all ports/airports, banned imports from countries with known outbreaks.	
Accept other relevant answers.	

Question 25 (19 marks)

(a) Using the table above, state the optimum lamb specifications for this market. (2 marks)

Description	Marks
States carcass fat score of 3	1
States carcass weight between 21.1–24 kg	1
Total	**2**

(b) Using the information in the table above, explain how product variation would affect financial return. (4 marks)

Description	Marks
Explains the connection between product variation and financial returns, including $/kg price per carcass differences	4
Describes connection between product variation and financial return, noting single table figures ($/kg)	3
Outlines connection between product variation and financial return	2
Makes a statement connecting product variation and financial return	1
Total	**4**
Answers could include: If a producer can meet the optimum market specifications, they could expect $4.20/kg for their lambs, which would give a return of $100.80 for a 24 kg lamb with a fat score of 3. However, if they do not, then they may instead receive as low as $2.70/kg, which would be a return of $48.60 for an 18 kg lamb with a fat score of 5. If the animals grown are consistent, i.e. low product variation, then they can sell them within these optimal market specifications or the higher prices adjacent to these, such as $4/kg for animals with the optimum weight, but a fat score of 2, or optimum fat score of 3, but up to 27 kg. High product variation means that even when the average is within the optimum specifications, there may be many lambs falling well outside these optimum categories, such as very heavy or very light animals, meaning the producer would have lower returns for the same inputs.	
Accept other relevant answers.	
Note: must include information from the table in their response.	

(c) Explain **two** possible causes of variation in **either** product quality **or** quantity in an animal production system with which you are familiar. (6 marks)

Description	Marks
For each cause (2 x 3 marks)	
Explains a cause and its effect on product quality or quantity	3
Outlines a cause and its effect on product quality or quantity	2
Identifies a relevant cause	1
Total	**6**
Causes could include: • breed • weather • nutrition • handling • transport • a specific example of one of the above.	
Accept other relevant answers.	
Note: variation must be relevant to cause and can be on product quality or quantity.	

(d) Compare the profitability of the producer's management choices, using the price grid from the table on page 17 that has been reprinted below. Show all workings. (7 marks)

Description	Marks
Selects $4/kg for 22 kg/fat score 2 lamb	1
Calculates that 22 kg/fat score 2 lamb will bring $88	1
Selects $3.70/kg for 27 kg/fat score 2 lamb	1
Calculates that 26 kg fat score/2 lamb will bring $96.20 (can round to whole $)	1
Subtracts the extra feed cost from the 26 kg fat score/2 lamb price	1
States the $ difference between the two choices	1
States the most profitable option	1
Total	**7**
Answers could include: The 26 kg lamb will bring $90.20 after adjusting for the extra cost of inputs. Compared to the 22 kg lamb at $88, this is an extra $2.20 per head. The more profitable option is to raise lambs to 26kg.	

Question 26 **(10 marks)**

(a) (i) State **two** trends shown in the table. (2 marks)

Description	Marks
For each trend (2 x 1 mark)	
States a trend	1
Total	**2**
Answers could include: • all increase in yield over time from one to eight weeks • once per day lower yield than three times per day (approx. 20%) for the first four weeks • moving from three to two milkings decreased yield slightly at five weeks, but then recovered to almost as much as three times a day milking by week eight • the cows that were milked only once per day for the first four weeks did not attain the same yield as the other group, even when milked twice a day.	
Accept other relevant answers.	

(ii) State the milking frequency you would recommend to the dairy farmer, and justify your reasoning for the recommendation. (4 marks)

Description	Marks
States a recommendation	1
Subtotal	**1**
Justifies a relevant recommendation using information from the data	3
Outlines a relevant recommendation	2
Makes a relevant statement about the recommendation	1
Subtotal	**3**
Total	**4**
Answers could include: • one to three milkings a day • justification must match the milking frequency given and can include labour costs, stress on cows, yield, animal welfare, and production system.	
Accept other relevant answers.	
Note: any recommendation can be correct given the relevant justification	

(b) (i) On the basis of the above pedigree, which animal would you use to develop your A2 herd. (1 mark)

Description	Marks
bull 10 (only homozygous A2A2 option)	1
Total	**1**

(ii) Compare the genetic benefits, of using an A2A2 homozygous sire instead of a heterozygous sire over your herd of heterozygous cows. (3 marks)

Description	Marks
Compares benefits of A2A2 homozygous and heterozygous sires	3
Outlines a benefit of a A2A2 homozygous sire	2
States a benefit of a A2A2 homozygous sire	1
Total	**3**

Answers could include:

Using an A2A2 homozygous sire instead of an A1A2 heterozygous sire over a herd of heterozygous cows will increase the incidence of the desired A2A2 genotype in the herd. If a heterozygous bull is used, it can be expected that approximately a quarter of the calves produced would be A2A2 homozygous, but if an A2A2 sire is used then an expected half of the progeny will be heterozygous. This allows the farmer to reach their breeding goals sooner.

