



OBJECTIVES

At the end of this chapter, students should be able to:

- â—† classify feeds.
- â—† mention sources and functions of food nutrients.
- â—† state the different types of ration/diet and their uses.
- â—† state causes and symptoms of malnutrition and their corrections in farm animals.

17.1 Introduction

Animal nutrition is an important aspect of animal production because farm animals require some nutrients for proper body function. The main objective of livestock production should be the efficient conversion of feed consumed into animal products. Animal nutrition study deals with the nutrients needed by animals, the functions of these nutrients, the quantity required to have a balanced diet, how the overhead cost of feeding the animals can be minimised, and how the animals utilise the nutrients taken to achieve the intended outcome.

Livestock feeds are required by farm animals for the following purposes: proper growth and development repair of worn out tissues supply of energy the general well-being of the animal production of milk, meat, eggs and so on. Farmers or animal producers therefore need the basic knowledge of all the nutrients present in the feeds as required by the animals.

17.2 Meaning of Animal Nutrition

Nutrition is the science of feeding farm animals with appropriate diet for normal growth, development and production. It deals with the science of the nature of feed and proportionate distribution of feed nutrients. The study of animal nutrition therefore enables the farmer to determine the correct amounts and combinations of animal feedstuff required to attain his production objectives.

17.3 Classification of Feeds

Feeds are classified according to the amount of nutrient (chemical composition) contained, bulkiness and use. The chemical composition gives the potential value of the feed but not the actual nutritive value. Feeds are classified into

- (a) Basal or energy concentrates
- (b) Protein concentrates
- (c) Vitamins and mineral supplements

- (d) Roughages
- (e) Feed additives

17.3.1 Basal or energy concentrates

This is the feed that has crude fibre content of less than 18%. It is high in energy or starch.

Characteristically, a basal energy concentrate: has low starch

â is highly digestible

â has low minerals

â is low in fibre

It makes up the larger percentage of the feed. Basal or energy concentrates can be sourced from cereal grains, roots and tubers and forage pasture.

17.3.2 Protein concentrates

Protein concentrates also have less than 18% crude fibre content.

â It is high in digestible protein.

â It has low carbohydrates and fats.

â It is low in minerals.

â It is highly digestible.

Protein concentrates can be sourced from plants and animals such as soya bean meal, groundnut cake, palm kernel cake, cotton seed meal, fish meal, meat meal and blood meal.

17.3.3 Mineral and vitamin supplements

These are required in small quantity in feed. They supplement basal and protein concentrates. They have low energy, low protein and low fibre. They are necessary for growth and development. They aid food digestion and provide resistance to diseases.

17.3.4 Roughages

These are feeds containing more than 18% crude fibre content. They have poor or low digestibility, low protein and digestible carbohydrates but high in fibre. Roughages exist in the form of pasture and forage crops, hay, straw, soilage and silage.

(a) Pasture and forage crops are green and succulent grasses and legumes consumed by grazing animals such as cattle, sheep and goats.

(b) Hay is the cut and dried grass prepared and used for feeding animals during the dry season when green grasses are not easily available.

(c) Straw is the aerial part of grass or harvested crops cut and stored for future use.

(d) Soilage is the cut fresh or succulent grasses and legumes from the field given to the animals in their pens.

(e) Silage is the preservation of green and succulent forage crops under anaerobic conditions.

17.3.5 Feed additives

Feed additives are the non-nutritive materials added to the feed to improve the performance of animals. Absence from the feed does not constitute nutrient deficiency situation for the animal. Examples are coccidiostat and synthetic enzymes.

17.4 Sources and Functions of Food Nutrients

A nutrient is any element or compound present in the feed and required by the animal in certain

proportion for proper body functioning. There are six classes of nutrients as follows:

- (a) Water
- (b) Carbohydrates
- (c) Fats and Oil
- (d) Protein
- (e) Minerals
- (f) Vitamins

17.4.1 Water

Water is the nutrient required in the largest amount in the body. It is also the most essential compound in the body, because it bathes body cells and prevents dehydration.

