

## **National FFA Convention – Genetics and Reproduction Scenario October 2016**

**Scenario:** Your team is a group of dairy consultants that work with dairy operations to improve the reproduction and genetics on farms. Recently, you met Felecia F. Amondson, the owner of FFA Family Dairy. Ms. Amondson wants to improve the genetics and reproductive management on her dairy operation and would like your team's advice.

FFA Family Dairy is currently milking 800 cows that are housed in a free stall dairy operation in the Midwestern US. The farm has a rolling herd average of 27,840 lbs of milk, and they typically average 3.8% milk fat and 3.0% milk protein. The dairy originally started as a 60-cow operation in the 1970's and has gone through 2 expansions over the years. The cows are currently milked 3 times a day in a double-16 parallel parlor. As they have expanded, facilities have been built to adequately accommodate all of the calves, heifers, and cows. Stall comfort on the dairy is good and the cows are exhibiting good lying rates. The farm has a great relationship with their nutritionist and do not currently have concerns with the nutritional content, mixing, or feeding of the diet for the milking herd. They would like to maintain a constant number of milking heifers and cows each month throughout the year.



Figure 1. Free stall barn at FFA Family Dairy. The barn is a curtain-sided free stall barn with an open ridge, a central feed alley, and fans that are set to automatically turn on at 78 degrees F.

### **Areas of discussion from Ms. Amondson:**

Ms. Amondson has concerns about how well the reproductive program is performing on her dairy. She feels that there are opportunities for improvement and she would like you

to take a look at her records and the farm and make recommendations for improvements. The cow breeding records (Table 1) and a summary of the technician breeding records (Table 2) are provided to you. After evaluating the information, provide a summary of the positive and negative aspects of the breeding program on this dairy over the past year.

Before you get started, Ms. Amondson asks you to define some terms as she wants to make sure that she clearly understands the terms that are being discussed. Explain to Ms. Amondson what the following terms mean:

- Conception rate
- Heat detection rate
- Pregnancy rate

Table 1. Summary of heat detection and pregnancy rates over the past year.

| 21-Day Pregnancy Rate for FFA Family Dairy |                     |                            |                   |        |               |
|--------------------------------------------|---------------------|----------------------------|-------------------|--------|---------------|
| Date                                       | # Eligible Past VWP | # Reported Bred or in Heat | Pct Heat Observed | # Preg | Pct Preg Rate |
| 10/21/2015                                 | 125                 | 78                         | 62                | 26     | 21            |
| 11/11/2015                                 | 137                 | 91                         | 66                | 35     | 26            |
| 12/2/2015                                  | 122                 | 78                         | 64                | 31     | 25            |
| 12/23/2015                                 | 112                 | 67                         | 60                | 23     | 21            |
| 1/13/2016                                  | 125                 | 71                         | 57                | 23     | 18            |
| 2/3/2016                                   | 129                 | 76                         | 59                | 27     | 21            |
| 2/24/2016                                  | 118                 | 73                         | 62                | 26     | 22            |
| 3/16/2016                                  | 119                 | 72                         | 61                | 24     | 20            |
| 4/5/2016                                   | 121                 | 82                         | 68                | 30     | 25            |
| 4/26/2016                                  | 124                 | 79                         | 64                | 31     | 25            |
| 5/17/2016                                  | 119                 | 74                         | 62                | 27     | 23            |
| 6/7/2016                                   | 128                 | 78                         | 61                | 24     | 19            |
| 6/28/2016                                  | 143                 | 81                         | 57                | 21     | 15            |
| 7/19/2016                                  | 115                 | 72                         | 63                | 14     | 12            |
| 8/09/2016                                  | 118                 | 70                         | 59                | 13     | 11            |
| 8/30/2016                                  | 113                 | 69                         | 61                | 14     | 12            |
| 9/20/2016                                  | 121                 | 77                         | 64                | --     | --            |
| 10/11/2016                                 | 132                 | 91                         | 69                | --     | --            |
| Average                                    |                     |                            | 62                |        | 20            |

All of the breeding for the heifers and cows is done by artificial insemination. Three different AI technicians breed cows on the farm, depending on their work schedule and when cows need to be bred. The breeding records of the technicians are shown in Table 2.

