

Leaving Certificate Higher Level 'Scientific Explanation' Questions

2012

9. Give a scientific explanation for any **four** of the following:
- (a) The importance of pollination in plants.
 - (b) A greater demand for energy by animals kept outdoors over winter.
 - (c) The occurrence of bare patches of ground in a recently sown cereal crop
 - (d) The benefits arising from shelter-belts on exposed farms.
 - (e) The locating of boars in dry sow houses.

[2012Marking Scheme](#)

2011

9. Give a scientific explanation for any **four** of the following:
- (a) The action of yeast in brewing **and** baking.
 - (b) Progeny testing of A.I. bulls.
 - (c) The use of systemic chemicals to control aphids.
 - (d) Trace element deficiencies in crop production.
 - (e) The fact that the creep area for bonhams is kept at a higher temperature than the rest of the farrowing house.

[2011Marking Scheme](#)

2010

9. Give a scientific explanation for any **four** of the following:
- (a) The practice in abattoirs of fasting animals before slaughter **and** of allowing the carcasses to hang for some days before sale.
 - (b) The increase in the number of fish kills in rivers and lakes in summer.
 - (c) The unsuitability of the Holstein breed for single suckling.
 - (d) The addition of soya bean meal to cereals in pig rations.
 - (e) The inclusion of both conifers and broadleaf trees in shelterbelts.

[2010Marking Scheme](#)

2009

9. Give a scientific explanation for any **four** of the following:
- (a) The growing of first early potato crops in specific regions of Ireland.
 - (b) A greater demand for energy by a farm animal when reared outdoors over the winter.
 - (c) The failure of cereal seeds to germinate after sowing.
 - (d) The formation of an iron pan in a soil profile.
 - (e) The use of plastic in the cultivation of maize.

[2009Marking Scheme](#)

2008

9. Give a scientific explanation for any **four** of the following:
- (a) The improvement of a soil by the addition of lime.
 - (b) The appearance of yellow leaves in crop plants.
 - (c) The pruning of a field hedge.
 - (d) The greening of potatoes.
 - (e) The production of gases in a slurry tank.

[2008Marking Scheme](#)

2007

9. Give a scientific explanation for any **four** of the following:
- (a) High levels of leatherjackets in a crop following grass.
 - (b) A change in the leaf area of plants growing near a hedgerow.
 - (c) Feeding bought-in calves only water and glucose for the first 24 hours on arrival on a farm.
 - (d) The variation in the dry matter content of potatoes.
 - (e) The practice of housing a boar near sows and the double-serving of sows in a pig breeding enterprise.

[2007Marking Scheme](#)

2006

9. Give a scientific explanation for any **four** of the following:
- (a) Autumn ploughing as practised on the cultivations for crops.
 - (b) Conservation of hedgerows.
 - (c) The culling of breeding stock.
 - (d) The function of a gizzard in poultry.
 - (e) Movement of water from the soil through the plant to the atmosphere.

[2006Marking Scheme](#)

2005

9. Give a scientific explanation for **four** of the following:
- (a) A high incidence of liver fluke in cattle grazing on poorly drained pasture.
 - (b) Teat dipping of cows after milking.
 - (c) The issuing of warnings to potato growers by the Irish Meteorological Service.
 - (d) A high incidence of leather jacket damage in a cereal crop following grass.
 - (e) The presence of duct-like particles in the air surrounding barley plants showing white raised patches on their leaves.

[2005Marking Scheme](#)

2004

9. Give a scientific explanation for **four** of the following:
- (a) The leader-follower system of grazing.
 - (b) The wilting of sugar beet tops before feeding them to livestock.
 - (c) The rolling or trampling of grass when making silage.
 - (d) The production of carbon dioxide in the animal.
 - (e) The absorption of water by the root hairs of plants.

[2004Marking Scheme](#)

2003

9. Give a scientific explanation for **four** of the following:
- (a) The addition of molasses to grass during the making of silage.
 - (b) Conservation and retention of hedgerows on a farm.
 - (c) The absence of a flowering head on a sugar beet plant during its first season of growth.
 - (d) Potted plants losing turgidity on a very warm day.
 - (e) "Earthing up" around the potato.

[2003Marking Scheme](#)

2002

9. Give a scientific explanation for **four** of the following statements.
- (a) The necessity for a number of thinning operations in forest-tree production.
 - (b) The practice of including calcined magnesite in the diet of lactating cows in early spring.
 - (c) The development of peat over a gley soil.
 - (d) The importance of aphid control in a region where certified seed potatoes are grown.
 - (e) The importance of storing the fertiliser Calcium Ammonium Nitrate in sealed plastic bags.

