بسم الله الرحمن الرحیم

دانشگاه پیام نور

وزارت علوم, تحقیقات و فناوری

جزوه زبان تخصصی

کارشناسی ارشد تغذیه دام

تالیف :

دکتر حشمت سپهری مقدم

استادیار دانشگاه پیام نور

1392

CONTENTS

Introduction:

This pamphlet have 5 chapters. In the first chapter, the MSC students will know with the most important straregies to help them with the reading comprehension questions. The following the students have to make 3 questions of the next readings.The second chapter explains about poultry nutrition. Poultry nutrition discuse about energy terms, apparent digestible energy, apparent and true metabolizable energy, net energy, protein and amino acid, fats, minerals and vitamins in poultry. Dairy cattle nutrition is discussed in the forth chapter, the main subjects are about dry matter intake, rumen degradable protein, inorganic elements and vitamins. In the fifth chapter, I discuse about animal physiology and in the next chapter animal genetics is explained briefly.

CHAPTER 1

Strategies for answering reading comprehension question

1- Read the question first. Read the question, not the answer choices. When you know the kinds of questions you must answer, it will be easier to find the answers.
2- Skim or read the passage quickly. Do not read word for word or in detail. Read quickly to find the main idea and general organization.
3- Go back to the passage to answer questions. If you know the answer, you do not need to go back to the passage.
4- Leave the difficult questions until last.
5- Take a guess when you do not know the answer. If you do not know the answer, take a guess. When you are takeing a guess, first use a process of elimination. How can you eliminate the wrong answer on a multiple-choice item?

Types of reading comprehension questions

1- Reading for details:
   detail questions ask you about specific information in the passage. Detail questions usually begin with the words. To answer detail questions, focus on the key word or words used in the question. Then you must scan the passage. When you scan a passage, you move your eyes quickly over the passage until you find the key words that you are looking for: a name, a date, a number. It is not necessary to read the

whole passage again-just locate the key words. Once you find the key words, you can read the sentences that follow or come before to make sure you have found the right information. The correct answer to a detail question will not usually use the exact words as found in the passage but synonyms or statement of what is stated in the passage. Some questions ask about what is not in the passage or what is not true according to the passage. These questions have the word NOT or EXCEPT in capital letters.

2- Reference and vocabulary questions:

Instead of repeating words or phrases, the second time we use them we refer to them by reference words. Referene words are in many cases pronouns such as “it”, “them” , “ they” or “this”. Reference questions ask what certain reference words, such as “ they” or “ this” refer to. The incorrect answers are other nouns that are mentioned in the passage. To answer a reference question, substitute the four choices given to you for the reference word. The one that is the best substitute for it is the correct answer.

3- Reading for main ideas:

On of the most frequently asked quections in the Reading Comprehension section is the main idea of passage. There is usually one such question for each reading passage.Az its name suggests, the main idea is the most important idea in the passage or what the passage is about. Each passage has main and subordinate, or less important, ideas. The main idea may appear in the middle or toward the end.

when the main idea of a passage is not clear because each paragraph has a different main point, a question identifying the main topic of the passage will be asked.

The main idea is not always the first sentence in the paragraph or passage. It can also appear in the middle or toward the end of a paragraph.

When the main idea is not clear because each paragraph has a main point, combine all tge main points to get the main idea.

Make sure the answer you select for the main idea question relates to the whole passage and the main idea you have selected is discussed all through the passage.

4- Reading for inference:

Inference questions are perhaps the most difficult questions to answer in the reading comprehension section. The answers to these questions are not directly stated in the passage but are understood, or implied. There are some strategies for inference questions such as: Go beyond the information stated in the passage.

Draw a conclusion or reason out what is implied- that is, what the author of the passage means or believes to be true but has not stated in the passage.

Remember that the answer to the question will not be stated in words in the passage.

Be ware of answer choices that go beyond what you can logically infer from the passage Wrong answer choices will often be too exaggerated or overstated to be precisely correct.

5- QUESTIONS ON INFORMATION COMING BEFORE OR AFTER THE PASSAGE

These quastions ask you to suppose the passage is part of a longer and to guess what the topik of the previous paragraph or the following paragraph would be. In such questions, the beginning of the passage usually gives you a clue as to the topik that follows.

