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1. Marketing can BEST be described as

(A) value-added farm products
(B) promoting and selling goods and services
(C) selling goods produced on the farm at a marketplace
(D) buying goods from the market to be sold to exporters

B

Agricultural marketing includes all the services involved in moving an agricultural product from the farm to the consumer. This includes the promotion and sale of goods and services.

2. Gross domestic product is the total value of

(A) goods consumed by a country
(B) services provided to other countries
(C) goods and services produced in a country
(D) goods and services sold to other countries

C

Gross domestic product (GDP) is the market value of all the goods and services produced in a country within a specific time period, usually annually.

Items 3–5 refer to the following current issues that affect agriculture on a worldwide basis.

(A) Soil erosion
(B) Bioterrorism
(C) Global warming
(D) Problems with food security

In answering Items 3–5, match each item below with one of the options above. Each option may be used once, more than once or not at all.

Which of the above issues is MOST likely to result from

3. improper herbicide usage?

3: A

Improper herbicide usage can kill ground cover plants that hold the soil together, resulting in soil erosion.

4. the burning of bushes and emission of gases from industrial operations?

4: C

The burning of bushes and emission of gases from industrial operations releases large amounts of greenhouse gases into the atmosphere, contributing to global warming.

5. the incidence of pests and diseases, and poor postharvest practices?

5: D

Food security is a country's ability to supply its people with a sufficient quantity of safe, affordable, nutritious food at all times. Postharvest is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing. Poor crop handling after harvest causes a loss of produce. The incidents of pests and diseases and poor postharvest practices therefore results in a loss of produce. If this is widespread in thro country, it negatively impacts food security.

6. Which of the following is the MOST likely reason for the proliferation of praedial larceny in the Caribbean?

(A) The fines are too small.
(B) There are no laws against it.
(C) It is difficult to catch the person committing the act.
(D) Vendors do not have to show origin of farm produce.

Answer: A

Predial larceny is the theft of agricultural produce. It is one of the main challenges to agriculture in the Caribbean.

There are weak sensitivities among police & judiciary (judges) to predial larceny, i.e. they do not see it as a serious offense; therefore offenders are not sternly dealt with, which emboldens them to continue. Loss of produce & the resulting loss of money discourages farmers.

Police can help by establishing a squad to deal with predial larceny. Police & the judiciary can help by treating predial larceny sternly.

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7. The correct sequence of steps to be followed in growing a crop is

(A) selection of planting material, land preparation, planting, aftercare and harvesting
(B) land preparation, selection of planting material, planting, aftercare and harvesting
(C) selection of planting material, land preparation, planting, harvesting and aftercare
(D) selection of planting material, planting, land preparation, aftercare and harvesting

A

To grow a crop, planting material must be selected (seeds, seedlings, vegetative parts such as cuttings etc). The choice depends on the crop.

Land must be prepared according to the needs of the crop being grown. The general steps in land preparation are site selection, land clearing, tillage, drain formation, leveling and bed formation.

The material is then planted.

Aftercare is the care of the crop as it grows: irrigation, fertilizing, pest and disease management etc. This is necessary for optimal crop growth and therefore maximum yields.

Once the stage of maturity at which the crop id harvested is reached, the crop is harvested.

Item 8 refers to the following table which shows the demand, supply and price of tomato in a country.

Quantity Demanded (kg)	Quantity Supplied (kg)	Price ($)
400	1 000	1.00
500	800	1.50
700	700	2.00
1 000	400	2.50

8. Based on the information in the table, the equilibrium price of tomato is

(A) $1.00
(B) $1.50
(C) $2.00
(D) $2.50

C

The price of a commodity in a perfect market is determined by interaction of the two market forces that affect sales of the commodity. These forces are demand for the commodity and supply of the commodity
The price of the commodity is determined by the demand for it in relation to the conditions of its supply at a particular time.

At some point, two forces of demand and supply are brought into balance or equilibrium, i.e. the demand and supply become balanced. The equilibrium price is the price at which demand and supply are balanced. In terms of supply and demand curves, it is the price at the point where the 2 curves intersect.

You do not need to look at the curves to determine the equilibrium price and quantity. You can just look at the demand and supply tables. The equilibrium price is the price at which the quantity demanded and supplied are equal. In this case, the equilibrium price is $2.00.

9. Which of the following is NOT a source of farm credit for a farmer?

(A) Credit union
(B) Commercial bank
(C) Trade organization
(D) Savings and thrift society

C

Credit unions, commercial banks and savings and thrift societies are sources of credit to farmers; farmers can obtain loans to purchase agricultural inputs, e.g., seeds, feed, fertilizer, fuel etc., from from these institutions. Take organizations manage and regulate international trade. They are not sources of credit.

