NAV subindices for purebred beef: within breed specific subindex weights

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The NAV board approved 24 November 2021 to establish 7 joint Nordic subindices (Table 1). NAV has in the autumn 2022 received joint Nordic recommendations for within breed weights for the different subindices from Angus, Charolais, Hereford, Limousine and Simmental. The NAV board approved the recommended relative weights in Table 2-4 on the November 2022 NAV board meeting. Implementation took place 7th March 2023.

Table 1. Joint Nordic subindices for beef.

Subindex	**Underlying index**
Growth	Daily carcass gain (DCG)
	Yearling weight - direct (dYW)
Slaughter quality	Carcass fat score (CFA)
	Carcass conformation score (CCO)
Production	Growth
	Slaughter quality
Calving	Calving ease - maternal, 1st calv. (mCAE1)
	Calf survival - maternal, 1st calv. (mCSU1)
	Calving ease - maternal, 2+ calv. (mCAE2)
	Calf survival - maternal, 2+ calv. (mCSU2)
Milk	Weaning weight gain - maternal (mWG)
Dam	Calving
	Milk
Birth	Calving ease - direct, 1st calv. (dCAE1)
	Calf survival - direct, 1st calv. (dCSU1)
	Calving ease - direct, 2+ calv. (dCAE2)
	Calf survival - direct, 2+ calv. (dCSU2)

Table 2. Production indices - final weights in percentage.

Index	Underlying index	AAN	CHA	HER	LIM	SIM
Growth	Daily carcass gain (DCG)	75	75	50	75	50
	Yearling weight - direct (dYW)	25	25	50	25	50
Slaughter quality	Carcass fat score (CFA)	0	25	10	25	25
	Carcass conformation score (CCO)	100	75	90	75	75
Production	Growth	70	70	50	50	70
	Slaughter quality	30	30	50	50	30

Table 3. Dam indices - final weights in percentage.

Index	Underlying index	AAN	CHA	HER	LIM	SIM
Calving	Calving ease – maternal, 1st calv. (mCAE1)	40	40	29	30	35
	Calf survival – maternal, 1st calv. (mCSU1)	40	40	34	31	25
	Calving ease – maternal, 2+ calv. (mCAE2)	10	10	20	16	19
	Calf survival – maternal, 2+ calv. (mCSU2)	10	10	17	24	21
Milk	Weaning weight gain - maternal (mWG)	100	100	100	100	100
Dam	Calving	50	50	30	50	50
	Milk	50	50	70	50	50

Table 4. Birth indices - final weights in percentage.

Index	Underlying index	AAN	CHA	HER	LIM	SIM
Birth	Calving ease – direct, 1st calv. (dCAE1)	41	30	36	28	32
	Calf survival – direct, 1st calv. (dCSU1)	43	25	46	25	20
	Calving ease – direct, 2+ calv. (dCAE2)	9	25	15	17	21
	Calf survival cow – direct, 2+ calv. (dCSU2)	7	20	3	30	27

Standardization factors for the indices.

The presentation breeding values for indices follow the same principle of the single traits where animals in the base population are standardized to a mean of 100 and standard deviation of 10.

The standardization factors in table 5 and 6 for the new indices (in Table 1.) have been calculated considering the weights in tables 2 – 4 in this document. Genetic standard deviation for single traits correspond to the ones used for the standardization of breeding values in the current Pure bred beef routine evaluation.

Table 5. Standardization factors for calving single traits and subindices.

Index	AAN	CHA	HER	LIM	SIM
Birth weight - maternal, 1st. calv.	0.639	0.664	0.539	0.698	0.567
Birth weight - direct, 1st. calv.	1.655	2.005	1.751	1.688	1.956
Calving ease - maternal, 1st. calv.	0.046	0.072	0.047	0.071	0.083
Calving ease - direct, 1st. calv.	0.088	0.111	0.092	0.113	0.143
Calf survival - maternal, 1st. calv.	0.038	0.045	0.032	0.042	0.035
Calf survival - direct, 1st. calv.	0.078	0.052	0.071	0.059	0.053
Birth weight - maternal, 2+ calv.	0.653	0.596	0.625	0.546	0.549
Birth weight - direct, 1st. calv.	1.760	1.830	1.787	1.599	1.800
Birth weight - direct, 2+ calv.	0.017	0.023	0.020	0.022	0.021
Calving ease - maternal, 1st. calv.	0.022	0.036	0.024	0.039	0.046
Calving ease - maternal, 2+ calv.	0.009	0.018	0.008	0.017	0.014
Calving ease - direct, 1st. calv.	0.002	0.033	0.002	0.038	0.035
Calving index	0.655	0.776	0.735	0.798	0.740
Birth index	0.624	0.686	0.650	0.751	0.841
Dam index	6.727	7.551	7.558	6.672	7.529

Table 6. Standardization factors for carcass single traits and subindices.

