DEERSelect

4th October 2011

The Meat Yield Module

Purpose: To allow genetic comparisons between animals for the value of the carcass and primal cuts using different sources of data. This will also mean that the carcass weight and primal cutscan contribute to the 3 indices in the Red Deer analysis (replacement early kill, replacement late kill and terminal) and the Terminal Index in the Wapiti analysis, instead of using liveweight at 12 months (W12) only.

Measurements and techniques utilised:

- Liveweights
- eye muscle area using ultrasound scanning
- eye muscle area, and meat and fat in the loin, rump and shoulder of the animal, using CT scanning.

In the future other carcass measurement technologies could be utilised.

Method: A multi-trait model simultaneously removes the effects of known environmental influences (e.g., herd, year, animal age, dam age) and estimates the genetic component for each animal, known as breeding values or BVs. The economically relevant traits are then combined, using economic weights, into indices for an early finishing system, a late finishing system and a terminal system.

Animals will obtain BVs for these traits even if they do not have the data recorded, due to relationships between traits (genetic correlations) and between animals. Animals having little of their own data will have low accuracies relative to those with other data. Those with ultrasound eye muscle area (EMA) and/or CT data will have the highest accuracies, all else being equal (see Table 1 for examples).

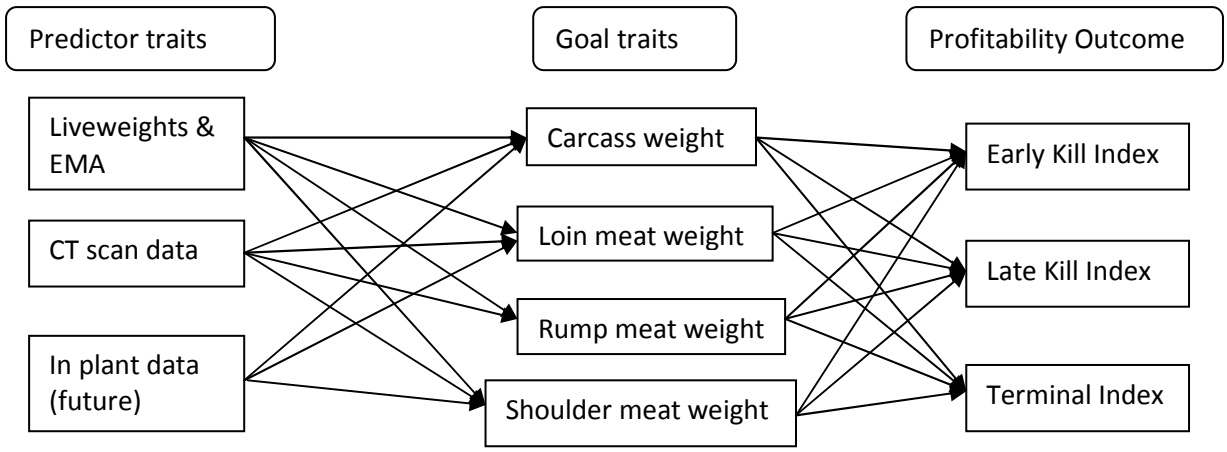
Outputs:

- Predictor trait BVs: These BVs are produced for traits that are used to estimate the Goal traits, if the Goal trait itself is not measured directly eg EMA BV is used in the prediction of carcass weight BVs, so its "value" is incorporated in carcass weight BVs. Accordingly, including predictor traits in selection decisions would be double counting – its contribution would have already been correctly included in the carcass trait BV. Figure 1 summarises the relationships.
- Goal trait BVs: These BVs (carcass weight, loin meat, rump meat and shoulder meat) are used in calculating the indices all at 12 months of age. The loin, rump and shoulder BVs are

all expressed in relation to a constant carcass weight hence they can be interpreted as the additional contribution these traits make over and above the carcass weight.