10. Which of the following is NOT a fixed cost?

(A) Fuel
(B) Tax
(C) Machinery
(D) Depreciation

Answer: A

Fixed costs (FC) are costs that do not increase or decrease with the level of production. Examples include land rental, machinery, buildings, insurance premiums (the amount of money paid for an insurance policy), taxes, loan installments and depreciation (a reduction in the value of an asset over time, due in particular to wear and tear). No matter how much or little production occurs, these costs do not change, e.g. suppose a farmer buys a tractor and is paying $5,000 per month. That monthly payment is his loan installment. Regardless of how much or little production happens, the farmer still has to pay that money every month; it does not change.

Variable costs (VC) are costs that increase or decrease with the level of production. Examples include the cost of fuel, feed, fertilisers, medications and pesticides. For example, to increase production on a chicken farm, the farmer will increase the number of chicks he purchases, as well as the amount of feed, medicines etc. he purchases. Thus the amount of money spent on these inputs increases with the increased production, i.e. the cost of these inputs increases with increased production. If production decreases, so to does the money spent on these inputs, so the cost of these inputs decreases with decreasing production. Variable costs also include the value of the produce consumed by the farmer and his family. Additionally, while buildings are a fixed cost, repairs to buildings, as well as other repairs, are variable costs.

11. Which of the following is a MAJOR problem associated with Caribbean farming as it relates to land?

(A) Land is usually cheap and readily available.
(B) It is usually difficult to obtain land for rental.
(C) Farmers who own land are usually better farmers.
(D) Farmers are usually hesitant to develop rented land.

B

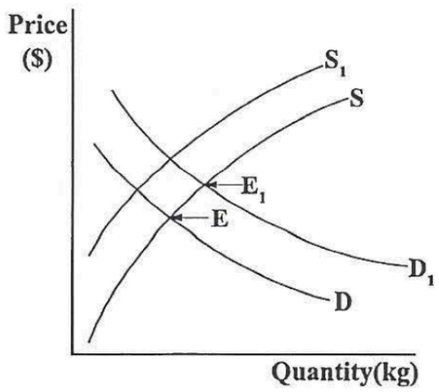
Cheap available land is not usually available to Caribbean farmers, and even if it were, it would be a BENEFIT, not a PROBLEM.

The assertion that farmers who own land are usually better farmers is nonsense.

Farmers are willing to improve their production by developing the land they use if they can, even if the land is rented, and the landlords will usually allow it as they can get higher rent since the farmer makes more money.

The major difficulty farmers face in this list is the prospect of getting land for rental.

Item 12 refers to the following graph of a demand and supply curve.



12. During Lent, people demand more fish than any other meat. This is represented by a shift from

(A) D_1 to D
(B) D to D_1
(C) S_1 to S
(D) E_1 to E

B

Factors that change demand for the commodity other than price cause the commodity's demand curve to shift left or right. If a factor causes increased demand, the curve shifts right. If a factor causes decreased demand, the curve shifts left. This causes the demand curve to shift left.

During lent, the demand for fish increases. The demand curve D_1 therefore shifts left to D.

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13. Which of the following factors does a lender consider when processing a loan application for a farmer?

I. Character of the farmer
II. Management ability
III. Repayment capacity

(A) I and II only
(B) I and III only
(C) II and III only
(D) I, II and III

D

The lender considers all 3. The character of the farmer gives the lender confidence that the farmer has the honesty and integrity to repay the loan. Management amorality gives the lender confidence that the farmer has the ability to manage the farm business to make the money to pay his loan installments on time. Repayment capacity gives the lender confidence that the farmer has the ability to repay the loan at all.

14. In economic terms, a shortage exists when

(A) demand is equal to supply
(B) demand is less than supply
(C) demand is greater than supply
(D) supply is greater than demand

C

When demand exceeds supply, there is not enough of the commodity for all of the buyers to get as much as they want. Therefore some do not get enough or get any at all. This is a shortage.

When supply exceeds demand, there is more of the commodity than all of the buyers want. All of the buyers get enough but there is some left over. This is called a glut or surplus.

15. Which of the following records is designed to give information on the yield of yams?

(A) Production
(B) Inventory
(C) Financial
(D) Labour

15. Which of the following records is designed to give information on the yield of yams?

(A) Production
(B) Inventory
(C) Financial
(D) Labour

C

Production records are useful to identify production problems so that farm performance can be improved. The most common production records used are crop cultivation records, livestock production, labour and machinery records.

Types of production records are:

- Crop cultivation records include all the various fields or orchard numbers, production size, yield potential and soil analyses of the land used for that specific crop or fruit. Other items included in the crop cultivation records are fertilization, seeding, cultivation methods, weed and pest control, time of application and crop yields.
- Livestock production records have related to livestock farming should be included here. Examples are feed, medicine dosing, marketing costs and individual animal records such as milk production, calving records, wool production, weaning mass and weight gains. The opening and closing numbers of livestock should be grouped according to their age and gender, for example, bulls, cows and one to two-year-old heifers.
- Labour records have information such as such as service contracts of staff, wages received, rations, medical costs and worker's compensation are recorded in the labour records. Other items that should be included are the number of laborers, loans, debts, leave and absences.
- Machinery records include in the machinery records and should include details such as model type, age, book value, repairs, service records, hours worked and insurance.

