
# Dairy Cattle Evaluation and Management Handbook

2017-2021

## *Purpose*

*The purpose of the National FFA Dairy Cattle Evaluation and Management Career Development Event is to provide a competitive event for agricultural education students which emphasizes skills in dairy cattle management and evaluation.*

## Objectives

- To provide a practical experience to students enrolled in agricultural education with an interest in dairy cattle to help prepare for industry positions or in management of a modern dairy herd.
- To develop students' skills in observation, analysis, communication and team collaboration.
- To provide experience in the evaluation of dairy cattle type, production records and dairy herd management.
- To encourage agriculture instructors to seek assistance from various resources in the dairy industry. (Examples: dairy breed associations, artificial breeding organizations, state extension dairy specialists, state dairy herd improvement associations, dairy equipment manufacturers, local dairy farmers and breeders, etc.)

## Event Rules

****If there are any questions or issues, the State FFA Advisor will make the final decision.****

*Each team will be comprised of five members, with four scores counting. Only four members will certify to represent Washington at the National level, the fifth participant will have eligibility to be declared as the Washington participant in the National Dairy Handler's competition, and will follow all rules and guidelines of the National contest.*

- The total of the top four participant scores will be used to determine total team score.
- It is highly recommended that participants wear FFA Official Dress for this event.
- The most current and updated information will be used as industry standards change.
- Written sheets will be used in the event to record all responses.

# Event Format

Each participant must have:

- Two sharpened No. 2 pencils
- An electronic calculator. Calculators used in this event should be battery operated, non-programmable and silent with large keys and displays. Calculators should only have these functions: addition, subtraction, multiplication, division, equals, percent, square root, +/- key and one memory register. No other calculators are allowed to be used during the event.

## TEAM ACTIVITY

### 400 POINTS

Each team will be provided with a dairy farm management scenario to identify problems and determine possible improvements. (See references.) All necessary information will be provided.

The scenario will be based on the following rotating topic areas:

- 2017: Feeds/Nutrition
- 2018: Housing/Facilities
- 2019: Health/Diseases
- 2020: Genetics/Reproduction
- 2021: Young Stock Management

Each scenario may include animal welfare, biosecurity, business management, current issues, environmental management and safety concerns related to the topic area.

Team Expectations:

- Teams should assume the role of a hired consultant advising a producer (judges).
- Teams will be given 40 minutes to prepare their recommendations to be presented to a panel of judges.
- It is not necessary to describe the scenario to the judges since they are the producer.
- Teams will be allowed 10 minutes to present their recommendations, followed by five minutes of clarifying questions from the judges.

**Commented [WA1]:** Margaret questioned times for the presentation:
40 min – team prep?
10 min – presentation?
5 min – questions?

**Commented [RW2]:** Keep 40 minutes?

# INDIVIDUAL ACTIVITIES

## GENERAL KNOWLEDGE EXAM (150 POINTS)

- The exam will consist of a 50 question exam involving dairy management practices and may include DHI Records.
- Forty questions will cover various dairy management and industry related topics.
- Up to ten questions may be answered using a dairy herd record evaluation data sheet to analyze individual cows.
- Participants will have 40 minutes to complete the exam.
- Questions will come from tests from the three previous years, not to include the most immediate competition.

## EVALUATION AND SELECTION (300 POINTS)

- Six classes of four dairy animals will each be placed on type. Classes will be selected from the recognized breeds of dairy cattle. The class selection committee, however, shall give priority to selecting quality cattle in the breeds available and not be obligated to having all breeds represented in the evaluation classes. Classes will consist of heifers, young cows or mature cows.
- Class or classes may contain production/pedigree data as part of the evaluation process.
- Participants will be permitted to view the animals from all angles but will not be permitted to handle them.
- The dairy cattle handlers will wear numbers which identify the animals.
- Each class is worth 50 points maximum for a correct placing.
- Participants will have 12 minutes to place each class. For classes on which oral reasons will be given, participants will be given 15 minutes.

## ORAL REASONS (100 POINTS)

- Oral reasons will be required on two classes. These two classes will be designated by the event coordinator prior to the actual evaluation of the class.
- Oral reasons will be given immediately following the evaluation classes.
- Participants may not use notes during delivery of reasons. Points will be deducted for the use of notes.
- Each class is worth 50 points maximum for each set of reasons.
- Participants will have 12 minutes to prepare each set of oral reasons. No more than two minutes may be used to deliver the reasons before the judges.

# Scoring

| Individual | Maximum Points |
|---|---|
| General knowledge exam | 150 |
| Evaluation | 300 |
| Oral reasons | 100 |
| **TOTAL POSSIBLE SCORE** | **550** |

| Team | Maximum Points |
|---|---|
| Dairy management activity | 400 |
| Total individual score x4 | 2,200 |
| **TOTAL POSSIBLE SCORE** | **2,600** |

## TIEBREAKERS

If a tie occurs, the following events will be used to determine award recipients:

### INDIVIDUAL

- Oral reasons score
- General knowledge exam score
- Evaluation score

### OVERALL TEAM

- Team activity score
- Total oral reasons score
- Total general knowledge exam score
- Total evaluation score

# References

*This list of references is not intended to be all-inclusive.*

Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. The following list contains references that may prove helpful during event preparation.


- National FFA past CDE material: *FFA.org*
- Hoard's Dairyman- Judging contest and materials, youth tests and quiz questions and current industry issues: *www.hoards.com*
- Cornell University Department of Animal Science Dairy Resources: *http://www.ansci.cornell.edu/4H/dairycattle/dairyresources.html*
- Virginia Dairy Quiz Bowl study materials: *https://www.vtdairy.dasc.vt.edu/youth/quizbowl/youth-quiz-bowl.html*
- CEV Multimedia, Inc.: *www.cevmultimedia.com*
- Holstein Foundation Education Workbooks: *http://www.holsteinfoundation.org/Holstein Foundation Youth Programs: Quiz Bowl Materials: http://www.holsteinfoundation.org/*
- Dairy Herd Improvement: *www.drms.org*
- Current Dairy Unified Scorecard: *http://www.purebreddairycattle.com/pages/Literature.php*
- Gillispie, James R. Modern Livestock and Poultry Production most current edition. Albany, NY: Delmar Cengage Learning, Inc. 2015. Note: confirm publisher and publisher contact. Cengage Publishers *cengage.com*

# Team Activity: Content of Presentation Rubric

400 points

CHAPTER STATE TEAM NUMBER

| INDICATOR | Very strong evidence of skill is present 5-4 points | Moderate evidence of skill is present 3-2 points | Strong evidence of skill is not present 1-0 points | Points Earned | Weight | Total Points |
|---|---|---|---|---|---|---|
| **Opening statement** | Begins with an impact statement or question that articulates the focus of the topic area. | Begins with an impact statement or question that is vague concerning the topic area. | Begins with a statement or question that is completely irrelevant to the topic area. | | X 4 | |
| **Identification of problem areas** | Four or more problems from the scenario are accurately identified and discussed. | Two to three problems from the scenario are accurately identified and discussed. | One or no problems from the scenario are accurately identified and discussed. | | X 8 | |
| **Supporting information** | Does an outstanding job discussing industry trends with related statistics. | Does an adequate job discussing industry trends with related statistics. | Vaguely discusses industry trends with related statistics. | | X 12 | |
| **Factors of impact** | All factors that are impacted by problems listed in the scenario are addressed. (i.e., economic impact, production factors, etc.) | Some factors that are impacted by problems listed in the scenario are addressed. (i.e., economic impact, production factors, etc.) | Little or no factors that are impacted by problems listed in the scenario are addressed. (i.e. economic impact, production factors, etc.) | | X 20 | |
| **Identifying solutions** | All solutions connect with and support industry best practices. | Some solutions connect with and support industry best practices. | Solutions do not connect with and do not support industry best practices. | | X 20 | |
| **Implementation of solutions** | All solutions are correctly prioritized for implementation; provides complete justification for the implementation process. | Few solutions are correctly prioritized for implementation; pro-vides little justification for the implementation process. | Solutions are incorrectly prioritized for implementation; provides no justification for the implementation process. | | X 12 | |
| **Conclusion** | Provides a summary statement that provides a clear and concise overview of the topic area. | Provides a summary statement that provides a vague overview of the topic area. | Provides a summary statement that has little relevance to the topic area. | | X 4 | |
| | | | | | **TOTAL POINTS** | |

## Team Activity Example Scenario

**Directions:** Please read the dairy farm management scenario and supplemental information provided for the scenario, identify problems and determine possible improvements. Your team should assume the role of a hired consultant advising the producer (judges). Then, you have five minutes to respond orally to the judges. Your team has 40 minutes to prepare your recommendations to be presented to a panel of judges. It is not necessary to describe the scenario to the judges since they are the producer. Teams will be allowed 10 minutes to present their recommendations, followed by five minutes of clarifying questions from the judges.

You will be provided with an additional worksheet to assist you with your presentation. This worksheet will be turned in to the judges after the completion of your presentation and responses to the judges' questions. All team members are expected to participate in the oral presentation. You may make and take notes for the presentation.

## Dairy Management Exercise Example

### DAIRY NUTRITION SCENARIO

**Scenario:** You received a call from Fred F. Anderson, owner of FFA Dairy, LLC. Mr. Anderson feels that his nutrition program could be improved and would like you to evaluate his farm to see what suggestions you have for improvements.

FFA Dairy, LLC has 1,150 total Holstein dairy cows on a freestall dairy operation in the Midwestern US. The farm has a rolling herd average of24,000 lbs. of milk. They typically average 3.8% milk fat, 3.0% protein, and a SCC of 175,000. The cows are milked three times a day in a double-20 parallel milking parlor. The freestalls are bedded with sand, and the cows are utilizing their stalls well. They are feeding the same TMR ration to all lactating cows. The lactating cow ration was properly balanced by a nutritionist in September to meet the nutrient needs for cows producing 85 lbs. of milk per day. The balanced ration fed daily to the cows contains the following amounts (as fed) on a per cow basis:

- 4 lbs. of dry hay
- 20 lbs. ofhaylage per cow
- 55 lbs. of corn silage per cow
- 27 lbs. of grain, concentrates, vitamins and minerals

The cows have recently dropped approximately 8 lbs. of milk per day and the milk fat percentage has dropped to 3.4%. Mr. Anderson would like to get the problem corrected immediately. A veterinarian has checked the cows and confirmed that there are no new, contagious, or chronic disease issues and says to check with a nutritionist. The cows in the early lactation group are averaging a body condition score (BCS) of2.25. Cows in the dry cow group

are a body condition score (BCS) of 4.0.