Accept other relevant answers.

Question 27 **(14 marks)**

(a) State how many sheep from the flock were used in the trial and on what basis they were selected. (2 marks)

Description	Marks
number of sheep (20)	1
selected based on rumen size	1
Total	**2**

(b) Write a valid hypothesis for the investigation and state **two** suitable controlled variables. (4 marks)

Description	Marks
States a valid hypothesis containing an independent and dependent variable	2
States a hypothesis containing a valid independent or dependent variable	1
Subtotal	**2**
States two relevant controlled variables	2
States one relevant controlled variable	1
Subtotal	**2**
Total	**4**
Answers could include: • hypothesis: methane production is lower in sheep with a small rumen and/or shorter retention time. • null hypothesis (no difference) and lower methane with larger rumen also acceptable (hypothesis doesn't have to be supported) • variables – breed of sheep, feed type, amount of feed, age of sheep, location of trial.	
Accept other relevant answers.	

(c) State the relationship between rumen size and both retention time and methane production. (2 marks)

Description	Marks
States a relationship between rumen size and both retention time and methane production	2
States a relationship between rumen size and retention time or methane production	1
Total	**2**
Answers could include: Sheep with smaller rumen sizes tended to have a lower retention time and methane production than sheep with larger rumens.	
Accept other relevant answers.	

(d) (i) Outline another way of reducing methane production in microbial digestive systems. (2 marks)

Description	Marks
Outlines a method to reduce methane production in ruminants	2
States a method to reduce methane production in ruminants	1
Total	**2**
Answers could include: • increase feed quality to decrease retention time • decrease fibre content to decrease retention time • provide seaweed supplement to inhibit enzymes responsible for final step in methane production.	
Accept other relevant answers.	

(ii) Discuss why it is important to reduce the amount of methane produced in livestock production. (4 marks)

Description	Marks
Discusses the importance of reducing the amount methane produced in agriculture	4
Describes the importance of reducing the amount methane produced in agriculture	3
Outlines the importance of reducing the amount methane produced in agriculture	2
States a fact about why reduced methane production is important in agriculture	1
Total	**4**
Answers could include: • methane is a key contributor to greenhouse warming/climate change • methane is a more potent greenhouse gas than CO_2 • climate change and emissions are of interest politically and socially.	
Accept other relevant answers.	

Section Three: Extended answer **30% (40 Marks)**

Question 28 **(20 marks)**

(a) Identify a quality assurance (QA) program relevant to your selected product of the enterprise and explain the role that the QA program plays in ensuring that on-farm practices can meet the requirements of markets. (10 marks)

Description	Marks
Identifies a relevant QA program	1
Subtotal	**1**
Explains how a QA program informs on-farm practices	5
Describes how a QA program informs on-farm practices	4
Outlines how a QA program informs on-farm practices	3
Identifies how a QA program informs on-farm practices	2
Identifies how a QA program informs a singular on-farm practice	1
Subtotal	**5**
Explains how at least one on-farm practice meets a market requirement	4
Describes how at least one on-farm practice meets a market requirement	3
Outlines how at least one on-farm practice meets a market requirement	2
Identifies that an on-farm practice meets a market requirement	1
Subtotal	**4**
Total	**10**

Answers could include:

- Australian Pork Industry Quality Assurance Program (APIQ) for pigs/pig meat
- APIQ establishes a set of standards for on-farm practices that must be met by producers to be accredited. This includes standards in animal welfare, housing, feed, water, and veterinary care for pigs. For example, pig producers must meet certain requirements to be considered a free-range system, including having outdoor paddocks, wallows and kennels or huts for shelter. Another on-farm practice that must be met is the welfare standard, where (among other requirements), pigs must have access to food at least daily, always have access to water on-farm, and be checked daily. This means the farmer must check the stock at least daily to comply with the QA standards
- accredited producers are demonstrating their commitment to producing meat to a high standard of welfare and/or safe, sustainable practices – all important market requirements. For example, records are kept to ensure that animals are not sold within antibiotic withholding periods, leaving the meat residue-free. This helps to build trust with consumers, retailers, and export markets and ensures the long-term sustainability of the Australian pork industry.

Accept other relevant answers.

