* + 1. **Michigan FFA Poultry Contest Study Guide (2020 and future)**

1. ***Helpful Resource: Poultry Science Manual for National FFA Career Development Events. (Seventh edition)***
2. *(Study Guide Credit: Buckeyeman, Ohio)*
3. By technical definition poultry are not considered livestock
4. Leghorn strains hens used mostly in USA-white shell eggs
5. Browns or production reds are used for brown eggs
6. Pullets are females that have not reached sexual maturity. Hens are females that have reached sexual maturity and are producing eggs.
7. 16-17 weeks age pullets are grown and taken to farm operations for future egg layers
8. 3-3 ½#feed to get 1 dozen eggs
9. Michigan has approximately 18 million table egg laying hens
10. Laying hens will begin to lay around 20 weeks of age and reach a peak production between 35 and 45 weeks of age. For most breeds of laying hens peak production should be approximately 95% rate of lay. Rate of lay is just the percentage of hens that lay every day.
11. Hens lay eggs in a series called a clutch. For commercial operations a hen with a large clutch size is key to keeping production.
12. Hens will be kept in production for approximately 52 weeks, at which time hens are either rendered into meal for animal feeds or molted, depending on the egg and pullet market at the time
13. Hens are housed in several types of systems with conventional or colony cages being the most common followed by aviary or cage-free systems
14. By December 31, 2024 all eggs in Michigan must be produced in a cage-free setting
15. Table egg hens produce eggs for consumption, these eggs are not fertilized
16. In contrast to broilers or meat birds, egg laying hens are strictly monitored for weight gain. IF a pullet gains weight too fast she may reach sexual maturity too soon.
17. During laying a hen’s weight is also tightly monitored, hens that are overweight will either have a reduced rate of lay or stop laying eggs altogether
18. Breeder hens produce fertile eggs for the production of the next generation, these eggs are not sold in stores
19. Broilers are a hybrid of several different breeds, each chosen for specific traits such as temperament, early growth, and muscle yield
20. Breeder hens and roosters for broiler breeders have raised and slatted floors
21. 85% hatchability for broiler breeder eggs goal
22. 7# feed needed (twice that of leghorns) to get a dozen broiler breeder eggs
23. 20,000 or more broilers raised in one house on farm (50 x 500) size as example, but barns are getting larger and larger, with a typical broiler barn being 55x600 feet long or larger
24. Poultry operations often have 5-7 flocks of broilers per year
25. 99% of broilers are under contract and contract growers are paid per pound based on liveweight of birds
26. Broilers average 6.2 lbs in six weeks age, for the national processing average
27. White meat used in USA as a priority, dark meat exported (white meat is consumer preference)
28. Broad Breasted White turkeys are the preference for turkey industry in USA
29. 95% of turkeys are under contract from growers.
30. No turkeys farms in Michigan are contract growers, all are in the Michigan Turkey Producers co-operative
31. Most turkeys grown in the US are utilized for further processing and are made into lunch meats, sausages, etc, only a small percentage of turkeys grown are actually marketed for whole bird use, generally these birds are only sold around Thanksgiving, Christmas and Easter
32. Turkeys gain 1# on 2 ½#feed (feed conversion) whereas broilers are less than 1.9# feed to get 1# gain
33. Feed costs represent approximately 70% of the cost of producing eggs or meat
34. All poultry meat represents 35% of the total meat marketed from (fish, beef, pork, mutton, and poultry)
35. Consumers eat almost 100 lbs of poultry meat per year, higher than any other meat
36. Poultry description for animal type- feathered, biped (two footed) warm-blooded, 4 chamber heart
37. Waterfowl belong to order... Anseriformes
38. Pigeons and doves belong to order......Columbiformes
39. Outer skin on fowl called epidermis and inner layer called dermis
40. Skin color of birds influences consumer appeal. yellow skin preferred in certain regions of the US, specifically along the east coast
41. Feathers age grown after day 5 in egg and originate in tract called pterylae and cover 75% of body
42. Female feather tips are generally round and male tips normally have pointed tips
43. Feathers are mostly symmetrical in shape except for the flight feathers which are asymmetrical. This shape gives flight feathers lift, much like the wing of an airplane, allowing birds to fly
44. Female birds molt to repair feathers and the reproductive tract. When birds molt, egg production stops. However, induced molting is an integral part of table egg production, reducing the cost of producing eggs significantly
45. Combs and wattles are innervated with many blood vessels and are primarily part of cooling and body temperature management
46. Earlobe color indicates egg shell color. White earlobes= white shell. Red earlobes= brown eggs
47. Pectoral muscles important in avian system and pectoral muscles equal all other muscles in body weight
    1. 15-25% of body weight for pectoral muscles
    2. in mammals only 1% body is pectoral muscle
    3. pectoralis major= downstroke
    4. Supracoracoideus = upstroke
48. Muscle is comprised of two types of fibers Type I and Type II. Type two fibers are fast twitch fibers that are used in anaerobic or explosive type muscle movements. This is generally what would be considered white meat. Type 1 muscle fibers are slow twitch muscle fibers that are used during aerobic or endurance type muscle movements, this is dark meat.
