Assessment Schedule – 2018

Agricultural and Horticultural Science: Demonstrate understanding of how NZ commercial management practices influence livestock growth and development (91294)

Evidence Statement

Question ONE: Production monitoring and timing

Achievement	Achievement with Merit	Achievement with Excellence
Describes how a farmer carries out a monitoring management practice for the candidate's selected livestock.	**Explains** how this monitoring management practice affects the selected livestock's growth and development.	**Justifies** the economic impact and the timing of meeting the selected livestock's market, when using this monitoring management practice.

N0	No response; no relevant evidence.
N1	Some writing, but does not describe how a livestock monitoring management practice is carried out.
N2	Partial or insufficient description of how a livestock monitoring management practice is carried out.
A3	**Describes** how a monitoring management practice is carried out.
A4	**Fully describes** how a livestock monitoring management practice is carried out, with reference to growth rates.
M5	**Explains** how a monitoring management practice affects livestock growth and development, linking to growth rates.
M6	**Fully explains** how a monitoring management practice affects livestock growth and development, linking to feed utilisation *OR* energy intake to growth rate.
E7	**Justifies** the use of a livestock monitoring practice by discussing how it improves the timing and economics of livestock production. Comprehensive evidence for superiority in ONE aspect, with the other aspect well supported.
E8	**Justifies** the economic impact and the timing of meeting the selected livestock's market when using this monitoring management practice. Comprehensive supporting evidence for superiority in BOTH aspects.

Q1	Evidence
(a)	**Describes** how a monitoring management practice is carried out on the candidate's selected livestock. *Salmon* Monitoring can involve behavioural observation, measuring length, or weighing. The handling of salmon is generally kept to a minimum, to minimise harm or stress to the fish; however, occasionally through the grow-out cycle there may be a requirement to handle the fish, to monitor health or size. In freshwater hatcheries, the smolt are measured for size by a mechanical grader, which splits the fish into different groups according to size. The smolt will grow at a faster rate when they are with fish of a similar size. In the wild, disease is not normally an issue for salmon, as they are kept in check by predation. In the farming environment, ill salmon will swim close to the surface and may display gulping behaviours. In New Zealand, salmon stocks are currently disease-free. Salmon should be monitored from the fry stage through to adult stage. Fry and smolt should be monitored to determine the effectiveness of the feeding regime. Feeding can then be adjusted to ensure an optimum growth rate is maintained. In Marlborough, cameras are used to observe when the salmon are full, after which the feeders are turned off. This means the salmon are fed enough to ensure that their growth rate is increased, and also that food wastage is minimised.
(b)	**Explains** how a monitoring management practice improves livestock growth and development. Careful monitoring enables farmers to determine whether their salmon are receiving the optimum feed for growth and development. If the salmon are not meeting growth targets, feeding may be increased or the type of feed changed, to increase the growth rate. This will ensure better utilisation of the feed. Salmon feed provides a high-energy diet containing protein (42–54%), and lipids (16–40%). Protein is required for flesh development and lipids for energy, while minerals and vitamins essential for body processes are consumed in smaller quantities. This means that salmon feed needs to meet the nutritional requirements of the fish. Salmon are usually fed approximately 1.5 kg of feed for every 1 kg of flesh produced. Any deficiency in one of these nutritional requirements will adversely affect growth and development of the fish. Adult fish are fed up to 200 times per day, and this is controlled by a computer-automated system linked to a camera. By carefully controlling the amount of high-quality feed using this monitoring system, the fish are able to maximise their growth rates. This ensures a higher intake and better utilisation of the feed, leading to greater growth and faster liveweight gain. Higher feed intake increases digestion and the absorption of nutrients, therefore maximising the intake of digestible energy and protein required for growth, and for muscle and tissue development.
(c)	**Justifies** the use of a livestock monitoring practice by discussing how it improves the timing and economics of livestock production. Monitoring for health and size throughout the grow-out cycle is important in salmon farming, as any delay in timing at any life stage affects how fast the salmon mature. The salmon grow-out cycle includes the following stages: egg, alevin, fry, smolt, and adult salmon. Throughout each of these stages, the salmon must be carefully monitored, with adjustments made to feeding to ensure optimum growth rates. The faster the fish achieve a desired liveweight (3.5–4.0 kg), the quicker the turnover of fish in the production system and the more likely it will meet the timing demands of the market. By controlling the amount of high-quality feed, the fish are able to maximise their growth rates, as they can spend more time feeding, ensuring that they have a higher intake and better utilisation of the feed, which results in greater growth and faster liveweight gain. Higher feed intake increases digestion and absorption of food nutrients, maximising the intake of digestible energy and protein required for growth, and for muscle and flesh development. This therefore improves the quality of salmon produced, due to the richer, buttery flavour and higher omega-3 levels. Compared with the wild-caught varieties, farmed salmon tend to have higher levels of omega-3, due to the feed. Monitoring of mature salmon through weighing is important in determining the time of harvesting. The costs in time and money invested in monitoring of the salmon can be high. Labour and specialised equipment are needed for the various monitoring systems, but these costs are outweighed by the profit earned when a large quantity of high-quality salmon are able to reach the market at the optimum time.