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16. Some farming programmes are often INEFFECTIVE because the subsidy granted is

I. not made available at the right time
II. not enough to cover the intended purpose
III. to be repaid immediately

(A) I only
(B) I and II only
(C) II and III only
(D) I, II and III

B

Farming are not planned to be immediately repaid. However they may not be enough to cover the intended purpose and they may not be available at the right time.

17. A farmer intends to expand his poultry farm. Which of the following budgets will he prepare?

(A) Partial
(B) Complete
(C) Whole farm
(D) Gross margin

Answer: A

A partial budget is prepared when there is a change in a specific aspect of the existing farm plan that requires modification of the budget.

For example, a farmer may want to know whether replacing one crop with another crop, or buying a pick-up truck instead of hiring one, or adding more cattle to his herd, would be more profitable. In such situations, most of the income (receipts) and expenses (costs) in the existing budget will remain the same and only a few of them will change. A partial budget identifies the income and expenses that will change and sets out how additional costs and income will affect the change in profit. The farmer can therefore determine if the proposed change is economically sensible or not.

A partial budget provides an estimate of expected change in income and expenditure resulting from the proposed farm plan change. Therefore it is prepared before the proposed change is implemented.

Items **18–19** refer to the following economic terms.

(A) Net profit
(B) Gross margin
(C) Gross farm income
(D) Fixed expenses

Match each item below with one of the options above. An option may be used once, more than once or not at all.

18. Total income

19. Total income minus total expenses

18: C

Gross income, also called total income, is all of the money that a business receives from sales of goods and services, and from non-sale transactions such as subsidies, tax rebates etc. These are not sales, but they are sources of income because they bring money into the business.

19: A

Net income is income after money for all expenses (variable and fixed) is deducted. Expenses are the costs of production, i.e. costs of inputs, both variable and fixed. In accounting, expenses are called expenditure. The calculated difference between gross income and total expenditure is called net income, also known as net profit. Net income = Gross income – Total expenditure

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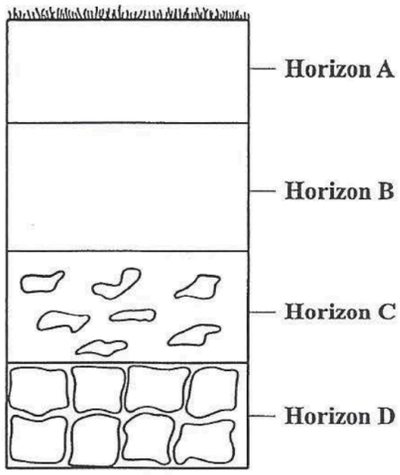
20. If a farmer needs to determine the appropriate treatment for pests which affect his crops, he should consult (A) an agronomist (B) an entomologist (C) an agricultural engineer (D) a postharvest technologist	A The BEST answer for this question would be a plant pathologist. This agricultural professional studies plant health and identifies diseases, pests and other health problems a plant may experience. However, this is not one of the answers listed here. The best answer IN THIS LIST is an agronomist. This agricultural professional specializes in crop production, soil control, and soil management, tries find ways to maximize crop production from a given acreage of soil and performs experiments to determine and then maximize plant nutrients and soil health.
21. A soil sample was collected from a school farm and found to be very high in H^+ ions. This indicates that this soil MOST likely (A) has a high calcium content (B) is alkaline (C) is neutral (D) is acidic	D Soil pH is determined by the amount of hydrogen ions (H+ ions) or hydroxide ions (OH-) present. An acidic soil has more H+ ions than OH- ions. The more acidic the soil, the more more H+ ions it has than OH- ions. An alkaline soil has more OH- ions than H+ ions. The more alkaline the soil, the more OH- ions it has than H+ ions.
22. A bag of mixed fertilizer is labelled 7:14:21. What is the ratio of nitrogen to phosphorus in this fertilizer? (A) 1:2 (B) 3:1 (C) 2:3 (D) 3:2	A The ratio of nutrients in a mixed fertilizer is nitrogen (N): phosphorus (P): potassium (K), i.e. N:P:K. This fertilizer has a ratio of 7:14:21. This means it has 7% N, 14% P and 21% K. Mathematically this means an NPK ratio of 1:2:3 since 14 is twice as much as 7 and 21 is 3 times as much as 7. Therefore there is twice as much P as N and 3 times as much K as N. So the ratio of N to P in this fertilizer is 1:2.
23. Which of the following can be done to speed up the breaking down of organic matter in a compost heap? (A) Allow a long time to pass before applying another layer. (B) Add water to the compost when it is dry. (C) Light a fire on top of the compost to create more heat. (D) Gather dead plants and animals faster.	B Keeping the heap moist promotes the growth of microbes that break down the organic matter.