[2002Marking Scheme](#)

2001

9. Give a scientific explanation for any **four** of the following:
- (a) The presence of a red colour in the urine of a bovine animal.
 - (b) A large population of rushes and sedges in grassland overlying a gley soil.
 - (c) The necessity to allow sugar beet tops to wilt for about a week before feeding them to livestock.
 - (d) A variation in the concentration of carbon dioxide in the atmosphere during a warm sunny day.
 - (e) Milking cows more frequently than twice daily increases their yields over a lactation period.

[2001Marking Scheme](#)

2000

9. Give a scientific explanation for any **four** of the following:
- (a) The failure of plants to produce starch in a nitrogen-filled atmosphere.
 - (b) A greater loss of energy by farm animals kept out of doors during the winter months in comparison to those housed indoors.
 - (c) A variation in the height of the water table in a field during the year.
 - (d) A low incidence of liver fluke in cattle grazing on a well drained pasture.
 - (e) A slow rate of transpiration from plants during humid weather.

(48 marks)

1999

9. Give a scientific explanation for any **four** of the following:
- (a) A low percentage rate of establishment in a field of winter barley.
 - (b) The production of gases in a slurry tank.
 - (c) A variation in the number and size of the sprouts on potatoes exposed to a range of temperatures in the laboratory.
 - (d) A high incidence of tussocks of unproductive grasses in a pasture sward.
 - (e) A lower water content in food as it passes into the abomasums of a ruminant animal.

(48 marks)

1998

9. Give a scientific explanation for any **four** of the following:
- (a) Maintaining a constant temperature in a pig farrowing unit.
 - (b) Land drainage of marshy ground adjacent to a dairy or sheep farm enterprise.
 - (c) A notable reduction in the size of tap roots growing during an extended drought period.
 - (d) Feeding 'beastings' to a calf after birth.
 - (e) A slow rate of plant growth on a gley soil.

(48 marks)

1997

9. Give a scientific explanation for any four of the following:
- (i) The importance of pollination in seed production.
 - (ii) The controlled spreading of farmyard slurry on grassland.
 - (iii) A change in the composition of grass material over the growing season.
 - (iv) The production of oxygen during photosynthesis.
 - (v) A variation in the rate of transpiration of grass plants over the period of a warm summer day.
 - (vi) The importance of Aphid control in the production of 'seed' potatoes.

(48 marks)

1996

9. Give a scientific explanation for any four of the following:
- (a) Baling and storage of hay immediately after drying.
 - (b) The process of podzolisation in a soil.
 - (c) The protection of root crops during winter storage.
 - (d) Using a systemic chemical in the control of Potato Blight
 - (e) The inclusion of Boron in some artificial fertilisers.

(48 marks)

2012 Marking Scheme

9. (a) Necessary for (sexual) reproduction of flowering plants / allows for genetic variation / production of seeds / fruits / which are food for animals / part of the food chain / biodiversity-maintains a balance in the ecosystem. 4 x (4m+4m+4m)
- (b) Colder outdoors / wetter / animals use energy for heat (respiration) / greater energy demand to maintain critical temperature / animals move around and use energy / thermoregulation (maintain body temperature) 4 x (4m+4m+4m)
- (c) Seeding rate is too low / winter kill (frost etc) may leave bare patches / disease / Rhizoctonia / damping-off / pests eating seed / not using certified seed / poor seedbed preparation / waterlogging. 4 x (4m+4m+4m)
- (d) Protection for animals / protection for plants (crops) / reduce wind damage / increase soil temperature / protection for buildings / habitat for wildlife / aesthetic purpose. 4 x (4m+4m+4m)
- (e) Presence of boar stimulates sow's oestrous cycle / used to detect sows in heat / can detect pheromones / used for double serving. 4 x (4m+4m+4m)

