



Coimisiún na Scrúduithe Stáit State Examinations Commission

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Eolaíocht Talmhaíochta	Ardleibhéal

Marking Scheme	Leaving Certificate Examination, 2007
Agricultural Science	Higher Level



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LEAVING CERTIFICATE AGRICULTURAL SCIENCE

HIGHER LEVEL

MARKING SCHEME

Leaving Certificate 2007
Agricultural Science - Higher Level
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1. Answer any six parts

- (a) livestock unit the number of farm livestock that consume a quantity of food equivalent to that consumed by a mature productive cow (or 550 kg animal or 5-7 sheep) **5**
 2 – 2.5 lu per hectare **5**
- (b) different varieties/ different cost of production/ different soil requirements/ different grain quality (e.g. protein content)/malting barley sown on contract/ higher price for malting barley/ lower N requirement for malting barley/ malting barley requires more care when growing or harvesting/ malting barley more sensitive to drought/ malting barley sown in certain areas in Ireland **5 + 3 + 2**
- (c) (i) cellulose/ hemicellulose/ pectin **5**
 (ii) calcium **5**
- (d) (i) feeds (lives) off host/ attached to outside **2 + 2**
 (ii) tick **3**
 (iii) Arthropoda **3**
- (e) (colloidal humus particles) have a higher cation exchange capacity **10**
 [allow **5** marks for “hold more water” or “smaller particles” or “more fertile”]
- (f) **5 + 3 + 2**
 (i) chewing or move the jaw or eating or physical digestion
 (ii) digestion or enzyme or lubrication or forms bolus or defence
 (iii) digestion of cellulose (fibre) or regurgitation or chewing the cud or retains foreign bodies
- (g) $\frac{3}{3}$ $\frac{1}{1}$ $\frac{4}{4}$ $\frac{3}{3}$ **5**
5
- (h) chemical agents in vegetation may interfere with iodine utilisation/ can cause blood disorders/ insufficient fibre/may cause bloat **5 + 5**
- (i) fertile/ good drainage/ holds water/ easy to cultivate/ good organic matter/ good structure/ warm soil/ balanced composition/ aerated **5 + 3 + 2**
- (j) (i) **3 + 2**
 (transpiration is) the movement of water through a plant or evaporation from a leaf
 (translocation is) the movement of dissolved food substances through a plant
3 + 2
 (ii) (osmosis is) the movement of water through a membrane or not requiring energy
 active transport is the movement of substances requiring energy
 [allow one reference to energy requirement for 3 + 2]
 [for (i) and (ii) - accept definitions in each case]

2. (a) (i) soil air - more carbon dioxide concentration / less oxygen concentration/ less nitrogen concentration/ difference in water vapour **2(3)**
(ii) respiration in root/ microbial activity or respiration of soil organisms/ decomposition/ any reference to a process in the nitrogen cycle (e.g. nitrogen fixation) **3**
- (b) two samples of different soils/ placed in suitable apparatus/ placed in water/ equal amounts of water/ leave for a period/ method for noting level of water/ measure level of water in samples/ conclusion **5(3)**
- (c) (i) south facing soil /heats up faster **2(3)**
(ii) dark soil / absorbs heat faster **2(3)**
(iii) wet soil/ is slower to heat or has higher specific heat capacity **2(3)**
(iv) latitude or height above sea level or proximity to sea or reference to a specific location/ variation in temperature **2(3)**
3. (a) (i) Beet pulp provides fibre or energy **3**
Rolled barley provides carbohydrate or energy source **3**
Soya bean meal provides protein or protein low in hay and silage or concentrates fed as rumen size restricted or prevent twin lamb disease **3**
Minerals prevent hypocalcaemia (lambing sickness) or swayback **3**
(ii) extra cost/ waste of protein/ ewes too big/ lambs too big (lambing difficulty) **2(3)**
- (b) (i) 6- 8 weeks before lambing **3**
(ii) start with 100 - 200 g/day / increase by 100 g each week/ to reach 500 -750 g at lambing **2(3)**
(iii) to determine presence of live lamb(s) or of twins (or triplets) **3**
(iv) poor health of ewe/ low milk production/ under-sized lambs/ pregnancy toxemia (twin lamb disease)/ hypocalcaemia **2(3)**
- (c) pastures are rested/ poaching prevented/ earlier grass growth encouraged/ facilitate management at lambing/ increases lamb survival rates/ to avoid “chill” in lambs/ avoid predation/ easier to monitor **4(3)**