In the next chapter, There are readings that you have to make 3 questions about each types of reading. Pay attention to mentioned strategies.

CHAPTER 2

Poultry Nutrition

Energy terms for feedstuffs are defined and discussed in detail in *Nutritional Energetics of Domestic Animals and Glossary of Energy Terms* .A brief description of the terms most frequently used in connection with poultry feeds appears below.

A calorie (cal) is the heat required to raise the temperature of 1 g of water from 16.5° to 17.5° C. Because the specific heat of water changes with temperature, however, 1 cal is defined more precisely as 4.184 joules.

A kilocalorie (kcal) equals 1,000 cal and is a common unit of energy used by the poultry feed industry.

A megacalorie (Mcal) equals, 1,000,000 cal and is commonly used as a basis for expressing requirements of other nutrients in relation to dietary energy.

A joule (J) equals 10^7 ergs (1 erg is the amount of energy expended to accelerate a mass of 1 g by 1 cm/s). The joule has been selected by Le Systéme International d'Unites (SI; International System of Units) and the U.S. National Bureau of Standards (1986) as the preferred unit for expressing all forms of energy. Although the joule is defined in mechanical terms (that is, as the force needed to accelerate a mass), it can be converted to calories. The joule has replaced the calorie as the unit for energy in nutritional work in many countries and in most scientific journals. In this publication, however, calorie is used because it is the standard energy terminology used in the U.S. poultry industry and there is no difference in accuracy between the two terms.

A kilojoule (kJ) equals 1,000 J.

A megajoule (MJ) equals 1,000,000 J.

Gross energy (E) is the energy released as heat when a substance is completely oxidized to carbon dioxide and water. Gross energy is also referred to as the heat of combustion. It is generally measured using 25 to 30 atmospheres of oxygen in a bomb calorimeter.

Apparent digestible energy (DE) is the gross energy of the feed consumed minus the gross energy of the feces. (DE = [E of food per unit dry weight × dry weight of food] - [E of feces per unit dry weight × dry weight of feces]). Birds excrete feces and urine together via a cloaca, and it is difficult to separate the feces and measure digestibility. As a consequence, DE values are not generally employed in poultry feed formulation.

Apparent metabolizable energy (*ME*) is the gross energy of the feed consumed minus the gross energy contained in the feces, urine, and gaseous products of digestion. For poultry the gaseous products are usually negligible, so *ME* represents the gross energy of the feed minus the gross energy of the excreta. A correction for nitrogen retained in the body is usually applied to yield a nitrogen-corrected *ME* (ME_n) value. $ME_{n,}$ as determined using the method described by Anderson et al. (1958), or slight modifications thereof, is the most common measure of available energy used in formulation of poultry feeds.

True metabolizable energy (*TME*) for poultry is the gross energy of the feed consumed minus the gross energy of the excreta of feed origin. A correction for nitrogen retention may be applied to give a TME_n value. Most ME_n values in the literature have been determined by assays in which the test material is substituted for part of the test diet or for some ingredient of known *ME* value. When birds in these assays are allowed to consume feed on an ad libitum basis, the ME_n values obtained approximate TME_n values for most feedstuffs.

Net energy (*NE*) is metabolizable energy minus the energy lost as the heat increment. *NE* may include the energy used for maintenance only (NE_m) or for maintenance and production (NE_{m+p}). Because *NE* is used at different levels of efficiency for maintenance or the various productive functions, there is no absolute *NE* value for each feedstuff. For this reason, productive energy, once a popular measure of the energy available to poultry from feedstuffs and an estimate of *NE*, is seldom used.

Procedures for Determining Metabolizable Energy

Metabolizable energy is determined by various bioassay procedures whereby feed intake and excreta output are related over a 2- to 5-day test period. Apparent metabolizable energy is most commonly determined through actual measurement of feed intake and excreta output, or by determining the ratio of dry matter intake to output through use of an inert dietary marker, such as chromic oxide (Cr_2O_3). A number of potential problems arise with use of markers

Both *ME* and *TME* should be corrected for nitrogen retention that occurs during the assay period. If, during an *ME* determination, nitrogen is retained by the animal, the excreta will contain less urinary nitrogen and hence less energy would be excreted as compared with an animal that is not retaining N. Because the extent of nitrogen retention differs with age and species, a correction factor is essential if comparisons of *ME* values for the same ingredient with different animals are to be made.