2011 Marking Scheme

9. (a) Equation may cover all points / anaerobic respiration (fermentation) / production of alcohol / production of CO₂ used in brewing / CO₂ used to raise bread. 4 x (4m+4m+4m)
- (b) Calves or offspring are tested / growth rate / FCR / compared / with progeny of other bulls / kept under the same conditions / records kept / large statistical sample / very reliable in predicting results of a mating with a particular bull / more reliable than performance test / can predict lift in milk yield / fat or protein increase in herd. 4 x (4m+4m+4m)
- (c) Systemic; chemicals are absorbed by plants / through stoma / up xylem / down phloem (translocated) (vascular system only accepted instead of either xylem or phloem) / aphids suck sap / ingest chemical / longterm control 4 x (4m+4m+4m)
- (d) Caused by wrong soil type / deficiency in soil or parent rock / over cultivation / over liming / ph too high / ph too low / soil exhaustion / named example e.g. boron deficiency causes crown rot in beet / incorrect rotation / monoculture / leaching / reclaimed land 4 x (4m+4m+4m)
- (e) To attract bonhams away from sow / and avoid being crushed / higher temp too hot for sow / bonhams small lose heat easily / farrowing house 20°C for sows / up to 30* in creep area / to attract them to feed. 4 x (4m+4m+4m)

2010 Marking Scheme

9. (a) full gut (rumen) at slaughter/ increases meat hygiene risk/ E. coli risk on meat/
sugar (glycogen) in muscle turns to lactic acid/ especially if animals are stressed/
results in poor quality meat
Hanging carcass allows blood to drain/ enzymes/ break down tough fibres in meat/
better quality meat 3 (4m)
At least one reference each to fasting and hanging
- (b) oxygen is more soluble in cold H₂O/ water warm in may/ less O₂/ water levels low
in may/ effluent is less diluted/ silage operations begin in mid may (Cork usually
reports first incidents)/ high BOD/ of silage effluent or of fertilizer or of slurry/
eutrophication/ algal bloom/ bacteria any three 3 (4m)
- (c) highest yielding breed/ too much milk for one calf/ mastitis likely in cow/ scour
likely in calf/ Holsteins are not winter-hardy/ Holsteins require more feed/ they
are a dairy breed/ calves not suitable for beef any three 3 (4m)
- (d) protein rich/ increases muscle growth/ cereals are low in protein/ meat +bone
meal no longer available/ cereals and soya complement each other/ because
each has the amino acid lacking in the other/ soya is high in lysine (essential
amino acid)/ which pigs cannot manufacture/ and low in methionine/ cereals
are the reverse any three 3 (4m)
- (e) conifers do well at windy high altitudes (broadleaves don't)/ broadleaves lose
their foliage in winter (conifers don't)/ conifers grow fast and tall (broadleaves
grow slow)/ very few broadleaves can tolerate salt-laden wind in coastal areas
(many suitable conifers exist)/ suitable for wildlife (biodiversity)/ aesthetic any three 3 (4m)

2009 Marking Scheme

9. (a) Near sea (frost-free)/ sandy loam/ southerly aspect (warm soil)/ on south or
east coast or correct named region/ suitable climate any three 3 (4m)
- (b) Respiration (provides energy)/ used for heat/ outdoors colder/ wetter/
more movement/ more energy required any three 3 (4m)
- (c) Low air temp./ waterlogging (lack of oxygen)/ uncertified seed/ soil too
cold/ disease (damping off)/ compaction/ pests **or** named pest
e.g. leatherjackets or wireworms or birds any three 3 (4m)
- (d) Higher rainfall/ acidic conditions/ leaching/ iron washed out of A horizon/
accumulates in B horizon/ solidifies/ as thin layer any three 3 (4m)

- (e) Raises temp./ maize needs high temp to germinate/ 17°C/ gives a longer growing season/ higher yield/ biodegradable or plastic breaks down in sunlight/ does not have to be collected/ conserves moisture/ weed control any three 3 (4m)

2008 Marking Scheme

9. (a) lime contains calcium salts/ increase pH/ improves flocculation/ better drainage/ increases bacterial activity/ increases availability of some nutrients/ increases earthworm population/ cation exchange 3m+3m+6m
- (b) may be caused by N or Mg deficiency/ waterlogging (or leaching) may account for N deficiency/ N or Mg needed for chlorophyll molecule/ Chlorosis/ virus yellows (or other disease)/ drought/ pests 3m+3m+6m
- (c) removing apical buds pr meristem/ apical dominance replaced by lateral domina (thickening)/ REPS/ amenity or appearance/ road safety/ more shelter 3m+3m+6m
- (d) tuber is a stem/ exposed to light/ causes chlorophyll production/ poisonous alkaloids in tuber/ solanin/ lack of earthing-up (or the idea) 3m+3m+6m
- (e) (organic material) decomposing/ anaerobic/ bacteria/ respiring/ one named gas (carbon dioxide, methane, ammonia, hydrogen sulphide) 3m+3m+6m