The day that you arrive, you watch the new employee that is feeding the cows mix a load of feed for the early lactation cows. They are feeding two times per day using a vertical TMR mixer. The mix is being made for 100 cows in the pen. They mix the following amount in the mixer in the following order:

- Dry hay: 200 lbs.
- Haylage: 1,000 lbs.
- Corn silage: 2,750 lbs.
- Grain mix: 1,350 lbs.

After adding all of the ingredients, the TMR is mixed for 30 minutes. The TMR is then fed immediately to the cows. These early lactation cows are housed in a pen with a feed bunk that is 200 feet long. There are 100 freestalls in the pen as well. There are adequate fans in the barn and a properly functioning soaker system on the inside of the feeding lane to prevent heat stress.

The only change that has been recently made with the feeds is that a new bunker of corn silage was just started. The feeder used the front bucket on a tractor to remove the silage from the face, starting in the middle of the pile face. The ration has not been adjusted since they started feeding the new corn silage. An analysis of both the old and the new corn silage has been provided for your information (Table 1 ).

After the ration was mixed, you particle sized the ration using a Penn State Particle Separator. The results from the using the separator were:

- Top screen: 2%
- Middle screen: 40%
- Bottom pan: 58%

In addition to an overall evaluation of his nutrition program, Mr. Anderson has a few specific questions for you:

- What changes should he make to help the cows return to their previous milk production level and how would you work with him to implement these changes?
- Do you have suggestions to increase the percentage of milk fat of the lactating cows?
- Which of the nutrition-related or nutrition management changes would you make first?

# Table 1. Chemical analysis of the original corn silage and the new corn silage.

| CORN SILAGE ANALYSIS | | Date of Analysis: 3/18/2013 | | Date of Analysis: 10/11/2013 | |
|---|---|---|---|---|---|
| | | Original Corn Silage | | New Corn Silage | |
| | | Dry matter basis | As fed basis | Dry matter basis | As fed basis |
| Dry Matter | % | 100 | 34.5 | 100 | 28.2 |
| Crude Protein | % | 7.9 | 2.7 | 8.5 | 2.4 |
| Soluble Protein | % | 54 | 18.6 | 52 | 14.7 |
| Degradable protein | % | 73 | 25.2 | 70 | 19.7 |
| Acid Detergent Fiber | % | 23.5 | 8.1 | 30.5 | 8.6 |
| Neutral detergent fiber | % | 41.5 | 14.3 | 48.9 | 13.8 |
| NDFD, 30 hr | %of NDF | 56.4 | 19.5 | 41.5 | 11.7 |
| Calcium | % | 0.25 | 0.09 | 0.21 | 0.06 |
| Phosphorus | % | 0.24 | 0.08 | 0.26 | - 0.07 |
| Magnesium | % | 0.17 | 0.06 | 0.18 | 0.05 |
| Potassium | % | 1.2 | 0.41 | 1.4 | 0.39 |
| Nitrate | % | negative | | negative | |
| Aflatoxin | ppb | negative | | negative | |
| DON | ppm | negative | | negative | |
| pH | | 4.2 | | 4.5 | |
| Lactic acid | % | 5.6 | | 2.1 | |
| Acetic Acid | % | 2.25 | | 2.4 | |
| Butyric Acid | % | 0.01 | | | |
| Lactic/ Acetic Ratio | | 2.49 | | 0.88 | |

# Example of SWOT Analysis

| STRENGTHS | WEAKNESSES |
|---|---|
| 1. Milk fat, protein, and SCC are good prior to new corn silage | 1. TMR mixing for 30 minutes |
| 2. 2 feet of bunk space per cow | 2. Using a bucket to face the silage pile |
| 3. | 3. New feed samples: 7% higher in fiber 15% lower in digestability |
| 6. | 6. |
| 7. | 7. |
| **OPPORTUNITIES** | **THREATS** |
| 1. On farm moisture testing | 1. 8 lb milk drop .4 % drop in milk fat |
| 2. Retrain feed mixer person | 2. Particle size of diet |
| 3. Check particle size with shaker box | 3. No moisture adjustments to new corn silage (6% change in moisture) |
| 4. Feed multiple groups of cattle | 4. Too large of drop in body condition score |

## Team Activity Worksheet

| STRENGTHS | WEAKNESSES |
|---|---|
| 1. | 1. |
| 2. | 2. |
| 3. | 3. |
| 4. | 4. |
| 5. | 5. |
| **OPPORTUNITIES** | **THREATS** |
| | 1. |
| | 2. |
| | 3. |
| | 4. |
| | 5. |

## Example/Sample Response

| Problems or Opportunities Identified | Relevant Data and Supporting facts | Proposed Solutions |
|---|---|---|
| 1. Length of time TMR is mixed | 1. Penn State shaker box information and lower fat test | 1. Run the mixer less time |
| 2. Moisture testing | 2. Non – Adjustment to new moisture | 2. On farm moisture tester |
| 3. Bunker face | 3. Picture of bunker, use of bucket | 3. silage facer |
| 4. Body condition scores | 4. Body condition scoring | 4. Group cows to nutrition needs |
| 5. Distribution of feed in feed bunk | 5. Picture | 5. Spread it evenly, push up more often |

| Problems or Opportunities Identified | Relevant Data and Supporting facts | Proposed Solutions |
|---|---|---|
| 1. | 1. | 1. |
| 2. | 2. | 2. |
| 3. | 3. | 3. |
| 4. | 4. | 4. |

| | | |
|---|---|---|
| 5. | 5. | 5. |

# Dairy Scenario Presentation Outline

INTRODUCTION: **TEAM MEMBER #1**

1) Introduce the team members

STRENGTHS: **TEAM MEMBER #2**

1) Bunk space
2) Cooling

CHANGES: **TEAM MEMBER #3**

1) TEAM MEMBER R mixing time
2) Moisture Testing

SOLUTIONS: **TEAM MEMBER #4**

Adjust mixing time/proper training for employees,
1) Work with nutritionist or equipment rep
2) Moisture testing on farm

CHANGES: **TEAM MEMBER #1**

1) Bunker face
2) Distribution of feed

SOLUTIONS: **TEAM MEMBER #2**

1) Use silage facer
2) Spread feed out in barn, push up feed

CHANGES: **TEAM MEMBER #3**

1) Body condition scores

SOLUTIONS:

1) Multiple grouping strategies

CHANGES: **TEAM MEMBER #4**

1) Inventory of feeds

SOLUTIONS:

1) Stock pile enough corn silage to let current crop ferment

WRAP UP: **TEAM MEMBER #1**

1) Boots on ground
2) Our team can monitor:

- Feed mixer
- Bunkers
- Body condition scores

Thank You for your time (Shake Hands)

# Answer Key

FFA Dairy, LLC has several positive strengths. The cows are comfortable and the barn is designed to help cool the cows. Up until recently, they have had good milk components. They are not overcrowding the early lactation cows, which should help those cows get off to a good start.

### FEED NOT DISTRIBUTED FULL LENGTH OF FEEDBUNK

One of the easiest problems to fix in this scenario is to place feed along the entire length of the feed bunk. By not feeding the entire length of the feed bunk, there is not enough recommended space for the cows in the pen (24 inches of feed bunk space per cow). From the feed access standpoint, it is good that FFA Dairy, LLC is not overcrowding, but an overcrowding situation is being created by not feeding along the entire feed bunk. The overcrowding can reduce feed access for the cows.

### TMR MIXED TOO LONG

The feeds in the TMR are being mixed much too long. The time stated, 30 minutes, is definitely excessive. The long mixing time is further evidenced by the Penn State Particle Separator results. The amount of the TMR remaining on the top screen is much too low and there is too much in the bottom pan. The amount on the top screen should be between 5 to 10% (note that recommendations will vary between 2 to 10%, but are typically in the 5 to 10% range). There should be 30 to 50% remaining on the middle screen and less than 40% in bottom pan. The over-mixing of the TMR is one of the factors that could be contributing to the reduction in milk fat % from 3.8 to 3.4%.

### CHANGE IN NUTRIENT ANALYSIS OF CORN SILAGE

The rations need to be rebalanced for the new bunker of corn silage as the nutrient value of the corn silage has changed. The changes in nutrient value of the corn silage are likely one of the main reasons for the recent drop in milk production.

- The new corn silage (10/11/13) has greater levels of fiber (neutral detergent fiber [NDF] and acid detergent fiber [ADF]), indicating that the corn silage will contain less energy for the cows.
    - Also, the NDF in the corn silage is much less digestible (41.5% as compared to 56.4% for 30 hr NDF). The decreased digestibility of the fiber will reduce the amount of energy the cows are able to utilize from the corn silage they are consuming.
- The moisture level of the new corn silage has increased dramatically (34.5 to 28.2% dry matter), but the amount of the various feeds being included in the ration has not changed on an as fed basis. This has resulted in the cows receiving less forage in their ration, another possible cause of the reduced milk fat percentage.
- The VFA profile of the new corn silage shows a low level of lactic acid and a high level of acetic acid. This indicates that the silage did not ferment properly and could be leading to palatability issues as well.

### BUNKER MANAGEMENT

The new corn silage appears to have some mold along the edge and the face of the silage is not being managed very well. The face of the bunker is very uneven, providing additional surface area and exposure of the silage to

oxygen. The additional oxygen exposure can increase spoilage and increase the potential for molding.

### TRANSITION COW PROBLEM

The dry cows are too fat and are not transitioning well. Because of transition cow problems, the cows are losing too much weight early during their lactation. Ideally, the dry cows should have a BCS of 3.5 and the early lactation cows would be averaging 2.5 to 2.75.

### NEW FEEDER- LABOR MANAGEMENT

There is a new feeder at FFA Dairy, LLC. The feeder needs to be properly trained to understand dry matter and inclusion of feeds in the TMR, mixing times and strategies for the TMR, and properly placing feed along the entire feed bunk and close enough that the cows are able to reach the feed.