PROTEINS AND AMINO ACIDS

Dietary requirements for protein are actually requirements for the amino acids contained in the dietary protein. Amino acids obtained from dietary protein are used by poultry to fulfill a diversity of functions. For example, amino acids, as proteins, are primary constituents of structural and protective tissues, such as skin, feathers, bone matrix, and ligaments, as well as of the soft tissues, including organs and muscles. Also, amino acids and small peptides resulting from digestion-absorption may serve a variety of metabolic functions and as precursors of many important nonprotein body constituents

Protein and amino acid requirements vary considerably according to the productive state of the bird, that is, the rate of growth or egg production. For example, turkey poults and broiler chickens have high amino acid requirements to meet the needs for rapid growth. The mature rooster has lower amino acid requirements than does the laying hen, even though its body size is greater and its feed consumption is similar.

Body size, growth rate, and egg production of poultry are determined by their genetics. Amino acid requirements, therefore, also differ among types, breeds, and strains of poultry, as can be seen by comparing the values shown in the requirement tables provided in this report for the different types of poultry. Genetic differences in amino acid requirements may occur because of differences in efficiency of digestion, nutrient absorption, and metabolism of absorbed nutrients

Although each amino acid can be metabolized independently of others, relationships between certain amino acids exist. In some instances, the relationship may be beneficial. For example, one amino acid may be converted to another to fulfill a metabolic need. In other instances, a metabolic antagonism may exist with undesirable consequences.

FATS

Fat is usually added to the feed for meat-type poultry to increase overall energy concentration and, in turn, improve productivity and feed efficiency. Oxidation of fat is an efficient means to obtain energy for the cell in large quantity, whereas anabolic use involves direct incorporation into the body as a part of growth. Lipid accrual is most obvious in adipose tissue; however, cell multiplication also requires an array of lipids to form associated membranes. These two uses can occur simultaneously; however, the extent of each may vary considerably.

Total fatty acids contributed by all lipid categories, the proportion that are in free form, and the types of fatty acids present provide information related to expected digestibility as well as how the fat may be used subsequently. Fatty acid chain length, extent of unsaturation, and nature of esterification all influence intestinal absorption (Moran, 1989a). The percentage MIU and percentage digestibility combine to influence the ME_n value. All feed fats should be stabilized by an antioxidant to preserve unsaturated fatty acids and routinely monitored for the possible presence of undesirable residues such as insolubles, chlorinated hydrocarbons, and unsaponifiables and for peroxides

Extra Caloric Effect

Employing high levels of added fat often leads to more ME_n than can be accounted for from the summation of ingredients. High level fat feeding evidently increases the intestinal retention time of feed and so allows for more complete digestion and absorption of the nonlipid constituents

Directly employing dietary fat in the assembly of either body or egg lipids results in a fatty acid composition similar to that of the diet. Fat absorbed from the fowl's intestine is transported to the liver, where some modifications may occur. For the most part, the unsaturated fatty acids are unchanged, but the saturated ones may undergo desaturation, especially stearic acid which can be converted to oleic acid. Also, elongation and further desaturation of 18:2(n-6) and 18:3(n-3) may occur in the liver.

Essential Fatty Acids

Linoleic acid (18:2, n-6) and a-linolenic acid (18:3, n-3) are recognized as metabolically essential fatty acids. The position of the double bonds in these n-6 and n-3 polyunsaturated fatty acids (PUFA) is unique because they are not formed in the fowl.

MINERAL

Minerals are the inorganic part of feeds or tissues. They are often divided into two categories, based on the

An excess of dietary calcium interferes with the availability of other minerals, such as phosphorus, magnesium, manganese, and zinc. A ratio of approximately 2 calcium to 1 nonphytate phosphorus (weight/weight) is appropriate for most poultry diets, with the exception of diets for birds that are laying eggs. When poultry are laying eggs, a much higher level of calcium is needed for eggshell formation, and a ratio as high as 12 calcium to 1 nonphytate phosphorus (weight/weight) may be correct. But high levels of calcium carbonate (limestone) and calcium phosphates may tend to make the diet unpalatable and dilute the other dietary components. If a calcium source contains a high level of magnesium (as does dolomitic limestone), it probably should not be used in poultry diets.