17.4.1.1 Functions of Water

1. Water forms the major component of animal tissues and the animal body and makes up to 40-80% of the weight of an animal depending on the age of the animal. Younger animals usually contain more water in their bodies and muscles than older animals.
2. Water dissolves and transports food substances to different parts of the body.
3. Water helps in excretion of waste from the body.
4. Water helps to break complex food substances into simpler food substances, this is called hydrolysis, for example, protein + enzyme + water = amino acids + enzyme.
5. Water is involved in the regulation of body temperature such as excretion of water through the skin during sweating.
6. Water forms a major part of blood plasma and also present in the synovial fluid which lubricates the joints as well as the aqueous humour of the eyes which aids in sight.
7. Water is used in acid/base balance.
8. It helps in the turgidity of muscles and cells of the body.
9. It acts as cushion for the nervous system and helps to maintain homeostasis.
10. Assists in enzyme and hormone formation and distribution.
11. It forms a major component of milk.

17.4.1.2 Sources of water

1. Water drunk by the animal
2. Water present in the feed
3. Metabolic water

17.4.2 Carbohydrates

Carbohydrates contain carbon, hydrogen and oxygen with hydrogen and oxygen being in the same proportions as in water. They have general formula $(CH_2O)_n$, in which n is 3 or larger. Different types of carbohydrates are found in animal feed. These include:

(a) Simple sugar or monosaccharides: Examples are glucose, fructose and galactose.

(b) Disaccharides: These consist of two simple sugars condensed together, for example:

- Sucrose (glucose + fructose)
- Lactose (glucose + galactose)
- Maltose (glucose + glucose)
- Polysaccharides – These are complex carbohydrates such as starch, cellulose and

amylopectin made up of long chains of disaccharides and monosaccharides.

17.4.2.1 Functions of carbohydrates

1. They yield energy when oxidised in the body $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{energy}$.
2. When eaten in excess carbohydrates can be converted to fats and stored in the body and can be used as source of energy when the body needs energy.
3. They enable the animals to maintain their body temperature.

17.4.2.2 Sources of carbohydrates

- (a) Cereal grains such as maize, guinea corn, millet, barley, wheat and rice
- (b) Roots and tubers such as yam, cassava, potatoes, cassava peels, yam peels and plantain
- (c) By-products from processing or milling of grains such as rice bran, wheat bran and maize bran
- (d) Roughages such as forages, fodder, haulms and straw
- (e) Fruits such as bananas and oranges

17.4.3 Fats and oils (lipids)

The simplest distinction between fats and oils is based on their physical properties. Fat is solid at room temperature, while oil is liquid at room temperature. Like carbohydrates, they are made up of carbon, hydrogen and oxygen. On hydrolysis fats and oils yield fatty acids and glycerol.

17.4.3.1 Functions of fats and oils

1. They are sources of energy. They yield approximately $2\frac{1}{4}$ times as much energy as that of carbohydrate or protein.
2. Fatty acids such as linolenic acid and arachidonic acid are essential for growth and development of smooth skins and glossy hair.
3. They form essential components of cell membranes as phospholipids.
4. Fats and oils function as solvents for the fat-soluble vitamins such as vitamins A, D, E and K.
5. Fats help in insulation and conservation of body heat.
6. They protect internal organs.
7. Fats and oils act as body-building materials.

17.4.3.2 Sources of fats and oils

- (a) Fats and oils are obtained by extracting oil from oil seeds and fruits such as soya bean, groundnuts, cotton seeds, palm fruits, palm kernel, melon seeds and coconut.
- (b) Animal fats such as lard and tallow obtained from animal tissues are also used in animal feeds.

17.4.4 Proteins

Proteins are highly complex molecules that contain carbon, hydrogen, oxygen and sometimes nitrogen, sulphur and phosphorus. Protein on hydrolysis yields the smallest absorbable unit called amino acids. The amino acids contain at least one basic amino group ($-NH_2$) and a carboxylic acid group ($-COOH$) in their molecule. Examples of amino acids are tryptophan, histidine, methionine, arginine, theanine, leucine, isoleucine, valine, lysine and phenylalanine. The non-essential amino acids are synthesised by non-ruminants from other nitrogenous oil compounds and therefore need no dietary supplementation. The non-essential amino acids are aspartic acid, serine, proline, glutamic acid, alanine, glycine, tyrosine, cysteine, glutamine, asparagine and arginine. Ruminants have the ability of synthesizing both the essential and non-essential amino acids from both nitrogenous and non-nitrogenous sources.