### OTHER CONSIDERATIONS- MULTIPLE RATIONS

Right now, FFA Dairy, LLC is feeding the same TMR to all of the cows. They could consider grouping cows and feeding multiple rations to more closely meet the needs of the cows in the various groups. However, multiple rations do increase the chances of errors and labor management becomes an important factor.

# Dairy Management Exercise Example

Commented [WA3]: Margaret: Do we want to include these questions as they probably aren't going to be the questions on the event test and might confuse the teams during their preparation.

Select best answer for each of the following 40 questions.

1. White blood cells (leukocytes) that move into the udder during inflammation and epithelial cells from milk producing tissues are two type of cells that are measured when your cow is suffering from what?
   A) Pinkeye
   B) Milk Fever
   C) Mastitis
   D) Ketosis
   E) None of the above

2. After milk is picked up at the farm, how often should the bulk tank be washed and sanitized?
   A) Every time it is emptied
   B) Once a Day
   C) Once a week
   D) Monthly
   E) Once a year

3. You recently visited a farm that installed new lights in the freestall barn. The goal was to increase the photoperiod of the cows by providing them with 16-18 hours of light to increase milk production. What hormone is released by the pineal gland in response to this lighting change?
   A) Oxytocin
   B) Melatonin
   C) Progesterone
   D) Prostaglandin
   E) Relaxin

4. When lameness caused by abscesses, infection, foot rot or injury is common in a dairy herd, what should the owner implement immediately to help reduce lameness in his herd?
   A) Footbath
   B) New bedding
   C) Change milking times
   D) Increase the moisture in the bedding pack
   E) All of the above

5. It is often said you can't improve what you can't measure. The Brix refractometer is a tool used on many dairy farms to help estimate or measure what?
   A) Wither height
   B) Light quality
   C) Cow's reaction time
   D) Amount of bacteria in milk
   E) Colostrum quality

6. Healthy calves are essential to any dairy operation. To be a better grower of calves you have joined the Dairy Calf & Heifer Association. According to this organization, how many quarts of colostrum should a calf receive in the first four hours of life?
   A) 1 quart
   B) 2 quarts
   C) 4 quarts
   D) 8 quarts
   E) 12 quarts

7. If there are large numbers of flies around the dairy barn, what should be the first thing to be examined in an attempt to solve the fly problem?
   A) Cow feeding procedures
   B) Milking procedures
   C) Calf feeding procedures
   D) Manure handling procedures
   E) Mowing the grass

8. Mastitis is a growing problem on your neighbor's farm. You notice that he is bedding his cows with straw. You recommend that he should change his bedding to what to help decrease the amount of bacteria?
   A) Sawdust
   B) Sand
   C) Compost
   D) Chopped Bark
   E) All of the above will work

9. When using a body condition scoring system of 1 to 5, what does a score of 1 mean?
   A) Extremely thin
   B) Average body condition
   C) Extremely fat
   D) Above average body condition
   E) These are the best cows in the herd

10. Paul Bunyan's ox "Babe" had a rare genetic disorder that caused him to be blue. Both his parents were apparently normal. What are the odds his next full-sib will be blue?
    A) 25%
    B) 50%
    C) 67%
    D) 75%
    E) 100%.

11. In what part of whole milk are most of the off-flavors found?
    A) Protein
    B) Lactose
    C) Butterfat
    D) Water
    E) Minerals

12. A cow is almost ready to calf. You observe excessive fluid accumulation in the udder and surrounding tissues. What do we call this condition?
    A) Ketosis
    B) Udder Edema
    C) IBR
    D) Mastitis
    E) Bangs

13. This dairy breed was originally used for milk, meat and draft purposes. Today it is known for high protein to fat ratio, longevity, sound feet and legs, and having few health problems. Which breed is this?
    A) Guernsey
    B) Milking Shorthorn
    C) Jersey
    D) Brown Swiss
    E) Holstein

14. The following information is listed concerning a cow: 305 3X 35,234 4.2 1480 3.2 1127 Which of the following is not correct?
    A) 305 day lactation
    B) Milked three times per day
    C) Milk contained 4.2 % milk fat
    D) Milk contained 3.2% milk fat
    E) Milk contained 3.2% milk protein

15. You infuse an antibiotic into a cow's udder to treat her for mastitis, how should her milk be handled?
    A) Discard milk from treated quarter according to label
    B) Discard milk from treated quarter for 72 hours
    C) Discard all milk according to label
    D) Discard all milk for 72 hours
    E) Discard all milk for 96 hours

16. What state is currently working on a proposal to establish a new Federal Milk Marketing Order?
    A) New Mexico
    B) Wisconsin
    C) California
    D) Washington
    E) Michigan

17. Absorption of antibodies from colostrum primarily takes place in which compartment of a calf's stomach?
    A) Abomasum
    B) Omasum
    C) Reticulum
    D) Rumen
    E) Small Intestine

18. During evening chores you notice one of your heifers is not feeling well and is in need of treatment. After reading the product label you are using for treatment, you learn that the shot has to be given IM. Where is the injection site located on your heifer?
    A) In the muscle of the neck
    B) In the vein
    C) In the fat tissue

D) Under the skin
E) It doesn't matter

19. The Council on Dairy Cattle Breeding recently reported the following milestone achieved in genotyping dairy animals in August 2015.
A) 500,000 genotyped
B) 750,000 genotyped
C) 1 million genotyped
D) The first animal with 100% of its genome typed
E) 3 million genotyped

20. All quality assurance programs insist that a farmer have what type of on-going relationship with their veterinary?
A) Veterinary Client Patient Relationship (VCPR)
B) A relationship is not required
C) Telephone contact only
D) First name basis
E) None of the above

21. The dairy cow has the ability to digest some of the plant carbohydrates which animals with simple stomachs cannot. Which of the following is not one of these carbohydrates?
A) Cellulose
B) Lignin
C) Hemicellulose
D) Starch
E) Pectin

22. Cull heifers and cows have been treated with hormones to cause them to become sexually active as heat check animals. What is the primary hormone that is used?
A) Estrogen
B) Progesterone
C) LH
D) FSH
E) Testosterone

23. Which of the following countries was the number 1 milk and milk product importer in 2014?
A) Japan
B) Algeria
C) Saudi Arabia
D) China
E) Russian Federation

24. This waxy substance found in the teat duct limits bacterial growth and provides a physical barrier against bacteria.
A) Alveoli
B) Keratin
C) Myoepithelial
D) Prolactin
E) Papillae

25. Little Miss Muffet sat on her tuffet, eating her curds and whey. How many pounds of whey are produced from 10 pounds of milk?
A) 1 pound

B) 10 pounds
C) 9 pounds
D) 5 pounds
E) 0 pounds.

26. When a dairy farm operation is owned by a single individual, what type of business entity is this called?
A) Limited Liability Corporation
B) Limited Liability Partnership
C) C Corporation
D) S Corporation
E) Sole proprietorship

27. What corn forage is typically harvested with a forage harvester equipped with an ear-snapper header? The ear should be chopped with a short length-of-cut and then well processed with the on-board kernel processor.
A) Earlage
B) Snaplage
C) Corn Silage
D) Haylage
E) All of the above

28. What is the name of the new fluid milk beverage that is ultra-filtered that Coca-Cola is producing with Select Milk Producers?
A) Dairy Pure
B) TruMoo
C) Muscle Milk
D) Fairlife
E) CocaMoo.

29. What is the name of the international organization of educators, scientists and industry representatives who are committed to advancing the dairy industry? The Journal of Dairy Science is the organization's official publication.
A) American Dairy Science Association
B) American Dairy Association
C) International Dairy Producers
D) American Animal Science Association
E) Dairy Herd Improvement Association

30. Which of the following countries was the number 1 exporter of milk and milk products in 2014.
A) New Zealand
B) European Union
C) United States
D) Belarus
E) Australia

31. The PMO regulations govern the production, hauling, processing, packaging and storage of which type and grades of milk?
    A) Only Grade A milk,
    B) Both Grade A and manufacturing milk
    C) Manufacturing grade milk only
    D) Grade B only
    E) Processing grade milk and Grade A.

32. In the reproductive cycle, the level of what hormone in the blood decreases when the corpus luteum is destroyed?
    A) Relaxin
    B) Testosterone
    C) Oxytocin
    D) Progesterone
    E) Prostaglandin

33. After harvesting corn silage, you take a soil test. The test shows your field is high in phosphorus and low in potassium. Which of the following fertilizers would you not apply in order to reduce the potential of phosphorus run off?
    A) 0-0-44
    B) 46-0-0
    C) 0-0-50
    D) 11-52-0
    E) 18-4-12

34. On a dairy farm where foot rot problems have been identified in the herd as a major cause of lameness, which common material is used in the footbath to prevent foot rot:
    A) Copper sulfate
    B) Calcium carbonate
    C) Sodium chloride
    D) Monosodium phosphate
    E) Iron oxide

35. This fatal cattle disease destroys the intestinal lining of ruminants with its major symptom being diarrhea?
    A) IBR
    B) Johne's disease
    C) Listeria
    D) Leukosis
    E) Black Leg

36. Which group of cattle should not be vaccinated with a modified live bovine virus diarrhea vaccine:
    A) Calves
    B) Pre-pubertal heifers
    C) Open cows and heifers
    D) Pregnant cows and heifers
    E) None of the above

37. Which vitamin is often recommended as a feed additive to minimize the occurrence of fatty liver and ketosis in fresh cows?
    A) Niacin (B-3)
    B) Vitamin A
    C) Thiamine (B-1)
    D) Vitamin E
    E) Biotin (B-7)

38. When the environmental temperature falls below 30 degrees F, the normal diet of a young calf should be supplemented with?
    A) Water
    B) Energy
    C) Protein
    D) Vitamin A
    E) Warm fresh milk

39. A cow who has recently calved has had her blood tested. The test shows that she has a calcium deficiency more than likely related to an imbalance of calcium, phosphorus and Vitamin D. Which disease is the cow suffering from?
    A) Blackleg
    B) Ketosis
    C) Milk Fever
    D) Johne's
    E) Hardware

40. In the updated 2009 PDCA Dairy Cow Unified Scorecard, in the dairy strength category which trait receives the highest priority?
    A) Ribs
    B) Chest
    C) Barrel
    D) Thighs
    E) Neck

*Prepared by K.L. Heckaman, Purdue Extension – Kosciusko County, Warsaw, IN*

# Official Answers for Dairy Management Exercise:

| | | | |
|---|---|---|---|
| 1. | D | 21. | C |
| 2. | C | 22. | B |
| 3. | B | 23. | B |
| 4. | D | 24. | D |
| 5. | E | 25. | D |
| 6. | A | 26. | C |
| 7. | A | 27. | A |
| 8. | C | 28. | B |
| 9. | C | 29. | D |
| 10. | D | 30. | E |
| 11. | B | 31. | A |
| 12. | A | 32. | C |
| 13. | A | 33. | A |
| 14. | C | 34. | D |
| 15. | D | 35. | D |
| 16. | E | 36. | E |
| 17. | E | 37. | A |
| 18. | C | 38. | C |
| 19. | A | 39. | A |
| 20. | E | 40. | B |

# Herd Record Evaluation Example

Select the one cow that best answers each of the following 10 questions.

