Council on Dairy Cattle Breeding

# CDCB future developments

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# Topics

- Net merit update ( &co.)
  - New trait being published (RFI)
- Slightly modified evaluation SNP set (+ yearly usability update)
- Genomic weighting
- Heterosis enhancement
- Jersey recessives
- Ancestor discovery and virtual dam project (evaluation perspective)
- Weekly breed ID updates
- Weekly/Monthly processing update
- Publication and distribution rules review

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Implementation:
August 2021

# Net merit update

- New NM$, same goal
  - maximizing cows' lifetime profitability
- Most significant revision in a long time
  - Inclusion of Residual Feed Intake (RFI), Early First Calving (EFC) and Heifer Livability (HLV)
  - Revision of parameters used in existing traits

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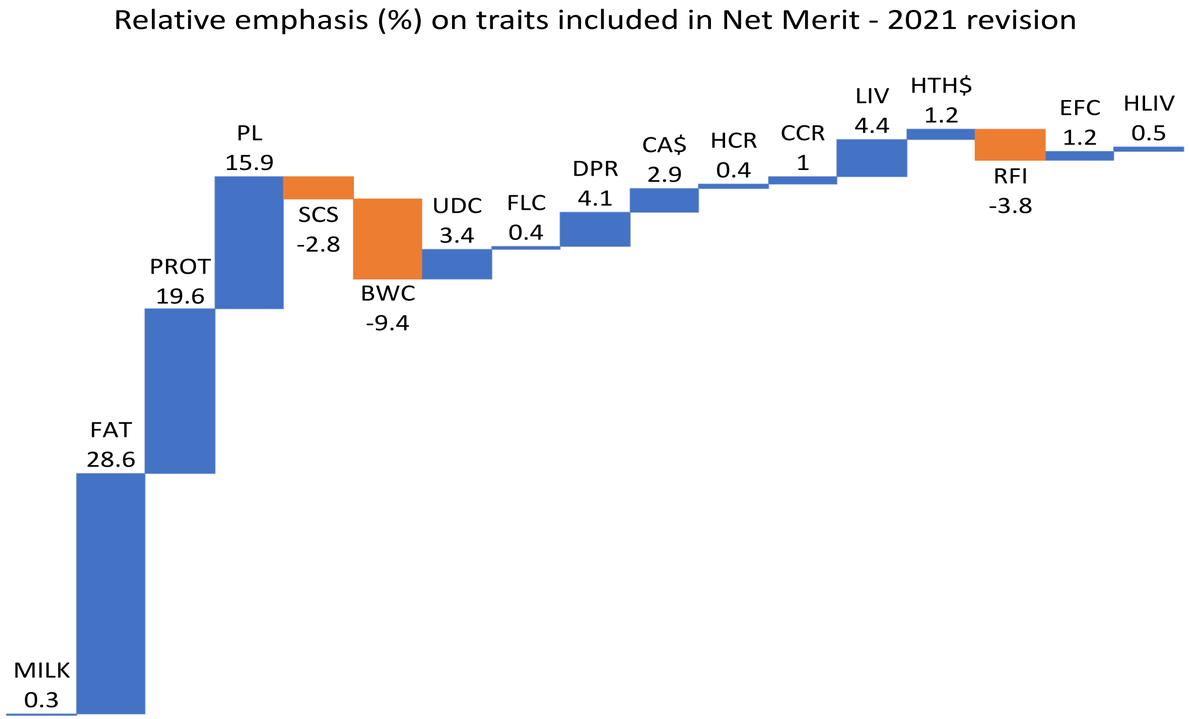
# What changes?




| | | |
|---|---|---|
| Reduced RE | FAT | Revised estimated costs of milk components |
| | UDC | Gains in udder conformation reduced milking labor |
| | FLC | Not well correlated with hoof health or lameness |
| | CA$ | Progress made reduced phenotypic average and SD |
| | LIV | Death rates and cull cow prices declined |
| Increased RE | PL | Better accounts for maturity effects |
| | BWC | Maintenance costs higher than previously assumed |

**Relative emphasis:** *contribution of each trait when ranking the animal in the NM$ scale (rel + genetic variation)*

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# Overview and take-home messages (I)

- Body weight (BWC) receives much more RE than before
  - BWC estimates are now based on effective measurements feed costs for maintenance (parameters were estimated indirectly before)
- BWC includes multiple traits.
  - Strength is mostly associated with body weight and feed intake.
  - Dairy form (thin cows) will still be penalized because of upward selection of PL, fertility and hth$, combined with a downward selection for size.