The requirements for trace minerals are often fulfilled by concentrations present in conventional feed ingredients. Soils vary, however, in their content of trace minerals, and plants vary in their uptake of minerals. Consequently, feedstuffs grown in certain geographic areas may be marginal or deficient in specific elements. Thus, poultry diets may require supplementation to ensure adequate intake of trace minerals. Because of the interactions that occur between various minerals such as copper and molybdenum, selenium and mercury, calcium and zinc, calcium and manganese (Mertz, 1986), excessive concentrations of one element may result in a deficiency in the amount available to the bird of some other element. Formulators of poultry diets should be aware of these possible mineral interactions.

Vitamins

The requirements for most vitamins are given in terms of milligrams per kilogram of diet. Exceptions are vitamins A, D, and E, for which requirements are commonly stated in units. Units are used to express the requirements for these vitamins because different forms of the vitamins have different biological activities.

Maximum tolerances for vitamins are of the order of 10 to 30 times the minimum requirement for vitamin A, 4 to 10 times for vitamin D_3, and 2 to 4 times for choline chloride (possibly because of the chloride). Niacin, riboflavin, and pantothenic acid are generally tolerated at levels as great as 10- to 20-fold their nutritional requirement. Vitamin E is generally tolerated at intakes as great as 100-fold the required level. Vitamins K and C, thiamin, and folic acid are generally tolerated at oral intake levels of at least 1,000-fold the requirement. Pyridoxine may be tolerated at 50 times or more of the requirement (Aboaysha and Kratzer, 1979). High levels of biotin and vitamin B_{12} have not been tested.

WATER

Water must be regarded as an essential nutrient, although it is not possible to state precise requirements. The amount needed depends on environmental temperature and relative humidity, the composition of the diet, rate of growth or egg production, and efficiency of kidney resorption of water in individual birds (Medway and Kare, 1959). It has been generally assumed that birds drink approximately twice as much water as the amount of feed consumed on a weight basis, but water intake actually varies greatly.

Several dietary factors influence water intake and water:feed ratios. Increasing crude protein increases water intake and water:feed ratios (Marks and Pesti, 1984). Crumbling or pelleting of diets increases both water and

feed intake relative to mash diets, but water:feed ratios stay relatively the same. Increasing dietary salt increases the water intake

Nutrient Requirements of Chickens

Chickens vary greatly according to the purpose for which they have been developed. Those intended for the production of eggs for human consumption (Leghorn-type) have a small body size and are prolific layers, whereas those used as broilers or broiler breeders (meat-type) have rapid growth rates and a large body size. They are less efficient egg layers. Methods of feeding differ for these two kinds of chickens.

CHAPTER 3

Dairy cattle nutrition

Dry matter intake (DMI) is fundamentally important in nutrition because it establishes the amount of nutrients available to an animal for health and production . Actual or accurately estimated DMI is important for the formulation of diets to prevent under feeding or overfeeding of nutrients and to promote efficient nutrient use. The ratio of forage concentrate(F:C)inlactatingdairy cow diets has been reported to affect DMI. In alfalfa or orchard grass based diets, cows fed concentrateas 20 percent of the dietary DM produced less milk (P _ 0.01) than cows fed

diets that contained 40 or 60 percent concentrate Assuming that cows consume DM to meet their energy requirements National ResearchCouncil, often less DMis consumed when fat replaces carbohydrates as an energy source in diets.Fats may also decrease ruminal fermentation and digestibility of fiber and so contribute to rumen fill and decrease the rate of passage. Allen (2000) also indicated fats may contribute to decreased DMI through actions on gut hormones ,oxidation of fat in the liver and the general acceptability of fat sources by cattle. Feedstuffs vary widely in their relative proportions of protein and NPN , in the rate and extent of ruminal degradation of protein ,and in the intestinal digestibility and aminoacid (AA) composition of ruminally undegraded feed protein.The NPN in feed and supplements such as urea and ammonium salts are considered to be degraded completely in the rumen.

