Arkansas CTE

Poultry Science: Grades 10, 11, 12

Adopted 2014

Assess the history and economics of the poultry industry.

1.1 Investigate the Poultry Industry history in the US.

1. Explain how the poultry industry has changed from the 1900's to the present, and how environmental conditions and consumer demands have driven these changes. (New York dressed bird, vertical integration, artificial incubation) 1.1.1
2. Formulate the ranking of the top 5 states in each major area of production and determine reasons for migration to those states. (broilers, table eggs, turkeys) 1.1.2

1.2 Investigate the financial impact the Poultry Industry has in the US.

1. Compare the value of current market trends in broiler processing. Whole bird, parts and cut-up, value added products 1.2.1
2. Identify the divisions of a vertically integrated poultry company. (feed mill, hatchery, veterinary/technical service, processing plant, further processing plant) 1.2.2
3. Analyze the impact of poultry industry in Arkansas 1.2.3

Evaluate poultry genetics.

2.1 Cite Historical Evidence of Genetic Changes

1. Defend the purpose for the poultry industry moving from a dual purpose bird to broilers and table egg layers. (negative correlation between meat and egg production) 2.1.1
2. Identify the breeds used to develop today's broiler and layer strains. (Plymouth Rock, Cornish, White Leghorn, Rhode Island Red) 2.1.2
3. Connect the contributions of modern innovations to the success of early breeding programs. (trap nests, artificial incubators, broody) 2.1.3
4. Analyze important genetic changes that occurred in the 1940s through the 1990s. 2.1.4

2.2 Develop a logical argument that heritability affects a breeding program.

1. Prove that heritability affects selection progress. (high heritability = rapid progress, low heritability = slow progress) 2.2.1
2. Connect selection pressure and genetic progress. 2.2.2
3. Compare the traits emphasized for male genetic lines and female genetic lines. (Males - meat yield, weight for age, days to market, feed efficiency, body conformation, fat content. Females - fertility, hatchability, age at sexual onset, rate of egg production) 2.2.3
4. Explain how sex-linked traits work and how the commercial egg industry uses this in their breeding programs. 2.2.4

2.3 Analyze the Primary Breeder Program.

1. Assess the pyramidal structure of the primary breeder program. (Pedigree Level, Great grandparent Level , Grandparent Level, Parent Level, Commercial Broiler) 2.3.1
2. Defend the reasons for crossing pedigree lines to develop the modern commercial broiler. (heterosis, hybrid vigor, blending male and female traits, protection from theft of genetics) 2.3.2
3. Investigate how the value of broiler stock changes within the pyramid structure. 2.3.3

Investigate poultry reproductive anatomy and egg formation.

3.1 Evaluate the Anatomy of the Egg.

1. Analyze the major anatomical features of the egg, and differentiate each structure according to the type(s) of function performed. (stigma, albumen, shell, chalazae, germinal disc, yolk membrane, yolk) 3.1.1
2. Outline the steps involved in egg shell formation beginning with raw materials in the blood. 3.1.2

3.2 Evaluate the Reproductive Anatomy of Poultry.

1. Examine how estrogen contributes to sexual maturation of the hen. 3.2.1
2. Analyze the individual parts of the oviduct, describe their functions, and assess the time the egg spends in each segment of the oviduct. (ovary, follicle, infundibulum, uterus, magnum, isthmus, cloaca, vent, vagina) 3.2.2
3. Assess the average amount of time a developing egg spends in each segment of the oviduct. 3.2.3
4. Investigate the functions of the parts of the male avian anatomy. (testicle, cloaca, vas deferens) 3.2.4
5. Investigate the events that occur in the brain and body of both male and female poultry in response to increased photoperiod. (sexual maturation, estrogen, pituitary gland, FSH, LH ovulation, progesterone) 3.2.5
6. Describe pigment loss in a laying hen. 3.2.6
7. Analyze the calcium metabolism of an egg-producing hen. 3.2.7
8. Compare clutch lengths in the following birds: Turkey hens, Jungle fowl hens, Leghorn hens, Broiler breeder hens, Quail hens 3.2.8

Assess embryo development and egg hatching conditions in poultry

4.1 Investigate the Development of the Egg.

1. Connect embryonic development (two phases) and structures in hatching eggs 4.1.1
2. Compare developmental occurrences in the early, mid and late incubation 4.1.2

4.2 Evaluate Environmental Conditions for Hatching

1. Assess responsibilities of the breeder farm in hatching egg preparation. Why is packing the eggs onto carts correctly so critical? 4.2.1
2. Investigate the major responsibilities and concerns of a hatchery. (hatchability, fertility, hatch of fertile) 4.2.2
3. Describe proper egg temperature and humidity in the hatchery: egg storage, incubator and hatcher. Discuss the implications if these conditions are not maintained. 4.2.3
4. Cite evidence why egg rotation is necessary in the setter, but not in the hatcher. 4.2.4
5. Investigate the length of time chicken and turkey eggs are held in the setter and hatcher. 4.2.5
6. Calculate hatchability, fertility, and hatch of fertile 4.2.6

Assess the environmental physiology and health of poultry.