2007 Marking Scheme

9. (a) grassland natural habitat of crane fly/ lays eggs in grass/ larvae emerge/ feed on vegetation 6m+3m+3m
- (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 6m+3m+3m
- (c) animals stressed after transport/ rehydration/ glucose for energy/ prevent scour/ weaning on to food 6m+3m+3m
- (d) 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 6m+3m+3m

2006 Marking Scheme

9. (a) weathering during winter/ frost breakdown of soil/ good seed bed with less traffic/ deep ploughing for root crops/ earlier sowing/ better germination/ less cultivation in spring/ pest control/ better organic matter breakdown 7m+3m+2m
- (b) shelter for wildlife/ food source for wildlife/ protection for crops/ shelter for farm animals/ absorb carbon dioxide/ replenish oxygen/ biodiversity/ wildlife corridors/ REPS 7m+3m+2m
- (c) reduction in prolificacy (litter size)/ reduction in milk yield/ health problems etc. 7m+3m+2m
- (d) poultry have no teeth/ gizzard part of alimentary canal/ muscular/ grit or sand/ food ground up 7m+3m+2m
- (e) water taken in through root/ by osmosis/ diffuse across into centre of root/ carried upward in xylem/ by root pressure/ cohesion-adhesion/ capillarity/ evaporation through leaves/ stomata/ transpiration stream 7m+3m+2m

2005 Marking Scheme

9. (a) snail is intermediate host (or carries larval stage)/ thrives in poorly drained land/ larval stage (or named stage) needs water to swim 4m+8m
- (b) teat dipped in antiseptic/ protection against mastitis or other disease 4m+8m
- (c) moist warm conditions (Beaumont period)/ favour reproduction by zoospores/ of potato blight fungus 4m+8m
- (d) adult crane fly lays eggs on grass/ larva of the crane fly/ feeds on grasses/ cereals and grasses similar plants 4m+8m
- (e) spores/ of (powdery) mildew (fungus) 4m+8m

2004 Marking Scheme

9. (a) young calves on fresh grass/ more palatable/ easier to digest/ less parasites 6m+6m
- (b) contain oxalic acid/ causes scour/ must leave a number of days to wilt. 6m+6m
- (c) trampling or rolling expels air/ anaerobic conditions needed for fermentation or for bacteria/ better quality silage (must refer to pH) 6m+6m
- (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 6m+6m

2003 Marking Scheme

9. (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 (6m)
- (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 (6m)
- (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 (6m)
- (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 to
 retain turgidity any two 2 (6m)
- (e) *Earthing up around 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 (6m)

2002 Marking Scheme

9. (a) *Number of thinning operations in forest tree production*
 Poorest trees removed leaving the best trees/ allows the remaining trees grow
 at an increased rate/ reduced competition for water and nutrients any two 2 (6m)
- (b) *Practice of including calcined magnesite in the diet of lactating cows in early spring*
 use calcined magnesite against grass tetany – the staggers/ well-fertilised
 grass imbalance in magnesium can cause grass tetany any two 2 (6m)
- (c) *Development of peat over a gley soil*
 Drainage/ gleys are waterlogged soils/ ideal for formation of peat which has
 a high MC/ organic matter not decomposed any two 2 (6m)
- (d) *Importance of aphid control in a region where certified seed potatoes are grown*
 Vectors/ carry/ spread/ of disease/ virus any two 2 (6m)

- (e) *Importance of storing Calcium Ammonium Nitrate in sealed plastic bags*
CAN absorbs moisture from air/ causes caking and wastage to occur any two 2 (6m)

2001 Marking Scheme

9. (a) Babesiosis (Babesia bovis),/ parasite spread by common tick/ destroys RBC's any two 2 (6m)
red water fever = 6 marks only
- (b) Gley formed by waterlogged conditions/ rushes and sedges like wet conditions/ help in the water absorption of the excess water/ competition removed/ better grassed die any two 2 (6m)
- (c) Tips contain oxalic acid/ toxin/ harmful chemical/ cause diarrhoea (scour)/ allowed to wilt for toxin to degrade/ oxalic acid removed calcium and can lead to milk fever any two 2 (6m)
If just wilting stated = 6 marks
- (d) High light intensity = high photosynthesis rate which will reduce CO₂ in the air/ as light intensity decreases the levels of CO₂ will rise any two 2 (6m)
- (e) Milking empties the udder/ this stimulates the milk secreting alveoli to start further secretion/ higher yield results from frequent milking any two 2 (6m)