The goals of ruminant protein nutrition are to provide adequate amounts of rumen-degradable protein (RDP) for optimal ruminal efficiency and to obtain the desired animal productivity with a minimum amount of dietary CP. Optimizing the efficiency of use of dietary CP requires selection of complementary feed proteins and NPN supplements that will provide the types and amounts of RDP that will meet, but not exceed, the N needs of ruminal microorganisms for maximal synthesis of MCP,and the types and amounts of digestible RUP that will optimize, in sofar as possible,the profile and amounts of absorbed AA.

The nutritive value of MP for dairy cattle is determined by its profile of essential AA (EAA) and probably also by the contribution of
total EAA to MP.

A number of inorganic elements are essential for normal growth and reproduction of animals. Those required in gram quantities are referred to as macro minerals and this group includes calcium, phosphorus, sodium, chlorine, potassium, magnesium, and sulfur.The macrominerals are important structural components of bone and other tissues and serveas important constituents of body fluids.They play vital roles in the maintenance of acid-base balance, osmotic pressure ,membrane electric potential and nervous transmission.Those elements required in milligram or microgram amounts are referred to as the traceminerals. This group includes cobalt, copper, iodine, iron, manganese, molybdenum, selenium, zinc, and perhaps chromium and fluorine. Other elements have been suggested to be essential based on studies in other species but these are generally not considered to ever be of practical importance in dairy cattle.The trace minerals are present in body tissues in very low concentrations and often serveas components of metallo enzymes and enzyme cofactors,or as components of hormones of the endocrine system.

Vitamins are classified as either fat-soluble or water soluble. Vitamins A, D, E, and K are fat-soluble and the B-vitamins and vitamin are water soluble.Vitamins have diverse functions including involvement in many metabolic pathways, immune cell function, and gene regulation.A clinical deficiency of a vitamin results in a specific deficiency disease such as rickets when vitamin D is deficient. Subclinical deficiencies may occur in which clinical signs of the deficiency are not evident but performance or overall animal health is less than optimal.Water is the most important nutrient for dairy cattle.It is required for all of life' s processes transport of nutrients and other compounds to and from cells ; digestion and metabolism of nutrients; elimination of waste materials (urine, feces, and respiration) and excess heat (perspiration) from the body; maintenance of a proper fluid and ion balance in the body; and provision of a fluid environment for the developing fetus.

CHAPTER 4

Animal physiology

Comparative animal physiologists compare and contrast the physiological systems of different animal species, or of a single species under difference environmental conditions. This branch of physiology is an experimental science driven by an interest in understanding how physiological systems allow animals to adapt to their individual and ever-changing environments. We seek to answer questions such as: How do aquatic mammals dive for greater than 30 minutes on a single breath of air? Do birds sleep during flight while migrating? How do the heart and brain function of artic and Antarctic fish function at sub-zero temperatures? How do turtles and frog survive at the bottom of ice covered lakes and ponds over winter? By adapting a systems-level approach, from molecules to organisms, comparative animal physiologists are able to understand the emergent properties that arise when physiological components operate as a whole; properties that can not be predicted from knowledge of the individual components alone.

In the animal physiology program instruction will explore a broad array of species living in diverse habitats to emphasize the commonality and differences amongst species. In the first and second years of this program students take courses which provide them with a solid background in both the basic sciences and introductory animal physiology, and cell and molecular biology. In the third and fourth years, we offer a series of courses that provide students with an in depth understanding of the major aspects of physiology which include neurophysiology, respiratory physiology, endocrinology, sleep physiology and comparative cellular physiology. In the last year of study students are encouraged to apply to conduct independent research project courses in the laboratories of physiologists within the Department of Cell and Systems Biology.