Question TWO: Breeding

Achievement	Achievement with Merit	Achievement with Excellence
Describes how a breeding management practice is carried out.	**Explains** how this breeding management practice affects growth and development of the selected livestock.	**Evaluates** the use of a breeding management practice by discussing how it improves the quality and economics of livestock production.

N0	No response; no relevant evidence.
N1	Some writing, but does not describe a breeding management practice.
N2	Partial or insufficient description of how a breeding management practice is carried out.
A3	**Describes** how a breeding management practice is carried out.
A4	**Fully describes** how a breeding management practice is carried out, with reference to growth rates.
M5	**Explains** how this breeding management practice affects growth and development of the selected livestock, linking to growth rates.
M6	**Fully explains** how this breeding management practice affects growth and development of the selected livestock, linking food utilisation *AND* energy intake to growth rates.
E7	**Evaluates** the use of a breeding management practice by discussing how it improves the quality and economics of livestock production. Comprehensive evidence for superiority in ONE aspect, with the other aspect well supported.
E8	**Evaluates** the use of a breeding management practice by discussing how it improves the quality and economics of livestock production. Comprehensive supporting evidence for superiority in BOTH aspects.

Q2	Evidence
(a)	**Describes** how the breeding management practice for the selected livestock is carried out. *Horses* Thoroughbreds can travel medium distances at fast paces, requiring a balance between speed and endurance. In New Zealand, all thoroughbreds in the racing industry must be registered with the Thoroughbred Breeders Association (NZTBA). This gives some guarantee of breeding quality, as the race history of the sires' progeny will be available. This race history is the main consideration in selecting a sire, as the breeder will determine the likelihood of raising a winning racehorse based on the quality and quantity of winners among the progeny. Sires are also chosen to complement the mare. Other considerations the breeder may consider include conformation, temperament, hardiness, inherited health issues or physical defects, and the possibility of inbreeding. Some sires are known to be prepotent, meaning they seem to be more likely to pass their good qualities along to their offspring, despite the mares' traits.
(b)	**Explains** how the breeding management practice improves growth and development of the selected livestock. Choosing a high-quality sire to mate with the mare will produce high-quality progeny that are likely to have good conformation, temperament, and hardiness, with better food conversion efficiency and increased growth rates. The progeny will be able to maximise the intake of digestible energy and protein required for growth, muscle, and tissue development, contributing to faster growth rates. Thoroughbred sires that are chosen for high-quality traits will produce faster-maturing progeny that will have a greater chance of survival and a higher likelihood of success on the racetrack.
(c)	**Evaluates** the effectiveness of a breeding management practice by discussing how it improves the quality and economics of livestock production. Quality genetics are important in the thoroughbred breeding industry, and they can come at a substantial cost in stud fees. Choosing a quality sire to breed with the mare may be a high cost, but this can be justified by the breeder. Choosing a high-quality sire to mate with the mare will produce high-quality progeny. Better sire selection enables better-quality horses to be bred more quickly, as they are able to maximise their growth rates and will have a higher intake and better utilisation of feed, resulting in greater growth and faster liveweight gain. Higher feed intake increases digestion and absorption of food nutrients, maximising the intake of digestible energy and protein required for growth, and for muscle and tissue development. This therefore ensures that the progeny are of a high quality and that they reach the market or racetrack sooner. This will improve the profit for the horse racer or the breeder. The financial gains made by having a higher-quality progeny raised will likely offset the financial outlay of the stud fees.

