

New Genetic Evaluations Consider the Cow's Contribution to Calving Ease

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For nearly 25 years, US Holstein sires have been evaluated for calving ease. These evaluations measured the tendency of a bull to sire calves that were born more easily than an average calf (due, in part, to calf size). Results were published as the expected percentage of difficult births in heifers (%DBH), and producers used these data to decide which service bulls could be used as mates for virgin heifers. Despite the value of heifer calves today, calving time can be a source of frustration and expense for many farmers. Difficult births require extra labor and veterinary care, and they often lead to lost milk production and increased days open in the subsequent lactation. Severe cases can result in death of the calf, and sometimes even death or disability of the cow (calf mortality data from a recent study by Meyer et. al at Iowa State are shown below).

Calving ease is measured by dairy producers, and each birth is scored from 1 to 5. As shown below, the distribution of scores is not "normal" (bell-shaped), nor is it supposed to be. Most calvings will fall in category 1 or 2, and only cases that require substantial assistance get scores of 4 or 5. Producers should "score 'em as they see 'em" (or score 'em as 1 if they don't see 'em), and let the geneticists deal with the "abnormal" distribution of scores.

Measurement of Calving Ease	
Score	Definition
1	No problem (or unobserved)
2	Slight problem
3	Needed assistance
4	Considerable force
5	Extreme difficulty

Most difficult calvings involve first calf heifers and, due to their larger size, bull calves tend to cause more problems than heifer calves. Other factors, such as your heifer management program (we want heifers that are well grown, but not overweight), can also play a key role. Genetics also play a part, and the new calving ease evaluation system developed by Drs. Curt Van Tassell and George Wiggans at the USDA Animal Improvement Programs Laboratory in Maryland can help producers reduce the incidence of calving problems on their farms.

Frequency of Calving Difficulty			
Score	Lactation 1	Lactation 2	Lactation 3+
1	63.0%	79.9%	81.0%
2	14.4%	9.6%	9.1%
3	14.4%	7.2%	6.8%
4	5.3%	2.1%	2.0%
5	2.8%	1.2%	1.1%

Calf Mortality by Calving Ease Score		
Calving Ease Score	1 st Lactation	2 nd + 3 rd Lactation
1	6.1%	3.9%
2	14.3%	12.6%
3, 4, 5	27.7%	26.5%

What's new about this genetic evaluation system? The main difference is that a distinction is made between the genetic impact of the sire of the calf and the sire of the cow. In the past, we considered only the sire of the calf. Bulls that sired calves that were born with difficulty received poor evaluations (high %DBH), and bulls that sired calves that were born easily received favorable evaluations (low %DBH). However, we ignored the fact that some cows deliver calves more easily than others, regardless of the calf's role, and we ignored the fact that some cows produce calves that are born more easily than others. These two factors, the cow's ability to deliver a calf easily and the cow's propensity to produce a calf that is born easily, form the basis for a new trait called "daughter calving ease". To differentiate this trait from the sire of calf effect, the name of our traditional calving ease evaluations will be changed to "service sire calving ease".

Service Sire Calving Ease = Tendency of calves from a particular service sire to be born more easily (or more difficult) than an average calf

Daughter Calving Ease = Tendency of daughters of a particular sire to have more (or fewer) problems at calving time than an average cow and to produce calves that are born more easily (or more difficult) than calves produced by an average cow

These new evaluations will be available for Holstein bulls (including Red & Whites) in August 2002. Evaluations for both traits will be expressed on the same scale as before, that is, the expected percentage of difficult births (scores 4 or 5) in first-calf heifers. Heritability of service sire calving ease is roughly 16%, and heritability of daughter calving ease is about 10%. Reliability of service sire calving ease will typically be high, because data from numerous calves (of both sexes) are available within a year of the bull's semen release. Reliability of daughter calving ease will often be low, however, because of the aforementioned heritability value, because only females express the trait, and because some herds do not report usable calving ease data. This means that parent average will be an important source of information for many newly released AI bulls. The following table shows the average number of daughters of AI bulls in the milk yield and daughter calving ease evaluations, as well as the average number of calves in the service sire calving ease evaluation, according to birth year of the bull.

