Knowledge Center for Agriculture

PRINCIPLES OF DANISH BEEF CATTLE BREEDING

Recording of Data
Calculation Methods
Breeding Values

Knowledge Center for Agriculture, Cattle

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First edition

Contents

1. Introduction

Calculation of breeding values for Beef Cattle in Denmark has been practiced since 1992.

The breeding evaluation system complies with the international rules for registration, documentation, calculations, etc. The Danish system, in our opinion, gives reliable estimated breeding values.

Today, Danish beef breeds have quality genetics by international standards at their disposal. By this publication, we want to stress the reliability of the Danish breeding values.

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2. Identification

2.1 Organization

In 1993 The Danish Ministry of Food, Agriculture and Fisheries (MFAF) adopted an identification system developed by The National Committee on Danish Cattle Husbandry (present Knowledge Center for Agriculture | Cattle) during the 1980s to be the official national identification system for all farm animals.

The Danish Veterinary Services (Dept. of The Danish Ministry of Family and Consumer Affairs MFCA)) are in charge of the identification system. Knowledge Center for Agriculture | Cattle administers farm numbers, animal ID and eartags on the behalf of The Danish Veterinary Services.

2.2 Rules concerning identification and registration

The rules of identification comply with EU-regulation (directive no. 1760/2000, with later adjustments). All farms with herds of cattle, pigs, sheep, goats, deer, ostrich, fox, mink, finnraccoon and commercial poultry production must be in the herd register of the MFAF (CHR-register). Farms are allocated individual farm numbers (CHR-numbers). Farm numbers have no attached geographical relations.

The identification of an animal always contains the farm number of the specific farm in Denmark where the animal was born or first imported to.

Until December 1998 all eartags were printed with a special logo, a 5-digit farm number and a 4-digit individual animal number within the farm.

Since January 1999 the capacity of the ID-system has been expanded, so that the farm numbers will be 6-digit and the individual animal numbers will be 5-digit. Every head of cattle in Denmark is thus unambigously identifiable.

In December 2004 the logo was changed.

DK CKR®

Logo 1984 to 2004

Logo since 2004

If an eartag does not carry one of the shown logos, the Danish authorities do not officially recognize it for cattle.

Animals born in Denmark are marked with yellow eartags, whereas imported animals are marked with red eartags on arrival to Denmark.

Calves born must be reported to the Central Cattle Database within seven days from birth.

Herds may use the barn registration sheets as a copy of the herd register.

2.3 Implementation and reliability

The herd owner is responsible for the ear tagging. As soon as the ear tag has been properly attached and the birth has been reported within the time limit stipulated, the animal is registered in the Central Cattle Database, containing data on all cattle and all herds in Denmark. This system ensures maximum security as regarding the identification, pedigree, yield, and herd affiliation of any animal.

3. Data collection and handling

Registration is a natural prerequisite for attending official breeding activities, i.e. classification, cattle shows, performance testing, etc. Basic registrations of identity, birth date and ownership is required for all Danish cattle.

The national Danish cattle database is used for these basic registrations. The advantage is that this allows farmers to register other data:

- Birth records as calving ease and birth weight
- Sire and dam
- Weightings
- Carcass records (data from approved slaughterhouses are automatically registered - carcass weight, EUROP conformation score.

From the AI-society the cattle database include recording of all AI-events. Besides these general registrations the beef breed association has introduced a registration program for members. This program includes:

- Weighting program
- Linear classification
- Intensive registration of natural mating.

The breeding value calculation for beef breeds include all data

3.1 Organization

Knowledge Center for Agriculture, Cattle carries out the registration and herdbook keeping of beef breeds.

The national board of the breed handles the herdbook interests of the individual beef breeds and works out rules concerning the registration and herdbook keeping procedures. The rules are stored in the computer system to allow the registration system to function as a herdbook. The herdbook keeping and the issuing of certificates are thus carried out automatically for animals, which fulfil the requirements for registration of the breed in question.