Question THREE: Livestock health

Achievement	Achievement with Merit	Achievement with Excellence
Describes how a health management practice is carried out.	**Explains** how a health management practice improves livestock growth and development.	**Justifies** the use of a health management practice to improve the quantity and economics of livestock production.

N0	No response; no relevant evidence.
N1	Some writing, but does not describe how a health management practice is carried out.
N2	Partial or insufficient description of how a health management practice is carried out.
A3	**Describe**s how a health management practice improves livestock growth and development.
A4	**Fully describes** how a health management practice improves livestock growth and development.
M5	**Explains** how a health management practice improves livestock growth and development, linking to growth rates.
M6	**Fully explains** how a health management practice improves livestock growth and development, linking food utilisation *AND* energy intake to growth rates.
E7	**Justifies** the use of a health management practice by discussing how it improves the quality *OR* quantity and economics of livestock production. Comprehensive evidence for superiority in ONE aspect, with the other aspect well supported.
E8	**Justifies** the use of a health management practice by discussing how it improves the quality *AND* quantity and economics of livestock production. Comprehensive supporting evidence for superiority in BOTH aspects.

Q3	Evidence
(a)	**Describes** how a health management practice improves livestock growth and development. *Trimming feet in dairy goats* Dairy goats' feet need trimming about every 6–8 weeks. In the wild, goats walk around on hard, stony ground that wears down their hooves. In dairy goat situations, their feet are not worn down. This predisposes them to scald, footrot, and skeletal deformities. The cause of scald is a wet environment (especially contaminated by faeces). Moisture softens the area between the toes, and then the bacterium *F. necrophorum* (which is found in faeces) invades the area. If a second bug, *D. nodosus*, also invades, footrot develops; if deeper invasion by *A. pyogenes* occurs, goats can get foot abscesses. Scald will spontaneously heal under dry conditions – it provides a natural cure in goats of up to 90% after 24 hours on dry ground. Trimming can be carried out by a trained professional or by the farmer, using shears and a sharp knife to trim the sidewalls of the claws and sole. Regular trimming prevents scald, footrot, and skeletal deformities, which means that the health of the goat is not compromised. If a goat is lame, its milk production will decrease. It is important to frequently check the herd's feet for overgrown hooves and trim whenever necessary, or maintain a regular cycle of trimming. **Explains** how a health management practice improves livestock growth and development. If the goat has a foot injury, it will be using energy to fight the infection instead of using this for milk production. The goat will not be able to eat as much food, due to the lameness, and may miss out on feed, due to its inability to compete with other goats for the best-quality food. Preventing illness through regular trimming of the feet leads to better utilisation of feed, due to increased quantity and quality of feed, and more efficient digestion and absorption of nutrients, therefore maximising the intake of digestible energy and protein required for higher rates of growth or milk production.
(b)	**Justifies** the use of a health management practice by discussing how it improves the quality, quantity, and economics of livestock production. It costs approximately $3.50 to have a goat's feet trimmed by a trained professional, and this should be carried out every 6–8 weeks to prevent illness. This leads to better utilisation of feed, due to more efficient digestion and absorption of nutrients, therefore maximising the intake of digestible energy and protein required for higher rates of milk production. Healthy goats produce better-quality milk that has a higher proportion of milksolids. Goat milk is a high-value product that earns a premium price. A herd of 550 goats, producing 0.21 kilograms of milksolids per head per day, on a $14/kg payout, will generate revenue of around $11,300 a week. With regular, thorough monitoring of the goats' feet during milking, the frequency of trimming could be reduced, and if the farmer were to trim their own herd's feet, the costs could be reduced further. However, if the farmer were to not trim their herd's feet often enough, more goats could become lame, and this could have a detrimental effect on the milk production of the herd. Lameness could lead to serious infection, resulting in increased veterinary expenses or even death of the goat. Goat losses and poor health will result in reduced quantity and quality of milk. The quality and production increases gained by having a healthy goat herd far outweigh the costs associated with trimming the goat herd's feet.

Cut Scores

Not Achieved	Achievement	Achievement with Merit	Achievement with Excellence
0 – 6	7 – 12	13 – 19	20 – 24