(b) Identify both a major international market **and** a main competitor of the animal product selected above. Describe a current protection strategy for Australian products and explain how comparative advantage allows Australian producers to be more competitive in the selected international market. (10 marks)

Description	Marks
Identifies an international market for the product selected in (a)	1
Identifies an international competitor for the product selected in (a)	1
Subtotal	**2**
Describes a protection strategy for Australian products	3
Outlines a protection strategy for Australian products	2
Identifies a protection strategy for Australian products	1
Subtotal	**3**
Explains benefits of comparative advantage to a producer	4
Describes benefits of comparative advantage to a producer	3
Outlines benefits of comparative advantage to a producer	2
Identifies benefits of comparative advantage to a producer	1
Subtotal	**4**
Links comparative advantage to the selected international market	1
Subtotal	**1**
Total	**10**

Answers could include:

- examples for pigs: an international market is Singapore, and a competitor to this market is Brazil. (Answers will be specific to the selected product)
- to protect Australian pork from international competition, the Australian government has implemented various measures, including negotiating free trade agreements, tariffs, quotas, and biosecurity regulations. For example, to protect the integrity of the Australian pork industry, no fresh meat is allowed to be imported. This protects our industry as countries like Brazil may have Aujeszky's disease outbreaks, but Australia does not. This makes Singapore more likely to import Australian pork
- Australia has a comparative advantage in pork production due to factors, such as favourable climate conditions, efficient production systems, and strict biosecurity measures. These factors allow Australian producers to produce high-quality pork products at a lower cost than many other countries, which makes them more competitive in the Singaporean market. Additionally, Australia's reputation for producing safe and high-quality food products has helped to increase demand for Australian pork in Singapore.

Accept other relevant answers.

Question 29 (20 marks)

(a) Name an animal production system and state **two** adaptations that an animal producer can make to their production system to adapt to changed circumstances caused by climate change. Discuss how these changes will enable the producer to continue to be sustainable. (8 marks)

Description	Marks
For each adaptation (2 x 4 marks)	
Discusses how the adaptation will enable the producer to be sustainable	4
Describes how the adaptation will enable the producer to be sustainable	3
Outlines how the adaptation will enable the producer to be sustainable	2
States an adaptation that will enable the producer to be sustainable	1
Total	**8**

Answers could include:

- diversification of livestock and/or pastures e.g. producers could incorporate a wider range of plants or livestock species that are better suited to a drier climate. If an area is experiencing more frequent droughts, the producer could choose drought-resistant pasture varieties or incorporate more drought-tolerant livestock breeds
- introducing shade or cooling systems to mitigate the effects of heat stress, e.g. increasing temperatures from climate change could increase the incidence of heat stress, therefore reducing livestock growth, reproductive success and milk production. To help mitigate this, a producer could implement shade and/or cooling systems, such as misting systems or fans, in livestock areas. This should reduce the impact of climate change on livestock health and productivity, and improve animal welfare, therefore allowing the producer to be sustainable.

Accept other relevant answers.

(b) Identify a consumer trend relevant to the animal production system named in part (a). Discuss the potential impact of a new technology that can be used in this system to optimise production in response to the trend. (6 marks)

Description	Marks
Identifies a relevant consumer trend	1
Subtotal	**1**
Discusses a relevant new technology and how it optimises production in response to the trend	5
Discusses a relevant new technology	4
Describes a relevant new technology	3
Outlines a relevant new technology	2
States a relevant new technology	1
Subtotal	**5**
Total	**6**

Answers could include:

- trend – ethically produced meat
- new technology – precision livestock farming (PLF)
- PLF uses sensors and cameras, to monitor and manage livestock welfare in real-time and, potentially, remotely
- PLF could be used to monitor animal behaviour, such as feeding and movement patterns, to identify signs of stress or illness so that the producer can make immediate changes to improve welfare, such as identifying a flyblown sheep and treating immediately rather than waiting until the mob is next brought in. This not only improves welfare, but optimises production through earlier interventions and improved efficiency.

Accept other relevant answers.

(c) Describe the positive impact of a quality assurance (QA) program, on an enterprise's sustainability, focusing on the triple bottom line. (6 marks)

Description	Marks
Describes the impact of a QA program on an enterprise's sustainability	3
Outlines the impact of a QA program on an enterprise's sustainability	2
States an impact of a QA program on an enterprise's sustainability	1
Subtotal	**3**
Includes an economic impact	1
Includes a social impact	1
Includes an environmental impact	1
Subtotal	**3**
Total	**6**

Answers could include:

Economic:
- enhances enterprise reputation and marketability
- consumers are increasingly looking for sustainably produced products, and Livestock Production Assurance (LPA) certification can demonstrate an enterprise's commitment to responsible and sustainable production practices – links to social
- by meeting the standards set out in the LPA program, an enterprise can increase its market access, particularly to export markets, which can help to improve its profitability and long-term viability.

Social:
- promotes ethical and responsible production practices
- QA program includes standards related to animal welfare, worker safety, and community engagement, which can help to ensure that the enterprise is operating in a socially and environmentally responsible manner
- builds trust with its stakeholders, including employees, customers, and local communities, which can lead to increased loyalty and support – links to economic.

