



Coimisiún na Scrúduithe Stáit
State Examinations Commission

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Scrúduithe Ardteistiméireachta, 2003

Eolaíocht Talmhaíochta

Ardleibhéal

Marking Scheme

Leaving Certificate Examination, 2003

Agricultural Science

Higher Level



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Question	Answer	Marks
1. (a)	1. Vaccination - dose of non-living (or part of) pathogen or toxin to produce immune response (antibodies) 2. Symbiosis - two organisms living together for mutual benefit 3. Tillering - growth of side shoots	6 + 2 + 2
(b)	1. Respiration without oxygen 2. Slurry tank / silage pit / muscle/etc. <u>any one</u>	5 5
(c)	Comparable portions of sand, silt and clay/ gritty between fingers/slightly plastic when wet/ light / has good amount of available water/ rich in nutrients / good drainage/etc.	6+ 2 + 2
(d)	1. Gramineae 2. A = spikelet B = panicle/petiole/stalk	4 3 + 3
(e)	Epigeal = cotyledons come above ground during germination Hypogeal = cotyledons stay below ground during germination Examples = Any one for each	3 3 2 + 2
(f)	1. Adipose Tissue = fat 2. Bone = calcium /phosphorus/ magnesium 3. Muscle = protein /carbohydrate (glycogen)	6 + 2 + 2
(g)	Aspect = exposed to sun in southern facing OR less exposed to sun in northern facing / soil warms up sooner in southern OR later in northern facing	5 + 5
(h)	Systemic = absorbed by the plant/ less coverage needed/slow acting Contact = kills what it touches/ more coverage needed/ fast acting	5 5
(i)	Tendrils = hold / grip/ climb Stolon = allows the plant spread (reproduction) Sorus = for spores to develop	6 + 2 + 2
(j)	Cell wall (no cell wall)/ cellulose (no cellulose)/ chloroplast (no chloroplast)/ plastid (no plastid)/ no centrosome (centrosome)/ large vacuole (smaller vacuole)/ etc <u>any two</u>	5 + 5

Question 2

- (a) *Flocculation*
structural units of soil are aggregates or peds / held together by organic or inorganic cements / cementing particles are colloidal in size / come together in floccules or clusters / -ve charges on the cementing particles are satisfied by polyvalent cations / particles are linked together by bridges of polarised water molecules / floccules formed / sand and silt are trapped into the aggregates / Fe, Al, H, Ca are effective ions and are abundant in Irish soils / high degree of structural development / gives rise to better (more fertile) soils/ brings particles together to form pores/ influences pore size/ influences aeration/ influences drainage/ influences temperature
any four **4 X 4 marks**
- (b) (1) *Cementation* = particles and cements are pushed closer together
Separation = cemented materials are broken up (or pushed into aggregates or clumps) **2 X 2 marks**
- (2) Wetting and drying - drying causes shrinkage, pushes particles together wetting, drying circles causing cracks, break-up of soil mass
Freezing and thawing - swelling and shrinkage, frost tilth formed,
Activity of roots - small roots increase soil and cement contact, large roots crack and break up soil
Activity of earthworms - particles and cement mixed in gut, better structure - Casts, channels left by worms promote cracking and break-up
Tillage operations - promote aggregation, expose large clods, promote drying and shrinkage
any four
name of factors 4 X 2 marks
explanation 4 X 1 marks
- (c) *Named soil type* **1 mark**
Full marks to be awarded for **one** experiment to investigate texture **OR** structure
Diagram = **(0, 3, 5 marks)**
Points can be found on diagram or written
Method **5 x 2 marks**
1. hand lens/ feel with fingers/ moisten and knead/note cohesiveness and plasticity/
roll into threads and bend/ use a table of pre-determined information to decide the
soil texture any five
OR
2. place soil in beaker/ add water/ break up and mix/pour into graduated
cylinder/add water/ allow to sediment/ measure volumes of layers
any five
OR
Any valid experiment to investigate texture or structure