17.4.4.1 Functions of proteins

1. They are essential for growth.
2. They are used to synthesise or manufacture new tissues and to replace worn out ones.
3. They are used to synthesise enzymes and hormones.
4. They are needed by pregnant animals to build up the foetus and foetal membranes.
5. Proteins are used to manufacture milk proteins in lactating or milk-producing animals.
6. Excess proteins (amino acids) are used as a source of energy just like carbohydrates and fats (the amino acids are first deaminated).
7. They help in the formation of gametes (reproductive cells) in reproduction.
8. They help in the production of antibodies.
9. They help in the formation of digestive juices.
10. They provide materials for building protective coverings such as hair, nails, horns, hoofs, wool and feathers.

17.4.4.2 Sources of proteins

- (a) Plant protein sources – groundnut cake, cotton seed meal, soya bean meal, palm kernel cake, sunflower seed meal and coconut meal.
- (b) Animal protein sources – fish meal, blood meal, meat meal, hatchery wastes (unhatched eggs), feather meal and poultry offal meal.

17.4.5 Minerals

Minerals constitute the inorganic matter of feeds. They exist in feeds as elements and compounds (salts). Minerals are divided into

- (a) Macro or major mineral elements – they are needed or required relatively in large amounts by the animals.
- (b) Micro or minor or trace mineral elements – they are required in a relatively small amount by the animals. Examples of mineral elements are given in Table 17.1

17.4.5.1 Sources of minerals

Minerals can be sourced from bone meal, bone ash, oyster shell, periwinkle shell, limestone, common salt, green forages, hay and silage; inorganic salts such as copper sulphate, zinc carbonate, dicalcium phosphate, zinc oxide and potassium sulphate.

TABLE 17.1

Macrominerals	Microminerals
Calcium	Copper
Phosphorus	Iron
Potassium	Manganese
Magnesium	Zinc
Sodium	Cobalt
Sulphur	Iodine
Chlorine	Fluorine
	Molybdenum
	Selenium

TABLE 17.2 Sources, functions and deficiency symptoms of some common minerals

Mineral	Sources	Functions	Deficiency Symptoms
Calcium	Bone meal, oyster shell, limestone, milk	<ul style="list-style-type: none"> • Bone and teeth formation • Egg shell formation • Blood clotting 	<ul style="list-style-type: none"> • Ricket • Osteomalacia • Soft egg shell • Retarded growth
Phosphorus	Bone meal, fish meal, dicalcium phosphate	<ul style="list-style-type: none"> • Bone and teeth formation • Egg shell formation • Acid-base balance 	<ul style="list-style-type: none"> • Ricket • Osteomalacia • Lack of appetite
Magnesium	Salt licks, forage grasses, wheat germ	<ul style="list-style-type: none"> • Activation of enzymes • Aids functioning of nervous system 	<ul style="list-style-type: none"> • Hyper-irritability • Nervous disorder (tetany)
Sodium and chlorine	Common salt licks, fish meal	<ul style="list-style-type: none"> • Regulate acid-base balance • Maintenance of osmotic pressure • Constituent of HCl in the stomach • Improve palatability of feed 	<ul style="list-style-type: none"> • Reduced growth and weight • Decline in appetite
Sulphur	Salt lick, fish meal	<ul style="list-style-type: none"> • Constituent of protein and amino acids, e.g., methionine and cysteine 	<ul style="list-style-type: none"> • Poor growth
Iron	Yeast, iron injection, salt licks	<ul style="list-style-type: none"> • Constituent of haemoglobin in red blood cells 	<ul style="list-style-type: none"> • Anaemia, especially in piglets
Iodine and Cobalt	Iodised salts, fish meal, salt licks	<ul style="list-style-type: none"> • Constituent of hormone called thyroxine • Constituent of vitamin B₁₂ • Activate some enzymes 	<ul style="list-style-type: none"> • General malnutrition • Goitre
Copper	Salt licks	<ul style="list-style-type: none"> • Aids formation of haemoglobin • Iron absorption 	Anaemia
Fluorine	Salt licks, fluorinated water	<ul style="list-style-type: none"> • Prevent tooth decay 	Tooth decay

