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Which AI Dairy Sire Should You Use?

Willard Dillon, Extension Dairyman

Daughter-herdmate sire summary information will help you pick out the bull most likely to improve your herd. These lists are available from your County Extension Agent, DHIA tester, and AI organization. They are based on the DHIA Sire Summary List published four times each year by the USDA. This list contains summaries for the following: (1) New summaries (five or more AI or non-AI progeny with herdmates available for the first time), (2) all AI sires reported as in service during the specified year, and (3) sires for which special requests for summaries were received.

Before considering the new DHIA Sire Summary List in more detail, let's look at the historical changes that have occurred in the methods of sire selection for milk production.

1900-Any registered bull used on scrub cows improved milk production in the daughters.

1920-A registered bull out of a high-producing dam usually improved a daughter's production.

1935-A bull whose daughters produced more than their dams was the best choice to improve milk production.

1950-A desirable bull's daughters produce more than their herdmates.

Now-Artificial bulls with the highest daughter-herdmate comparisons should be used on most cows for maximum genetic improvement in milk production.

This new method of sire evaluation is needed because of the many factors that influence a cow's milk production. The more important of these include the feeding program, herd health, milking techniques, housing, overall management, and inherited ability of the cows. All these and other factors combine to cause a cow's production to

**Figure 1. Many Factors Influence Milk Production**

- Inherited Ability
- Overall Management
- Housing
- Feeding Program
- Milking Techniques

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vary from one year to the next. Yet improvement through breeding considers only one of these factors, inherited ability.

How to Use a Sire Summary List

An example of the information contained in the DHIA Sire Summary List is given in Figure 1. The breed of the sire is listed at the top left corner of each page. Along the far left edge of the page sires are listed in order of registration numbers. The only identification on the first summary is the registration number. You will need to know the registration number of the sire to find his summary easily. Sire name and pedigree information is added to subsequent tabulations.

In the next column, the number of AI daughters and/or non-AI daughters are listed. The asterisk at the end of the row of dots indicates that 51% or more of the daughters with herdmates were registered. A number from 1 to 25 following the AI or non-AI daughters indicates the number of herds. If more than 25 herds are represented by daughters with herdmates, this will be coded with a "-25*". A non-AI sire evaluation based on less than 10 daughter-herdmate comparisons and an AI evaluation based on less than 25 comparisons should be considered "preliminary." When a non-AI summary contains 25 unselected comparisons and an AI evaluation contains 50-60 unselected comparisons in 25 or more herds, additional data do not greatly increase the accuracy of ranking the sires according to breeding value.

The third column contains the average of the daughters' production records. All records used in sire summaries consist of lactation records of 305 days or less and are standardized to a mature equivalent, twice-a-day milking basis. The fourth column contains the adjusted herdmates' average and for non-AI sires the daughter-herdmate difference is listed.

The last column contains the predicted difference for AI sires. This measure of an AI sire's breeding value can be used to compare AI sires. The desirable sire has daughters that produce more than their herdmates. A sire with a 1000 pound predicted difference is more likely to improve milk production than one with a 200 pound predicted difference. Selection and use of top ranking sires on at least 75 percent of your dairy herd will result in maximum genetic progress for milk production.

Results from four typical sires are shown in the sample Sire Summary List in Figure 1. The first sire improved milk production 527 pounds and fat production 25 pounds on 491 daughters with herdmates. (See circled figures in Figure 2). He has demonstrated his ability to improve milk and fat production and would be an excellent choice for use in your herd.

Sire Low Production, the second sire in the example, has demonstrated just the opposite results as shown by the Predicted Difference 196- and 11-. Minus signs follow rather than precede the numbers to which they apply because of computing machine limitations. Sire Low Production's summary also illustrates that a positive sire summary of 310 pounds of milk and 7 pounds of fat based on non-AI daughters does not guarantee a desirable AI summary.

Sire 1357986 shows promise although only 5 non-AI daughters would indicate that we should suspend judgment until he has more daughters with lactation records summarized.

Sire 2468975 with a difference of 1806- and 40- on 26 non-AI daughters gives every indication that he will lower milk and fat production in his daughters.
Summary

1. The USDA-DHIA Sire Summary List is used to evaluate a sire's breeding value for production by comparing his daughters with their herdmates.

2. In herds that have used artificial breeding, 80-90 percent of the differences between herd averages are caused by feeding and management (the environment) while only 10-20 percent are caused by genetic differences.

3. When an AI evaluation contains at least 50 to 60 unselected comparisons, additional numbers will not greatly change a sire's ranking.

4. Sire evaluations based on a summary of AI daughters in different herds will be more informative than a summary based on non-AI daughters in one herd.

5. The daughter-herdmate difference is more important than the level of herdmates production in the sire evaluation.

6. Both the environment and inherited ability are important influences of the production of each cow and the returns from a dairy farm. All dairy farmers should try to provide the most efficient environment possible because this increases returns in a short time. Longer term returns from changing the inherited ability of the cows should then be given more emphasis.

Figure 2. Example of information contained in the sire summary

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1234567 (Name of Sire)</td>
<td>510 Al Daughters-25</td>
<td>1115</td>
<td>12.593</td>
</tr>
<tr>
<td>12-31-57 1000789 24608000</td>
<td>493 With Herdmates</td>
<td>1093</td>
<td>12.631</td>
</tr>
<tr>
<td>14 Non-Al Daughters</td>
<td>37</td>
<td>14.721</td>
<td>3.7</td>
</tr>
<tr>
<td>12 With Herdmates</td>
<td>37</td>
<td>14.590</td>
<td>3.7</td>
</tr>
<tr>
<td>7654321 Sir Low Production</td>
<td>556 Al Daughters-25</td>
<td>1024</td>
<td>12.307</td>
</tr>
<tr>
<td>12-31-52 1000987 86420000</td>
<td>536 With Herdmates</td>
<td>993</td>
<td>12.317</td>
</tr>
<tr>
<td>38 Non-Al Daughters</td>
<td>112</td>
<td>12.144</td>
<td>3.6</td>
</tr>
<tr>
<td>30 With Herdmates</td>
<td>101</td>
<td>12.837</td>
<td>3.6</td>
</tr>
<tr>
<td>1357986 States - 32</td>
<td>5 Non-Al Daughters-01</td>
<td>5</td>
<td>14,130</td>
</tr>
<tr>
<td>5 With Herdmates</td>
<td>5</td>
<td>14,130</td>
<td>3.4</td>
</tr>
<tr>
<td>2468978 States - 32</td>
<td>28 Non-Al Daughters-02</td>
<td>17</td>
<td>12,242</td>
</tr>
<tr>
<td>26 With Herdmates</td>
<td>17</td>
<td>12,242</td>
<td>3.8</td>
</tr>
</tbody>
</table>

a/ Sire information appears in the left column, number of daughters in the second column, average production of daughters in the third column, adjusted herdmate average in the fourth column and predicted difference in the last column.