Sub-Index Approach - Sheep

LRS

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Intro

- 15 EBVs are calculated
  - 6 direct genetic for growth
  - 3 maternal genetic for growth
  - 6 genetic for reproduction
- 8 more breeding objective traits

EBV Traits

Direct	Maternal	Repro.
Sv=Survival	Svm	AgeFL
WtB=birth	WtBm	Nborn1
Wt50	Wt50m	TWW1
Gain		Int
ULoin		Nborn2
UFat		TWW2

Sub-Indexes

1. Growth Index
2. Carcass Index
3. Maternal Index

Growth Index

$$\begin{aligned} G &= 10(Sv) - 10(WtB) \\ &\quad +30(Wt50) + 50(Gain) \end{aligned}$$

Carcass Index

$$C = 50(ULoin) - 50(UFat)$$

Maternal Index

$$
\begin{aligned}
M \;=\; & 0(AgeFL) \;+\; 5(Nborn1) \;+\; 5(TWW1) \\
& -10(Int) \;+\; 20(Nborn2) \;+\; 20(TWW2) \\
& +10(Svm) \;-\; 10(WtBm) \;+\; 20(Wt50m)
\end{aligned}
$$

Indexes Planned

- Terminal Live Sales Model
- Terminal Carcass Sales Model
- Maternal Annual Model
- Maternal Accelerated Model
- Self-Replace
- Self-Replace Accelerated

Terminal Live Sales Index

$$TL = 90\,(G) + 10\,(C) + 0\,(M)$$

- Most of the weight on growth,
- Some weight on carcass,
- No weight on maternal.
- Just an example, decide on your own weights.

Terminal Carcass Index

$$TC = 70\,(G) + 30\,(C) + 0\,(M)$$

- More weight on carcass.
- Just an example, decide on your own weights.

Maternal Annual Index

$$MA = 20\,(G) + 0\,(C) + 80\,(M)$$

- Most weight on maternal sub index.
- Just an example, decide on your own weights.

Maternal Accelerated Carcass Index

$$MC = 15\,(G) + 5\,(C) + 80\,(M)$$

- Most weight on maternal sub index.
- A little added on carcass sub index.
- Just an example, decide on your own weights.

Self Replace Index

$$SR = 40\,(G) + 20\,(C) + 40\,(M)$$

- Equal emphasis on growth and maternal.
- Moderate emphasis on carcass.
- Just an example, decide on your own weights.
- Did not see much difference between two SR indexes.

Process

- Compute emphasis on each trait for an index, use TL as an example.

$$\begin{aligned} TL &= 900(Sv) - 900(WtB) + 2700(Wt50) \\ &\quad + 4500(Gain) + 500(ULoin) - 500(UFat) \end{aligned}$$

- Divide coefficients by 10,000.
- Divide coefficients by genetic SD of trait, e.g.

$$\frac{0.09}{0.2536}(Sv) = 0.3549(Sv)$$

- Determine genetic variance of the entire index (TL), then scale to an index variance of 100.

Weights for Indexes

Trait	TL	TC	MA	MC	SR
Sv	5.90	5.56	2.04	1.60	4.29
WtB	-2.96	-2.79	-1.03	-0.81	-2.16
Wt50	2.36	2.23	0.82	0.64	1.72
Gain	2.82	2.66	0.98	0.77	2.05
ULoin	0.29	1.05	0.00	0.24	0.94
UFat	-0.89	-3.24	0.00	-0.73	-2.91
Svm	0.00	0.00	13.65	14.30	7.17
WtBm	0.00	0.00	-4.97	-5.21	-2.61
Wt50m	0.00	0.00	2.26	2.37	1.19
AgeFL	0.00	0.00	0.00	0.00	0.00
Nborn1	0.00	0.00	5.66	5.92	2.97
TWW1	0.00	0.00	0.58	0.61	0.31
Int	0.00	0.00	-0.73	-0.76	-0.38
Nborn2	0.00	0.00	20.13	21.09	10.58
TWW2	0.00	0.00	1.82	1.90	0.96

Comparison of Weights with Cheryl's

Trait	TL	Cheryl's TL
Sv	5.90	3.31
WtB	-2.96	-3.23
Wt50	2.36	7.06
Gain	2.82	5.74
ULoin	0.29	0.00
UFat	-0.89	0.00

Expected Responses

Trait	TL	%	Cheryl's TL	%
Sv	0.03	9	0.00	3
WtB	0.24	-9	0.22	5
Wt50	1.46	27	1.14	39
Gain	2.48	45	2.53	53
ULoin	0.84	5	0.00	0
UFat	0.18	-5	0.00	0

Correlated Responses

Trait	TL	MA	SR
Wt100	3.46	1.87	2.81
WtCarc	0.78	0.45	0.64
DFIewe	0.03	0.02	0.03
DFIlam	0.05	0.03	0.04
CFat	0.08	0.21	0.03
Cconf	0.03	0.03	0.04
Nwean	0.03	0.10	0.07
LEase	0.04	0.08	0.06

Remarks

- Sub-Index Approach = Index by Committee,
- Not based on any prices or costs, i.e. not economically based,
- Straight-forward, simple to construct,
- Does not depend as much on genetic correlations as economic approach,
- All traits are affected by any index whether they are included in the index or not,
- Could be expanded to include Health sub-index.

At Last

The End