49. Birds have hollow bones called pneumatic bones, these bones are connected to the respiratory system and are extensions of the air sacs
50. Birds breathe much differently than mammals, in birds both inspiration and exhalation are active processes and it takes two respiratory cycles for air to enter and exit the body
51. Clavicle= wishbone
52. Sternum bone = equals keel bone bottom of breast
53. Keel bone is modified to allow for attachment of the large breast muscles that are needed for flight. Flightless birds do not possess a keel bone, instead they have sternums much like in mammals
54. Avian respiratory system is a one or uni-directional system, air flows in only one direction and never co mingles like in mammalian respiratory systems
55. Birds respiratory system more efficient than mammals
56. Syrinx is the voice box located @junction of trachea and two primary bronchi
57. Air sacs are unique to birds and have NINE (9) air sacs
58. Birds have a pointed tongue that forces food down gullet and birds do not have teeth
59. Crop - stores food (large pouch in espohagus), very little to no digestion takes place in the esophagus
60. Glandular stomach- (proventriculus) secrete gastric juices that begins to soften and break down food
61. Muscular stomach (gizzard or ventriculus) grinds feed and serves as the teeth so to speak
62. Birds are often fed grit to help grind feed
63. Small amounts of feed are passed from one segment of the digestive system to the next all day long, this prevents hunger and keeps nutrient breakdown to a continual process
64. Small intestines- primary site of nutrient absorption
65. Small intestine is made of three part, duodenal loop (containing the pancreas), jejenum and ilium
66. Large intestine is the primary site of water reabsorption from feces
67. Cloaca- posterior end that is the junction of digestion, exocrine, and reproductive tracts
68. Cloaca is a common exit for excreta and eggs
69. Birds do not urinate, therefore instead of feces they produce what is called excreta, where uric acid and feces are combined into one substance
70. gall bladder produces bile that breaks down fats
71. A hens reproductive tract consists of two parts, ovary and oviduct
72. Ovary is the organ where ova (eggs) or yolks are formed
73. Oviduct is a tube that forms the remainder of the egg
74. Eggs are produced by one ovary (left) and associated with oviduct
75. Sometimes the right oviduct will form, this is called a persistent cystic right oviduct, and is detrimental to the birds health
76. Oviduct is 30 inches long and contains (I M I U) *infundibulum, magnum, isthmus,shell gland* plus vagina
77. Egg formation-
    1. 15 minutes- infundibulum- engulfs yolk
    2. 3 hours- magnum- secretes white
    3. 75 minutes- isthmus- shell membranes
    4. 20-21 hours- shell gland- forms shell, adds extras Purpose of vagina is to pass egg once signal is given