Item 24 refers to the following diagram of a soil profile.



24. Which horizon determines the chemical composition of the soil?

(A) Horizon A
(B) Horizon B
(C) Horizon C
(D) Horizon D

D

The soil horizons are as follows.

- Horizon A: (topsoil): the most important horizon in terms of crop growth because it contains most of the soil nutrients
- Horizon B (subsoil): when loosely packed, permits easy penetration of roots, damage and aeration
- Horizon C (weathered rock): his is partially weathered parent rock
- Horizon D (parent rock or bedrock): the rock whose weathering formed the soil; it influences soil type and mineral content.

25. Which of the following does NOT cause soil erosion?

(A) Overgrazing
(B) Land clearing
(C) Excessive rainfall
(D) Erection of windbrake

D

Soil erosion is the process by which particles of topsoil are carried away from one area, by water, wind, or other factors such as human activity, and deposited at another area.

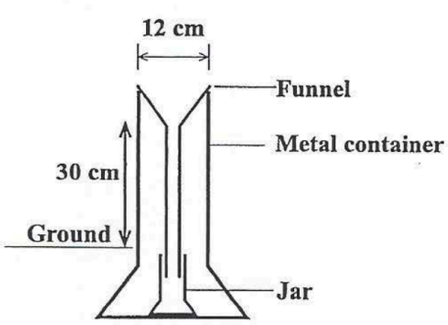
Overgrazing can cause oil erosion by the consumption of all the plants that cover the soil. This leaves the soil exposed to wind and rain, which move the topsoil away.

Land clearing has the same effect as it clears away all of all the plants that cover the soil.

Excessive rainfall can cause soil erosion by the sheer volume of water falling on the soil. This is particularly the case on hillsides.

A windbreak provides shelter from wind, Thus putting up a windbreak does not cause soil erosion. On the contrary; it REDUCES soil erosion.

Item 26 refers to the following diagram of a piece of equipment.



26. The equipment is used to measure

(A) rainfall
(B) air pressure
(C) wind speed
(D) relative humidity

A

This is a diagram of a rain gauge. A rain gauge is used to measure rainfall.

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27. Which of the following will NOT take place if the air temperature rises above 37°C?

(A) Increased evaporation
(B) Increased rate of transpiration in plants
(C) Increased drying out of the surface soil
(D) Increased risk of fungal diseases in plants

D

Temperatures above 37 ˚C will cause increased evaporation of water and increased transpiration in plants. Transpiration is the loss of water from plants through the stomata of their leaves. The rate of transpiration increases with increasing temperature. The increased evaporation dries out the soil faster.

Fungi thrive in moist environments. Since temperatures above 37 ˚C promote dry conditions, fungal activity is reduced at these temperatures. Thus the incidence of disease caused by fungi decreases.

29. The type of germination where the cotyledons appear above the ground is known as

(A) hypogeal
(B) multiple
(C) osmotic
(D) epigeal

D

In epigeal germination, the cotyledons rise above the ground as the seedling emerges from the soil. In hypogeal germination, the cotyledons stay below ground.

30. Which of the following conditions will increase transpiration rate?

(A) Cool, moist and windy
(B) Cool, dry and windy
(C) Hot, wet and windy
(D) Hot, dry and windy

D

Transpiration is the loss of water from a plant via its exit as water vapor through the stomata of the plant's leaves. Higher temperatures increase a plant's transpiration rate Lower temperatures decrease it. High humidity (a large amount of moisture in the air) reduces the transpiration rate. Windy conditions increase transpiration.

31. Which of the following strategies may be used by a plant breeder to improve crop quality?

(A) Selection and hybridization
(B) Mutation and cover cropping
(C) Tissue culture and bench terracing
(D) Hybridization and contour cropping

A

In plant breeding, selection is process of selectively propagating plants with desirable characteristics and eliminating or "culling" those with less desirable characteristics. Plant hybridization is the process of crossbreeding between genetically dissimilar parents to produce a hybrid.

Selection chooses only plants with desirable characteristics and hybridization crosses to of these plants that are not genetically related together. The offspring plants are called hybrids.

Hybridization combines the desirable characteristics of different plants, producing hybrids that have all these characteristics in the same plants. This improves the quality of the plants and thus crop quality.

32. Seeds are formed from

(A) the rupturing of fruit walls
(B) fertilized ovules
(C) fertilized ovary
(D) mature ovules

B

Pollination (the transfer of pollen from anther to stigma) puts a pollen grain, which contains a male gamete, onto the stigma of the flower. The pollen grain produces a pollen tube which grows down the style into an ovule in the ovary. The ovule contains a female gamete. The male gamete is transferred down the pollen tube into the ovule, where its nucleus fuses with the nucleus of the female gamete in the ovule. This is fertilization of the ovule. The fertilized ovule develops into a seed, while the ovary develops into a fruit.

