Calculation and use of genetic evaluations for feed saved

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Topics



- Revision of cow maintenance cost
- Economics for Feed Saved (FSAV)
- Reliability for residual feed intake (RFI) and FSAV
- Formulas to combine RFI and BWC into FSAV
- Feed costs for each pound of milk, fat, or protein
- Future national impact of FSAV

Body weight (BW) and body weight composite (BWC)

- Since 2000, Net Merit (NM\$) has deducted for higher feed costs of larger cows by including a penalty on BWC.
- Since 2017, the previous composite formula from U Minnesota was replaced by new BWC formulas based on HAUSA research and AJCA research to better predict actual cow BW.
 - Dairy form included to predict weight instead of frame size.
- More data from university research herds and genomic regressions now indicate 35 instead of 40 pounds increase in BW for each unit of HO BWC.

Body weight and maintenance feed (dry matter intake)

- National Research Council publishes nutrients required
- Estimate is increasing
- Estimates from CDCB data are much higher
- Phenotypic, cow genomic, and sire regressions give similar, high estimates
- NM\$ should put 2.3 X more emphasis on small body size

Maintenance estimate:	DMI lb / BW lb / year
NM\$ 2018 assumed	1.7
NRC 2001	2.7
NRC 2021	3.4
Phenotypic	5.8
Genomic	5.5
Sire genomic	5.9
NM\$ 2021 proposed	4.5

Other incomes and costs for BWC already in NM\$

- +\$0.75 Income from cull cows / pound BW
- +\$0.17 Income from larger calves / pound cow BW
- -\$0.75 Heifer growth cost up to 1200 pounds
- -\$0.50 Cow growth cost from 1200 to 1500 pounds
- -\$0.10 Extra housing costs for cows
- Incomes and expenses all converted to feed pounds / lactation
- Maintenance + other items = 138 pounds DMI / unit BWC



FSAV formulas and reliability averages

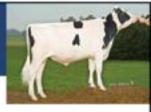


Combining BWC and RFI into FSAV

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$$PTA_{FSAV}$$
 -138 * PTA_{BWC} - 1 * PTA_{RFI} pounds / lactation
- REL_{FSAV} 0.35 * REL_{BWC} + 0.65 * REL_{RFI}

- Reversing these formulas can give PTA_{RFI} and REL_{RFI} if interested
- REL averages for calf predictions
 - BWC and RFI 77% and 15%
 - Feed Saved 37%
- Low REL will reduce REL of NM\$ but increase genetic progress

Including Feed Saved PTA and REL in NM\$



- Lifetime value of FSAV = \$0.12/lb DMI * 2.6 lactations = \$0.31
- Reliability of NM\$ with FSAV (or RFI) included

- NM\$ with FSAV $REL_{NMS} \times 0.89 + REL_{RFI} \times 0.11$

NM\$ current 76%

NM\$ with FSAV 69%

- Correlation of NM\$ with and without FSAV included = 0.984
- Extra progress from FSAV is worth ~\$8 million/ year nationally

Milk component prices and feed costs (proposed \$)

- Few researchers estimated costs for milk components.
- New data indicates that milk fluid and protein may require less feed and fat more feed than previously assumed.
- Feed cost for fat still poorly estimated because body fat loss during feeding trials not accounted for, only body weight change (next slide).

Income – cost \$	Milk	Fat	Protein
2021 base milk price \$ / lb	0.014	2.10	2.60
2018 feed cost	0.027	0.65	0.90
2021 feed cost	0.007	0.96	0.84
2018 profit / lb	-0.013	1.45	1.70
2021 profit / lb	+0.007	1.14	1.76

Feed consumed to produce milk, fat, or protein



	Description	Marginal feed \$	DMI (lb) f	or compo	nent yields
Model		/ 100 pounds milk	Milk	Fat	Protein
1	Phenotypic	3.32	0.008	2.82	5.32
2	Genomic	8.93	0.087	11.41	8.05
3	Sire genomic	6.08	0.040	6.58	7.38
NM\$	Assumed 2018	7.68	0.225	5.42	7.50
NM\$	Proposed 2021	6.96	0.060	8.00	7.00
ECM	Energy corrected milk	-	0.327	12.95	7.65

Relative emphasis in NM\$ and progress (proposed)

Trait	Relative emphasis		Correlation with index	
	2018	2021	2018	2021
Milk	-0.7	7.1	.51	.62
Fat	26.8	16.3	.78	.71
Protein	16.9	13.7	.68	.73
BWC	-5.3	-10.4	23	37
RFI	0.0	-14.2	.00	.14
[Feed Saved]		24.6		.39

Many other proposed changes will affect the 2021 emphasis and progress.

Proposed NM\$ revisions for April 2021



- Revise maintenance cost for BWC for all breeds
- Include RFI and BWC feed reductions in FSAV for Holsteins
- Adjust feed costs for milk components
- Include heifer livability (HLIV) and early first calving (EFC)
- Revise opportunity and maturity costs in productive life (PL)
- Adjust price forecasts and other economic assumptions

Conclusions



- Selection for Feed Saved should improve US profit by \$8 million / year
 - \$4.3 million extra progress from DMI data via residual feed intake
 - \$4.0 million from more penalty on BWC via more maintenance cost
- RFI could get ~14% of relative emphasis in net merit, but low REL of ~15% for RFI and ~37% for FSAV of young animals will limit progress
- REL of NM\$ is lower when feed intake or other traits with low REL (such as fertility) are included in selection goal, but progress is faster

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