Table 2. Breeding records by technician from 10/1/15 to 8/30/16.

| Technician | Number of animals bred | Number of animals confirmed pregnant | Percent successful |
|------------|------------------------|--------------------------------------|--------------------|
| Kelly      | 504                    | 185                                  | 36.7               |
| Jody       | 227                    | 92                                   | 40.5               |
| Dana       | 480                    | 111                                  | 23.1               |

**Ms. Amondson has a few specific questions for you:**

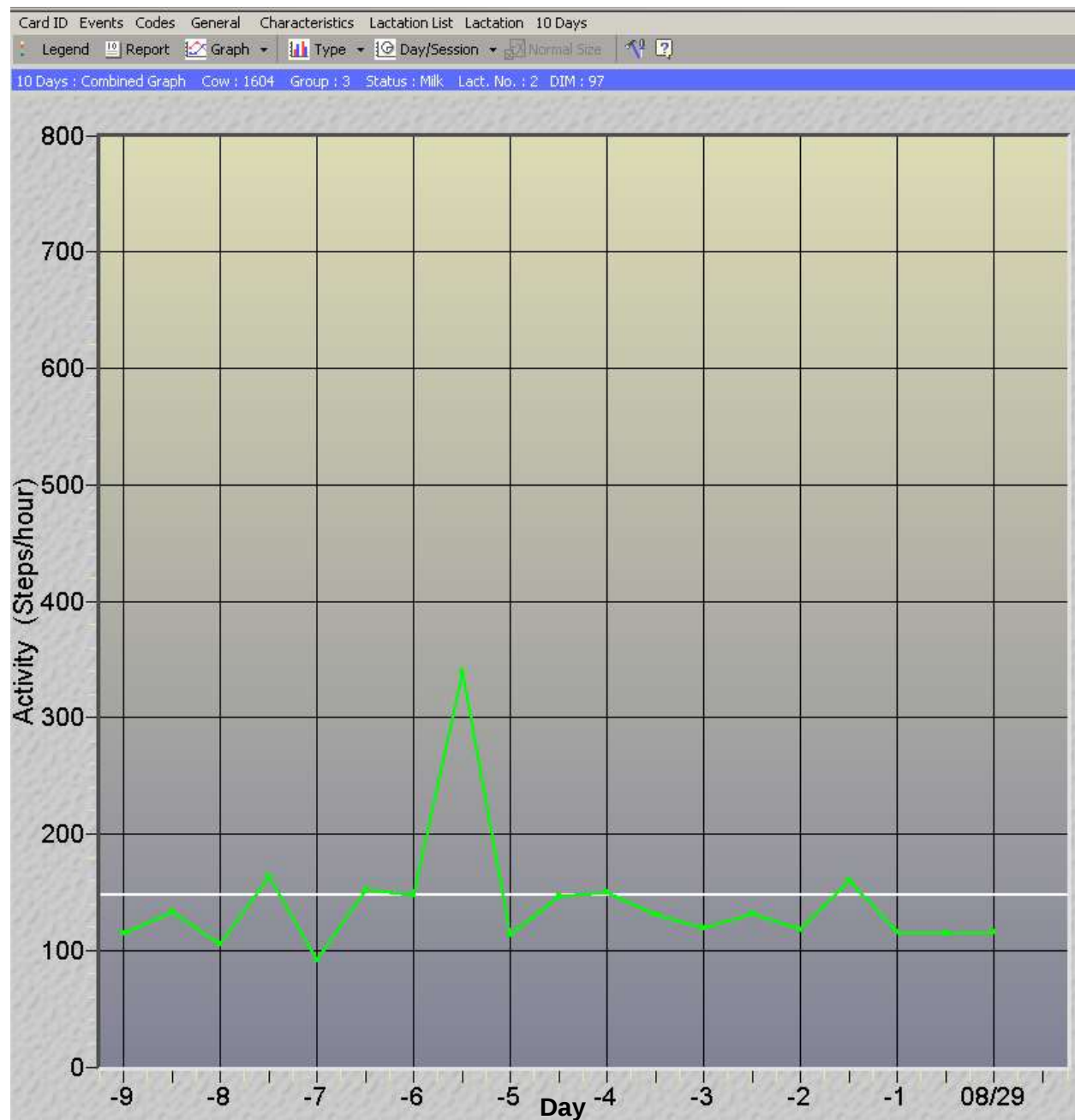
- 1.) Ms. Amondson has a group of virgin heifers she will be breeding over the next month. A new company, Best Bulls, Inc., just dropped off sire proofs for sires she could choose for heifers (Table 3). She would like your assistance to determine which would be the best sire for each of these three heifers:
  1. Heifer 123 – She would really like to improve the milk production on this genetic line.
  2. Heifer 456 – Breeding to a sire that would be most likely to pass on the best feet and legs.
  3. Heifer 789 – Breed this heifer to the highest index according to Holstein Association.

