# 2021 Net Merit $ Genetic Index Includes Additional Traits

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In August of 2021, the Council on Dairy Cattle Breeding (CDCB) released updates to the Net Merit (NM$), Cheese Merit (CM$), Fluid Merit (FM$), and Grazing Merit (GM$) Indexes used to rank AI sires, bulls, and cows. These indexes allow one to predict the lifetime profit of a particular animal relative to a cow born in 2015 and then choose those animals with the highest value for a higher probability of being the most profitable. Each of these indexes uses a slightly different relative emphasis of 45 economically important traits. Fluid Merit $ is intended for a fluid market where milk protein has no or little value. Both Net Merit $ and Cheese Merit $ indexes place a value and relative emphasis on fat and protein yield. The Grazing Merit $ Index is intended for producers that seasonally calve or graze as 2.5 times more emphasis is placed on fertility.

**The relative emphasis (%) of traits included in Net Merit $ (NM$), Fluid Merit $ (FM$), Cheese Merit $ (CM$), and Grazing Merit $ (GM$) for Holsteins.**

| Trait | NM$ | FM$ | CM$ | GM$ |
|---|---|---|---|---|
| Milk | 0.3 | 21.9 | -2.2 | 0.3 |
| Fat | 28.6 | 28.3 | 27.2 | 27.6 |
| Protein | 19.6 | 0.0 | 20.9 | 18.9 |
| Productive Life (PL) | 15.9 | 15.7 | 15.1 | 6.9 |
| Somatic cell score (SCS) | -2.8 | -1.6 | -3.5 | -2.8 |
| Body weight composite (BWC) | -9.4 | -9.3 | -8.9 | -10.9 |
| Udder composite (UDC) | 3.4 | 3.4 | 3.2 | 3.8 |
| Feet/Leg composite (FLC) | 0.4 | 0.4 | 0.4 | 0.4 |
| Daughter pregnancy rate (DPR) | 4.1 | 4.1 | 3.9 | 11.7 |
| Calving trait subindex (CA$) | 2.9 | 2.8 | 2.7 | 2.6 |
| Heifer conception rate (HCR) | 0.4 | 0.4 | 0.4 | 0.7 |
| Cow conception rate (CCR) | 1.0 | 1.0 | 0.9 | 2.8 |
| Cow livability (LIV) | 4.4 | 4.3 | 4.2 | 3.3 |
| Health trait subindex (HTH$) | 1.2 | 1.2 | 1.2 | 1.4 |
| Residual feed intake (RFI) | -3.8 | -3.8 | -3.6 | -4.2 |
| Early first calving (EFC) | 1.2 | 1.2 | 1.1 | 0.9 |
| Heifer livability (HLIV) | 0.5 | 0.5 | 0.5 | 0.4 |

Source: USDA- AIP Research Report NM$8 (5-2021) VanRaden and others.

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This revision included updates to prices expected over the next few years for each trait, small changes in the way the values for individual traits were calculated, and the addition of 3 more traits to the already extensive list of traits. CDCB notes that this revision is the most significant one in some time. The traits added include feed saved (FS-Holsteins only), heifer livability (HLIV), and early first calving (EFC).

Positive values for Feed Saved are more favorable and equate to selecting for cows that are more efficient at converting feed into milk in comparison to the genetic base. Some cows are more efficient at converting feed into milk compared to others of similar weight and production. Smaller cows use a smaller percentage of feed for maintenance and more nutrients in feed are used for milk production. Calculations for the Feed Saved Trait take into account both actual feed intake (measured during research feeding trials mainly conducted at universities) versus expected or calculated feed intake (called residual feed intake-RFI) and a body weight composite index. Body weight composite index is calculated using stature, strength, body depth, rump width and dairy form traits. Dairy form is used as a way to "penalize" cows that are too thin. Body weight composite index contributes more to the PTA for Feed Saved because of its higher reliability compared to Residual Feed Intake (RFI). For breeds other than Holstein, only body weight composite is used to calculate Feed Saved since actual feed intake data were unavailable for use in this calculation.

Selection for Heifer Livability and Early First Calving traits improve the health and growth of heifers. Positive values for both traits are desirable. Heifer Livability PTA's are an indication of a heifer's potential survivability and are expressed as a percentage point of more calves that survive till calving. Heritability of Heifer Livability is low and, as such, the emphasis is low in NM$ and the other indexes. Higher PTA's for Early First Calving are associated with better fertility, increased heifer growth rates, and longer productive life.

Net Merit $ or one of the associated indexes allows one to select future herdmates and parents of future generations based on a combination of traits important for profitability. One should select the index that best reflects ones milk market. These indexes are updated every few years to include new traits and to reflect the economic emphasis that should be placed on each of these traits. When selecting AI sires, choosing those in the top 20% (80th percentile or higher) allows one to select sires that are genetically in the top for the breed weighted for a variety of traits and not just one or two traits, such as milk production or a single type trait.