National FFA 2022
Poultry CDE
Team Activity – KEY (also see reference material and pictures)

Questions 1-3: refer to the reference picture.

1. Which part of the hen's reproductive tract performs a function that is needed at a breeder farm, but not at a commercial table egg farm?
    a. Part A
    b. Part B
    c. Part C
    d. Part D
    e. Part F

    B – infundibulum, where fertilization occurs (fertilization is not needed at on a commercial egg farm). Based on knowledge from the A&P section of the manual.

2. Part A is the _____; one of the hormones it secretes is _____.
    a. Ovary; luteinizing hormone
    b. Adrenal gland; cortisol
    c. Hypothalamus; gonadotropin releasing hormone
    d. Ovary; progesterone
    e. Pituitary gland; follicle stimulating hormone

    D – Ovary, which produces progesterone (and estrogen; not listed). Based on knowledge from the A&P section of the manual.

3. If the blood spot on the egg shown in the reference picture is from an egg gathered at a commercial table egg farm, it ***most likely*** occurred because:
    a. There was a hemorrhage in the isthmus
    b. A loose shell fragment in the uterus cut a capillary, releasing blood
    c. The follicle that produced the yolk did not rupture at the stigma
    d. An embryo in this egg died early in the developmental stage
    e. None of the above

    C – eggs should not be fertile at a commercial table egg farm, and the most likely explanation is that the follicle ruptured at the stigma. Based on knowledge from the A&P section of the manual.

Questions 4-7 The information in the reference picture (depicting eggs that hatch, infertile eggs, and eggs containing dead embryos) is representative of the egg-strain hatchery in this scenario.

4. Calculate the percent mortality for eggs incubated in this egg-strain hatchery.
    a. 20% mortality
    b. 10% mortality
    c. 24% mortality
    d. 12% mortality

e. 27% mortality

A – The number of dead embryos is 36 (out of 180 total eggs). Mortality = (36/180)*100 = 20%

5. Calculate the percent fertility for eggs incubated in this egg-strain hatchery.
    a. 88% fertility
    b. 80% fertility
    c. 95% fertility
    d. 90% fertility
    e. 67% fertility

C – The number of infertile eggs is 9 (out of 180 total eggs). Fertility = (171/180)*100 = 95%

6. Calculate the overall hatchability (hatchability of all eggs) in this egg-strain hatchery.
    a. 50% hatchability of all eggs
    b. 70% hatchability of all eggs
    c. 80% hatchability of all eggs
    d. 75% hatchability of all eggs
    e. 65% hatchability of all eggs

D – The number of eggs that hatched is 135 (180-36 dead – 9 infertile);
Hatchability = (135/180)*100 = 75%

7. Calculate the hatchability as a percent of fertile eggs in this egg-strain hatchery.
    a. 90.0% hatchability of fertile eggs
    b. 88.6% hatchability of fertile eggs
    c. 84.3% hatchability of fertile eggs
    d. 80.0% hatchability of fertile eggs
    e. 78.9% hatchability of fertile eggs

E – The number of eggs that hatched is 135 (180-36 dead – 9 infertile); the number of fertile eggs is 171 (180 – 9 infertile); Hatch of fertile eggs = (135/171)*100 = 78.9%
Could also calculate as (75/95)*100 = 78.9%

Questions 8-10 pertain to the egg-strain pullet farm, and use information provided in the reference material and a few of the reference pictures.

8. Given the information in the reference material, how wide is each of the houses on the pullet farm?
    a. 30 feet wide
    b. 40 feet wide
    c. 45 feet wide
    d. 50 feet wide
    e. 150 feet wide

C – There are 25,000 birds in each house x 0.9 square feet per bird = 22,500 square feet needed.
Square feet = length x width; therefore 22,500 = 500 x width; width = 45 feet

9. Based on the information in the reference picture, depicting the body weights of birds on the pullet farm, calculate the percent uniformity (the percentage of birds that fall within 10% of the average body weight).
    a. 48% uniformity
    b. 68% uniformity
    c. 75% uniformity
    d. 64% uniformity
    e. 80% uniformity

    B – Average body weight = 1,000 grams (from the picture); 10% of the average = 100 grams, so the range of acceptability is 900-1,100. There are 24 birds outside of this range, so there are 75-24 = 51 birds inside the range. Uniformity = (51/75)*100 = 68%

10. Which of the vaccines, shown in the reference picture, could be used during the growing phase of egg-strain pullets?
    a. A
    b. B
    c. C
    d. B and C
    e. All of the above

    E – all of the above. Based on knowledge from the egg-strain pullet and hen management section of the manual

Questions 11-15 pertain primarily to the table egg farm, and use information provided in the reference material.

11. All of the pullets that were alive at the end of the growout period on the egg-strain pullet farm, 147,000 birds total, were placed in a cage layer facility. What must the percent mortality have been at the egg-strain pullet farm during the growout period?
    a. 2% mortality on the egg-strain pullet farm
    b. 4% mortality on the egg-strain pullet farm
    c. 5% mortality on the egg-strain pullet farm
    d. 8% mortality on the egg-strain pullet farm
    e. 10% mortality on the egg-strain pullet farm

    A – total birds on the pullet farm = 25,000 birds per house x 6 houses = 150,000 birds. 147,000 birds were alive and transferred to the layer facility;
    mortality = (150,000-147,000)/150,000*100 = 2% mortality on the egg-strain pullet farm

12. At peak egg production, 2.5% of the birds that were placed on the table egg farm had died, and 139,000 eggs were produced the day of peak egg production. Calculate the ***hen-housed egg production*** for the day of peak egg production:
    a. 99.5% hen-housed egg production
    b. 97.0% hen-housed egg production
    c. 94.6% hen-housed egg production
    d. 91.8% hen-housed egg production
    e. 86.7% hen-housed egg production