Option one - Question 3

- (a) (1) During late pregnancy
dry sow house / fed once daily (2.5 kg meals) / final 3-4 weeks fed extra (0.5 kg) daily / 1 week before moved to farrowing house / sow is washed or deloused or disinfected/ vaccinated/ put in farrowing unit / temperature maintained at 20 °C / if problems farrowing call vet.
any four **4 X 2 marks**
- (2) After birth of bonhams
left in farrowing crate / to prevent injury to bonhams / suckles for 5-6 weeks / fed suckling ration (1.8 kg + 0.5 kg per bonham) / supply of water / post weaning sow moved back to dry sow house / disease prevention/ in oestrus within 5-7 days
any four **4 X 2 marks**
- (b) digestibility (D-value)/ degree to which food (grass) is retained and used by animal/ changes with time / decreases after flowering/ decrease in soluble carbohydrates (starch or sugar)/ increase in fibre/variation between species
any three **2 (6) + 4 marks**
- (c) (i) for energy/ for lactation yield/ to produce colostrum/ for development of calf/ to prevent illness or death of cow (or calf)/ “milking off her back”
any three **3 + 3 + 2 marks**
- (ii) Catch crops
example/ crop grown between two main crops / best utilisation of land / catch crop a winter grazing food for animals/ less outlay on fodder / break in tillage reduces incidence of pests and diseases / weed control by shade control/ low labour input/ etc.
any three **3 + 3 + 2 marks**

Option two - Question 3

- (a) (1) greater yield gives greater production/ high quality grass produces maximum LWG/ higher dry matter yield from high value crop
any two **2 X 4 marks**
- (2) under-stocking leaves grass uneaten (wasted)/ more stemmy growth/ correct stocking rate/ livestock unit per area/ increased stocking rate in summer/ overstocking leads to overgrazing/ little growth overall/ weakens desirable species/ encourages rosette type weeds/ decreases production
any two **2 X 4 marks**
- (b) short leafy grass (vegetative stage)/palatable / very digestible/ rotation of stock around a series of grazing areas/ makes best use of this grass/parasite control
diagram of strip/paddock 0, 3, 5 marks
3 points = 6 + 3 + 2 marks
- (c) (1) colostrum/ milk/ creep feeding of grass/ concentrates
any three in correct order **3 + 3 + 2 marks**
- (2) housing clean/well ventilated/ no overcrowding/ rotational grazing/ leader-follower system/ isolation of diseased animals/ isolation of bought in animals/ dosing/ vaccination/etc.
any four **4 X 2 marks**

Question 4

ANY TWO

1. The presence of micro-organisms in an animal foodstuff

sample of foodstuff / sterile agar plates (allow two points for description of making sterile agar plates) / control (unopened plate) / inoculate plate with foodstuff / incubate / upside down / time / furry growth is fungus/ dome shaped colonies are bacteria/ control is clear/micro-organisms from foodstuff

any six

6 X 4 marks

2. How the activities of earthworms have an important role in the soil

wormery / different types of material/ soil /gravel or sand/ chalk/ leaves/ in layers in wormery / add worms / cover/ leave / observe layers mixed up/ worms bring down leaves/ mix soil layers/ control

any six

6 X 4 marks

3. The productivity of an area of grassland

measure area of grassland / enclose area/ mow the grass from the top / find mass of the grass removed / record/ repeat this over defined time/ total mass of grass is a measure of productivity

OR

measure area of grassland / enclose (fence) area / allow cows graze on grass/ milk cows regularly/ measure the amount of milk / record/ total amount of milk is a measure of productivity/

OR

measure area of grassland / enclose (fence) area / weigh a number of cattle/ record/ allow cattle graze on grass / reweigh cattle after a fixed period/ weight increase is a measure of productivity

any six

6 X 4 marks

4. To show the action of a named enzyme

named enzyme / named (matching) substrate / suitable medium/ suitable apparatus/ mix enzyme and substrate/ suitable temperature/observe change or test for product/ name product formed

any six

6 X 4 marks

Question 5

- (a) chemical reactions /occurring in a cell (in an organism) / either breaking down or combining substances/ example of reaction any two **3 + 2 marks**
- (b) metabolism/ respiration / excretion (urine or sweat)/exercise/ heat/ production/ faeces / fighting illness/etc. any three **3 X 3 marks**
- (c)

Bulky foods	Concentrates
Fresh Grass	Cereal grains
Silage /Hay	Cereal grain by-products
Root crops	Fats / oils
Straw	Molasses, beet pulp
Forage crops	Oilseed by-products
	Legume seeds
	Animal products
	Dried skimmed milk
	Feed supplements
	Ration/Nuts/Meal

Distinguish the above by type / nutrition / energy value / cost / other, according to examples given

Name of 2 bulky foods = 2 X 3 marks

Name of 2 concentrates = 2 X 3 marks

Distinguish = 2 X 3 marks

- (d) (1) ruminant has 4 chambers / monogastric has 1 chamber **2 X 4 marks**
- (2) ruminant = bulky cellulose diet/low in food with sugars (root crops) (allow "digests grass") any one **4 marks**
 monogastric = less fibrous/less bulky/ more root crops/ more concentrates any one **4 marks**