**For questions 1 through 10, use the "herd record evaluation".**

6. Indicate which cow is potentially suffering from rumen acidosis.
7. Which cow should be the next one to be dried off after the testing date, assuming that breeding dates are accurate?
8. Indicate which cow has the highest index value that selects for the improvement of milk, fat, and protein yield, somatic cell score and productive life.
9. Which cow has the lowest mature equivalent for fat?
10. Indicate the cow having the least impact on the somatic cell count in the bulk tank.
11. Indicate which cow is having the most impact on the somatic cell count in the bulk tank.
12. Select the cow that will transmit the lowest expected breeding value to her offspring for milk.
13. Select which cow will be the next one to calve after the testing date, assuming normal gestation length.
14. Determine the cow with the highest expectation among the cows for the value of a future lactation's production, relative to the herd average.
15. Select the cow which is the most significantly underweight.

*Prepared by K.L. Heckaman, Purdue Extension – Kosciusko County, Warsaw, Ind.*

**Commented [WA4]:** Renumber the following questions to be correct: 1-10

## 2014 National FFA Dairy Cattle Event - Dairy Herd Record Evaluation - Management Quiz

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Date of Test: 8-13-2015 | | | | | Report Information current through 8-13-15 | | | | | | | | | | | | | | | | | | | page 1 |
| 4 | | | X-b | | | Test Day Production | | | | | | | | | | | Current Lactation | | | | | | | | | Net |
| 5 | scc | date | r | Repro | BCS | milk | fat | protein | s | Cow | .....status... | | days | age @ | | days | milk | fat | prot | MatureEquivalent | | | ERPA | PTA | Merit |
| 6 | | bred | e | Code | | # | % | % | c | No. | date | code | dry | calving | | in | # | # | # | milk | fat | prot | $$ | milk | $$$ |
| 7 | 1000's | | d | | | | | | s | | | | | (months) | | milk | | | | # | # | # | Dev | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | 35 | | | C | 3.25 | 113.1 | 3.3 | 3.0 | 1.5 | **460** | 02/22/15 | 2 | | 116 | # | 171 | 19,208 | 676 | 542 | 26,747 | 954 | 796 | 126 | | |
| 10 | 93 | 1/8/15 | 3 | P | 3.75 | 31.6 | 4.2 | 3.5 | 2.9 | **564** | 05/18/14 | 2 | | 81 | # | 451 | 36,896 | 1,468 | 1,183 | 26,826 | 1,113 | 882 | 59 | 84 | 223 |
| 11 | 44 | | | | 2.00 | 117.6 | 3.6 | 2.9 | 1.8 | **569** | 07/15/15 | 2 | | 94 | # | 28 | 1,313 | 51 | 43 | | | | -616 | 536 | 11 |
| 12 | 81 | 6/4/15 | 1 | P | 2.75 | 107 | 2.8 | 2.8 | 2.7 | **570** | 02/21/15 | 2 | | 89 | # | 172 | 19,060 | 635 | 549 | 25,008 | 795 | 762 | 73 | -198 | 114 |
| 13 | | 12/18/14 | 2 | P | 3.25 | Dry | | | | **594** | 07/02/15 | 3 | 41 | 77 | # | 348 | 32,391 | 1,119 | 953 | 28,706 | 1,030 | 867 | 156 | 578 | -35 |
| 14 | | 12/18/14 | 1 | P | 3.50 | Dry | | | | **607** | 07/24/15 | 3 | 19 | 75 | # | 366 | 30,971 | 1,163 | 922 | 26,040 | 1,005 | 794 | -175 | -320 | 157 |
| 15 | 33 | | | C | 2.75 | 128.1 | 3.1 | 2.5 | 1.4 | **612** | 02/09/15 | 2 | | 80 | # | 184 | 20,933 | 630 | 534 | 27,821 | 877 | 749 | 37 | 444 | -64 |
| 16 | 23 | 4/23/15 | 5 | P | 3.00 | 76.9 | 4.1 | 2.8 | 0.9 | **618** | 08/23/14 | 2 | | 74 | # | 354 | 41,103 | 1,268 | 1,182 | 35,123 | 1,113 | 1,036 | 484 | 780 | 158 |
| 17 | 29 | 4/23/15 | 1 | P | 3.25 | 90.4 | 2.8 | 2.8 | 1.2 | **626** | 12/14/14 | 2 | | 76 | # | 241 | 24,126 | 493 | 699 | 25,611 | 506 | 789 | -750 | 175 | -183 |
| 18 | 264 | 5/14/15 | 1 | P | 2.75 | 107 | 3.0 | 2.6 | 4.4 | **627** | 02/17/15 | 2 | | 78 | # | 176 | 20,552 | 750 | 550 | 26,115 | 934 | 740 | 324 | 430 | 195 |
| 19 | 1715 | 1/29/15 | 2 | P | 3.00 | 15 | 3.7 | 4.0 | 7.1 | **633** | 07/15/14 | 2 | | 70 | # | 393 | 38,887 | 1,327 | 1,111 | 32,900 | 1,190 | 963 | 797 | 697 | 221 |
| 20 | 18 | 7/17/15 | 3 | | 3.75 | 79.9 | 2.8 | 2.8 | 0.5 | **648** | 01/21/15 | 2 | | 73 | # | 203 | 22,531 | 655 | 623 | 24,596 | 705 | 712 | -406 | 808 | 270 |
| 21 | 13 | 4/2/15 | 1 | P | 2.75 | 75.4 | 2.9 | 2.7 | 0.1 | **650** | 01/22/15 | 2 | | 73 | # | 202 | 18,356 | 609 | 493 | 20,778 | 697 | 585 | -587 | 2 | 145 |
| 22 | 13 | | | | 3.25 | 117.6 | 2.8 | 2.4 | 0.1 | **651** | 06/21/15 | 2 | | 78 | # | 52 | 3,687 | 121 | 103 | 23,327 | 379 | 664 | -396 | 437 | 48 |
| 23 | 13 | | | | 2.75 | 129.6 | 3.4 | 2.7 | 0.1 | **652** | 04/12/15 | 2 | | 75 | # | 122 | 11,888 | 486 | 347 | 24,767 | 773 | 769 | -63 | -161 | 12 |
| 24 | 44 | 2/19/15 | 1 | P | 3.25 | 58.8 | 4.3 | 3.4 | 1.8 | **657** | 11/20/14 | 2 | | 70 | # | 265 | 29,282 | 1,181 | 829 | 27,334 | 1,135 | 812 | -22 | 246 | 369 |
| 25 | 44 | 4/23/15 | 3 | P | 3.00 | 52.7 | 3.2 | 2.8 | 1.8 | **658** | 08/21/14 | 2 | | 66 | # | 356 | 31,400 | 967 | 898 | 27,419 | 876 | 806 | -458 | 742 | 26 |
| 26 | | 12/18/14 | 4 | P | 3.25 | Dry | | | | **661** | 07/02/15 | 3 | 41 | 60 | # | 475 | 40,566 | 1,474 | 1,152 | 30,039 | 1,138 | 858 | 139 | 196 | 97 |
| 27 | | 11/6/14 | 1 | P | 3.25 | Dry | | | | **662** | 06/10/15 | 3 | 63 | 64 | # | 326 | 23,092 | 945 | 733 | 21,182 | 897 | 686 | -538 | -595 | 186 |
| 28 | 13 | 7/17/15 | 2 | | 3.25 | 110 | 2.8 | 2.3 | 0.1 | **672** | 02/13/15 | 2 | | 68 | # | 180 | 25,710 | 677 | 623 | 30,865 | 854 | 779 | 502 | | |
| 29 | | 12/18/14 | 1 | P | 3.25 | Dry | | | | **674** | 07/24/15 | 3 | 19 | 63 | # | 313 | 32,320 | 1,356 | 904 | 29,160 | 1,258 | 834 | -127 | 165 | 26 |
| 30 | 13 | 7/17/15 | 2 | | 2.75 | 105.5 | 3.8 | 2.9 | 0.1 | **675** | 03/16/15 | 2 | | 69 | # | 149 | 14,440 | 562 | 456 | 22,976 | 816 | 772 | 209 | -150 | 248 |
| 31 | 18 | | | C | 3.25 | 128.1 | 2.6 | 2.5 | 0.5 | **686** | 05/21/15 | 2 | | 70 | # | 83 | 9,931 | 291 | 273 | 26,068 | 528 | 755 | 134 | 1,234 | 326 |
| 32 | 13 | 7/17/15 | 1 | | 3.00 | 107 | 3.0 | 2.7 | 0.1 | **689** | 04/12/15 | 2 | | 68 | # | 122 | 15,501 | 601 | 429 | 25,870 | 791 | 764 | 425 | 1,406 | 346 |
| 33 | | 11/26/14 | 1 | P | 3.50 | Dry | | | | **695** | 06/10/15 | 3 | 63 | 56 | # | 378 | 25,434 | 1,006 | 777 | 21,180 | 868 | 658 | -695 | -244 | 17 |
| 34 | 13 | | | C | 3.00 | 110 | 3.4 | 2.6 | 0.1 | **698** | 05/18/15 | 2 | | 68 | # | 86 | 7,729 | 281 | 215 | 22,238 | 551 | 655 | -769 | -626 | 59 |
| 35 | 1970 | 6/25/15 | 1 | N | 3.25 | 125.1 | 2.7 | 2.5 | 7.3 | **701** | 04/01/15 | 2 | | 65 | # | 133 | 15,832 | 491 | 411 | 27,366 | 712 | 753 | 5 | 1,265 | 260 |
| 36 | 31 | 6/25/15 | 3 | N | 3.25 | 116.1 | 2.6 | 2.5 | 1.3 | **704** | 12/21/14 | 2 | | 61 | # | 234 | 29,897 | 874 | 759 | 32,854 | 962 | 884 | 880 | 1,442 | 340 |
| 37 | 13 | 6/25/15 | 1 | P | 2.75 | 104 | 3.4 | 2.7 | 0.1 | **708** | 03/22/15 | 2 | | 63 | # | 143 | 16,094 | 495 | 452 | 24,867 | 724 | 742 | -434 | 504 | 344 |
| 38 | | 12/18/14 | 2 | P | 3.00 | Dry | | | | **709** | 07/24/15 | 3 | 19 | 54 | # | 399 | 36,959 | 1,124 | 1,083 | 29,782 | 950 | 874 | 96 | 859 | 298 |
| 39 | 54 | | | | 3.00 | 132.7 | 4.5 | 3.1 | 2.1 | **711** | 07/13/15 | 2 | | 66 | # | 30 | 1,718 | 85 | 61 | | | | 503 | 260 | 491 |
| 40 | | 12/18/14 | 2 | P | 3.25 | Dry | | | | **712** | 07/24/15 | 3 | 19 | 53 | # | 398 | 33,928 | 1,316 | 1,070 | 27,827 | 1,121 | 890 | 350 | 629 | 161 |
| 41 | 429 | | | | 3.00 | 110 | 3.5 | 2.4 | 5.1 | **723** | 06/22/15 | 2 | | 64 | # | 51 | 3,561 | 116 | 87 | 22,777 | 421 | 564 | -114 | 676 | 184 |
| 42 | 15 | 6/25/15 | 3 | P | 3.25 | 105.5 | 3.5 | 2.8 | 0.3 | **730** | 12/17/14 | 2 | | 56 | # | 238 | 29,412 | 909 | 865 | 31,856 | 1,038 | 991 | 622 | 992 | 169 |
| 43 | 123 | 1/9/15 | 1 | P | 3.00 | 33.1 | 3.7 | 3.3 | 3.3 | **738** | 08/28/14 | 2 | | 52 | # | 349 | 30,103 | 1,087 | 844 | 27,938 | 1,047 | 796 | 182 | 630 | 331 |
| 44 | 33 | 6/4/15 | 1 | P | 2.50 | 110 | 3.0 | 3.0 | 1.4 | **744** | 03/15/15 | 2 | | 57 | # | 150 | 18,628 | 627 | 504 | 27,416 | 842 | 793 | 311 | 347 | 208 |
| 45 | 152 | 4/23/15 | 3 | P | 4.00 | 46.7 | 3.4 | 3.0 | 3.6 | **745** | 09/10/14 | 2 | | 51 | # | 336 | 29,962 | 1,166 | 888 | 27,543 | 1,095 | 822 | 268 | 86 | 185 |
| 46 | | 12/18/14 | 2 | P | 3.25 | Dry | | | | **746** | 07/24/15 | 3 | 19 | 49 | # | 369 | 31,310 | 1,201 | 939 | 28,112 | 1,114 | 850 | 146 | 429 | 227 |
| 47 | 23 | 7/17/15 | 2 | | 3.50 | 117.6 | 3.7 | 2.9 | 0.9 | **748** | 03/16/15 | 2 | | 57 | # | 149 | 17,657 | 691 | 539 | 27,292 | 986 | 894 | 588 | -97 | 260 |
| 48 | 13 | 7/17/15 | 2 | | 3.25 | 107 | 2.9 | 2.7 | 0.1 | **749** | 02/12/15 | 2 | | 56 | 2 | 181 | 18,600 | 759 | 524 | 25,034 | 955 | 742 | 148 | 548 | 297 |
| 49 | 17 | 6/4/15 | 1 | P | 3.00 | 123.6 | 1.5 | 2.9 | 0.4 | **753** | 03/17/15 | 2 | | 57 | 2 | 148 | 18,501 | 390 | 481 | 28,608 | 507 | 797 | 324 | 1,141 | 310 |
| 50 | 57 | 1/10/15 | 1 | P | 3.00 | 48.2 | 3.7 | 3.4 | 2.2 | **757** | 10/16/14 | 2 | | 52 | 1 | 300 | 29,223 | 1,177 | 901 | 27,419 | 1,119 | 859 | 72 | 135 | 196 |
| 51 | 38 | 6/4/15 | 1 | P | 3.50 | 85.9 | 4.6 | 3.2 | 1.6 | **758** | 02/20/15 | 2 | | 56 | 2 | 173 | 16,213 | 794 | 472 | 21,474 | 1,068 | 657 | 31 | -154 | 226 |
| 52 | 87 | 7/17/15 | 3 | | 3.25 | 116.1 | 2.8 | 2.8 | 2.8 | **759** | 11/17/14 | 2 | | 52 | 2 | 268 | 34,512 | 876 | 936 | 35,820 | 907 | 994 | 613 | 1,082 | 366 |
| 53 | 115 | 4/23/15 | 3 | P | 4.25 | 93.4 | 3.8 | 3.1 | 3.2 | **765** | 09/10/14 | 2 | | 49 | | 336 | 32,608 | 1,173 | 1,005 | 29,644 | 1,085 | 920 | 328 | 202 | 265 |
| 54 | 54 | 6/25/15 | 3 | P | 3.00 | 82.9 | 3.8 | 3.3 | 2.1 | **767** | 12/14/14 | 2 | | 53 | | 241 | 24,741 | 844 | 785 | 26,482 | 950 | 885 | 42 | 370 | 438 |
| 55 | | 11/7/14 | 1 | P | 3.25 | Dry | | | | **769** | 06/10/15 | 3 | 62 | 47 | | 321 | 24,342 | 807 | 708 | 23,739 | 815 | 701 | -893 | -129 | 56 |
| 56 | 13 | | | | | 123.6 | 2.7 | 2.7 | 0.1 | **770** | 04/11/15 | 2 | | 56 | | 123 | 14,821 | 574 | 397 | 27,513 | 761 | 779 | 222 | 554 | 347 |
| 57 | 17 | 7/17/15 | 3 | | | 105.5 | 3.3 | 2.7 | 0.4 | **771** | 12/19/14 | 2 | | 52 | | 236 | 26,258 | 938 | 753 | 29,785 | 1,066 | 893 | 145 | 552 | 308 |
| 58 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 59 | **Somatic** | | **P Pregnant** | | | | | | **Somatic** | | | **Status Codes** | | | | | | | | | | | | | |
| 60 | **Cell** | | **W Preg W Twins** | | | **Body** | | | **Cell** | | | | | | | | | | | | | | | | |
| 61 | **Count** | | **N Open** | | | **Condition** | | | **Score** | | | | | | | | | | | | | | | | |
| 62 | **(1000's)** | | **C Do not breed** | | | **Score** | | | **(linear)** | | | **2 Milking 2nd lactation or greater** | | | | | | | | | | | | | |
| 63 | | | | | | | | | | | | **3 Dry** | | | | | | | | | | | | | |
| 64 | | | | | | | | | | | | **6 First Lactation** | | | | | | | | | | | | | |
| 65 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 66 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 67 | | | | | | Prepared by K.L. Heckaman, Purdue Extension - Kosciusko County, Warsaw, IN & L. Glista, NorthStar Cooperative, E. Lansing, MI | | | | | | | | | | | | | | | | | | | | |
| 68 | | | | | | | | | | | | | | | | | | | | | | | | | |