78. Male chicken reproductive organs are inside the body, unlike many mammals
79. Fowls urinary system different, no bladder, thus uric acid is mixed with feces in the cloaca to form excreta
80. Endocrine system consists of many hormones that regulate body system
81. Hypothalamus- gland at base of brain. Regulates hormones from pituitary gland
82. Pituitary gland is MASTER GLAND of body such as....
    1. FSH- Follicle Stimulating Hormone- growth and maturity
    2. LH- Luteinizing Hormone- - releases ovulation
    3. Oxytocin- (mesotocin) assists in physical process of laying egg
    4. Prolactin- stimulates broodiness in females
    5. Thyropin- - stimulates body growth
83. Thyroid- regulates metabolism and molting of feathers
84. Ovary- secretes estrogen
85. Testes - secretes testosterone in males
86. Pancreas- regulates sugar metabolism
87. Hens must have periods of light and dark to lay eggs, darkness is necessary for the production of certain hormones that cause ovulation
88. Hens have specialized reproductive tissues called sperm storage tubules, these tubules allow sperm to be stored by the hen for up to 7 days, therefore hens only need to be mated every few days to produce fertile eggs
89. All commercial turkeys produced in the US are done so by artificial insemination
90. Fertile vs non fertile eggs
    1. blastodisc= normal egg
    2. blastoderm= fertile egg
91. Yolk important in developing embryo, provides all of the nutrition for the developing embryo, primarily made of water, lipids (fats) and proteins
92. Egg white or albumin provides liquid for the developing embryo, serves as a cushion or shock absorber and contains many antimicrobial compounds to prevent infection
93. Once fertilization happens... egg changes from blastodisc to blastoderm due to cell division (1 to 2 to 4 etc)
94. Early egg development of fertile egg nutrition comes from stores in the blastoderm
95. Embryos undergo 2 to 4 cell divisions while the egg is formed inside the hen, once the egg is laid development halts until incubation
96. 48 hours after fertile egg incubated- blood vessels appear 64 Neural tube is formed in egg and spine is formed
97. Somites develop and three kinds of cells:
    1. dermatome= forms skin
    2. myotome= forms muscle
    3. sclerotome= fonns skeletal structure
98. By day 10 in fertile eggs all muscles are developed and *all parts* of the chick are formed
99. Birds head position in egg is- tucked under right wing on large end of egg
100. Malformations= birth defects (nalpositions and malfonnations= 5% decrease in hatchability)
101. Nutrition is important in embryonic development. It need 40 different nutrients to develop correctly
102. New born chicks are poikilotherms and are not able to regulate their body temperature until about 7 to 10 days of age
103. Direct causes of *Infectious diseases=* bacteria, viruses, parasites, and fungi
104. Causes of *non-infectious diseases=* injuries, toxic poisons, nutritional factors
105. Bird STRESS caused by chilling, poor ventilation, overcrowding, inadequate quality and quantity of feed and water, overmedication and others
106. Bio-security measures to control diseases
     1. reduce contact between birds and infectious organisms
     2. maintain sanitary conditions
     3. strengthen bird's defense against infectious organisms
107. Ways to reduce infection
     1. Isolate new birds for several weeks
     2. "All in All Out'' policy.....same age birds enter and leave
     3. Purchase young birds
     4. Sanitize people and equipment before entering buildings
     5. Reduce pests and stray birds (carrier of diseases)
     6. t) Properly dispose of dead birds and waste that might be contaminated
     7. g) Allow two weeks "'down time" before placing new birds in buildings
     8. Allow 72 hours between farm visits
108. Key to *sanitation=* effective cleaning and disinfecting
109. organic materials such as (manure, dirt, dust, feathers and litter) host disease organisms
110. quaternary ammonium compound is good water-sanitizing agent
111. chlorine-based compound (hypochlorite) is most effective on cleaning surfaces, does not work well in areas that have a lot of organic material
112. *inexpensive disinfectants=* time, freezing, thawing, and sunshine
113. Adequate nutrition help overcome stress of disease
114. PROPER housing protects poultry from contact with disease agents
115. VACCINES one of most useful practices in prevention of certain diseases
116. Birds can be vaccinated at many times in their life, most vaccines are given as embryos in the egg or at 1 day of age, however some require boosters and are given at various times during the birds life
117. Review diseases, symptoms etc pages C-40-C-42 especially
     * 1. cholera, pullorum, New Castle, Fowl Pox\*\*\*, Mareks \*\*\*\*, coccidiosis, bumblefoot