Index	AAN	CHA	HER	LIM	SIM
Birth weight - maternal	0.689	0.638	0.666	0.600	0.534
Birth weight - direct	1.819	1.740	1.977	1.596	1.720
Weaning weight gain - maternal	6.686	5.253	7.272	5.160	5.022
Weaning weight gain - direct	8.342	7.467	7.579	8.021	7.755
Yearling weight - maternal	8.155	6.026	8.787	5.800	5.818
Yearling weight - direct	18.673	20.449	17.21	17.676	18.649
Post-weaning weight gain	9.803	10.248	8.614	6.811	8.405
Daily carcass gain	37.60	31.703	34.724	29.302	31.445
Carcass conformation score	0.461	0.554	0.439	0.502	0.492
Carcass fat score	0.182	0.225	0.173	0.198	0.182
Growth index	0.951	1.008	0.972	0.944	0.909
Slaughter quality index	0.965	0.663	0.963	0.677	0.714
Production index	0.858	0.813	0.741	0.844	0.861

Correlations between indexes and underlying traits and between indexes and subindexes (breeding values from the June 2022 NAV PbB evaluation). See list of abbreviations at the end of this document on page 8.

Growth index

Table 7. Correlation between growth index and underlying traits by breed

	GRO1 AAN	GRO2 CHA	GRO3 HER	GRO4 LIM	GRO5 SIM	
dYW	0.87	0.88	0.95	0.9	0.95	DNK
CDG	0.99	0.99	0.93	0.99	0.95	
dYW	0.92	0.91	0.95	0.91	0.96	FIN
CDG	0.99	0.99	0.96	0.99	0.96	
dYW	0.89	0.87	0.95	0.9	0.96	SWE
CDG	0.98	0.98	0.92	0.99	0.94	

Slaughter quality index

Table 8. Correlation between slaughter quality index and underlying traits by breed

	SLQ1 AAN	SLQ2 CHA	SLQ3 HER	SLQ4 LIM	SLQ5 SIM	
CFA	0.08	-0.05	0.18	0.16	0.08	DNK
CCO	1	0.95	0.99	0.93	0.95	
CFA	0.06	-0.16	0.11	-0.28	0.04	FIN
CCO	1	0.95	0.99	0.95	0.93	
CFA	0.03	0.1	0.14	-0.2	0.31	SWE
CCO	1	0.94	0.99	0.95	0.92	

Production index (subindices)

Table 9. Correlation between production index and underlying subindexes by breed

	PRO1 AAN	PRO2 CHA	PRO3 HER	PRO4 LIM	PRO5 SIM	
SLQ	0.94	0.93	0.74	0.8	0.74	DNK
GRO	0.94	0.9	0.78	0.82	0.74	DNK
SLQ	0.95	0.95	0.83	0.84	0.69	FIN
GRO	0.95	0.93	0.81	0.86	0.69	FIN
SLQ	0.97	0.93	0.77	0.78	0.49	SWE
GRO	0.97	0.89	0.84	0.8	0.49	SWE

Production index (underlying traits)

Table 10. Correlation between production index and underlying traits by breed

	PRO1 AAN	PRO2 CHA	PRO3 HER	PRO4 LIM	PRO5 SIM	
dYW	0.95	0.94	0.83	0.84	0.93	DNK
CFA	0.03	-0.04	0.05	0.06	-0.07	DNK
CDG	0.75	0.76	0.65	0.65	0.85	DNK
CCO	0.67	0.59	0.74	0.79	0.74	DNK
dYW	0.95	0.96	0.84	0.87	0.94	FIN
CFA	0.13	-0.12	0.07	-0.22	-0.08	FIN
CDG	0.84	0.82	0.71	0.7	0.89	FIN
CCO	0.69	0.66	0.83	0.82	0.68	FIN
dYW	0.97	0.94	0.86	0.86	0.93	SWE
CFA	-0.05	-0.04	-0.11	-0.14	0.03	SWE
CDG	0.84	0.73	0.72	0.69	0.86	SWE
CCO	0.5	0.63	0.77	0.76	0.5	SWE

Calving index

Table 11. Correlation between growth index and underlying traits by breed

	CAL1 AAN	CAL2 CHA	CAL3 HER	CAL4 LIM	CAL5 SIM	
mCSU2	0.9	0.91	0.89	0.85	0.8	DNK
mCSU1	0.89	0.94	0.85	0.9	0.88	DNK
mCAE2	0.78	0.95	0.87	0.88	0.91	DNK
mCAE1	0.93	0.95	0.92	0.88	0.88	DNK
mCSU2	0.86	0.85	0.84	0.85	0.8	FIN
mCSU1	0.88	0.88	0.85	0.85	0.89	FIN
mCAE2	0.81	0.92	0.88	0.92	0.95	FIN
mCAE1	0.9	0.93	0.91	0.94	0.93	FIN
mCSU2	0.87	0.87	0.91	0.89	0.86	SWE
mCSU1	0.83	0.92	0.85	0.89	0.92	SWE
mCAE2	0.73	0.89	0.87	0.9	0.93	SWE
mCAE1	0.89	0.97	0.94	0.93	0.94	SWE

