



Coimisiún na Scrúduithe Stáit State Examinations Commission

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Scrúduithe Ardteistiméireachta, 2004

Eolaíocht Talmhaíochta

Ardleibhéal

Marking Scheme

Leaving Certificate Examination, 2004

Agricultural Science

Higher Level

LEAVING CERTIFICATE EXAMINATION 2004
AGRICULTURAL SCIENCE – HIGHER LEVEL
Marking Scheme

1. (a) **4 + 3 + 3 marks**
- (i) snail
- (ii) Mollusca
- (iii) grazer on crops/damage to potatoes/ damage to stems/ secondary host or involved in life cycle of liver fluke/etc. any one
- (b) better drainage/ better aeration/ easier to cultivate/ earlier sowing (warmer)/ better crumb structure/ less retentive of nutrients/ less retentive of water/ darker colour
any four **3 + 3 + 2 + 2 marks**
- (c) name of pest (animal) **5 marks**
biological control (natural or managed) **5 marks**
- (d) BSE/TB/foot and mouth/anthrax/Newcastle disease/ brucellosis/ rabies/ sheep scab/ swine fever/ Aujeszki's disease/scrapie/ etc.
any three **4 + 3 + 3 marks**
- (e) **4 + 3 + 3 marks**
- (i) thistle
- (ii) Compositae (Asteraceae)
- (iii) rosette growth habit/ creeping habit/ radical leaf arrangement.
- (f) (i) C = wheat D = barley **3 + 3 marks**
(ii) beard (awns) on barley/ thinner grains on barley/ head parallel to stem on barley/ long auricles on barley/ hairless auricles on barley/
any one **4 marks**
- (g) colour/height/ growth habit/any valid difference.
any three **4 + 3 + 3 marks**
red clover: has red-pink flower / taller / has erect growth habit / has creeping growth habit / has hairy stem and leaves/ is not as aggressive/ is not as persistent/ not as good at nitrogen fixation/ not as good quality/ bigger leaves
- (h) (i) nutrition/ breed/ health/ time of shearing any one **5 marks**
(ii) 1-4 kg (2 – 9 lb) approx **5 marks**
- (i) regulates blood glucose level/ assimilation of food/ stores glycogen/ stores minerals and vitamins/ makes bile/ provides heat/ protein or amino acid breakdown/ detoxification/ destroys red corpuscles/any other valid function.
any two **5+5 marks**
- (j) to avoid pollution/ to prevent accumulation in food chain/damage to wildlife/ residue in crops/ risk to handlers/ to comply with REPS/ affects pollination
any two **5 + 5 marks**

2. (a) (i) texture: A sandy, B clayey **2 + 2 marks**
(ii) two differences under each heading
physical properties: A has better drainage/ A has better aeration/ A easier to till/ A warms up earlier/ B retains water better / A leaches easier
chemical properties: B has better cation exchange/ B more fertile/ B flocculates/ B has less leaching
any four **4 x 3 marks**
- (b) soil profile **name 4 marks**
diagram showing horizons **3 marks**
[If diagram does not match named profile then 0 marks for diagram]
labels or description **3 x 3 marks**
(Letters alone e.g. A, B, C: 3 marks)
- (c) (i) soil texture/ mineral content/ pH/ drainage any one **4 marks**
(ii) glaciation/ physical weathering/ frost/ wind or water causes disintegration/ rain causes chemical weathering/ /rainwater causes leaching/ effect of wind
any one **4 marks**
(iii) water retention/ vegetation affected by aspect/ soil erosion on hillside/ shallow soil on hillside/ deep soil lower down/ more fertile lower down.
frost action related to altitude any one **4 marks**
(iv) organic parent material/ living organisms contribute nutrients/ type of plant influences soil / type of vegetation depends on climate and plants cause physical weathering/ acidity of soil depends on vegetation type/ all earthworm activities any one **4 marks**