5.1 Evaluate the Importance of Environmental Conditions in Poultry Health

1. Investigate both homeothermic and homeostasis in terms of poultry temperature regulation. 5.1.1
2. Contrast methods of heat exchange. (convection, conduction, radiation) 5.1.2
3. Analyze sensible and insensible methods of heat loss. 5.1.3
4. Investigate vasoconstriction and vasodilation, and indicate how heat flow from the core through the physiological shell is impacted by these processes. 5.1.4
5. Investigate how total heat production and heat production per unit body weight changes as body weight increases. 5.1.5
6. Differentiate between the two major categories of thermoregulatory mechanisms, and explain the differences (active vs passive) 5.1.6
7. Differentiate between each of the temperature zones to which poultry may be exposed. For each zone, list the thermoregulatory mechanism(s) that may be used, including specific examples. 5.1.7
8. Connect how the range of temperatures in the thermoneutral zone changes as birds age. 5.1.8
9. Evaluate how the proportion of heat lost by insensible and sensible mechanisms is impacted by environmental temperature and humidity. 5.1.9
10. Draw conclusions about how feed and water intake are affected by environmental temperature. 5.1.10

5.2 Investigate Disease Transmission and Prevention in Poultry.

1. Explain common methods of disease transmission 5.2.1
2. Investigate effective measures of preventing infectious disease transmission. (biosecurity, sanitation, vaccination, proper nutrition, protective clothing or PPE) 5.2.2
3. Assess common disease causing agents. (bacteria, virus, fungus, protozoa, parasite) 5.2.3
4. Analyze the difference between infectious and non-infectious disease and explain why infectious disease can be so damaging for poultry farms. (mortality, morbidity, pathogenicity) 5.2.4
5. Differentiate between immunity and passive immunity: How each is obtained and how prevents/treats illness from pathogens. (antibodies) 5.2.5
6. Compare commonly used vaccination methods for poultry. (vaccine, aerosol, subcutaneous, wingweb, oral) 5.2.6

Assess the nutritional needs of poultry.

6.1 Evaluate the Avian Digestive System

1. Analyze the eating habits of chickens and turkeys and the impact this behavior has on how birds should be fed. 6.1.1
2. Asses the monogastric digestive system of poultry and identify the function of each segment of the digestive tract. (beak, esophagus, crop, gizzard, ventriculus, small intestine, ceca, large intestine, cloaca, vent) 6.1.2

6.2 Connect Avian Nutrition Requirements to the functions of the bird

1. Analyze classes of nutrients needed by poultry and dietary sources of each. (Protein, carbohydrates, fats, vitamins, minerals, water) 6.2.1
2. Categorize essential amino acids and non-essential amino acids and describe factors that influence a bird's requirement for them. (lysine, methionine, cysteine) 6.2.2
3. Research the relationship between triacyglycerides and essential fatty acids in the blood 6.2.3
4. Analyze why the avian requirement for vitamins is relatively high compared to other species 6.2.4
5. Connect fat-soluble vitamins and water-soluble vitamins needed in a poultry ration, with the dietary sources to provide them 6.2.5
6. Classify macro-minerals and micro-minerals needed in poultry diets 6.2.6
7. Assess the role of cereal grains, oilseed meals, animal protein meals, and oils in poultry nutrition and include some common feedstuffs in each category 6.2.7
8. Propose conditions that result from nutrient deficiencies in poultry 6.2.8
9. Investigate the importance of the yolk residue in chick nutrition. (Meckel's diverticulum) 6.2.9

6.3 Analyze the feeding of Commercial Poultry

1. Investigate essential amino acids that in poultry diets 6.3.1
2. Create the information that must be given for computer-based least-cost formulation programs to work 6.3.2
3. Compare and contrast forms and nutrient levels in poultry diets for the different segments of production. (pellets, crumbles, meal) 6.3.3