OR

3. (a) name [allow potato] **3**
rotation removes weeds/ deep ploughing buries weeds/ earthing up prevents weed growth/ spraying potatoes post-emergence stops weed growth/ autumn ploughing / inter-row cultivation (scuffling)/ stubble cleaning/ hand weeding **4(3)**
- (b) (i) grains swell or get heavier/ moisture % decreases (grain hardens)/ food moves from green parts to grain ends/ starch stabilises [allow bleaching of straw/ head turning downwards/ grains fall off] **3(3)**
(ii) test for moisture %/ screenings (test for purity)/ test for protein/ test for starch (Hagberg)/ colour test/ mycotoxin test/ weight per seed (thousand grain weight or hectolitre weight)/ germination test **2(3)**
- (c) name (e.g. rape, kale, stubble turnip, cabbage, grass, legume, lettuce) **3**
grown between two main crops/ any three cultivation procedures/ when sowed/ when harvested/ what used for/ when used/ how it is used/ what animal feeds on it **5(3)**
[do not accept ploughing]

4. Any **two** of (a), (b), (c), (d). **2 X 6(4)**
- (a) *two different soil samples/ sieve soil/ crush one sample/ add equal volume of samples / to two graduated cylinders/ pour water into cylinder/ record volume/ shake/ record volumes/ calculation
OR
*two different soils/ one compacted/ take can of known volume/ place upturned can in ground/
remove sample/ add water until full/ record volume of water added/ compare samples
- (b) 100 seeds/ moisten / place in suitable container/ on suitable substrate/ at suitable temperature/ air
or oxygen available/ leave for a period/ observe germination/ count/ number equals % or calculate/
repeat/ average
- (c) quadrat/ transect/ random throw or numbers/ repeat/ identify species or name species/ record/
percentage cover or frequency/ display or present result
- (d) two cows/ housed indoors/clean area/ feed same weight of grain/ one fed whole barley/ second
fed rolled barley/
- leave loose for 1 hour/ confine for 12 hours/ collect all dung separately/ water and sieve/
examine for presence of grains/ compare OR weigh cows at start/ feed over long period/ weigh at
end/ compare
OR
crushed grain sample/ whole grain sample/ add to water/ water bath/ amylase/ leave for a time/ test
for sugar or starch/ name of reagent/ describe positive result/ compare
5. (a) A = blade or leaf or lamina B = auricle or collar C = root D = ligule **4(3)**
- (b) improves soil structure/ helps control weeds/ helps prevent disease/ adds organic matter/
improves fertility / animal feed **6 + 3**
- (c) leafy/ digestible/ high protein/ not stemmy (young grass)/ before ear emergence (not flowering)/
indication of length or height **3(3)**
- (d) any **two** factors **2 X 3(3)**
*dry matter/ lower in silage (higher in hay)/ 70 - 80% in hay or 20 - 25% in silage
*protein / higher in silage (lower in hay)/ 14 – 18% in silage or 10% in hay
*DMD / higher in silage (lower in hay)/ 70% + in silage
*fibre / lower in silage (higher in hay)/ 30% in silage
*metabolisable energy / higher in silage (lower in hay)/ 10mJ/kg in silage or 9 mJ/kg in hay
6. (a) correct age at calving/ correct weight of cow/ easy calving bull/ isolate cow/ know calving date
from records/ regular inspection/ cleaning air passages/ clean environment/ fresh hay or straw/
navel dipping/ colostrum/ assist at calving/ calving jack/ reduce feeding prior to calving
6 + 6 + 3
- (b) good diet/ condition at mating/ heat detection/ bull's fertility/ breed/ housing/ records of or
improvement of reproductive efficiency/ calving interval / calving date/ grazing system/ stocking
rate/ disease control **6 + 6 + 3**
- (c) (i) examining animal by hand/ to assess the amount of fat cover under skin/ score range
6
(ii) higher bcs gives greater yield **3**
(iii) 1.74 **3**
(iv) age of cow/ breed/ genetics/ diet/ stage of lactation/ stage of milking **2(3)**

