

Genetic Evaluations for Fertility

by Jack McAllister

Dairy producers have been experiencing more problems with herd fertility in recent years. Not surprisingly, USDA dairy researchers have observed about a 2 day increase in average days open each year since 1990 in analysis of DHIA data. Genetically, there is also evidence that days open has increased by about .4 days per year. The decline in fertility with greater days open has generally been attributed to selection for greater milk yield. This would seem to be an almost unavoidable outcome because there is a moderately strong positive genetic relationship (.3) between milk yield and days open.

In February, 2003, the Animal Improvement Programs Laboratory of USDA published a new set of genetic evaluations for cows and bulls for fertility . This marks the first time genetic evaluations of this type have been available for breeding decisions.

Pregnancy rate for each 21-day period (the length of a normal heat cycle) after calving is used as the measure of fertility. It is defined as the percentage of non-pregnant cows that become pregnant during each 21 day period. Pregnancy rate can be obtained from the number of days open, i.e. the number of days which have elapsed since calving at the time of a successful or the last insemination.

Days open from DHIA records are used to arrive at pregnancy rate. Over a wide range of days open there is a near linear relationship between days open and pregnancy rate. For each 1% increase in pregnancy rate there are 4 fewer days open. Thus, a simpler linear approximation for pregnancy rate was derived from days open data:

$$\text{Pregnancy rate} = (233 - \text{Days open})/4$$

The genetic evaluation is called PTA "Daughter Pregnancy Rate" (DPR) and expresses the ability of bulls and cows to transmit fertility to their daughters. The base for comparison is progeny tested bulls born in 1995. Thus, the DPR values for individual bulls and cows are expressed relative to this base. DPR values for active AI Holstein bulls in November 2002 ranged from -3.3 % to 2.8%. Reliability values for bulls and cows will be lower than for yield traits even with the same number of daughters. This is because the heritability of pregnancy rate is only about 4%. Bulls with only first crop daughters will have average reliability of around 60% and recently born cows have an average reliability of about 30%.

It will now be possible to select more directly for fertility. At this time DPR has not been incorporated into the Net Merit indexes. However, the negative association between days open and productive life (PL) may be partly responsible for the slowing down of the decline in fertility since the Net Merit indexes have been available as a selection tool and productive life receives positive emphasis in them. Among bulls in the upper levels of NM\$ (80th percentile or higher) one could seek bulls who were also positive for DPR. In the most recent genetic evaluations, just over one-third of the 80th percentile NM\$ bulls were positive for DPR.