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33. When a cross is made between parents having a single difference in traits, this is referred to as (A) linkage (B) dihybrid (C) monohybrid (D) homozygous	C Monohybrid inheritance is the inheritance of a single trait e.g. flower color, fruit color, height, eye color, hair color etc. In a monohybrid cross, parents having a difference in one trait, e.g. purple flowers vs. red flowers or white fur vs. black fur, are crossed together.
34. Farmer Derek has a farm on 20 hectares of land. He cultivates vegetables and irrigates his crops with water from a pond in which he rears tilapia and ducks. Which of the following BEST describes this practice? (A) Mixed farming (B) Mixed cropping (C) Plantation system (D) Monoculture system	A Mixed farming is the cultivation of crops alongside the rearing of livestock. Multiple cropping, also called mixed cropping, is the cultivation of two or more crops simultaneously (at the same time) on the same plot of land. The plantation system is mass production of a few commodity crops done on large farms called plantations. Monoculture is the continuous cultivation and production of only one crop on a plot of land for many years.
35. Which of the following pest control methods are combined in the integrated pest management (IPM) approach? (A) Cultural, biological, medicinal, chemical (B) Cultural, biological, mechanical, chemical (C) Conventional, biological, medicinal, chemical (D) Conventional, biological, mechanical, chemical	B Integrated pest control, or integrated pest management (IPM), is the control of pests by using a combination of chemical, cultural, mechanical, biological and/or manual pest control methods to keep pest populations at low levels rather than totally eliminating them. Chemical pest control is the use of *pesticides* to kill pests. Cultural pest control is the practice of modifying the growing environment to reduce the prevalence of pests by making it less favorable for them. Mechanical pests control, is the management and control of pests using physical means such as fences, barriers or electronic wires. Biological pest control us the use of natural predators or parasites of pests against them. Manual pest control is the use of of hands-on techniques as well as simple equipment and devices to catch and remove pests.
36. The use of living organisms to control weeds is a practice known as (A) cultural control (B) chemical control (C) biological control (D) mechanical control	C Biological pest control us the use of natural predators or parasites of pests against them.

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37. In the agricultural sector, quarantine usually results in

(A) an increase in the quantity of produce due to useful pests
(B) a reduction in the quality of produce due to pests and diseases
(C) the production and spread of disease-causing organisms from one place to another
(D) the prevention and control of the spread of disease-causing organisms from one place to another

D

Agricultural quarantine is isolation of plants and animals. Agricultural quarantine is done to:
- prevent the introduction of pests and diseases into a country where the pest or disease is absent.
- prevent or control the spread of pests and diseases in a country or area should they enter.

38. Which of the following is encouraged by the use of proper postharvest handling of cut flowers?

(A) Delay of senescence
(B) Physiological disorder
(C) Maintenance of quality
(D) Prevention of weight loss

C

Postharvest is the stage of crop production immediately following harvest, including cooling, cleaning, sorting and packing.

Post-harvest technology is the processes developed to handle, store and market crop produce after it has been harvested.

An understanding of the way in which crops ripen, the changes that take place after harvest and the correct way to store produce will all increase farm profits.

39. Spoilage of stored fruits is NOT caused by

(A) mechanical damage
(B) proper ventilation
(C) high temperature
(D) high humidity

B

In postharvest management of fruits, mechanical damage is due to the action of machinery, mishandling, and/or improper packaging, and may result in cuts, punctures, bruises, and/or abrasions. This hastens (speeds up) spoilage.

In postharvest management of fruits, high temperature drives water loss, changes in metabolic activity, loss of flavor, texture and nutrients and therefore spoilage.

In postharvest management of fruits, high humidity encourages growth of bacteria and fungi, which hastens spoilage.

In postharvest management of fruits, poor ventilation of produce causes to the accumulation of carbon dioxide around the produce. When the concentration of this gas rises to between I and 5 percent in the atmosphere, it quickly causes spoilage by causing bad flavors, internal breakdown, failure of fruit to ripen and other abnormal physiological conditions.

Thus, the proper ventilation of produce is essential, as it reduces these effects. Therefore proper ventilation does not cause spoilage; it helps to retard it (slow it down).

40. A by-product of the fermentation of sucrose is

(A) fructose
(B) alcohol
(C) lactose
(D) water

B

Fermentation is the chemical breakdown of a substance by bacteria, yeasts of other microbes. In winemaking and brewing of beer, yeast ferments sucrose to produce ethanol, which is the alcohol in alcoholic beverages, and water.