Question 6

- (a) Named cereal crop **3 marks**
- (1) pH 6-6.5 / deep/sandy loam/grey brown podzolic / brown earths/etc. any two **2 X 3 marks**
- (2) plough/ harrow/produce fine seed bed/ etc. any two **2 X 3 marks**
- (3) time of sowing/method/ rate/ etc. depending on cereal type any two **2 X 3 marks**
- (4) 10:10:20 / N/ P/ K/ or relevant element(s) named/amount of fertiliser related to soil type/ any two **2 X 3 marks**
- (5) combine harvester /time/yield/etc. any one **3 marks**
- (b) (1) Control of soil-borne diseases/ pests /maintenance of soil structure/ of organic matter /of fertility/ weed control any two **6 + 3 marks**
- (2) Disease free/ high germination rate/ high purity type/ free of weed seeds/ seed dressing any two **6 + 3 marks**

Question 7

- (a) (i) Rr (allow W for recessive allele) **3 marks**
 (ii) incomplete dominance (or explanation) **4 marks**
 (iii) Parents **Rr** X **RR**
 Gametes **R** **r** **R**
 F1 genotype **RR** **Rr**
 F1 phenotype **Red** **Pink** **9 x 2 marks**
 (iv) fast results / easy to manipulate / contrasting traits/ large number of offspring any one **3 marks**
- (b) (i) (1) 22 (2) Haploid **2 x 3 marks**
 (ii) Parents **XX** **X** **XY**
 Gametes **X** **X** **Y**
 F1 genotype **XX** **XY**
 F1 phenotype **female** **male** **7 x 2 marks**

Question 8

ANY TWO of (a), (b), (c).

- (a) parent rock/chemical weathering / biological weathering/ pH/ slow release/ pH less than 5.5 form insoluble compounds / above 7.5 same/ decomposition of organic matter/ level of other nutrients any four **4 X 3 marks**

Total phosphates = phosphates in soil in all forms **6 marks**
 Available phosphates = soluble ions or compounds/ can be taken up by plants any one **6 marks**

- (b) Nitrogen cycle
 N₂ in air / nitrogen fixation / by bacteria/ name of bacterium in correct place/ synthesise amino acids/ synthesise ammonia compounds/ nitrates / plant protein / animal protein / ammonification / nitrification / ammonia - nitrites - nitrates / denitrification / nitrates – nitrites – nitrogen gas/ other valid point any six **6 X 4 marks**

- (c) **3 (3 + 3 + 2) marks**
- (1) Performance testing = keeping records of the animal's individual performance /growth rate/ efficiency at converting feed / comparing with records of other animals /kept under similar conditions
- (2) Progeny testing = keeping records of animal's offspring / growth rate/ efficiency at converting feed/ comparing with the offspring of other animals/ kept under similar conditions.
 [allow comparison (accuracy/expense/time) between 1 and 2 for one point]
- (3) Photosynthesis = to make food /for storage/ for survival/ for metabolism/ food source for animals/ oxygen production/ using carbon dioxide

Question 9

*Scientific Explanation for **four** of the following* **12 marks each**

- (a) *The addition of molasses to grass during the making of silage*
carbohydrate stimulant (adding sugar)/ for *Lactobacillus* or *Streptococcus*/
ensures lactic acid production/ avoids butyric acid production/ better silage
any two **2 X 6 marks**
- (b) *Conservation and retention of hedgerows on a farm*
biodiversity / shelter for animals / noise reduction / amenity/ screening
farmyard/ wildlife corridor/ REPS/ other valid answer
any two **2 X 6 marks**
- (c) *The absence of flower head on sugar beet during 1st season*
sugar beet is a biennial/ produces food storage in 1st year/ flowers in second
year/ has not been subjected to adverse conditions (cold)
any two **2 X 6 marks**
- (d) *Potted plants losing turgidity on a very warm day*
limited amount of water in potted plants/ loss of water from plants
(transpiration) / factors influencing transpiration/ increases with temperature/
plant needs water to retain turgidity any two **2 X 6 marks**
- (e) *Earthing up around the potato*
increases number of tubers/ prevents “greening”/ prevents zoospores of potato
blight getting down to the tubers (protection from blight)/ weed control/pest
control/protection from frost any two **2 X 6 marks**