Option one

- 3 (a) kills clover/ more chlorophyll/ greener grass/ increased cost/ pollution from leaching or runoff/ volatilisation/ susceptibility to disease/ better growth/ lodging
any four **4 x 4 marks**
- (b) needed to make chlorophyll/ more photosynthesis/ more yield/ (makes 16% of protein/ constituent of amino acids/ needed for growth (lack causes stunted growth)/ yellowing (chlorosis) any four **4 x 4 marks**
- (c) **named** legume (e.g. clover, peas, beans, lupin, lucerne) **4 marks**
any two precautions (e.g. sterilize) / crush/ wire loop/ streak agar plate/ incubate/ time/ result
any four **4 x 3 marks**

Option two

- 3 (a) (i) good fat:lean ratio/ scale 0-5 cows and sheep/ 0=thin 5=fat/ sows 0-9/ feel along backbone to indicate fat
any two **2 x 4 marks**
- (ii) **ratio of food to weight gain/ cost efficiency/ target ratio/**
affected by breed/ health/ management/ housing/ diet
(one of first three compulsory + any other point)
any two **2 x 4 marks**

(b)

calf	adult
milk/	
colostrums	
hay pencils	grass (hay, silage)
more protein	less protein
ration	cellulose
bacteria for rumen (probiotics)	high quality high dmd
minerals	minerals
vitamins	no vitamin additives

any four comparisons **4 x 4 marks**

(c) breed/ breeding programme/AI/ top bulls/ good cows/ stripping milk/ milk recording/ culling programme/ feeding high quality foods
hygiene **one** point from: washing/ lime on bedding/ disinfecting/ cooling milk to 4 °C
any four **4 x 4 marks**

4. (a) **named element**

4 marks

field method for sampling/ put soil sample in container/ add distilled H₂O/stopper and shake/ filter contents/ add drops of correct named reagent*/ note result**

5(4) marks

nitrogen : *diphenylamine/ ** blue precipitate
phosphorus *ammonium molybdate/ **yellow precipitate
sulfate; *barium chloride/ **white cloudiness
chloride; *silver nitrate/ **white precipitate
* and ** compulsory

OR

field method for sampling/ use soil test kit/ distilled H₂O/make up solution according to directions/ add to soil/ leave for x weeks/ description of result

5(4) marks

(b) weigh sample/ separate leaf from stem/ weigh each/ leaf to stem ratio/ ratio proportional to protein

OR

Kjeldahl method to detect N/ protein is 16%/ % protein =/ % N X 100/16

4 x 6 marks

(c) quadrat/ 1m² (or other known area)/name of crop / remove crop/ remove tops/ weigh/ record/ repeat/ average weight per area/ yield per drill/ number of drills/ area of field/ calculate per hectare/ correct yield any six **6 x 4 marks**

(d) weigh container/ weigh sample and container/ weight of sample / heat 105 °C or boil/ weigh again/ calculate difference/ weight lost is water content/ estimate percentage of water/ estimate percentage of solids. any six **6 x 4 marks**