# Key DHI Benchmarks from Dairy Metrics

| | PERCENTILE | | |
|---|---|---|---|
| | 50TH | 75TH | 95TH |
| Holstein Herds (N=73) with at least 100 cows | | | |
| Rolling Milk | 19388.6 | 21482.4 | 24494.6 |
| Rolling Fat | 702.4 | 778.4 | 887.8 |
| Rolling Protein | 595.4 | 657.4 | 746.6 |
| Daily Milk-Milk cows | 59.0 | 65.6 | 75.1 |
| Summit Milk 1st Lactation | 66.2 | 72.4 | 81.3 |
| Summit Milk 2nd Lactation | 82.1 | 90.3 | 102.2 |
| Summit Milk 3rd+ Lactation | 87.4 | 95.9 | 108.1 |
| Peak Milk 1st Lactation | 71.8 | 78.5 | 88.2 |
| Peak Milk 2nd Lactation | 88.8 | 98.2 | 111.7 |
| Peak Milk 3rd+ Lactation | 95.2 | 103.7 | 115.9 |
| Proj 305 Day ME Milk | 21502.8 | 23491.3 | 26352.0 |
| Standardized 150 Day Milk | 67.6 | 75.2 | 86.0 |
| Days in Milk | 210.9 | 191.4 | 163.4 |
| Age of 1st Lactation Cows | 26.5 | 24.8 | 22.4 |
| Cows Left Herd-All Lactations, % | 34.5 | 25.0 | 11.3 |
| Cows Died-All Lactations, % | 7.4 | 4.0 | 0.0 |
| Cows Left Herd for Repro-All Lactations, % | 5.5 | 1.3 | 0.0 |
| SCC Actual | 397.0 | 273.0 | 94.5 |
| SCC Score | 3.2 | 2.8 | 2.2 |
| SCC Score for 1st Lact Cows | 2.8 | 2.4 | 1.8 |
| SCC Score for 2nd Lact Cows | 3.1 | 2.6 | 1.9 |