Environmental:
- contributes to an enterprise's environmental sustainability by promoting sustainable land management, water conservation, and reduced greenhouse gas emissions
- LPA includes standards related to these areas, which can help to ensure that the enterprise is operating in an environmentally (and socially) responsible manner
- by implementing these standards, an enterprise can reduce its environmental impact and mitigate the risks associated with climate change, such as droughts, floods, and extreme weather events, links to social and economic.

Accept other relevant answers.

Question 30 (20 marks)

(a) Propose a short-term **and** a long-term goal that is relevant to an animal production system you are familiar with. Explain how aiming for each of these goals could influence intergenerational equity in this system. (10 marks)

Description	Marks
Proposes a relevant short-term goal	1
Proposes a relevant long-term goal	1
Subtotal	**2**
Explains how the short-term goal could support intergenerational equity	4
Describes how the short-term goal could support intergenerational equity	3
Outlines how the short-term goal could support intergenerational equity	2
Identifies how the short-term goal could support intergenerational equity	1
Subtotal	**4**
Explains how the long-term goal could support intergenerational equity	4
Describes how the long-term goal could support intergenerational equity	3
Outlines how the long-term goal could support intergenerational equity	2
Identifies how the long-term goal could support intergenerational equity	1
Subtotal	**4**
Total	**10**

Answers could include:

Chicken production

Short-term goal:

- to reduce the use of antibiotics in chicken production by 50% within the next two years. This goal could be achieved by implementing improved biosecurity measures, promoting the use of probiotics and prebiotics, and investing in research into alternative disease prevention methods
- by reducing the use of antibiotics in chicken production, the short-term goal would help to promote intergenerational equity by reducing the risk of antibiotic resistance in future generations. This would also help to ensure that antibiotics remain effective for treating human illnesses and diseases.

Long-term goal:

- to achieve a 50% reduction in greenhouse gas emissions from chicken production within the next decade. This goal could be achieved by improving energy efficiency, implementing renewable energy sources, reducing waste, and promoting sustainable farming practices
- reducing greenhouse gas emissions would help to promote intergenerational equity by ensuring that future generations have access to a healthy and sustainable environment. By reducing greenhouse gas emissions, the goal would help to mitigate the impact of climate change on future generations and promote a sustainable future for the industry.

Accept other relevant answers.

(b) Assess how the management of risk could be achieved while integrating the goals proposed in part (a). (10 marks)

Description	Marks
Analyses short-term goal risk, including probabilities, consequences, avoidance and mitigations	5
Examines short-term goal risk, including most of risk probabilities, consequences, avoidance and/or mitigations	4
Describes short-term goal risk, including risk probabilities, consequences, avoidance and/or mitigations	3
Outlines short-term goal risk, including risk probabilities, consequences, avoidance and/or mitigations	2
Short-term risk identified	1
Subtotal	**5**
Analyses long-term goal risk, including probabilities, consequences, avoidance and mitigations	5
Examines long-term goal risk, including most of risk probabilities, consequences, avoidance and/or mitigations	4
Describes long-term goal risk, including risk probabilities, consequences, avoidance and/or mitigations	3
Outlines long-term goal risk, including risk probabilities, consequences, avoidance and/or mitigations	2
Long-term risk identified	1
Subtotal	**5**
Total	**10**

Answers could include:

For a short-term goal of increasing lambing rate per ewe:

- having more lambs surviving per ewe can be achieved by selecting ewes who are more likely to have multiples. This carries the risk of increased likelihood of maternal rejection
- probability: on a scale of 1 (unlikely to occur) to 10 (certain), this risk would rank around 2. It will never be able to be eliminated completely, but many farmers manage with minimal maternal rejections
- consequences: maternal rejections cause either increased lamb mortality, or increased requirement for interventions with a high-labour requirement, such as hand raising or fostering
- avoidance/mitigation: cull breeders with a history of maternal rejections. Early interventions are more likely to be successful than later interventions. Seek advice from other farmers regarding successful fostering strategies.

For a long-term goal of changing current breed of sheep to a more drought tolerant breed:

- different breeds of sheep may have different management requirements, such as feeding, housing, equipment, and handling. This can increase the workload for the farmer and require additional resources
- probability: on a scale of 1 (unlikely to occur) to 10 (certain), this risk would rank around 4 (depending on the breed chosen) as many farmers run more than one breed of sheep successfully
- consequences: inadequate management can lead to poor flock health, reduced productivity, and economic losses for the farmer
- avoidance/mitigation: conduct research on the management requirements of the new breed before introducing them. Develop a management plan that considers any differences in feeding, housing, and handling. Seek advice from other farmers or breed associations.

Accept other relevant answers.

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