The dry period, inparticular the transition period, is characterized by dramatic changes in endocrine status. These changes prepare the cow for parturition and lactogenesis. Plasma insulin decreases and growth hormone increases as the cow progresses from late gestation to early lactation, with acute surgesin plasma concentrations of both hormones at parturition .Plasma thyroxine (T4) concentrations gradually increase during late gestation, decrease approximately 50 percent at calving, and then begin to increase. Similar but less pronounced changes occur with 3,5,3_-triiodothyronine (T3). Estrogen , primarily estrone of placental origin, increases inplasma during late gestation but decreases immediately atcalving . Progesterone concentrations during the dry period are elevated formaintenance of pregnancy but decline rapidly , approximately 2 days before calving. Glucocorticoid and prolactin concentrations increase on the day of calving and return to near prepartum concentrations the following day.

CHAPTER 5

Animal Genetics

A *gene* is a piece of DNA that carries information about a specific trait.

A *chromosome* is a string of genes connected together (although most of the chromosome is DNA that has no known function or no genetic activity).

An *allele* is a gene that is a member of a set of genes that all belong to the same locus, or location, on a chromosome. These genes are often thought of as being related to each other through mutations (one allele could be a mutation of another allele) or they could be mutations of an ancestor gene.

Chickens, like people, usually have two of every chromosome. The chromosomes in a chromosome pair are not identical, since one comes from each parent. A gene is said to be *dominant* when only one gene (rather than two) is sufficient for the expression of that trait to which the gene corresponds. Some genes are referred to as *incompletely dominant*. The expression of these genes is inhibited by (usually unknown) modifying genes. When the inhibiting, modifying genes are not present, the incompletely dominant gene expresses. This interaction with modifying genes is responsible for the seemingly random nature of the expression of incompletely dominant genes.

The sex chromosomes are unique in that there are two types, a long sex chromosome, the Z chromosome, and a short sex chromosome, the W chromosome. The female has one long and one short sex chromosome, she has ZW sex chromosomes. The male has two long sex chromosomes, he has ZZ sex chromosomes. For this reason, the female has only one copy of some genes that are on the long, Z, sex chromosome.

The genes that are not on the sex chromosomes are called ‘autosomal’ or autosomes. Both male and female chickens have two of these genes. Chickens have 39 pairs of chromosomes (78 individual chromosomes). Most of them are tiny and referred to as ‘dot’ or micro chromosomes.

PCR (polymerase chain reaction) uses a few basic everyday molecular biology reagents to make large numbers of copies of a specific DNA fragment in a test-tube. PCR has been called a ‘DNA photocopier’. While the concept is simple, PCR is a complicated process with many reactants. The concentration of template DNA is initially very low but its concentration increases dramatically as the reaction proceeds and the product molecules become new templates.

PCR is a super technique for the isolation of a target DNA sequence from either genomic DNA or cDNA in a relatively short time, avoiding many of the time-consuming aspects of ‘traditional’ gene cloning procedures. However, once you have your product you will often clone it into a suitable vector to provide a ready supply of the DNA without the need to repeatedly amplify the product from its original source. This will allow you to use the product for a variety of purposes, either as control DNA in subsequent experiments or for further detailed investigation.

The cloning of genes is often a crucial step in a scientific project and can

be both difficult and time-consuming. The use of PCR has greatly enhanced the successes of gene isolation. Cloning of genes by PCR can be divided into two main areas: (i) genes of known DNA sequence; and (ii) genes of unknown DNA sequence. Genome sequencing projects are

generating an increasing amount of data that makes cloning of genes more straight forward, however there remain many cases where unknown genes must be cloned.

In transgenic animal models, the conservation of DNA sequences between the transgene and the host wild-type gene can complicate the evaluation of the expression of each gene. The potential for gene silencing may complicate matters further.

Students Activities

In this chapter the students have to review journals such as Poultry Science, Gut, Archieves of Animal Nutrition, Italian Journal of Animal Science, British Poultry Science, Animal Science Journal, Animal Reproduction Science, Journal of Environmental Health Science & Engineering and…., then select one of them and lecture.

References:

1- National Research Council, 1994, Nutrient Requirement of Poultry. 9th rev. ed. National Academy.
2- Nutrient Requirements of dairy cattle. Seventh Revised Edition, 2001, National Research council.
3- Michael J. Mcpherson, 2006, PCR. Second Edition.
4- Milada Broukal, 2002, TOEFL Reading, 4th ed.