3.2 Rules concerning registration and herdbook keeping

It is a herd owner's duty to keep up-to-date as to the criteria for herdbook keeping if he wants to register an animal. When applying for registration and herdbook keeping, certain requirements must be met aiming at rendering work more effective:

- New herds apply to Knowledge Center for Agriculture, Cattle
- The registration forms can be completed by the owner or a technician who certifies the correctness of the information by signing the documents
- When purchasing a registered animal, a pedigree certificate can be ordered. Pedigree certificates can only be issued by the herdbook office
- All calves are to be registered by the herdbook office. Registration must be effected before any change of ownership.

3.3 Implementation and reliability

The herdbook office updates the registrations sent in. The whole system is based on the CKR-register, which is an unambiguous number system (see paragraph 2), securing extremely high reliability.

4. Classification

Beef cattle in Denmark are classified at national level by Danish Cattle Federation. The same guidelines are used for all 16 beef breeds, which are registered and entered in the herdbook by Knowledge Center for Agriculture, Cattle at the moment. No classification is carried out at local level.

Classification scale

In Denmark beef cattle is classified using the linear scoring system.

19 traits are scored using a linear scale from 1 - 9. Furthermore it is possible to apply codes for disorders in case a special deviation cannot be described by means of the linear scale. There are 49 different codes describing disorders (+9 especially for Highland Cattle).

The score/description is objective, linear and independent of lactation number and time in lactation. The 19 traits and the codes for disorders, if any, are then combined using a hand held terminal into 3 composite traits; BODY, MUSCULARITY and FEET & LEGS, which are combined into an overall type trait, called TYPE. These figures are corrected for condition, interval from calving, calving age (first calving), calving number, and as regards bulls also for condition, age and the optimum fixed for each individual trait of each individual breed. The resulting type figures are published using a scale from 60 - 99 with an average of 80 and a standard deviation of 5. Table 1 shows the different traits and the principles of calculation. Table 2 and 3 shows special characteristics for all breeds and the special ones used for Highland Cattle.

Table 1. Traits and principles of calculation

	TRAIT	COMPOSITE TRAIT	TOTAL TYPE SCORE
1	Width of fore end (front view)		
2	Depth of chest		
3	Top line	BODY	
4	Size		
5	General appearance		
6	Chine, width		
7	Loin, width		
8	Rump angle		
9	Length of rump		
10	Width of rump	MUSCULARITY	TYPE
11	Width of thighs		
12	Inside of thighs		
13	Depth of thighs		
14	Muscularity of thighs (side view)		
15	Rear legs (side view)		
16	Angle of pastern (side view)		
17	Rear legs (rear view)	FEET & LEGS	
18	Forelegs (front view)		
19	Bone quality		

Table 2. Special characteristics for all breeds

1	**HEAD**	**7**	**TEMPERAMENT**
10	Long, fine	70	Nervous
11	Wide, coarse	71	Aggressive
12	Deviating colour of muzzle	**8**	**KNEES AND HOCKS**
13	Deviating markings	80	Swollen hocks
2	**NECK**	81	Bruised hocks
20	Short	82	Hocks-out
21	Long	83	Swollen knee
22	Thick neck	**9**	**HOOFS**
23	Large dewlap	90	Wide spread toes
3	**SHOULDER**	91	Deviating colour of hoofs
30	Winged	92	Hoof trimming needed
31	Loose	93	Abnormal hoofs
4	**RUMP**	94	Toe-in (forelegs)
40	Prominent sacrum	**10**	**MOVEMENTS**
41	Prominent tail head	100	Short
42	Depressed tail head	101	Swinging
43	Wry tail head	102	Narrow
44	Narrow pin bones	103	Limping
45	Pointed rump	**11**	**TOP LINE**
46	Low thurls	110	Weak chine
47	High thurls	111	Weak loin
48	Fatty deposits	112	Uneven back
5	**UDDER/TEATS**	**12**	**NOT CLASSIFIED DUE TO**
50	Deep udder	120	Deviating markings
51	Large teats	121	Temperament
52	Small teats	122	Owner/animal not present
53	Extra teats		
54	Unsymmetrical udder		
55	Missing mammary gland(s)		
6	**SEXUAL ORGANS**		
60	Underdeveloped testicles		
61	Testicles missing		
62	Prolapse of prepuce		

Table 3. Special characteristics for Highland Cattle

13	**COLOUR**	**15**	**COAT**
131	Brindled	150	Forelock missing
132	Grey	151	Deviating amount of ordinary hair
133	Yellow		
134	White		
14	**HORNS**		
140	Unsymmetrical		
141	Damaged		
142	Deviation position of horns		

All classifications are reported to Knowledge Center for Agriculture, Cattle and printed in certificates/lists to the cattle breeder.