7. (a) (i) inbreeding is crossing between relatives **3**
 cross breeding involves a cross between non-relatives or varieties **3**
 (ii) performance testing compares growth rate of animals under similar conditions **3**
 progeny testing rates offspring relative to parents **3**
- (b)
- | | | | | |
|-----------|-------|---|----------|------------------|
| Parents | Rr | X | rr | 2 + 2 |
| Gametes | R r | | r | 2 + 2 + 2 |
| Offspring | | | | |
| Genotype | Rr | | rr | 2 + 2 |
| Phenotype | Round | | Wrinkled | 2 + 2 |
- (c) any three **3[3 + 3]**
- (i) *progeny of cross/ between individuals that are genetically different or between purebred lines or between homozygous parents/desirable characteristics/ seed production
- (ii) *having three or more sets of chromosomes (or 3n +)/ infertile/ example
- (iii) sperm from superior male/ hormone treatment/ eggs removed from high performance animal/ fertilised in vitro/ embryo cloned/ *implanted in other animal or organism
- (iv) *altering genotype (genes) of an organism/ duplication or insertion of genes from one species into another / may benefit growth or survival of organism/ example or GMOs or GM foods
8. (a) (i) cellulose digestion/ vitamin synthesis/ amino acid synthesis/ microbial protein **3(3)**
 (ii) any one **5(3)**
 *glucose/ absorbed/ from small intestine/ into hepatic portal vein/ to liver/ stored as glycogen or carried to body cells
 *amino acid/ absorbed/ from small intestine/ into hepatic portal vein/ to liver/ protein synthesis/ deamination or formation of urea
 *fatty acid/ absorbed/ into lacteals/ carried in lymph system/ to blood stream/ to liver or to adipose tissue
- (b) (i) named mineral (N, P, K, Ca, S, Mg) **3**
 two areas/ one control/ one test/ apply nitrogen/ leave for period of growth/ measure height of grass/ note colour/ cut/ weigh/ compare
 OR
 seedlings (young plants)/make up culture solutions/ experiment missing one mineral/ control with all minerals / place plants in containers/ add solutions/ leave in light/ aerate/ block light from solution/ observe growth/ note deficiency symptom **6(3)**
- (ii) Nitrogen – chlorophyll/ amino acid/ protein/ leaf growth
 Calcium – middle lamella/ support
 Phosphorus – ATP/ nucleic acids/phospholipids/ cell membrane/ root development/ cell division/ respiration
 Magnesium – chlorophyll/ proteins/ photosynthesis
 Sulphur – amino acids/proteins/ chlorophyll/ photosynthesis
 Potassium – promotes translocation of carbohydrate or disease resistance
 matching function **3**
- (c) (i) age of animal/ type of animal/ diet of animal/ length of storage/ dilution with water **3(3)**
 (ii) adds nutrients (or one named nutrient)/ produces organic matter (humus)/ improves water holding/ economical/ improves crumb structure/ increases earthworm activity **2(3)**
 (iii) hydrogen sulphide/ carbon dioxide/ ammonia/ methane **2(3)**
 (iv) do not enter house/ remove animals from house/ ventilate/ never alone/ agitate from outside/ wear mask **3**

9.

4[6 + 3 + 3]

- (a) grassland natural habitat of crane fly/ lays eggs in grass/ larvae emerge/ feed on vegetation
- (b) reduced light/ competition for light/ light needed for photosynthesis/ adaptation by increasing surface area
OR
competition for any environmental factor/ purpose of factor (e.g. photosynthesis, growth)/ resulting change in leaf area
- (c) animals stressed after transport/ rehydration/ glucose for energy/ prevent scour/ weaning on to food
- (c) category (time of sowing)/ variety/ amount of nitrogen fertiliser/ amount of Cl in fertiliser/ potash levels (sulphate of potash)/ sunshine for high dry matter (or less rainfall)
- (e) presence of boar brings on heat/ pheromones/ increased conception rates/ increased litter size