5. (a) (i) line transect and/or quadrat/ throw or place/ use key or identify/ count numbers or estimate percentage cover any three **3 + 3 + 2 marks**
(ii) dock/ dandelion/ nettle/ buttercup/ daisy/ ragwort/ cocksfoot/ meadow foxtail/ Yorkshire fog/ etc. any four **4 x 2 marks**
[do not allow ryegrass or clover]
- (b) species: perennial ryegrass/ white clover/ red clover/ Italian ryegrass/ Timothy **2 x 4 marks**
reasons: (as appropriate) productive/ persistent/ nutritious/ palatable/ persistent/ increases protein level/ adds nitrates **2 x 4 marks**
- (c) direct drilling/ kill grass (herbicide)/ drill/add fertilizer/ add slug pellets. **2 x 4 marks**
stitching in/slit drilling/don't kill grass/set back old pasture (heavy grazing or cut back on N)/ seeder or drill/ add fertilizer/ add slug pellets [allow any method not involving ploughing that gets seeds into ground]
2 x 4 marks
- 6 (a) (i) mixed grazing **4 marks**
(ii) better daily gain/ more output per ha/ better control of parasites/ named parasite/ better use of grass/sheep eat around dung pats/ sheep grazing increases tillering/ different dung and urine.
any four **4 x 3 marks**
- (b) (i) specified sire qualities/ specified dam qualities / breed/ time of mating or spring calving any three **3 + 3 + 2 marks**
(ii) calf with cow (or suckle)/ colostrum/ grass/ good quality silage/ meals or creep feed any three **3 + 3 + 2 marks**
- (c) name **1 mark**
teeth/ feet/ mouth/ breed/ pedigree/ age/ udder/ no discharges/ healthy/ conditionscore/ conformation/ etc. [allow one point only under each heading of conformation and condition scoring]
any five **5 X 3 marks**
- 7 (a) haploid; half full (single) set of chromosomes/ state of gametes/ N / result of meiosis **4 marks**
sex linkage; gene located on sex chromosome or characteristic associated with one sex **4 marks**
incomplete dominance; one allele not dominant over other/ heterozygous condition results in mix of phenotypes or example **4 marks**
- (b) (i) black short/ black long/ brown short/ brown long **4 x 4 marks**
(ii) 9:3:3:1 **4 marks**
[allow marks if genotypes appear in correct numbers in sixteen boxes]
- (c) (i) produces gametes/ produces haploid cells/ crossing over (chiasma) occurs/ allows for variation/ reduces chromosome number/ reduction division any two **2 x 4 marks**
(ii) change (error) in genetic material/ change in base sequence in DNA/ change in chromosome number any one **4 marks**
X rays/ radiation/ UV light (sunlight)/ mustard gas/ radon/ cigarette smoke/ asbestos/ colchicine/ etc. any one **4 marks**

- 8 (a) (i) rumination (chewing)/microbes, protozoa, bacteria, fungi, flora
(allow only two of these) / in rumen/ fermentation of cellulose /
cellulase/ glucose/ regurgitation/ saliva neutralizes acid
any four **4 x 3 marks**
- (ii) maintenance: sufficient to maintain body weight (to maintain body
condition) **6 marks**
production: extra food for muscle (or milk or developing embryo
or growth) **6 marks**
- (b) named crop **2 marks**
practices: plough/ stone free/ pH 5.5/ fertilising/ soil test/ rotovate/ sow
refer to method or spacing/ ridge/ spray/ pest control/ disease control/
harvest/ storage etc.
any five **5 x 4 marks**
yield: **2 marks**
- (c) (i) named fungus (e.g. blight, mildew, rust, *Rhynchosporium*) **4 marks**
effect on growth: spots or mycelium on leaves/ less photosynthesis/ feeds
on sap/ lower yield/ rotten tubers/ lodging in cereals
any two **2 x 4 marks**
- (ii) prevention and control: monitoring growth regularly/ certified seed/
resistant varieties/ crop rotation/ autumn ploughing/ spraying/ removing
diseased plants/ harvesting without delay/ growth encouragement/
biological control
any three **3 x 4 marks**
- 9 (a) young calves on fresh grass/ more palatable/ easier to digest / less
parasites
- (b) contain oxalic acid/ causes scour/ must leave a number of days to wilt.
- (c) trampling or rolling expels air/anaerobic conditions needed for
fermentation or for bacteria/ better quality silage (must refer to pH)
- (d) animals respire/ aerobically (or use of oxygen)/
 $6\text{O}_2 + \text{C}_6\text{H}_{12}\text{O}_6 = 6\text{CO}_2 + 6\text{H}_2\text{O}$ (chemical or word equation gets full
marks)
- (e) root hairs a semi-permeable membrane/ water diffuses to area of lower
concentration (or moves from low solute concentration to high solute
concentration)/ called osmosis
any two points in each of four **4 (6 + 6) marks**