| | PERCENTILE | | |
|---|---|---|---|
| | 50TH | 75TH | 95TH |
| Holstein Herds (N=73) with at least 100 cows | | | |
| SCC Score for 3rd+ Lact Cows | 3.6 | 3.1 | 2.4 |
| Cows (SCCS of 0-3), % | 57.9 | 65.2 | 75.7 |
| 1st lact (SCCS of 0-3), % | 65.0 | 72.7 | 83.8 |
| 2nd lact (SCCS of 0-3), % | 60.9 | 70.1 | 83.4 |
| 3rd lact (SCCS of 0-3), % | 50.1 | 59.4 | 72.8 |
| Pregnancy Rate-Current, % | 13.5 | 19.7 | 28.6 |
| Days Open-Projected Minimum-Total Herd | 180.7 | 155.6 | 119.5 |
| Projected Calving Interval | 15.2 | 14.3 | 12.9 |
| Actual Calving Interval | 14.5 | 13.7 | 12.5 |
| Days to 1st Service-(%herd < VWP) | 19.2 | 28.0 | 40.7 |
| Days to 1st Service-(%VWP to 100D) | 44.8 | 56.9 | 74.2 |
| Days to 1st Service-(%herd > 100D) | 37.5 | 49.9 | 67.8 |
| Days to 1st Service-Total Herd | 108.1 | 84.0 | 49.2 |
| Days to 1st Service(%herd <100D)-1st Lact | 62.5 | 76.3 | 96.1 |
| Days to 1st Service(%herd <100D)-2nd Lact | 65.5 | 79.2 | 98.9 |
| Days to 1st Service(%herd <100D)-3rd+ Lact | 63.0 | 74.1 | 90.1 |
| Conception Rate for Past 12M-1st Service, % | 48.4 | 66.5 | 92.6 |
| Conception Rate for Past 12M-2nd Service, % | 45.1 | 63.9 | 90.8 |
| Conception Rate for Past 12M-3rd+ Service, % | 35.0 | 51.9 | 76.3 |
| Service per Preg-All Lact | 2.5 | 1.8 | |
| Service per Preg-1st Lact | 2.5 | 1.8 | |
| Service per Preg-2nd Lact | 2.6 | 1.7 | |

| | PERCENTILE | | |
|---|---|---|---|
| | 50TH | 75TH | 95TH |
| Holstein Herds (N=73) with at least 100 cows | | | |
| Service per Preg-3rd+ Lact | 2.6 | 1.8 | |
| Heats Observed, % | 29.7 | 42.1 | 60.0 |
| Percentile Rank of Proven AI Bulls | 40.0 | 61.8 | 93.1 |

# Herd Record Evaluation Answer Key

| Cow No. | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 460 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 564 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 569 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 |
| 570 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 594 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 607 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 612 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 618 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 626 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 627 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 633 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 648 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 650 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| 651 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 652 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 657 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 658 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 661 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 662 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 |
| 672 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 674 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 675 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 686 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 689 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 695 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 698 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 |
| 701 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| 704 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| 708 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 709 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 711 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 712 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 723 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| 730 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 738 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 744 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 745 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 746 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 748 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 749 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 753 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 757 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 758 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 759 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 765 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 767 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 769 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| 770 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 771 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

3= full credit answer

1&2= partial credit answer

*Prepared by K.L. Heckaman, Purdue Extension - Kosciusko County, Warsaw, IN*

# Agriculture, Food and Natural Resources Content Standards

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| **ABS.01.02. Performance Indicator: Read, interpret, evaluate and write statements of purpose to guide business goals, objectives and resource allocation.** | | |
| ABS.01.02.02.c. Evaluate AFNR business goals and objectives, then make revisions based on data and observations. | Team Activity – Content | CCSS.ELA-LITERACY.W.9-10.2<br>CCSS.ELA-LITERACY.W.11-12.2<br>CCSS.ELA-LITERACY.W.9-10.9<br>CCSS.ELA-LITERACY.W.11-12.9<br>CCSS.ELA-LITERACY.RI.9-10.4<br>CCSS.ELA-LITERACY.RI.11-12.4 |
| **ABS.01.03. Performance Indicator: Devise and apply management skills to organize and run an AFNR business in an efficient, legal and ethical manner.** | | |
| ABS.01.03.01.c. Devise strategies to improve the operation of AFNR businesses using management skills. | Team Activity – Content<br>Event Exam | CCSS.ELA-LITERACY.SL.9-10.6<br>CCSS.ELA-LITERACY.SL.11-12.6<br>CCSS.ELA-LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY.L.11-12.6<br>CCSS.ELA-LITERACY.RST.9-10.4<br>CCSS.ELA-LITERACY.RST.11-12.4 |
| ABS.01.03.02.c. Devise management or operational strategies to address and adhere to local, state, federal, international and industry regulations. | Team Activity – Content<br>Event Exam | CCSS.ELA-LITERACY.SL.9-10.6<br>CCSS.ELA-LITERACY.SL.11-12.6<br>CCSS.ELA-LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY.L.11-12.6<br>CCSS.ELA-LITERACY.RST.9-10.4<br>CCSS.ELA-LITERACY.RST.11-12.4 |
| **ABS.02.02. Performance Indicator: Assemble, interpret and analyze financial information and reports to monitor AFNR business performance and support decision-making (e.g., income statements, balance sheets, cash-flow analysis, inventory reports, break-even analysis, return on investment, taxes, etc.).** | | |
| ABS.02.02.01.b. Prepare and interpret financial reports to describe the performance of AFNR businesses (e.g., efficiency, profitability, net worth, financial ratios, etc.). | Team Activity – Content<br>Event Exam | CCSS.ELA-LITERACY.W.9-10.9<br>CCSS.ELA-LITERACY.W.11-12.9<br>CCSS.ELA-LITERACY.RH.9-10.7<br>CCSS.ELA-LITERACY.RH.11-12.7<br>CCSS.MATH.CONTENT.HSS.ID.C.7<br>CCSS.MATH.CONTENT.HSS.IC.B.6<br>CCSS.MATH.CONTENT.HSN.Q.A.1<br>Savings: Benchmarks: Grade 12, Statements 3<br>Savings: Benchmarks: Grade 12, Statements 4<br>Savings: Benchmarks: Grade 12, Statements 6<br>Savings: Benchmarks: Grade 12, Statements 7<br>Financial Investing: Benchmarks: Grade 12, Statement 2 |
| ABS.02.02.02.c. Create recommendations to improve management of inventory in AFNR businesses (e.g., maintaining optimal levels, calculating costs of carrying input and output inventory, supply chain management, etc.). | Team Activity – Content<br>Team Activity - Presentation<br>Event Exam | CCSS.ELA-LITERACY.W.9-10.9<br>CCSS.ELA-LITERACY.W.11-12.9<br>CCSS.ELA-LITERACY.RH.9-10.7<br>CCSS.ELA-LITERACY.RH.11-12.7<br>CCSS.MATH.CONTENT.HSS.ID.C.7 |

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| | | CCSS.MATH.CONTENT.HSS.IC.B.6<br>CCSS.MATH.CONTENT.HSN.Q.A.1<br>Savings: Benchmarks: Grade 12, Statements 3<br>Savings: Benchmarks: Grade 12, Statements 4<br>Savings: Benchmarks: Grade 12, Statements 6<br>Savings: Benchmarks: Grade 12, Statements 7<br>Financial Investing: Benchmarks: Grade 12, Statement 2 |
| **ABS.03.01. Performance Indicator: Develop, assess and manage cash budgets to achieve AFNR business goals.** | | |
| ABS.03.01.01.b. Examine and interpret cash budgets for AFNR businesses. | Team Activity – Content<br>Event Exam | CCSS.ELA-LITERACY.RH.9-10.7<br>CCSS.ELA-LITERACY.RH.11-12.7<br>CCSS.ELA- LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY. L.11-12.6<br>CCSS.ELA- LITERACY.RST.9-10.4<br>CCSS.ELA- LITERACY.RST.11-12.4<br>CCSS.MATH.CONTENT.HSS.IC.B.6 |
| ABS.03.01.02.c. Predict the impact of management decisions on cash budgets in AFNR businesses. | Team Activity – Process<br>Team Activity – Content<br>Event Exam | CCSS.ELA-LITERACY.RH.9-10.7<br>CCSS.ELA-LITERACY.RH.11-12.7<br>CCSS.ELA- LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY. L.11-12.6<br>CCSS.ELA- LITERACY.RST.9-10.4<br>CCSS.ELA- LITERACY.RST.11-12.4<br>CCSS.MATH.CONTENT.HSS.IC.B.6 |
| **ABS.04.02. Performance Indicator: Develop production and operational plans for an AFNR business.** | | |
| ABS.04.02.01.c. Make recommendations to improve operational plans for an AFNR business based on best practices. | Team Activity – Process<br>Team Activity – Content<br>Team Activity - Presentation | AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3<br>CCSS.ELA-LITERACY.ELA-W.9-10.2<br>CCSS.ELA-LITERACY.W.11-12.2<br>CCSS.ELA-LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY.L.11-12.6<br>CCSS.ELA-LITERACY.RST.9-10.4<br>CCSS.ELA-LITERACY.RST.11-12.4 |
| ABS.04.02.02.c. Create strategies to improve the production process of an agricultural product for an AFNR facility (e.g., SWOT- strengths, weaknesses, opportunities and threats, supply chain management, etc.). | Team Activity – Process<br>Team Activity – Content<br>Team Activity - Presentation | AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3<br>CCSS.ELA-LITERACY.ELA-W.9-10.2<br>CCSS.ELA-LITERACY.W.11-12.2<br>CCSS.ELA-LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY.L.11-12.6<br>CCSS.ELA-LITERACY.RST.9-10.4<br>CCSS.ELA-LITERACY.RST.11-12.4 |
| ABS.04.02.02.c. Create strategies to improve the production process of an agricultural product for an AFNR facility (e.g., SWOT- strengths, weaknesses, opportunities and threats, supply chain management, etc | Team Activity – Process<br>Team Activity – Content<br>Team Activity - Presentation | AFNR Career Cluster – Agribusiness Systems Pathway, Statement 3<br>CCSS.ELA-LITERACY.ELA-W.9-10.2<br>CCSS.ELA-LITERACY.W.11-12.2<br>CCSS.ELA-LITERACY.L.9-10.6<br>CCSS.ELA-LITERACY.L.11-12.6 |