41. Which of the following sections of the digestive tract of the rabbit is responsible for pellet formation?

(A) Duodenum
(B) Stomach
(C) Caecum
(D) Colon

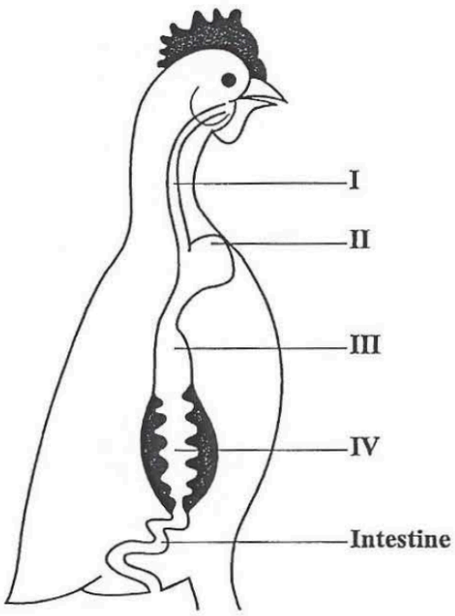
C

Rabbits and horses are pseudo-ruminants. A pseudo-ruminant is an animal that is able to live entirely on cellulose (from vegetation), but it does not have a rumen. Instead of a rumen, pseudo-ruminants have a digestive organ called a cecum that performs the same function as a rumen. It is part of a pseudo-ruminant's large intestine.

Pseudo-ruminants are hind-gut digesters. This means that most of their digestion takes place in the large intestine, specifically in the cecum. The cecum in pseudo-ruminants is large and well-developed. It contains bacteria that digest the cellulose in the food into glucose, converts some of the glucose into amino acids, and produces certain B-vitamins, similar to the rumen in a ruminant.

The cecum produces soft black pellets. The soft black pellets are eaten and pass down to the stomach, where they are fully digested. Soft black pellets are usually produced and eaten at night; they are called night feces. The fully digested soft black pellets pass into the ileum of the small intestine, where the simple nutrients are absorbed into the bloodstream for assimilation (use by the rabbit's body).

Item 42 refers to the following diagram showing part of the digestive tract of poultry.



42. Which of the parts labelled I, II, III, IV is the proventriculus?

(A) I
(B) II
(C) III
(D) IV

C

The proventriculus is a tube-like area that is the first part of a bird's stomach. It produces digestive juices such as pepsin and hydrochloric acid. Pepsin starts digesting proteins in the food. The food is throughly soaked in these digestive juices, after which it passes from the proventriculus to the gizzard.

43. In a non-ruminant animal, gastric juice is produced in the

(A) liver
(B) ileum
(C) stomach
(D) duodenum

C

In a monogastric (non-ruminant) animal, the stomach produces gastric juice.

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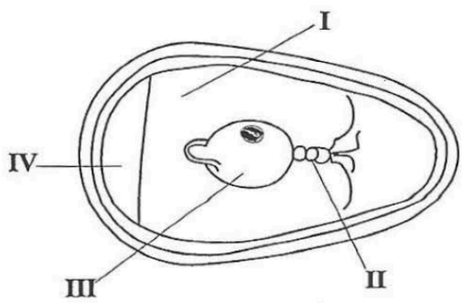
44. The MAIN mineral found in a bird's egg shell is

(A) iron
(B) calcium
(C) potassium
(D) phosphorus

B

The shell of a bird's egg is a hard but brittle protective coating of calcium carbonate crystals.

Item 45 refers to the following diagram of an egg.



45. Which two parts of the egg are rich in protein?

(A) I and III only
(B) I and IV only
(C) II and III only
(D) II and IV only

B

Structure I is albumen. This is commonly called the egg white. It is composed of proteins, minerals, some carbohydrates and water. It provides a developing embryo with some food and a source of water.

Structure III is the yolk. This is rich in fats called phospholipids, as well as protein. It is the main source of food for the developing embryo if the egg is a hatching egg (a fertilized egg). Its yellow color is created by pigments.

46. Rations designed primarily for energy would MOST likely contain

(A) urea, broken rice, fish meal
(B) coconut meal, urea, citrus meal
(C) molasses, rice bran, wheat middling
(D) coconut meal, fish meal, wheat middling

C

This ration is a concentrate. Concentrates are feedstuffs that are produced commercially in manufacturing facilities called feed mills using local and imported ingredients. A feedstuff is any food provided for animals.

Coconut meal and fish meal are concentrate ingredients that provide protein. Urea is a non-protein nitrogen compound. The nitrogen portion of urea its used by the microbes in a ruminant's rumen to produce amino acids, which are assembled into proteins.

Molasses, rice bran, citrus meal wheat middling are concentrate ingredients that provide carbohydrates, which are used by the animal's body for energy.

47. Which of the following stages of growth in broiler birds would require the highest percentage of protein?

(A) 1–3 weeks
(B) 3–4 weeks
(C) 4–5 weeks
(D) 5–6 weeks

A

Chicks grow fastest from 1 to 3 weeks old. Their protein requirement is therefore highest at this time to provide protein for their rapid tissue growth.

48. Food supplied in excess of the maintenance need of animals is referred to as

(A) development ration
(B) reproduction ration
(C) maintenance ration
(D) production ration

D

A production ration is an animal ration that supplies nutrients in excess of maintenance; this excess is used for production.

A balanced ration is an ration that contains all the necessary nutrients for growth and production in the right proportion for the animal.

