**NORTH CAROLINA FFA DAIRY CATTLE EVENT**

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**Problem 1:**

The Doe’s (Jane and John) have operated their family dairy farm for more than 25 years. Last year, their son, Jake decided to bring his family back into the dairy business and would like to expand the herd. In order to support multiple family incomes from the dairy enterprise, the Doe’s plan to start processing their own milk and making ice cream. They currently milk 150 Holstein cows and would like to double the herd size in 3-4 years. Their goals are also centered on increasing herd size, increasing milk fat production and longevity of the cows in their herds. Based on genetic information for the 4 bulls below, rank the bulls to match the goals of the Doe’s.

| **Sire** | **NM$**  **CM$**  **GM$** | **REL** | **PTA Milk lbs** | **PTA Fat lbs** | **PTA Fat %** | **PTA Protein lbs** | **PTA Protein %** | **PTA CCR** | **PTA**  **HCR** | **PTA**  **SCS** | **PTA DPR** | **PTA**  **PL** | **Sexed (Y/N)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1** | **883**  **880**  **808** | 96 | 2964 | 94 | -0.06 | 88 | 0.00 | 0.8 | -0.1 | 2.03 | -0.1 | 4.9 | Y |
| **2** | **701**  **743**  **618** | 95 | 858 | 81 | 0.18 | 47 | 0.08 | -0.2 | -0.4 | 3.81 | -0.8 | 4.7 | Y |
| **3** | **714**  **739**  **749** | 94 | 1007 | 60 | 0.08 | 41 | 0.03 | 5.9 | 3.4 | 2.80 | 4.7 | 7.5 | N |
| **4** | **659**  **676**  **656** | 96 | 874 | 96 | 0.22 | 31 | 0.01 | 2.4 | 2.7 | 2.83 | 1.8 | 3.3 | N |

**Problem 2:** Milk quality and udder health are concerns of more importance recently because of potential changes in milk shipping regulations. Thus, dairy farmers are implementing known strategies to help reduce somatic cell score (SCS), incidence of mastitis, and improve yields. Several strategies exist and most focus on milking management practices, including equipment maintenance, milk prep procedures, and sanitation practices. After a recent assessment of milking practices, Brown’s Dairy Farm have implemented new training protocols for their milk hands and as a result their somatic cell count decreased by nearly 75,000 cells/mL. In addition to changing milk prep procedures, it was also noted that many of the cows had rough teat ends (likely from poor attachment of milking units) and poor teat placement, all of which can contribute to increased mastitis. So, to address the issues of reducing SCS and improving udder composition, rank the following 4 bulls to help meet the farm’s goals.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SIRE** | **1** | | **2** | | **3** | | **4** | |
| NM$ | 883 | | 714 | | 701 | | 659 | |
| REL | 96 | | 94 | | 95 | | 96 | |
| **PTAs** | | | | | | | | |
| Milk, lbs | 2964 | | 1007 | | 858 | | 874 | |
| Fat, lbs | 94 | | 60 | | 81 | | 96 | |
| Fat, % | -0.06 | | 0.08 | | 0.18 | | 0.22 | |
| Protein, lbs | 88 | | 41 | | 47 | | 31 | |
| Protein, % | 0 | | 0.03 | | 0.08 | | 0.01 | |
| CCR | 0.8 | | 5.9 | | -0.2 | | 2.4 | |
| HCR | -0.1 | | 3.4 | | -0.4 | | 2.7 | |
| SCS | 2.03 | | 3.8 | | 2.81 | | 2.83 | |
| DPR | -0.1 | | 4.7 | | -0.8 | | 1.8 | |
| PL | 4.9 | | 7.5 | | 4.7 | | 3.3 | |
| UDC | 1.78 | | 0.37 | | 2.21 | | 1.21 | |
| **Linear Traits (STAs)** | | | | | | | | |
| **SIRE** | **1** | | **2** | | **3** | | **4** | |
| Stature | 0.27 | T | 0.21 | S | 1.16 | T | 1.54 | T |
| Strength | 0.92 | S | 0.02 | S | 1.03 | S | 0.92 | S |
| Body Depth | 1.10 | D | 0.12 | D | 1.02 | D | 1.2 | D |
| Dairy Form | 2.19 | O | 0.75 | O | 1.36 | O | 1.93 | O |
| Rump Angle | 1.46 | S | 0.27 | H | 0.85 | H | 0.45 | S |
| Rump Width | 0.25 | W | 1.25 | W | 0.95 | W | 1.53 | W |
| R legs – side | 2.12 | S | 0.74 | C | 1.15 | S | 0.36 | S |
| R legs – rear | 2.21 | S | 0.47 | H | 2.04 | S | 1.47 | S |
| Foot Angle | 2.34 | S | 0.53 | L | 2.73 | S | 1.71 | S |
| Feet & Legs Score | 1.78 | H | 0.02 | L | 1.66 | H | 1.69 | H |
| Fore Attachment | 2.51 | S | 0.78 | S | 3.12 | S | 1.1 | S |
| Rear Udder Height | 4.51 | H | 0.11 | H | 3.07 | H | 2.61 | H |
| Rear Udder Width | 4.15 | W | 0.1 | W | 2.82 | W | 2.4 | W |
| Udder Cleft | 0.98 | S | 0.96 | S | 0.99 | S | 0.21 | S |
| Udder Depth | 0.09 | S | 0.27 | S | 2.12 | S | 1.27 | S |
| F Teat Placement | 0.99 | C | 0.83 | C | 1.18 | C | 0.16 | C |
| R Teat Placement | 0.79 | C | 1.06 | C | 0.91 | C | 0.98 | W |
| Teat Length | 0.73 | S | 0.24 | L | 0.36 | S | 0.12 | S |