17.4.6 Vitamins

Vitamins may be defined as organic compounds present in foods in minute amounts and essential for normal development of tissues and for healthy growth and maintenance. Vitamins are divided into:

- (a) Fat-soluble vitamins A, D, E and K.
- (b) Water-soluble vitamins B₁ (thiamine), B₂ (riboflavin), niacin, B₆ (pyridoxine), pantothenic acid, biotin, folic acid, B₁₂, Vitamin C and chorine.

TABLE 17.3 Sources, functions and deficiency symptoms of vitamins

Vitamin	Sources	Functions	Deficiency Symptoms
A (Retinol)	Fish meal, palm oil, green plants, yellow maize	<ul style="list-style-type: none"> Proper eye sight Aids reproduction 	<ul style="list-style-type: none"> Night blindness Retarded growth Susceptibility to disease
C (Ascorbic acid)	Fruits, vegetables, green grasses	<ul style="list-style-type: none"> Formation of connective tissue, bone and teeth 	<ul style="list-style-type: none"> Scurvy Anaemia Poor healing ability
D (Calciferol)	Bone meal , fish meal, hay, sunlight	<ul style="list-style-type: none"> Bone formation Teeth formation Egg shell formation 	<ul style="list-style-type: none"> Ricket Osteomalacia Soft egg shell
E (Egosterol)	Vegetables, grasses, synthetic vitamin E	<ul style="list-style-type: none"> Aids reproduction Acts as an antioxidant 	<ul style="list-style-type: none"> Sterility Premature abortion
K (Phylloquinone)	Fish meal, vegetables	<ul style="list-style-type: none"> Aids blood clotting Formation of prothrombin 	<ul style="list-style-type: none"> Haemorrhage (inability of blood to clot in time)
B ₁ (Thiamine)	Cereals, yeast, green plants	<ul style="list-style-type: none"> Co-enzyme in protein and fat metabolism 	<ul style="list-style-type: none"> Beriberi Poor appetite
B ₂ (Riboflavin)	Cereals, yeast, green plants	<ul style="list-style-type: none"> Co-enzyme in fat metabolism 	<ul style="list-style-type: none"> Slow growth
B ₁₂ (Cobalamine)	Fish meal, milk products	<ul style="list-style-type: none"> Red blood cells formation Co-enzyme in biochemical reactions 	<ul style="list-style-type: none"> Pernicious anaemia
Niacin (Nicotinic acid)	Yeast, cereals, grasses	<ul style="list-style-type: none"> Carbohydrate Oxidation 	<ul style="list-style-type: none"> Pellagra (reddish tongue)

17.5 Types of Ration and Their Uses

A ration is the quantity of feed given to an animal within a 24 hour period (the amount of feed taken by an animal per day).

Diet: It is defined as the quantity of feed regularly given to or consumed by an animal.

It is formulated to meet specific metabolic or physiological functions such as growth, lactation, maintenance of pregnancy and reproduction.

Balanced Ration: This is the feed containing all the essential nutrients in the correct proportion and in adequate quantity for feeding animals.

â Rations are made up of several ingredients mixed together in such a way that all the nutrients required are in the right proportions.

â No single feedstuff contains all the nutrients in large enough quantities.

â Examples of feed ingredients or feedstuffs are ground maize, groundnut cake, soya bean meal, fish meal, palm kernel cake, brewerâ€™s dried grains, ground limestone, bone meal, sodium chloride, vitamin premix, grass and hay silage.

17.5.1.1 Maintenance ration

This is a ration containing only sufficient nutrients that enable the animals to carryout normal life processes such as respiration, heart beat, body movements and maintenance of good health without an increase or loss in weight. Examples are ration given to ruminants (straw, hay and silage) during the dry season.