118. Foot and leg problems (disorders) **small in broilers** 0.05 to I%: **large in turkeys** up to 33%
119. Rickets caused by lack of calcium, phosphorus, and /or Vit. D3
120. Calcium deficiency solved by feeding oyster shell, limestone. or meat/bone meal in ration
121. **Perosis** symptoms= swelling of hock joints, slipped tendons, severe shortening of long bones
122. 85% of rapid growth is result of genetic selection
123. Infectious agents are either direct or indirect cause of leg problems
124. Poultry waste is a DAILY problem... dead birds, poultry manure, and other wastes
125. Several houses wastes scraped or flushed into pits, storage ponds, or lagoons for later disposal (page C-46)
126. Pest problems are concerns in pits such as fly larvae
127. High rise laying hen houses may be 15-30 feet tall, and have manure storage areas underneath the cage systems
128. broilers, pullets. breeder birds and small laying flocks on
     1. concrete
     2. wooden
     3. earthen floors
129. Dry stack of manure (temporary storage) better to preserve manure nutrients as fertilizer= flexible application of manure during year vs. one time cleaning
130. Composting is aerobic (oxygen-requiring) process also known as DEEP STACK composting
131. 30:1 is proper carbon to nitrogen ratio for aerobic composting to work with 40-50% moisture 5% oxygen needed
132. Three composting methods:
     1. windrowing composting......good for 10-15 day storage
     2. forced air composting= thru piles of composting
     3. In-vessel composting= use large roto-tiller to mix contents
133. Manure production= 75% MOISTURE (broilers=¼# daily and turkeys= I# daily)
134. Broilers eat 26-30#/day/100 birds- 6 weeks old and 100 turkeys east 93-115#/100 - 16 week poults
135. Animal manure is good for fertilizer, and is typically considered a 3-3-3 of NPK
136. Composting takes approximately **60 days to complete**
137. HOT WEATHER use fan and pad system; COLD WEATHER use convection tube system
138. PSYCHROMETRY- study of moist air and changes. See page (C-60)
139. **DB** stands for dry bulb temperature
140. ONE pound air and ONE pound of water occupies 13.5 cubic feet of space in normal building'
141. from 40 degrees to 60 degrees doubles grains of water ( 40 degrees=33 and 60 degrees =62)
142. Every 20 degrees n rise of DB= double air moisture holding capacity
143. To determine relative humidity you need both a dry bulb and wet bulb temperature readings, the closer the two temperatures the higher the humidty
144. Poultry ventilation systems do not work well during high humidity
145. Modern poultry houses utilize what is called a negative air pressure system for ventilation. In other words the air pressure inside the barn is lower than the air pressure outside, this causes air to be pulled into the house rather than trying to push air into the house. This is a much more efficient way to ventilate large houses
146. Houses are ventilated to remove heat, remove moisture and to bring in fresh air
147. Poultry do not sweat to remove body heat, instead they pant like a dog. This is called gular flutter. During high humidity the ability to cool off via panting is greatly reduced, therefore it is imperative that excess humidity or moisture is removed from the houses.
148. Too little air flow in poultry buildings= STRONG AMMONIA ODOR
149. Jet flow= rapid flow from hole in open space example....2'' hole= 3 ½ foot distance of flow
150. Jet flow 16'' hole (like window open)= 30 foot of flow
151. 123. 40# turkey needs- 13.5 air flow whereas,,,6# broiler needs 3.0 air flow (CFN/bird)
152. Fresh air convection tube ventilation prevents cold air coming into building. Inflates with warm air
153. FAN and PAD SYSTEM are large fans at one end of building
154. Most broilers go to processing plants **6 weeks** (25-47 days)
155. Most hen turkeys go to processing **14-16 weeks age**
156. Most tom turkeys GO TO PROCESSING **18-20 WEEKS AGE**
157. **Michigan Turkey producers only producers heavy toms, these toms will average 45 lbs at processing**
158. 13 BASIC STEPS IN PROCESSING (SEE CHART PAGE C-73) AND THINK THRU PROCESS
159. Take broilers **off feed 6-12 hours** before slaughter; turkeys taken off **feed 8-10 hours** before slaughter
160. Feed withdrawal is the first step in processing and significantly reduces the risk of food borne illnesses
161. Carcasses put into 138-140 degree water- 30-75 seconds; scalded 123-130 degrees 90-120 seconds (loosens feather tracts, making plucking easier)
162. Must have USDA inspector at processing plant during process
163. FRESH LABEL poultry meat... never under 26 degrees
164. HARD CHILLED... 0-26 degree meat
165. FROZEN ... held below 0 degrees- sometimes called ""previously frozen

Updated March 2020