A maintenance ration is the amount of food needed to prevent any increase or decrease in the live weight of the animal; this is just enough to supply energy for all metabolic activities.

49. Concrete floors in pig pens are gently sloping to

(A) prevent feed spillage
(B) facilitate easy cleaning
(C) prevent animals from slipping
(D) encourage animals to move around

B

The slope facilitates runoff of water, which helps in cleaning the pen.

50. Which of the following would give a farmer precise information on the effectiveness of feed given to broilers?

(A) Stage of maturity of birds
(B) Commercial ration label
(C) The health of the birds
(D) Feed conversion ratio

D

Feed conversion ratio (FCR) is the quantity of feed required by an animal to gain a unit of weight.
The unit may be kg, lbs or whatever unit the weight is measured in. The effectiveness of a broiler feed is directly shown by the average amount of it the broilers require to gain a unit of weight.

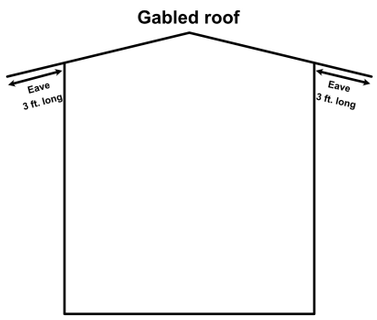
51. Which of the following types of roofs is MOST suitable for poultry pens?

(A) Lean-to roof
(B) Gable roof
(C) Flat roof
(D) Hip roof

B

A gabled roof design allows for the excess heat in the pen to rise up and out. It also promotes ventilation and reducing hyperthermia (heat stress).

The design is shown below.



52. During the actual process of artificial insemination, which of the following is NOT used?

(A) Bull
(B) Gloves
(C) Sperms
(D) Syringe

A

Artificial insemination (AI) is the introduction of semen into the uterus of a female by artificial means, i.e. by means other than copulation. In the case of cattle, a syringe is used to inject preserved semen from a bull into the cow's vagina. Gloves are used in the collection, storage and injection process. The bull itself is not needed in the actual process.

53. Artificial insemination (A.I.) has become increasingly popular in the Caribbean in recent years because

(A) regional goverments have been expanding the service
(B) it ensures that conception does take place
(C) more trained technicians are willing to assist
(D) it is a less costly way of upgrading local animals

Answer: D

Artificial insemination (AI) is the introduction of semen into the uterus of a female by artificial means, i.e. by means other than copulation. Mating in livestock farming refers to bringing together mature male and female animals of the same species for the purpose of breeding. Female animals that come into heat may be bred or serviced naturally by the male (boar, bull, ram or buck). As an alternative, semen from the male can be obtained and introduced into the reproductive tract of the female in heat via artificial insemination. Artificial insemination is carried out in cattle, sheep, goats and pigs.
AI is a skilled process that requires training. Attempts by untrained people can cause injury to the animal and failure of the insemination to lead to pregnancy. Upgrading local animals is crossbreeding them with breeds from other countries; it is much less expensive to ship stocks of semen from these animals than to ship the live animals.

Item 54 refers to the following diagram which represents a cross made between two heterozygous animals for coat colour.

Tt	×	Tt
(male)		(female)

T represents black coat colour
t represents red coat colour

54. What is the ratio of black to red offspring from the above cross?

(A) 2:2
(B) 3:1
(C) 4:0
(D) 4:1

A

T and t are alleles. Alleles are different form of agent that code for contrasting traits. In this case, the gene codes for coat color. Allele T codes for black and allele t codes for red.

The genotype of a trait is all of the genes that code for that trait, carried on a pair of chromosomes. Genotypes are represented by the two alleles in the genotype written together. In this case, there are 3 possible genotypes: TT, tt and Tt. TT and tt are both homozygous genotypes. A homozygous genotype is a genotype that has two identical alleles. Tt is a heterozygous genotype. A heterozygous genotype is a genotype that has two contrasting alleles.

Allele T is dominant and allele t is recessive. This is shown by T's representation with a capital letter and t's representation with a common letter. A dominant allele is an allele whose coded-for trait is displayed visibly even though the other allele is present in the phenotype. A recessive allele is an allele whose coded-for trait is displayed visibly only if the dominant allele is absent

Genotype determines phenotype. A genotype is the visible expression of the traits coded for by a genotype. Both the alleles in genotype TT are dominant. This genotype is therefore homozygous dominant. Since T codes for a black coat, the phenotype (visible coat color) that this genotype codes for is black fur. Both the alleles in genotype tt are recessive. This genotype is therefore homozygous recessive. Since t codes for a red coat, the phenotype (visible coat color) that this genotype codes for is a red coat. Genotype Tt has both the dominant and recessive allele. This genotype is therefore heterozygous dominant. Since T codes for a black coat and is dominant over t, the phenotype (visible coat color) that this genotype codes for is a black coat.