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| | | CCSS.ELA-LITERACY.RST.9-10.4<br>CCSS.ELA-LITERACY.RST.11-12.4 |
| **CS.01.02. Performance Indicator: Examine technologies and analyze their impact on AFNR systems.** | | |
| CS.01.02.01.b. Apply appropriate use of technologies in AFNR workplace scenarios. | Team Activity – Content<br>Team Activity - Presentation | |
| CS.01.02.01.c. Solve problems in AFNR workplaces or scenarios using technology. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |
| CS.01.02.02.b. Analyze how technology is used in AFNR systems to maximize productivity. | Team Activity – Process<br>Team Activity – Content | |
| **CS.03.01. Performance Indicator: Identify required regulations to maintain and improve safety, health and environmental management systems.** | | |
| CS.03.01.01.b. Assess health, safety and environmental procedures to comply with regulatory and safety standards. | Team Activity – Process<br>Team Activity – Content<br>Team Activity - Presentation | |
| **CS.03.02. Performance Indicator: Develop a plan to maintain and improve health, safety and environmental compliance and performance.** | | |
| CS.03.02.01.b. Analyze health and safety performance plans of an AFNR business. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |
| CS.03.02.02.b. Develop plans to improve environmental compliance and performance within an AFNR system. | Team Activity – Content<br>Team Activity – Presentation | |
| **CS.03.04. Performance Indicator: Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.** | | |
| CS.03.04.01.c. Design plans to ensure the use of appropriate protective equipment when using various AFNR tools and equipment. | Team Activity – Content<br>Event Exam | |
| CS.03.04.02.c. Evaluate and select appropriate tools and equipment to complete AFNR tasks. | Team Activity – Content<br>Event Exam | |
| CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |
| CS.03.04.03.c. Devise operation, storage and maintenance plans or schedules for AFNR tools and equipment. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |

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| **CS.04.01. Performance Indicator: Identify and implement practices to steward natural resources in different AFNR systems.** | | |
| CS.04.01.01.b. Analyze available practices to steward natural resources in AFNR systems (e.g., wildlife and land conservation, soil and water practices, ecosystem management, etc.). | Event Exam | |
| CS.04.01.01.c. Devise strategies for stewarding natural resources at home and within community. | Team Activity – Process<br>Team Activity – Content<br>Team Activity - Presentation | |
| CS.04.01.02.b. Analyze and assess sustainability practices that can be applied in AFNR systems (e.g., energy efficiency, recycle/reuse/repurpose, green resources, etc.). | Event Exam | |
| **CS.04.02. Performance Indicator: Assess the natural resource related trends, technologies and policies that impact AFNR systems.** | | |
| CS.04.02.01.b. Analyze natural resources trends and technologies and document how they impact AFNR systems (e.g., climate change, green technologies, water resources, etc.). | Event Exam | |
| **AS.01.02. Performance Indicator: Assess and select animal production methods for use in animal systems based upon their effectiveness and impacts.** | | |
| AS.01.02.01.c. Evaluate the effectiveness of different production methods and defend the use of selected methods using data and evidence. | Team Activity – Process<br>Team Activity – Content<br>Team Activity - Presentation | AFNR Career Cluster, Statement 1<br>AFNR Career Cluster – Animal Systems Pathway, Statement 3<br>STEM Career Cluster, Statement 1<br>Buying Goods and Services, Benchmarks: Grade 12, Statement 1<br>Buying Goods and Services, Benchmarks: Grade 12, Statement 3 |
| AS.01.02.03.b. Analyze and evaluate the accuracy and effectiveness of records used in an animal system business. | Event Exam | AFNR Career Cluster, Statement 1<br>AFNR Career Cluster – Animal Systems Pathway, Statement 3<br>STEM Career Cluster, Statement 1<br>Buying Goods and Services, Benchmarks: Grade 12, Statement 1<br>Buying Goods and Services, Benchmarks: Grade 12, Statement 3 |
| **AS.01.03. Performance Indicator: Analyze and apply laws and sustainable practices to animal agriculture from a global perspective.** | | |

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| AS.01.03.01.c. Evaluate the impact of laws pertaining to animal agriculture (e.g., pros, cons, effect on individuals, effect on businesses, etc.) and assess the compliance of production practices with established regulations. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | AFNR Career Cluster, Statement 2<br>AFNR Career Cluster – Animal Systems Pathway, Statement 1<br>STEM Career Cluster, Statement 1, 4<br>CCSS.ELA-Literacy.W.9-10.9b CCSS.ELA-Literacy.W.11-12.9b CCSS.ELA-Literacy.RI.9-10.1<br>CCSS.ELA-Literacy.RI.11-12.1<br>HS-ETS1-1 |
| AS.01.03.02.c. Select, evaluate and defend the use of sustainable practices in animal agriculture. | Team Activity – Content<br>Team Activity – Presentation | AFNR Career Cluster, Statement 2<br>AFNR Career Cluster – Animal Systems Pathway, Statement 1<br>STEM Career Cluster, Statement 1, 4<br>CCSS.ELA-Literacy.W.9-10.9b CCSS.ELA-Literacy.W.11-12.9b CCSS.ELA-Literacy.RI.9-10.1<br>CCSS.ELA-Literacy.RI.11-12.1<br>HS-ETS1-1 |
| **AS.02.01. Performance Indicator: Demonstrate management techniques that ensure animal welfare.** | | |
| AS.02.01.01.b. Design programs that assure the welfare of animals and prevent abuse or mistreatment. | Event Exam | HS-ETS1-2 |
| AS.02.01.02.c. Devise, implement and evaluate safety procedures and plans for working with animals by species using information based on animal behavior and responses. | Team Activity – Content<br>Team Activity – Presentation | HS-ETS1-2 |
| AS.02.01.03.b. Analyze and document animal husbandry practices and their impact on animal welfare. | Team Activity – Content<br>Event Exam | HS-ETS1-2 |
| AS.03.01. Performance Indicator: Analyze the nutritional needs of animals. | | |
| AS.03.01.01.c. Assess nutritional needs for an individual animal based on its growth stage and production system. | Team Activity – Content<br>Team Activity - Presentation<br>Event Exam | |
| AS.03.02 Performance Indicator: Analyze feed rations and assess if they meet the nutritional needs of animals. | | |
| AS.03.02.01.c. Select appropriate feedstuffs for animals based on a variety of factors (e.g., economics, digestive system and nutritional needs, etc.). | Team Activity – Content<br>Team Activity - Presentation<br>Event Exam | |
| AS.03.02.02.c. Select and utilize animal feeds based on nutritional requirements, using rations for maximum nutrition and optimal economic production. | Team Activity – Content<br>Team Activity - Presentation<br>Event Exam | |

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| AS.03.02.03.b. Compare and contrast methods that utilize feed additives and growth promotants with production practices that do not, (e.g., organic versus conventional production methods). | Event Exam | |
| AS.03.02.03.c. Make and defend decisions regarding whether to use feed additives and growth promotants after researching and considering scientific evidence, production system needs and goals, and input from industry professionals. | Team Activity – Content<br>Team Activity - Presentation | |
| **AS.03.03 Performance Indicator: Utilize industry tools to make animal nutrition decisions.** | | |
| AS.03.03.01.b. Utilize tools and equipment to perform animal nutrition tasks. | Event Exam | |
| AS.03.03.01.c. Select, evaluate and defend the use of specific tools or equipment used to perform animal nutrition tasks. | Team Activity – Content<br>Team Activity - Presentation | |
| AS.03.03.02.b. Analyze and apply information from a feed label and feeding directions to feed animals. | Event Exam | |
| AS.03.03.03.b. Analyze technologies used to provide animal nutrition and summarize their potential benefits and consequences. | Event Exam | |
| AS.03.03.03.c. Research and recommend technology improvements to provide proper nutrition to animals. | Team Activity – Content<br>Team Activity - Presentation | |
| **AS.04.01. Performance Indicator: Evaluate animals for breeding readiness and soundness.** | | |
| AS.04.01.02.c. Evaluate and select animals for reproductive readiness. | Selection Classes | |
| AS.04.02.03.c. Treat or cull animals with reproductive problems. | Event Exam | |
| **AS.04.02. Performance Indicator: Apply scientific principles to select and care for breeding animals.** | | |
| AS.04.02.01.c. Select and evaluate a breeding system based on the principles of genetics. | Team Activity – Content<br>Team Activity - Presentation<br>Event Exam | CCSS.MATH.CONTENT.HSS.MD.A.3<br>HS-LS3-2<br>HS-LS3-3 |

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| AS.04.02.02.c. Select and evaluate breeding animals and determine the probability of a given trait in their offspring. | Team Activity – Content<br>Team Activity - Presentation<br>Team Activity - Process<br>Event Exam<br>Selection Classes | CCSS.MATH.CONTENT.HSS.MD.A.3<br>HS-LS3-2<br>HS-LS3-3 |
| AS.04.02.04.b. Analyze the care needs for breeding stock in each stage of growth. | Event Exam | CCSS.MATH.CONTENT.HSS.MD.A.3<br>HS-LS3-2<br>HS-LS3-3 |
| **AS.04.03 Performance Indicator: Apply scientific principles to breed animals.** | | |
| AS.04.03.01.c. Select animal breeding methods based on reproductive and economic efficiency. | Team Activity – Content<br>Team Activity - Presentation | |
| AS.04.03.02.c. Evaluate the implementation and effectiveness of artificial insemination techniques. | Team Activity – Content<br>Team Activity – Presentation | |
| AS.04.03.03.b. Analyze the processes of major reproductive management practices, including estrous synchronization, superovulation, flushing and embryo transfer. | Event Exam | |
| AS.04.03.03.c. Create and evaluate plans and procedures for estrous synchronization, superovulation, flushing, embryo transfer and other reproductive management practices. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |
| AS.04.03.04.c. Select and assess animal performance based on quantitative breeding values for specific characteristics. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam<br>Selection Classes | |
| **AS.05.01. Performance Indicator: Design animal housing, equipment and handling facilities for the major systems of animal production.** | | |
| AS.05.01.01.b. Critique designs for an animal facility and prescribe alternative layouts and adjustments for the safe, sustainable and efficient use of the facility. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | AFNR Career Cluster – Animal Systems Pathway, Statement 2<br>STEM Career Cluster, Statement 4<br>STEM Career Cluster, Statement 5 |
| AS.05.01.02.b. Analyze the use of modern equipment, technology and handling facility procedures and determine if they enhance the safe, economic and sustainable production of animals. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | AFNR Career Cluster – Animal Systems Pathway, Statement 2<br>STEM Career Cluster, Statement 4<br>STEM Career Cluster, Statement 5 |
| **AS.06.03. Performance Indicator: Select animals for specific purposes and maximum performance based on anatomy and physiology.** | | |

