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Cooperative Extension South Dakota State University

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Selecting Dairy Sires

Cooperative Extension Service
South Dakota State University
U.S. Department of Agriculture

Super Sire

Sunnyview
No Proof John

No Information Ralph

HANSON 78
Selecting Dairy Sires

Selecting sires is a management decision that will not make or break a dairyman in the near future. However, it will make or break him when the sire's heifers get into the milking herd.

Breeding cattle is a game of chance, and anything a dairyman can do to improve his odds in the game will be to his advantage. Information is available to every dairyman that will help him improve his herd's milking ability and longevity. Unfortunately, many dairymen are not taking advantage of this information.

There are three types of breeding systems available to dairymen. These are 1) The Support Your Local Sale Barn System, 2) The Proceed With Caution System and 3) The Minimum Risk System.

Support Your Local Sale Barn System
This system requires a bull you know nothing about, like No Information Ralph.

Sire 1:
Name: No Information Ralph
Dam: No Records Mabel
Sire: Neighbor's Spotted Bull

Too many dairy cows are being bred to beef or dairy bulls like No Information Ralph. Breeding your cows to a beef bull will insure zero genetic progress. Breeding to a dairy bull whose sire is not proven and whose dam is not on test cannot assure genetic progress; sometimes it could be as disastrous as using the beef bull. The odds are very low that dairymen who use bulls like No Information Ralph will have better cows to milk in the future.

Proceed With Caution System
This method involves less risk than the Support Your Local Sale Barn System, because you use more information to choose the bull. Sire 2 would be a typical proceed with caution bull.

Sire 2:
Name: Sunnyview No Proof John
Bred by: Ed B. Goodbreeder
Dam: Sunnyview Zelda

2-1 365d 2x 18,640 3.8%
3-4 305d 3x 21,450 3.7%
4-5 366d 2x 24,600 3.6%
EATA = +1,200

Sire: Sunnyside Outstanding
PD (1/78) R = 99%, +1,100 M, +0.1%, +36F, +$65
PDT = +.58, R = 89%

The dairyman using sires like Sire 2 is starting to play the odds.

Although Sire 2 doesn't have a proof, and you don't know for sure how his daughters will do, complete information is available on his dam and sire. With excellent production on the dam's side, and a sire whose PD milk is +1,100 and who has a plus type, chances are much better than with Sire 1 that he will improve the herd.

Research has shown that adding the dam's EATA or Cow Index to the sire's PD, and dividing by 2 gives a good estimate of the amount of milk production that a bull will transmit to his offspring. For Sire 2, the estimate of his transmitting ability or the amount of milk his daughters will produce over breed average herdmates is (1,200 + 1,100)/2 = 1,150 pounds of milk. Using this method to rank young unproven sires removes some guessing.

Selecting on pedigree is the same thing bull studs do when they select young sires to progeny test. Only one of five bulls progeny tested remains in the stud. Even if you could use a young bull with an excellent pedigree you have no more than a 20% chance that he is as good as most bulls available through AI.

This is why dairymen must proceed with caution. Whether you buy a herd sire from a reputable breeder or use a bull from your herd, make sure to check his dam's pedigree, production and type, and his sire's pedigree, predicted difference, repeatability, and daughter's type profile. Make sure to select a bull from a high producing dam (from a good cow family) and a high PD sire. You will not
know what kind of daughters he will sire, but odds are they will be better than breed average.

An extension of the Proceed With Caution System is breeding 20-25% of the herd to young AI sires with superior pedigrees. This is an important breeding practice, because getting a few daughters of a bull in several DHI herds is an efficient and reliable way to prove a bull.

Syndicates are also becoming popular in purebred circles. Members of a syndicate will breed a few cows to superior pedigreed young bulls. This spreads the risk around, and increases the reliability of the eventual proof.

**Minimum Risk System**

This involves using a bull like Sire 3. It is minimum risk because the bull is proven, and the proof shows how the bull's daughters actually are performing.

Sire 3:

<table>
<thead>
<tr>
<th>AI Super Sire VG-88-GM (2/77)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PD (7778) R= 99%, +993M, -.18%, +9F, +$61</td>
</tr>
<tr>
<td>PDT = +1.36, R = 98%</td>
</tr>
</tbody>
</table>

This bull's predicted difference (PD) for milk shows that his daughters gave 993 pounds of milk more than their breed average herdmates per lactation. The 99% repeatability indicates that this proof will change very little and it is an accurate estimate of the bull's true transmitting ability. Minus .18%, +9F and +$61 are the predicted differences for percent fat, pounds of fat, and dollar value of product. Dollar value of product is based on the U.S. average milk price and fat differential. All PD values are expressed deviations from breed average herdmates.