17.5.1.2 Production ration

This is the ration given to farm animals which enables them produce. It supplies nutrients above maintenance and makes the animal capable of high production in form of meat, milk or egg.

Examples of production ration are as follows:

(a) Lactation ration: This is the rations given to lactating or nursing dams (mothers) from the time of parturition to the time the young ones are weaned. It is very rich in protein and energy.

(b) Weanerâ€™s ration: This is a special type of ration given to very young animals that have just been weaned. It is usually high in protein and contains ingredients that are easy to digest.

(c) Pregnancy or gestation ration: This is the ration given to pregnant animals. It consists of good

quality rations that will enable the animal to maintain themselves as well as provide nutrients for the developing foetus or foetuses.

(d) Fattening or finishing ration: Animals raised for meat production need a fattening ration for rapid growth and development. This should not be high in protein but should make the meat to be more juicy and taste better.

(e) Steaming up ration: This is the ration given to pregnant animals some weeks before parturition. It will enable the animals' body to be prepared for parturition and subsequent lactations.

(f) Flushing ration: This is the ration given to breeding female animals before mating to produce more ova or ovum. It increases the fertility rate of the female animals.

(g) Growers ration: This is the ration given to the animals for growth which involves building up new tissues and increasing weight.

(h) Broilers ration – This is the feed given to broiler chicks to enable them grow rapidly. There are two types of broiler ration.

(i) Broiler starter ration – Given to chicks from a day-old to six weeks of age. It is high in protein (up to 24%) which enables the animal to grow very rapidly.

(ii) Broiler finisher ration – Given to broiler chicks from 7 weeks to about 12 weeks of age. It is a fattening ration for broiler, high in energy to develop fully and to add on some fat.

(iii) Layer's ration – This is the feed given to pullets from point of lay (about 20 weeks of age) and throughout the laying period. It is high in calcium that helps in egg shell formation. It is used to maintain the layers in good health and enable them to lay large number of good quality eggs.

17.6 Ration Formulation

This involves the careful combination of all food nutrients in such a way as to meet the nutritional requirement for a particular animal.

The following principles must be considered when formulating a ration:

â Physiological state of the animal such as pregnant, lactating or young animals

â Availability of the feedstuff

â Composition of the nutrients

â Age of the animal

â Palatability of the feed

â The cost of the feedstuff

â Familiarity of the feed to the animal

â Purpose for keeping the animal such as for meat, milk or egg

17.6.1 Feed formulation methods

1. Manual Method: This is a method whereby the farmer handfeeds the animals with feedstuff considered good for the animals. The method is used in subsistence production. It is based on guess work.

2. Computer Method: This involves use of computer data on nutrient values of feedstuff to compute and produce accurate formulation.

3. Pearson's Square Method: This is a simple and efficient method of providing the energy protein needs of the animal.

TABLE 17.4 Classes of livestock feeds

Animal	Type	Classes of Feed	Age(Weeks)
Fowl	Broiler	1. Starter mash 2. Finisher mash	0-4 5-12
	Cockerel	1. Starter mash 2. Finisher mash	0-8 9-16
	Layers	1. Chick mash 2. Growers mash	0-6 7-12
		3. Pullet mash	13-18
		4. Layers mash	18 and above
	Piglets	Piglet mash (creep feed)	
Pig	Weaners	Weaners mash	
	Growers	Growers mash	
	Finishers	Finishers mash	
	Breeders	Flushing/streaming up ration	
	Rabbit	Pellets	
Cattle	Weaners	Pellets	
	Growers	Pellets	
	Breeders	Pellets	
Sheep	Calf/lamb/kid	Creep feed	
	Weaners	Weaners ration	
Goat	Growers	Growers ration	
	Fatteners	Fattening ration	
	Breeders	Flushing/streaming up ration	

Example feed containing 23% protein using available feedstuff as follows:

Maize meal – 8% protein

Fish meal – 40% protein

A balance ration can be formulated in the following ways:

(a) Construct a Pearsonâ€™s square.