Number of Observations by Age of Bull			
Birth Year	Milk Yield	Service Sire Calving Ease	Daughter Calving Ease
1991	285	543	148
1992	170	418	93
1993	94	309	61
1994	79	422	57
1995	81	272	54
1996	73	182	25
1997	52	190	16

How should producers use this information? You should continue to use service sire calving ease as you've used calving ease in the past – to decide which bulls can safely be used as mates for virgin heifers. Bulls with evaluations of 10% or higher for service sire calving ease should be used sparingly as mates for virgin heifers. Remember that natural service bulls do not have any calving ease information, so producers who "pasture breed" their virgin heifers with jumper bulls are taking a big risk in terms of calving problems. In addition, AI young sires have no calving ease data (although they do have parent averages), so producers should be cautious when mating large groups of heifers to young sires.

Daughter calving ease, on the other hand, can be used as a sire selection tool. Although it has not yet been incorporated into Net Merit and TPI, we know that other countries, such as Denmark, Holland, and Sweden, put 7-12% of their selection emphasis on calving ease. Bulls with undesirable service sire calving ease evaluations will also tend to have unfavorable daughter calving ease evaluations, because they will transmit a portion of this limitation to their daughters, who will in turn transmit it to their calves. The relationship is not perfect, however, and the correlation between service sire calving ease and daughter calving ease for AI bulls is about 50%. To put this into perspective, the correlation between PTA milk and PTA fat is about 80%, and the correlation between PTA milk and PTA type is about 0%. The following example shows results for four Holstein bulls that currently appear on the top 400 Net Merit list (names have been changed for entertainment purposes).

Example Bulls		
Name	Service Sire Calving Ease	Daughter Calving Ease
"Big Bill"	15	11
"Maternal Mel"	10	6
"Heifer Hal"	7	10
"Easy Eddie"	6	5

As shown in the table, "Bill" sires calves that are born with extreme difficulty and, when these calves grow up, they tend to have more calving problems than an average cow. "Mel" is also a poor choice for virgin heifers, but when his daughters become first-calf heifers, they seem to calve quite easily. "Hal" will be a popular choice for virgin heifer matings, but some of his daughters will have calving difficulties later, when they enter the milking herd. "Eddie" excels for both traits; he sires calves that are born very easily and, in turn, they become cows that calve very easily. These bulls represent the extremes that we see among active AI bulls. Very few bulls will have evaluations below 5% for either trait, and very few will exceed 15%. Most bulls will fall in the range of 8% to 11%. In conjunction with a good heifer management program, this new genetic information can be used to address a costly and frustrating problem on modern dairy farms, and to identify sires that excel for calving ease on both the paternal and maternal sides of the pedigree.

In summary, here are the key points:

1) Current calving ease evaluations, which measure a bull's tendency to sire calves that are born easily, have been improved by adjusting for the influence of his mates. These evaluations have been renamed "service sire calving ease".

2) New evaluations, which are called "daughter calving ease", will measure the influence of the sire of the cow on calving ease. These evaluations represent a combination of the cow's ability to deliver calves easily and the cow's propensity to have calves that are born easily.

3) Producers should start by choosing an outstanding group of bulls using an economic index, such as Net Merit or TPI. Daughter calving ease information can be used as a secondary selection tool in this process.

4) Producers should then use service sire calving ease to determine which of these selected bulls can safely be used as mates for virgin heifers.

5) Natural service bulls (beef or dairy) and AI young sires have no calving ease information, so using these bulls on virgin heifers is risky. Besides, your virgin heifers have the best genetics on the farm, and they're likely to conceive on the first service. Don't waste this valuable resource on a jumper bull!