Using a proven sire takes a lot of guesswork out of selection. Production information, and usually type information, show exactly what the bull is transmitting to his offspring. You no longer have to guess if a bull will transmit superior genetic material. His proof shows whether he will or will not. Of course, most proven bulls with high repeatabilities are available only through artificial insemination.

These are the three options available to a dairyman when he selects sires. It is his decision as to whether herd sires are "cow fresheners" or herd improvers. Genetic progress would be made in many South Dakota dairy herds if the Proceed With Caution System was used. Genetic progress would be overwhelming if more dairymen utilized the Minimum Risk System. Evaluate your dairy operation. If the Support Your Local Sale Barn or Proceed With Caution systems are for you the story stops here. If you want to use the Minimum Risk System, you can make progress through planning.

**Minimum-Risk Mating Plan**

The Minimum Risk System will give maximum benefit if a mating plan is designed before it is time to breed the cow. The following is an example of a mating plan. It may not fit all situations, but it is sound and simple. Don't hesitate to contact AI and breed association personnel who are well acquainted with sires of your breed and have seen their daughters.

1) **List** bulls, starting with the highest PD milk or dollars, that you can acquire. This information can be found in bull stud books, DHI sire summary issues, and each September 10 issue of the Hoard's
Dairyman. Select two to five times as many bulls as you intend to use, including some superior young sires. Set a minimum standard for PD milk or dollars, and repeatability, and breed 75 or 80% of your cows and heifers to bulls that meet those standards.

2) Go down the list and mark out the bulls that are too expensive, have been used heavily in your herd, do not meet your repeatability requirements.

The Semen Value Index (SVI) can be used to determine which bulls are the best buys for milk and fat.

\[
SVI = 0.3 \times (PD\$) + 2.50
\]

Bulls whose SVI most greatly exceeds the price per unit are the best semen buys. Several bulls are ranked on this basis in Table 1.

<table>
<thead>
<tr>
<th>Bull</th>
<th>PD milk</th>
<th>PD fat</th>
<th>PD $</th>
<th>Cost/unit</th>
<th>SVI</th>
<th>SVI-cost/unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+1890</td>
<td>+33</td>
<td>+144</td>
<td>15.00</td>
<td>45.70</td>
<td>30.70</td>
</tr>
<tr>
<td>B</td>
<td>+794</td>
<td>+30</td>
<td>+76</td>
<td>6.00</td>
<td>25.90</td>
<td>19.90</td>
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<tr>
<td>C</td>
<td>+651</td>
<td>+14</td>
<td>+70</td>
<td>7.00</td>
<td>23.50</td>
<td>16.50</td>
</tr>
<tr>
<td>D</td>
<td>+667</td>
<td>+24</td>
<td>+64</td>
<td>6.00</td>
<td>21.69</td>
<td>15.69</td>
</tr>
<tr>
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<td>-5.30</td>
</tr>
<tr>
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<td>+43</td>
<td>+124</td>
<td>55.00</td>
<td>39.70</td>
<td>-15.30</td>
</tr>
<tr>
<td>G</td>
<td>+1450</td>
<td>+67</td>
<td>+155</td>
<td>150.00</td>
<td>49.00</td>
<td>-101.00</td>
</tr>
</tbody>
</table>

Table 1. Ranking of bulls for best semen buy using the Semen Value Index.

Two other equations can be used to rank bulls for best semen buy. The Cornell Index is \([PD\$ - (value of 1 lb milk) \div 10] - [6 \times cost per unit]\) and gives the net return from sale of milk over cost of semen. A negative Cornell Index on expensive bulls indicates that the dairyman must get at least that much income from show winnings or sale of breeding stock to break even on his semen investment.

The Virginia Formula is \([PD\$ \times 2.15] \div 6\) and gives the amount you could afford to pay for semen and get your money back from milk sales alone. The bulls in Table 1 all rank the same when ranked by SVI minus cost per unit, Cornell Index, and Virginia Formula minus cost per unit.