(b) Place 23% at the intersection of the diagonals.

(c) Place fish meal (40%) at the lower left angle and maize meal (8%) at the upper left angle.

(d) Do a cross-subtraction as follows:

Maize meal 8% 17 parts maize meal

Fish meal 40% 15 parts fish meal

i.e., $23 \hat{\wedge} 8 = 15$

$40 \hat{\wedge} 23 = 17$

The farmer will need 15 parts of fish meal and 17 parts of maize meal.

To determine the percentage composition of the mix, add the parts ($17 + 15 = 32$)

Maize meal = $17/32 \hat{A} - 100 = 53.1\%$

Fish meal = $15/32 \hat{A} - 100 = 46.9\%$

17.7 Malnutrition in Farm Animals

Malnutrition is departure from normal nutrition which results when an animal takes insufficient food or eats diet that is deficient in one or more nutrients. Malnutrition could be caused by

- (i) Under feeding or under nutrition such as consumption of insufficient quantities of feed.
- (ii) Nutritionally unbalanced rations or lacking one or more nutrients resulting in a deficiency disease.
- (iii) The diet containing excess calories such as carbon–nitrogen imbalance.

TABLE 17.5 Samples of feeds for poultry fowl (100 kg or 100%)

Ingredients	Broiler Starter	Cockerel Finisher	Layer Mash
Maize meal	45.5	6.0	38.0
Maize offals	10.0	51.0	15.0
Brewers grain	—	—	13.0
Rice bran	10.0	—	3.45
Groundnut cake/ palm kernel cake/ soya bean cake	29.0 (SBC)	25.0 (PKC) 14.0 (GNC)	17.50 (SBC)
Fish meal	2.5	1.0	2.0
Bone meal	1.5	1.5	2.5
Oyster shell	1.0	1.0	8.0
Salt	0.25	0.25	0.30
Premix	0.25	0.25	0.25
Total	100.00 kg	100.00 kg	100.00 kg

TABLE 17.6 Malnutrition disease, causes, symptoms and corrections

S. no.	Malnutrition	Causes	Symptoms	Correction
1.	Ricket and osteomalacia	Lack of calcium, phosphorous and vitamin D	• Flexible and curve bones • Soft egg shell	Add fish meal/oyster shell to the feed
2.	Perosis (slipped tendon)	Lack of chlorine, calcium, phosphorus, folic acid	Birds lie down on their knees	Add vitamin B-complex and bone meal to the feed
3.	Pregnancy toxemia, ketosis	Insufficient energy	Loss of appetite	Feed carbohydrate to animals
4.	Milk fever (hypocalcaemia)	Low blood sugar	Loss of appetite, constipation and nervousness	Feed carbohydrate, bone meal or oyster shell
5.	Grass tetany (grass staggers)	Low blood magnesium	Nervousness galloping and convulsion	Feed quality grass and legume
6.	Baby pig anaemia	Low iron in blood	Loss of appetite and nervousness	Inject iron dextran
7.	Night blindness	Lack of vitamin A	Poor eye sight	Feed yellow maize
8.	Scurvy	Lack of vitamin C	Lesion around connective tissues	Feed vegetables and fruits
9.	Beriberi	Lack of vitamin B	• Lack of appetite • Fatigue and loss of weight	Feed yeast, cereals and vegetables

(iv) Genetic or environmental impairment –the animal cannot digest properly and/ or absorb food or cannot utilise food.

The general symptoms of malnutrition in all cases include:

- (i) Slow or retarded growth and emaciation in young animals
- (ii) Loss of weight or emaciation in adult animals
- (iii) Abortion in pregnant animals
- (iv) Poor milk, meat and egg production
- (v) Animals are predisposed to diseases
- (vi) Low reproductive rates
- (vii) High mortality rates

Activities

- Visit a nearby farm in your locality where animals are reared. Observe the type of feed given to the animals and also observe the effects of the feeds on the performance of the animals. Ask any

other questions from the farm manager or attendants at the farm.

2. Collect the different feedstuffs and formulate a balanced ration. Use the feed in your school farm to feed the animals Record your observation during the period of using the feed.