C – For this question the mortality is not needed. Hen-day production = (eggs produced on the day of peak production/number of hens placed)*100 = (139,000/147,000)*100 = 94.6%

13. At peak egg production, 2.5% of the birds that were placed on the table egg farm had died, and 139,000 eggs were produced the day of peak egg production. Calculate the ***hen-day egg production*** for the day of peak egg production:
    a. 99.3% hen-day egg production
    b. 93.2% hen-day egg production
    c. 94.6% hen-day egg production
    d. 97.0% hen-day egg production
    e. 91.5% hen-day egg production

    Total birds that died = 147,000 x 2.5% mortality = 3,675 dead birds. Live birds remaining = 147,000 – 3,675 = 143,325; hen-day egg production = (eggs produced on the day of peak production/number of live hens on that day)*100 = (139,000/143,325)*100 = 97.0%

14. By the end of the laying period, a total of 380 eggs per hen housed had been produced over 70 weeks of production (the birds were 88 weeks of age at that point). Calculate the overall ***hen-housed egg production***:
    a. 72.1% hen-housed egg production
    b. 77.6% hen-housed egg production
    c. 79.5% hen-housed egg production
    d. 87.8% hen-housed egg production
    e. 90.2% hen-housed egg production

    B – 380 eggs x 147,000 hens housed = 55,860,000 total eggs. Hen-day egg production = (55,860,000 eggs/147,000 birds/(70 weeks x 7 days/week)*100 = 77.6%

15. Given the information in question 14, and the production cost and egg price information found on the reference material, calculate the average profit per dozen eggs for the table egg farm.
    a. 14 cents per dozen eggs
    b. 22 cents per dozen eggs
    c. 30 cents per dozen eggs
    d. 1 cent per dozen eggs
    e. $1 per dozen eggs

    A – There are multiple ways to calculate this. Following is one way. Cost for the pullets = $5/pullet x 147,000 pullets = $735,000; Eggs produced = 380 eggs per hen housed x 147,000 hens housed/12 eggs per dozen = 4,655,000 dozen eggs produced; cost for the egg production = 4,655,000 dozen eggs x $0.7/dozen eggs = $3,258,500. Total cost for pullets and eggs = 3,258,500 + $735,000 = 3,993,500. Total revenue = $1 per dozen eggs x 4,655,000 dozen eggs = $4,655,000. Total profit = $4,655,000 – 3,993,500 = $661,500. Profit per dozen eggs = $661,500/4,655,000 dozen eggs = $0.14/dozen = 14 cents per dozen eggs.

Thoughts about the items in the presentation:

- Given the total number of egg-strain birds placed on the pullet farm, how many eggs would have to be set to supply all of the pullets that were placed on the farm?

  Birds placed on the pullet farm = 6 houses x 25,000 birds/house = 150,000 pullets. Use the overall hatchability to perform the calculation: Hatchability = eggs hatched/total eggs set; we know hatched number needed, and hatchability: 75% = (150,000/X)*100; solve for X; X = 200,000. BUT – half of the chicks that hatch are male (cockerels, not pullets), so the total number of eggs needed is 200,000 x 2 = 400,000 eggs.

- Based on the provided information and your calculations and answers to the questions, evaluate the performance of the breeder farm, hatchery, pullet farm, and layer farm.
  - Are there areas in which performance appears to be satisfactory?
  - Are there issues to address or opportunities for improvement?
  - As you discuss performance, consider including some of your calculated answers as evidence.

  Breeder farm: Good fertility (95%)

  Hatchery:
  - Poor hatch of fertile (< 79%)
    - Average egg storage time = 12 days – could contribute, because this is longer than optimum
    - Moving eggs directly from cooler to incubator is not recommended (eggs can sweat in the incubator), so this could explain some of the poor hatch of fertile eggs (best to pre-warm the eggs)
    - Incubators: temperature averages 102; relative humidity averages 85% (both are too high, and would decrease hatch of fertile eggs)

  Pullet farm:
  - Mortality is good (only 2%)
  - The pullets were underweight at 14 weeks of age, with an average body weight of 1,000 g (the recommended weight is 1,100 g at 14 weeks of age)
  - Uniformity is not good
    - Likely because there is not enough feeder space. Each house should contain 500 feeders (25,000 birds x 1 pan/50 birds) but only contains 450 (3 lines x 150 pans/line)
    - Amount of waterer space is fine (exceeds recommendations)

  Layer farm:
  - Overall egg production appears good (peak hen-day egg production 97%)
  - Total eggs produced in 70 weeks was 380; hen-housed egg production = 77.6%; also a respectable number

- The table egg farm in the scenario is a conventional cage layer facility. Discuss the factors that should be considered when deciding whether to convert to production using aviaries. In other

words, what are some of the advantages and disadvantages of egg production in cage layer facilities and aviaries?

Discussion of moving to aviaries:

What are the best reasons for and against moving to aviaries? (from the manual):

- Possible advantages of aviaries (some of this is from the "disadvantages of laying cages" in the manual): freedom of movement and expression of more natural behaviors, increased consumer acceptability (from some consumers), may have manure management advantages, fewer flies?, no cage marks on eggs, less bone fragility (cage layer fatigue)
- Advantages of cages: easier to manage, reduced production cost, no floor eggs, eggs are cleaner, less feed per dozen eggs, reduced aggression, eliminates broody hens, reduced parasites, less mortality, reduced labor cost

Students may come up with other observations and opinions.