Birth index

Table 12. Correlation between birth index and underlying traits by breed

	BIR1 AAN	BIR2 CHA	BIR3 HER	BIR4 LIM	BIR5 SIM	
dCSU2	0.86	0.68	0.86	0.88	0.83	DNK
dCSU1	0.87	0.68	0.89	0.87	0.82	DNK
dCAE2	0.84	0.91	0.91	0.88	0.94	DNK
dCAE1	0.93	0.86	0.94	0.81	0.88	DNK
dCSU2	0.77	0.76	0.77	0.8	0.81	FIN
dCSU1	0.76	0.72	0.82	0.76	0.82	FIN
dCAE2	0.88	0.96	0.91	0.94	0.96	FIN
dCAE1	0.93	0.96	0.96	0.94	0.95	FIN
dCSU2	0.8	0.85	0.79	0.82	0.89	SWE
dCSU1	0.79	0.83	0.86	0.78	0.86	SWE
dCAE2	0.91	0.97	0.93	0.95	0.96	SWE
dCAE1	0.95	0.97	0.97	0.96	0.97	SWE

Dam index (subindices)

Table 13. Correlation between dam index and underlying subindexes by breed

	DAM1 AAN	DAM2 CHA	DAM3 HER	DAM4 LIM	DAM5 SIM	
mWG	0.49	0.54	0.85	0.63	0.69	DNK
CAL	0.77	0.86	0.54	0.83	0.84	
mWG	0.73	0.76	0.93	0.82	0.77	FIN
CAL	0.66	0.63	0.43	0.49	0.65	
mWG	0.78	0.82	0.9	0.8	0.79	SWE
CAL	0.58	0.59	0.39	0.51	0.61	

Dam index (underlying traits)

Table 14. Correlation between dam index and underlying traits by breed

	DAM1 AAN	DAM2 CHA	DAM3 HER	DAM4 LIM	DAM5 SIM	
mWG	0.49	0.54	0.85	0.63	0.69	DNK
mCSU2	0.7	0.78	0.45	0.68	0.67	
mCSU1	0.69	0.82	0.41	0.71	0.74	
mCAE2	0.58	0.8	0.52	0.77	0.78	
mCAE1	0.71	0.81	0.54	0.75	0.75	
mWG	0.73	0.76	0.93	0.82	0.77	FIN
mCSU2	0.58	0.53	0.35	0.48	0.53	
mCSU1	0.56	0.56	0.4	0.47	0.57	
mCAE2	0.57	0.57	0.34	0.43	0.62	
mCAE1	0.6	0.59	0.39	0.42	0.61	
mWG	0.78	0.82	0.9	0.8	0.79	SWE
mCSU2	0.44	0.51	0.38	0.42	0.52	
mCSU1	0.41	0.56	0.38	0.46	0.58	
mCAE2	0.49	0.52	0.29	0.45	0.55	
mCAE1	0.6	0.57	0.34	0.48	0.58	

List of abbreviations

Abbreviation	Full name
DNK	Denmark
FIN	Finland
SWE	Sweden
AAN	Aberdeen Angus
CHA	Charolais
HER	Hereford
LIM	Limousine
SIM	Simmental
BW	Birth weight
mCAE1	Calving ease – maternal, 1st calv
mCAE2	Calving ease – maternal, 2+ calv.
dCAE1	Calving ease – direct, 1st calv
dCAE2	Calving ease – direct, 2+ calv.
mCSU1	Calf survival – maternal, 1st calv
mCSU2	Calf survival – maternal, 2+ calv.
dCSU1	Calf survival – direct, 1st calv
dCSU2	Calf survival – direct, 2+ calv.
mWG	Weaning weight gain – maternal
dWG	Weaning weight gain – direct
mYW	Yearling weight – maternal
dYW	Yearling weight – direct
PWG	Post-weaning weight gain
DCG	Daily carcass gain
CFA	Carcass fat score
CCO	Carcass conformation score
GRO1-5	Growth index for breeds 1 to 5 (AAN, CHA, HER, LIM, and SIM)
SLQ1-5	Slaughter quality index for breeds 1 to 5 (AAN, CHA, HER, LIM, and SIM)
PRO1-5	Production index for breeds 1 to 5 (AAN, CHA, HER, LIM, and SIM)
CAL1-5	Calving index for breeds 1 to 5 (AAN, CHA, HER, LIM, and SIM)
DAM1-5	Dam index for breeds 1 to 5 (AAN, CHA, HER, LIM, and SIM)
BIR1-5	Birth index for breeds 1 to 5 (AAN, CHA, HER, LIM, and SIM)