SUMMARY

A nutrient is any element or compound present in the food and required by the animal for its proper functioning.

â—† The study of the nutrients needed by farm animals is referred to as animal nutrition.

â—† The six classes of nutrients are water, carbohydrates, fats and oils, proteins, minerals and vitamins.

â—† Water is the most essential compound in the body and is required in large amount by the animals.

â—† Carbohydrates give energy when oxidised in the body and makeup the bulk of animal feeds.

â—† Proteins in the body are used to manufacture new tissues and to replace worn out cells.

â—† Vitamins are essential for normal development of tissues and for healthy growth and maintenance of animals.

â—† Examples of feedstuffs that supply the needed nutrients are ground maize, groundnut cake, soya bean meal, fish meal, palm kernel cake, bone meal, sodium chloride and limestone.

â—† Different kinds of animals require different types of feed and nutrients and this is determined by

- (a) the type of animal
- (b) age of the animal
- (c) physiological state of the animal and
- (d) the function performed by the animals.

â—† There are different types of rations: maintenance ration, production rations such as lactation ration and weaners ration, among others.

â—† A balanced ration is the one that contains all the nutrients required by the animal in the right amount and proportions.

â—† The effects of malnutrition may include slow or retarded growth and loss of weight among others.

Revision Questions

Essay Questions

1. (a) Write short notes on the following.

- (i) Maintenance ration
- (ii) Production ration
- (iii) Balanced ration
- (iv) Malnutrition

(b) Mention four factors normally considered when deciding the type of feed an animal should be placed on (WASSCE 2001).

2. (a) State six functions of protein in the body of a farm animal.

(b) List five:

- (i) Animal sources of protein.
- (ii) Plant sources of protein used in livestock feeding (WASSCE 1999).

3. (a) Explain the term ration.

(b) Name four classes of livestock feed and list two characteristics of each class.

(c) Distinguish between maintenance and production rations (WASSCE 1998).

4. (a) What is a balanced ration?

(b) Why are minerals and vitamins essential in the diets of farm animals?

5. State the sources and functions of the following nutrients.

(a) Carbohydrates

(b) Proteins

(c) Fats and oils

Objective Questions

1. Feed given to animals solely to sustain their live weight is called

(a) balanced ration.

(b) maintenance ration.

(c) production ration.

(d) weaners ration.

2. The ingredient which is not a major source of minerals in animal feeds is

(a) oyster shell.

(b) fish meal.

(c) bone meal.

(d) palm kernel.

3. When birds are fed on a ration deficient in riboflavin, which of the following symptoms will they show?

(a) Night blindness

(b) Cataract

(c) Curled-toe paralysis

(d) Scurvy

4. Which of the following group of macronutrients is a constituent of protein?

(a) Nitrogen, phosphorus and sulphur

(b) Calcium, magnesium and potassium

(c) Magnesium, calcium and phosphorus

(d) Sulphur, magnesium and potassium

5. The vitamin which is essential for the growth of spermatozoa in males and the development of foetus in females is

(a) vitamin A.

(b) vitamin D.

(c) vitamin E.

(d) vitamin K.

6. Which of the following class of poultry feeds has the highest protein content?

(a) Chicks mash

(b) Growers mash

(c) Layers mash

(d) Broiler starter

7. Which of the following class of nutrients is used mainly for energy production in farm animals?

(a) Carbohydrates

(b) Proteins

(c) Vitamins

(d) Minerals

8. In animal nutrition, iodine is essential for the production of

(a) thyroxin.

(b) oxytocin.

(c) insulin.

(d) progesterone.

9. Maintenance of osmotic balance in body cells of animals is regulated by

(a) calcium and phosphorus.

(b) magnesium and calcium.

(c) sodium and potassium.

(d) iron and phosphorus.

10. The general symptoms of malnutrition in animals include the following except

(a) retarded growth.

(b) low production.

(c) high mortality.

(d) increase in body size.

Answers to Objectives

1. b 2. d 3. c 4. a 5. c 6. b 7. a 8. a 9. c 10. d