Table 3. Sire proof from Best Bulls, Inc.

| Name | TPI  | NM\$ | MILK | Rel. | UDC  | FLC  | PL  | DPR | CE  |
|------|------|------|------|------|------|------|-----|-----|-----|
| A1   | 2682 | 822  | 1945 | 76   | 2.12 | 1.58 | 6.6 | 1.6 | 6.1 |
| B2   | 2598 | 724  | 972  | 76   | 1.68 | 2.28 | 5.4 | 2.8 | 5.4 |
| C3   | 2624 | 747  | 1869 | 78   | 1.86 | 2.49 | 5.1 | 2.7 | 6.0 |
| D4   | 2651 | 844  | 2136 | 75   | 1.39 | 1.61 | 6.3 | 1.2 | 7.3 |
| E5   | 2602 | 705  | 970  | 75   | 2.97 | 2.09 | 5.1 | 0   | 7.4 |
| F6   | 2631 | 762  | 1445 | 76   | 1.91 | 1.13 | 6.2 | 0.8 | 8.4 |
| G7   | 2696 | 819  | 1353 | 77   | 1.38 | 1.92 | 5.3 | 2.0 | 6.6 |

- 2.) A pedometer system has recently been installed on this farm on a trial basis on some of the early lactation cows. Ms. Amondson asks you to look at the graph for a cow that is wearing one of the pedometers. According to this graph (Figure 2), when was this cow in heat (indicate the calendar date)? When should this cow have been bred in order to have the highest probability of the cow getting pregnant?

Figure 2. Graph of pedometer activity from cow 6543.



3.) As not all cows on the farm have pedometers, what signs would you look for to indicate which cows are in heat?

## Answer Key:

### Definitions:

- Conception rate – number of cows that become pregnant/number of cows that were bred (usually multiplied by 100 and presented as a percentage) in a given amount of time. According to Table 2, the conception rate for FFA Family Dairy would be:  $388/1211 \times 100 = 32.0\%$ .
- Heat detection rate – number of cows that are determined to be in heat/number of cows that are eligible to be bred (usually multiplied by 100 and presented as a percentage) in a given amount of time
- Pregnancy rate – Every 21 days the number of eligible cows past the voluntary waiting period that become pregnant multiplied by 100 and presented as a percentage.

FFA Family Dairy has several positive strengths. The dairy is doing fairly well when it comes to milk production, nutrition, and cow comfort (other than heat abatement).

As for the general reproduction on the dairy, the herd is maintaining the recommended 21-day pregnancy rate of 20% with a heat detection rate of 62%. Thus, the conception rate in this dairy is running about 32%. Although these values are about average, there is some room for improvement in each of these areas.

Table 1 shows that summer is the greatest challenge for FFA Family Dairy when it comes to conception rates and getting cows bred. The decline in conception rates indicate that heat stress is likely reducing the conception rates on the dairy. The description in Figure 1 states that the fans are not being turned on until 78 degrees F. The fans need to be turned on at a much lower temperature (~65 degrees F) as cows will already be experiencing heat stress before the environmental temperature reaches 78 degrees F. In addition to having the fans start at a lower environmental temperatures, soakers could also be installed along the feed lanes to offer additional cow cooling during the summer months. Also, additional fans could be placed over the free stalls to improve airflow while cows are lying down.

According to Table 3, there are 3 people inseminating cows on the dairy. Two of the three technicians appear to be doing well getting cows pregnant. However, Dana, one of the main breeders on the farm, has a lower conception rate. There could be several reasons for this, as Dana could be expected to breed cows that are less likely to become pregnant (repeat breeders, breeding cows with sexed semen, etc) or the technique of the breeder may not be as good. Dana needs to be evaluated to determine if there is a reason for the lower conception rates when breeding cows. Retraining Dana to ensure that semen is being handled correctly and cows are being properly inseminated would be a good idea.

### Question #1 –

1. Heifer 123 – She would really like to improve the milk production on this genetic line.

- This heifer should be bred to A1. Although this is not the bull with the best proofs for milk, bull D4 has a higher CE value which would not be ideal when breeding a heifer.
- 2. Heifer 456 – Breeding to a sire that would be most likely to pass on the best feet and legs.
  - Bull C3 has the highest FLC and would be the recommended sire to use.
- 3. Heifer 789 – Breed this heifer to the highest index according to Holstein Association.
  - Bull G7 has the highest TPI value. This bull also has a decent CE for breeding heifers.

**Question #2** – The activity graph of this cow shows that she was in heat on 8/23/16 (8/29 – 6 days), which is when the cow's activity spikes on the graph. According to this graph, the increased activity would have been able to be detected early in the day to mid-day, thus the cow should be bred in the evening of 8/23/16.

**Question #3** – In addition to increased activity that can be recorded by pedometers, cows in heat will often exhibit restlessness and some increased movement can be seen visually. The best indicator as to whether a cow is in heat is if the cow is standing to be mounted by other cows. Other signs the cow may exhibit would be increased vocalization, mucus discharge from the vulva, bloody discharge from the vulva, swelling and reddening of the vulva, tailhead hair that has been rubbed, sniffing genitalia of other animals, raised head with lip curling, decreased feed intake, and decreased milk production.