**Bottom line: selection for more efficient and robust animals**

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# Overview and take-home messages (II)

- Residual Feed Intake currently has lower reliability so its RE is low.
  - Evaluation validated using single/multi step approaches and 5-way cross-validation (VanRaden et al., 2018; VanRaden and Hutchison, 2018; Li et al, 2020)
  - As (much) more data is collected, its RE will likely increase.
- Overall NM$ reliability will drop slightly

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# Overview and take-home messages (III)

- NM$ remains an index that maximizes lifetime profitability on all breeds
  - Market conditions, production costs and consumer trends
  - RFI is available for HO only
    - Other breeds receive 0 emphasis from RFI
    - Its economic weight distributed among the other traits
    - Not just RFI…

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# Webinar with more in-depth details

- Train the trainer session (technical session)

**June 7th, 2021 at 2 pm ET**

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# Slightly modified evaluation SNP set

Target: August 2021

- Will “affect” usability on 18,000 SNPs in various chips.
  - Usability checks (yearly now)
  - Will likely affect a few animals in the database when reprocessed (clear/add errors)
- 100 SNPs difference in evaluation set (negligible impact expected)
  - JNS area (better results and prep for lab tests when available)
- New imputation options (skipping long-range haplotypes)
  - Accuracy only marginally lower (>97% matching – avg. 200/79,000 SNP difference in JE)
  - Impact on 3k SNP chip animals, negligible in all others.
- **Yearly** update of usability from now on

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# Genomic weighting

Target: August 2021 (?)

- Research ongoing
- Expectation (first indications):
  - Recent research indicates that increasing genomic vs. traditional weighting improves accuracy of prediction (even if it increases slightly bias)
  - Changes will be depending on the difference of DGV vs TRAD and different by breed/trait group
  - Only minimal (+) effect on reliability.

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Target:
August 2021

# Heterosis enhancement

- Research ongoing
- Expectation (first indications):
  - Mostly a performance enhancement package (few hours saved)
  - Minor changes to logic for complex pedigrees
    - Heterosis in peculiar XX ancestors
    - Single-animal changes, but 0 impact on population

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Target:
August 2021

# Jersey recessives

- Currently a standard process for Holstein
- Aim: test results from registered JE animals
  - Polled, etc..
  - JNS tests when available
- Better haplotype calling stability
- Talks with AJCA in progress

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Target:
December 2021

# Ancestor discovery and virtual dam project (evaluation perspective)

- Including more information on pedigree connections will impact evaluations
  - Better parent averages
  - Better inbreeding/heterosis calculations
  - Less missing information (less use of “phantom groups”)

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# Virtual dam project (evaluation perspective)

J. Dairy Sci. 103
https://doi.org/10.3168/jds.2019-17580


## Discovering ancestors and connecting relatives in large genomic databases

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**Table 2.** Traditional and genomic EBV value means, SD, and reliabilities for yield traits of 295,136 animals with newly found ancestors, before and after pedigree completion

| | | Incomplete pedigree | | | Complete pedigree | | |
|---|---|---|---|---|---|---|---|
| EBV | Trait | Mean (kg) | SD (kg) | Reliability (%) | Mean (kg) | SD (kg) | Reliability (%) |
| Traditional | Milk | 1,948 | 720 | 26.6 | 2,064 | 811 | 32.6 |
| | Fat | 72.2 | 15.1 | 25.0 | 76.7 | 18.2 | 32.0 |
| | Protein | 59.4 | 14.6 | 26.9 | 63.0 | 17.0 | 32.9 |
| Genomic | Milk | 2,186 | 492 | 76.2 | 2,258 | 513 | 77.1 |
| | Fat | 74.9 | 19.7 | 76.0 | 77.6 | 20.5 | 76.9 |
| | Protein | 63.6 | 13.4 | 76.3 | 65.7 | 14.1 | 77.3 |

Target: after August 2021

# Weekly breed ID updates

- Similar to what is being done in monthlies
- Weeklies still affected
- Strategy identified
  - Only testing (e.g. time/resources) needed
  - Unlikely before end of August run

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Target: after August 2021

# Weekly/Monthly processing update

- Mostly a performance enhancement package
  - Better management (less processing) of crossbred evaluations.
  - Implemented in April for weeklies (1/3 time cut)
    - No impact on evaluations
  - Likely implemented after August for monthlies (~ logic)

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# Publication and distribution rules review

Target: after August 2021

- Stage one of a larger effort to increase frequency of full evaluations (6 times / year)
- **Steps :**
  - **1)** Document all publication and distribution rules currently in place, for all files published and released in weeklies, monthlies and triannuals (30% done)
  - **2)** Write a proposal of modification
  - **3)** Discuss with ”Evaluation frequency task force”
  - *repeat*

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# THANK YOU FOR YOUR ATTENTION

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