In this monohybrid cross between two heterozygous genotypes Tt and Tt, the offspring have the following genotypic ratio (ratio of genotypes):
• 25% (1 out of 4 offspring) TT
• 50% (2 out of 4 offspring) Tt
• 25% (1 out of 4 offspring) tt.

TT codes for black fur, Tt also codes for a black coat and tt codes for a red coat. The phenotypic ratio (ratio of phenotypes) is therefore:
• 75% (3 out of 4 offspring) black coat
• 25% (1 out of 4 offspring) red coat

This is a ratio of 3 black to 1 red, i.e. 3:1.

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55. Debeaking is done in layers mainly to

I. reduce the occurrences of cannibalism
II. improve the dressing percentage
III. improve carcass quality

(A) I only
(B) I and II only
(C) I and III only
(D) I, II and III

C

Debeaking is the removal of about 2 mm of the chicken's upper beak using a hot iron. Debeaking reduces cannibalism (the practice of the birds attacking and picking at each other to eat each other's flesh). This improves carcass quality by eliminating visible wounds. It does not affect dressing percentage.

56. Which of the following is a sign of heat in rabbits?

(A) Loss of appetite
(B) Swelling of the vulva
(C) Excessive noise making
(D) Restlessness and nervousness

D

Signs of heat in a doe (female rabbit) are:
• restlessness and nervousness.
• trying to join other rabbits in other hutches.
• scratching the floor.
• reddening of the vulva (the vaginal opening).

57. Droopiness, blood in faeces and swollen vent in poultry are common symptoms of

(A) snuffles
(B) fowl pox
(C) coccidiosis
(D) Newcastle disease

C

Coccidiosis is a disease that afflicts poultry. It is caused by type of micro-organism called a protozoan. Symptoms and signs are droopiness and loss of appetite, diarrhea with blood in feces; and the bird's vent (cloaca) becomes swollen and bloody.

A bird's cloaca is the common chamber that is the end of its digestive, urinary and reproductive systems. The vent is the cloaca's orifice (opening leading outside of the body).

The disease's mortality rate(percentage of deaths caused) is moderate. Nonetheless, it is still an economically important desires in poultry farming. With regard to animal production, an economically important disease is a disease that can cause large-scale economic losses to animal farmers if an outbreak occurs. This is because the disease spreads rapidly and causes high animal morbidity (percentage of sick animals) or high animal mortality (percentage of dead animals). The disease therefore costs the farmer a lot of money because many of his animals have low production due to being sick or die and therefore do mot produce at all.

Treatment of coccidiosis involves the following:
• Sulfa drugs and magnesium sulphate in the drinking water.
• swollen and bloody.
• Birds should be removed from wet, infected
• litter.
• Stocking density (number of birds per unit area of floor space) should be reduced.
• Coccidiostats can be added to feed
• concentrates.

Birds that recover have good immunity to reinfection by the pathogen (causative agent) of the disease.

58. Which of the following substances is used by honey bees to cement the comb to the frame during honey production?

(A) Pollen
(B) Propolis
(C) Bee bread
(D) Royal jelly

B

Propolis, a sticky substance worker bees make from certain tree buds, which is used to in hive building and maintenance e.g. to seal cracks in the hive. It is also used to cap cells in honeycombs and cement combs to frames man-made hives.

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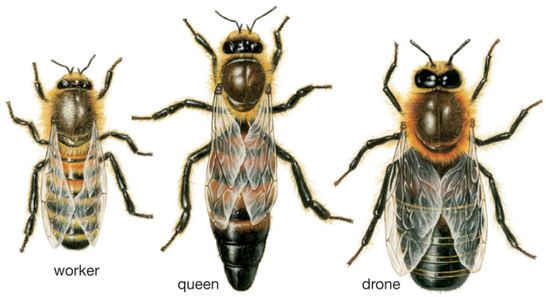
59. Which of the following types of bees has a big, broad body, with large compound eyes and no stings?

(A) Worker
(B) Drone
(C) Queen
(D) Soldier

B

Drones are fertile male bees. They are the second largest bees in a hive, after queens. They have no stinger. They have the largest eyes of all 3 castes of bees. They live 2 months and grow from larvae to adult in 24 days. They develop from larvae that are hatch from unfertilized eggs laid by workers.

Below is an image of a drone with images of the other 2 castes of bees: the worker and the queen.



60. Which of the following types of feed is given ONLY to layer birds?

(A) Starter
(B) Grower
(C) Finisher
(D) Developer

D

Layer chicks are fed chick starter for the first 7 weeks. They are then fed pullet developer until 15 weeks old. A pullet is a hen that is not more than a year old.

From 15 weeks old, they are fed layer ration until they are culled (removed from the batch) due to natural reduction of egg production as they age beyond their most productive period (2 years old).

Broilers should never be fed layer ration. Layer ration is high in calcium. Layers need calcium for eggshell production. The high calcium content in layer ration damages a broiler's kidneys.