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| Sample Measurement: The following sample measurement strands are provided to guide the development of measurable activities (at different levels of proficiency) to assess students' attainment of knowledge and skills related to the above performance indicator. The topics represented by each strand are not all-encompassing. | | |
| AS.06.03.01.c. Evaluate and select animals to maximize performance based on anatomical and physiological characteristics that affect health, growth and reproduction | Selection Classes | STEM Career Cluster, Statement 5 |
| AS.06.03.02.c. Choose, implement and evaluate sustainable and efficient procedures (e.g., selection, housing, nutrition and management) to produce consistently high-quality animals that are well suited for their intended purposes. | Team Activity – Content<br>Team Activity – Presentation<br>Selection Classes | STEM Career Cluster, Statement 5 |
| AS.06.03.03.c. Evaluate and select animals to produce superior animal products based on industry standards. | Selection Classes | STEM Career Cluster, Statement 5 |
| **AS.07.01. Performance Indicator: Design programs to prevent animal diseases, parasites and other disorders and ensure animal welfare.** | | |
| AS.07.01.02.c. Determine when an animal health concern needs to be referred to an animal health professional. | Event Exam | CCSS.MATH.CONTENT.HSN.Q.A.1<br>CCSS.MATH.CONTENT.HSN.Q.A.2<br>CCSS.MATH.CONTENT.HSN.Q.A.3 |
| AS.07.01.03.b. Identify and describe common illnesses and disorders of animals based on symptoms and problems caused by wounds, diseases, parasites and physiological disorders. | Event Exam | CCSS.MATH.CONTENT.HSN.Q.A.1<br>CCSS.MATH.CONTENT.HSN.Q.A.2<br>CCSS.MATH.CONTENT.HSN.Q.A.3 |
| AS.07.01.04.c. Design and implement a health maintenance and a disease and disorder prevention plan for animals in their natural and/or confined environments. | Team Activity – Content<br>Team Activity – Presentation | CCSS.MATH.CONTENT.HSN.Q.A.1<br>CCSS.MATH.CONTENT.HSN.Q.A.2<br>CCSS.MATH.CONTENT.HSN.Q.A.3 |
| AS.07.01.05.c. Identify and describe surgical and nonsurgical veterinary treatments and procedures to meet specific animal health care objectives. | Team Activity – Content<br>Team Activity – Presentation | CCSS.MATH.CONTENT.HSN.Q.A.1<br>CCSS.MATH.CONTENT.HSN.Q.A.2<br>CCSS.MATH.CONTENT.HSN.Q.A.3 |
| **AS.07.02. Performance Indicator: Analyze biosecurity measures utilized to protect the welfare of animals.** | | |
| AS.07.02.01.c. Design and evaluate a biosecurity plan for an animal production operation. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |
| **AS.08.01. Performance Indicator: Design and implement methods to reduce the effects of animal production on the environment.** | | |

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| AS.08.01.01.b. Assess methods of reducing the effects of animal agriculture on the environment. | Event Exam | AFNR Career Cluster – Environmental Service Systems Pathway, Statement 1<br>HS-LS2-6<br>HS-LS2-7 |
| AS.08.01.01.c. Devise a plan that includes measures to reduce the impact of animal agriculture on the environment. | Team Activity – Content<br>Team Activity – Presentation | AFNR Career Cluster – Environmental Service Systems Pathway, Statement 1<br>HS-LS2-6<br>HS-LS2-7 |
| **AS.08.02. Performance Indicator: Evaluate the effects of environmental conditions on animals and create plans to ensure favorable environments for animals.** | | |
| AS.08.02.02.c. Devise and improve plans to establish favorable environmental conditions for animal growth and performance based on a variety of factors (e.g., economic feasibility, environmental sustainability, impact on animals, etc.). | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | HS.LS4-6 |
| **CRP.01.01. Performance Indicator: Model personal responsibility in the workplace and community.** | | |
| CRP.01.01.01.c. Evaluate past workplace and community situations and determine how personal responsibility positively or negatively impacted outcomes. | Team Activity – Content<br>Team Activity – Presentation | |
| **CRP.01.02 Performance Indicator: Evaluate and consider the near-term and long-term impacts of personal and professional decisions on employers and community before taking action.** | | |
| CRP.01.02.02.c. Make and defend professional decisions after evaluating their near- and long-term impacts on employers and community. | Oral Reasons | |
| **CRP.01.03. Performance Indicator: Identify and act upon opportunities for professional and civic service at work and in the community.** | | |
| CRP.01.03.01.c. Devise strategies for involvement in professional service opportunities at work and in the community (e.g., coaching/mentorship, presentations at meetings, etc.). | Team Activity – Content<br>Team Activity – Presentation | |
| **CRP.02.01. Performance Indicator: Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.** | | |
| CRP.02.01.01.b. Assess workplace problems and identify the most appropriate academic knowledge and skills to apply. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |

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| CRP.02.01.01.c. Apply academic knowledge and skills to solve problems in the workplace and reflect upon the results achieved. | Event Exam | |
| **CRP.02.02. Performance Indicator: Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.** | | |
| CRP.02.02.01.b. Assess workplace problems and distinguish the most appropriate technical concepts to apply. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | |
| CRP.02.02.02.b. Assess community problems and identify the most appropriate technical concepts to apply. | Team Activity – Process<br>Team Activity – Content<br>Event Exam | |
| **CRP.04.01. Performance Indicator: Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.** | | |
| CRP.04.01.02.b. Apply strategies for speaking with clarity, logic, purpose and professionalism in a variety of situations in formal and informal settings. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation | |
| **CRP.04.03. Performance Indicator: Model active listening strategies when interacting with others in formal and informal settings.** | | |
| CRP.04.03.01.b. Apply active listening strategies (e.g., be attentive, observe non-verbal cues, ask clarifying questions, etc.). | Team Activity – Process | |
| CRP.04.03.02.c. Model active listening strategies in formal and informal settings. | Team Activity – Process | |
| **CRP.05.02. Performance Indicator: Make, defend and evaluate decisions at work and in the community using information about the potential environmental, social and economic impacts.** | | |
| CRP.05.02.01.c. Evaluate and defend decisions applied in the workplace and community situations. | Team Activity – Content<br>Team Activity – Presentation<br>Oral Reasons | |
| CRP.05.02.02.c. Evaluate workplace and community situations and propose decisions to be made based upon the positive impact made on environment, social and economic areas. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation | |
| **CRP.06.02. Performance Indicator: Assess a variety of workplace and community situations to identify ways to add value and improve the efficiency of processes and procedures.** | | |

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| CRP.06.02.01.c. Evaluate past workplace and community situations and determine how processes and procedures impacted outcomes. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation | |
| **CRP.06.03. Performance Indicator: Create and execute a plan of action to act upon new ideas and introduce innovations to workplace and community organizations.** | | |
| CRP.06.03.02.b. Elicit and assimilate input and feedback from individuals and organizations about new ideas or innovations for the workplace or community. | Team Activity – Process | |
| **CRP.07.02. Performance Indicator: Evaluate the validity of sources and data used when considering the adoption of new technologies, practices and ideas in the workplace and community.** | | |
| CRP.07.02.01.b. Assess data sources for reliability and validity. | Team Activity – Process<br>Team Activity – Presentation | |
| CRP.07.02.02.b. Assimilate data to assist in making a decision about the adoption of a new technology, practice or idea by workplaces and community organizations. | Team Activity – Process<br>Team Activity – Presentation | CRP.07.02.02.c. Create and defend proposals for new technologies, practices and ideas using valid and reliable data sources. |
| **CRP.08.01. Performance Indicator: Apply reason and logic to evaluate workplace and community situations from multiple perspectives.** | | |
| CRP.08.01.01.b. Apply steps for critical thinking to a variety of workplace and community situations. | Team Activity – Process | |
| CRP.08.01.02.b. Assess solutions to workplace and community problems for evidence of reason, logic and consideration of multiple perspectives. | Team Activity – Process | |
| **CRP.08.02. Performance Indicator: Investigate, prioritize and select solutions to solve problems in the workplace and community.** | | |
| CRP.08.02.01.b. Assimilate and prioritize potential solutions to solve problems in the workplace and community. | Team Activity – Process | |
| CRP.08.02.02.c. Evaluate and select solutions with greatest potential for success to solve workplace and community problems. | Team Activity – Process | |
| **CRP.08.03. Performance Indicator: Establish plans to solve workplace and community problems and execute them with resiliency.** | | |
| CRP.08.03.02.b. Create plans to solve workplace and community problems. | Team Activity – Process<br>Team Activity – Content<br>Team Activity – Presentation | |

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| **CRP.09.03. Performance Indicator: Demonstrate behaviors that contribute to a positive morale and culture in the workplace and community (e.g., positively influencing others, effectively communicating, etc.).** | | |
| CRP.09.03.02.c. Model respectful and purposeful behaviors that contribute to positive morale and culture in the workplace and community (e.g., effectively communicating, recognizing accomplishments of others, etc.). | Team Activity – Process | |
| **CRP.11.01. Performance Indicator: Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.** | | |
| CRP.11.01.02.c. Evaluate effectiveness and make recommendations for using new technologies, tools and applications in the workplace and community. | Team Activity – Content<br>Team Activity – Presentation | |
| **CRP.12.01. Performance Indicator: Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.** | | |
| CRP.12.01.03.b. Assess the need and benefit for cultural and global competency in team settings at work and in the community. | Team Activity – Process | |
| **CRP.12.02. Performance Indicator: Create and implement strategies to engage team members to work toward team and organizational goals in a variety of workplace and community situations (e.g., meetings, presentations, etc.).** | | |
| CRP.12.02.02.b. Select strategies to engage team members and apply in a variety of situations. | Team Activity – Presentation<br>Team Activity – Process | |
| **BS.03.04. Performance Indicator: Apply biotechnology principles, techniques and processes to enhance plant and animal care and production (e.g., selective breeding, pharmaceuticals, biodiversity, etc.).** | | |
| BS.03.04.02.b. Assess the benefits, risks and opportunities associated with using biotechnology to promote animal health. | Team Activity – Content<br>Team Activity – Presentation<br>Event Exam | HS-ETS1-2<br>HS-LS4-6 |