Stature (T= Tall, S=Short); Strength (S= Strong, F= Frail); Body Depth (D= Deep, S= Shallow);

Dairy Form (O= Open Ribbed, T= Tight Ribbed); Rump Angle (H= High, S= Sloped); Rump Width (W= Wide, N= Narrow); Rear Legs (C= Curved, S= Straight); Foot Angle (S= Steep, L= Low); Feet & Leg Score (H=High, L = Low); Fore Udder Attachment (S= Strong, L= Loose); Rear Udder Height (H= High, L= Low); Rear Udder Width (W= Wide, N= Narrow); Udder Cleft (S= Strong, W= Weak); Udder Depth (D= Deep, S= Shallow); F Teat Placement (C= Close, W= Wide); R Teat Placement (C= Close, W= Wide); Teat Length (L= Long, S= Short).

**Solution 1:** Because the primary goal is to grow the herd, presumably from within, using sexed semen technology would be preferred, but not at the cost of improved milk and milk fat production. There is a nice top pair in Sires 1 and 4 and a bottom pair in sires 2 and 3. Both Sires 1 and 4 rank greatest in PTAF, but Sire 1 ranks over Sire 4 because of the giant lead in PTAM. Sire 1 also has the advantage of being a sexed sire, however, Sire 4 makes up for that in an improved PTA for HCR and CCR compared to Sire 1. Sires 2 and 3 were lowest in PTAF, which is important if the eventual goal is to increase milk fat and ice cream production. I give that Sire 3 has greater PTAM, but Sire 2 has increased PTAF, is available sexed.

**Solution 2:** Using genetics to make changes to udder health and subsequent milk quality is a longer term solution compared to some other management practices. Especially given that some udder composition traits are not as highly heritable as other production traits. However, being consistent in selection decisions over time, will improve the interaction of the udder with milking machines and equipment. Based on SCS and UDC, the clear top pair of the 4 sires above are Sire 1 and 3 with the bottom pair being 4 and 24. The Sires are placed 1 3 4 2. Sire 1 has the lowest PTA for SCS and though Sire 1’s PTA for udder composition is lower compared to Sire 3, Sire 1 offers a higher and wider rear udder attachment as well as potential for good teat placement. Sire 3 has the highest udder composition score, does well in rear udder attachment, but is discounted for shorter teats which could worsen problems in this herd. Sire 4 places over Sire 2 because of a lower PTA for SCS and a better PTA for UDC. While Sire 4 may produce daughter with wide rear teat placement, that does not forgive the extremely low UDC PTA of Sire 2. Additionally, Sire 2 is very poor in PTA for SCS and is only average in the linear udder traits.