3) Evaluate your cows, or preferably have someone else evaluate them for you, for functional type. Bull studs and breed associations have men highly capable of evaluating type. They also can assist you in selecting bulls. Recent research at Virginia Polytechnic Institute indicates that final classification score is highly correlated with individual type traits. Thus selecting only bulls whose daughters have high average type scores (high predicted difference type for Holsteins) would be advantageous.

Dairymen who follow this plan can be assured that they have maximized the odds of having better cows to milk in the future. At this point the science of mating stops and the art of mating begins. Many fantastic purebred herds have resulted from the “artful” intuition of their experienced owners. There certainly is still a need for purebred breeders with the ability to match pedigrees which result in superior cows and bulls. However, applying the art without the science also has weaknesses.

Be a scientific breeder, and you will be in the business long enough to practice both the science and the art of breeding dairy cattle.

Where do you stand in this game of chance? Are you using available information (DHIA records and sire summaries) to make intelligent decisions that improve your odds of milking better cows in the future? Are you taking full advantage of available superior genetic material? If you are, congratulations on your more profitable future in the dairy business.

Take the list of bulls remaining after step 2, and cut out bulls whose daughters are below breed average for type. Practice corrective mating by identifying each cow’s weakest type trait, and mate her to a bull remaining on the list who is siring daughters strong in that trait. For example, mate cows with poor udders to a bull who is siring daughters with balanced and firmly attached udders.

4) Make a mating plan as often as needed, and follow the plan when it is time to breed.

Sample Mating Plan for John Q. Dairyman

Goal 1. Breed 75–80% of cows and heifers to bulls with at least +800 PD milk and 60% repeatability. In addition, daughters of these bulls must average above breed average for type. Follow “corrective mating” by determining the weakest type trait of each cow, and mating her with a bull whose daughters are strong in that trait.

Goal 2. Breed the other 20–25% of cows and heifers to unproven bulls with superior pedigrees or bulls with high PD milk, low repeatability proofs. This is necessary to insure that new proven bulls will be available in the future.

Dairymen who follow this plan can be assured that they have maximized the odds of having better cows to milk in the future. At this point the science of mating stops and the art of mating begins. Many fantastic purebred herds have resulted from the “artful” intuition of their experienced owners. There certainly is still a need for purebred breeders with the ability to match pedigrees which result in superior cows and bulls. However, applying the art without the science also has weaknesses.

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Dairy Cattle Selection Definitions

Predicted Differences for Milk (PDM) and Fat (PDF)

The amount of milk or fat that daughters of a bull can be expected to produce above or below breed average herdmates during each lactation.

Herdmates

Cows in the same herd. Because total performance of a cow is only 25% genetic a bull’s Predicted Difference (PD) should be adjusted for level of a herd’s milk production. For each 1,000 pounds a herd produces over the breed average 100 pounds should be subtracted from the PD. For each 1,000 pounds a herd produces under breed average 100 pounds can be added to the PD. Current 2x, 305-day, ME breed averages used by the USDA are: Ayrshire, 10,538; Brown Swiss, 11,852; Guernsey, 9,291; Holstein, 14,118; Jersey, 8,794; and Milking Shorthorn, 9,238.

Predicted Difference Percent Butterfat (PD%)

Butterfat percent of bull’s daughters in comparison to breed average.

Predicted Difference Dollars (PDS)

The amount of income daughters of a bull will generate in one lactation compared to breed average cows. The dollar value is based on the current average U.S. price for 3.5% milk, adjusted for butterfat percent by the current U.S. butterfat differential.

Repeatability (R)

Indicates the reliability of the proof, and increases as number of daughters, number of records per daughter, number of bulls with daughters, and herdmates per daughter increase (99% is the highest). Higher repeatability proofs are more reliable because they are a more accurate estimate of a bull’s true transmitting ability and will change less.

Estimated Average Transmitting Ability (EATA) or Cow Index (CI)

An estimate of the amount a cow’s superior or inferior ability to produce milk that she will transmit to her offspring. EATA or CI are comparable to a bull’s PD. A heifer sired by a +1,000 pound PD bull and out of a +1,000 pound EATA or CI cow would be expected to produce 2,000 pounds of milk each lactation above breed average herdmates.

Predicted Difference Type (PDT)

Used by the Holstein-Friesian Association to predict the average conformation of future daughters of a sire above or below breed average herdmates on final classification score. Other breed organizations compare the average type scores of a bull’s daughters for different traits to the breed average for that trait.