- Indices: There will be an index valuing carcass traits for, in relation to-
    - Red Deer, each of an early kill system, a late kill system and a terminal system; and
    - Wapiti, a terminal system.

Figure 1 Relationship between Component traits, Goal Traits and Profitability Outcome



Example of outputs

The values expected for the meat yield indices and individual BVs are shown in Table 1 (these are for Red Deer analysis – the Wapiti results will be similar). Accuracies of BVs will increase as the amount of information contributing to them increases (either through progeny or the animal's own records, such as liveweights and scanning data).

The EMAceBV is an example of a predictor trait BV – the listed data is taken into account when determining the goal traits so should be regarded as a by-product of the genetic evaluation rather than an output of independent relevance. Similarly FATYeBV is a predictor trait since FAT yield is relevant to the determination of carcass yield goal trait. However, note that at this stage there is little variation in fat yield, so it has not been taken account of in the indices.

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Table 1 Yield indices, breeding values and accuracies for Red stags with varying amounts of information. The dark shaded columns are the new Meat Yield Indices; the light shaded are Predictor traits and the unshaded are Goal Traits.

Birth Year	Yield r-EK	Yield r-LK	Yield Term	CW eBV	CW Acc%	SHLY eBV	SHLY Acc%	LNLY eBV	LNLY Acc%	HQLY eBV	HQLY Acc%	FATY eBV	FATY Acc%	EMAc eBV	EMAc Acc%	No Prog	Data
2008	2530	1929	3726	10.4	75	0.11	42	0.05	40	0.06	45	0.18	55	1.4	46	21	
2007	2322	1728	3395	10.1	77	-0.42	46	-0.14	45	-0.40	49	0.10	60	1.3	47	13	
2006	1640	1208	2395	7.4	84	-0.34	47	-0.16	43	-0.44	50	0.27	66	0.2	64	44	
2008	1370	1036	2021	5.7	67	0.21	44	-0.03	43	0.17	47	-0.31	54	0.7	48	5	
2006	977	733	1433	4.2	83	-0.07	68	-0.04	63	-0.06	80	0.32	78	0.7	74	17	
2003	235	178	346	1.0	40	0.01	11	-0.00	0	0.01	12	-0.01	12	0.0	0	9	
2005	-153	-112	-225	-0.7	65	-0.02	0	0.01	0	0.10	0	-0.01	43	0.2	35	1	
2009	2600	1963	3820	11.0	74	-0.09	65	-0.10	59	0.33	79	-0.42	71	1.0	76	0	Wts + EMA + CT
2010	2597	1973	3823	10.8	58	0.09	26	0.02	23	0.00	28	0.19	37	0.9	29	0	W03 only
2009	1930	1441	2830	8.4	69	-0.17	38	-0.11	38	-0.17	39	0.22	54	-0.2	58	0	Wts + EMA
2009	1920	1492	2826	7.5	75	-0.07	66	0.13	60	0.56	81	-0.26	73	1.7	77	0	Wts + EMA + CT

Yield r-EK = Replacement Early Kill Meat Yield Index, cents
Yield r-LK = Replacement Late Kill Meat Yield Index, cents
Yield Term = Terminal Meat Yield Index, cents
CWeBV = carcass weight BV, kg
Acc% = accuracy of the BV to the left
SHLYeBV = Shoulder Lean Meat Yield at a constant carcass weight, kg
LNLYeBV = Loin Lean Meat Yield at a constant carcass weight, kg
HQLYeBV = Hind Quarter Lean Meat Yield at a constant carcass weight, kg
FATYeBV = Fat Yield at a constant carcass weight, kg
EMAceBV = Eye Muscle Area at a constant carcass weight
No Prog = number of progeny
Data = data used to estimate BVs: Wts = liveweights, EMA = eye muscle area scan, CT = computed tomography

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Further information

Further information on the compilation and interpretation of this data can be obtained from your DEERSelect bureau or:

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