4.1 Organization

Knowledge Center for Agriculture, Cattle is responsible for and organizes the classification of beef cattle.

In practice, a breed classifier appointed by the herdbook committee/breeding committee of the breed in question carry out the classification.

4.2 Rules

The classification rules vary a little from one breed to another but the main principle is that all bulls to be used for A.I. are to be presented to a classification committee at the age of minimum 1 year.

For all breeds the classification of cows/heifers is voluntary.

However, F3 crossbred females of breeds having an open herdbook are to be presented to a classification committee and accepted before being registered in the main herdbook (only valid for some breeds with open herdbook).

4.3 Implementation and reliability

At present the classification scores are included in the breeding indices for BODY, MUSCULARITY and FEET & LEGS.

5. Herdbook

5.1 Organization

The first Danish cattle herdbook was published in 1881.

The national boards of the different breeds design and manage the herdbook rules of the individual breeds. The national boards of the different breeds in this respect refer to Knowledge Center for Agriculture, Cattle, which is a sub-committee under the organization Danish Agriculture. This organization has been appointed by the Danish Ministry of Food, Agriculture and Fisheries to be responsible for herdbook keeping in Denmark.

5.2 Rules

Generally speaking, the Danish herdbook rules have been designed to comply with the EU directives on herdbook keeping.

Cattle have to be identified in accordance with the Danish order on identification of cattle as well as the rules adopted by Knowledge Center for Agriculture, Cattle. Bulls are only registered in the herdbook if their parentage has been confirmed. Progeny by non-registered bulls have unknown paternal ancestry. Some breeds keep open herdbooks where all purebred animals can be registered.

Furthermore the national board of the breed may decide that females of another breed can be registered in a supplement to the herdbook. When progeny of such a female is minimum 14/16 purebred, it can be registered in the herdbook.

Other breeds keep closed herdbooks where animals can be registered only if their parents are registered in the same herdbook. However, animals registered in a similar herdbook in another EU country are accepted.

Table 4. Breeds keeping open/closed herdbooks

Open herdbooks	**Closed herdbooks**
Shorthorn	Aberdeen Angus
Simmental	Hereford
Original Brown Swiss	Galloway
Gelbvieh	Dexter
Charolais	Danish Salers
Limousin	
Blonde d'Aquitaine	
Belgian Blue Cattle in Denmark	
Piemontese	
Highland Cattle	
Danish Grauvieh	

5.3 Implementation and reliability

The day-to-day herdbook keeping is the responsibility of Knowledge Center for Agriculture, Cattle and performed by staff from this organisation.

The pedigree data and other information on Danish-born animals are checked using data from the Central Database (parentage certificates (DNA/bloodgroups)). Blood group certificates of bulls are checked as well. The data of imported animals are checked by means of pedigrees submitted from the exporting country.

The data of all registered animals can be printed out anytime at the local cattle department.

6. Calculation of breeding values

For beef cattle sires' estimates of breeding values for daily gain, area of the L.D. and feed conversion efficiency are published following performance testing. Estimates of breeding values for all animals are calculated 4 times a year. The results include on-farm registrations of calving and weights, performance test results, conformation scores as well as results obtained at the slaughterhouses.

6.1 Performance test

Testing scheme

Bulls are tested in the age interval from 7.5 to 12 months. They are fed a complete ad-lib diet, weighed every four weeks, and their feed consumption is recorded throughout the period. At the age of 10, 11 and 12 months the area of the L.D. is measured by means of ultrasound.

Daily gain in the test period is calculated as:

$$1000 \times \frac{\text{Body weight gained in test period (kg)}}{\text{Days in test}}$$

Feed conversion efficiency is calculated as:

$$100 \times \frac{98 \times (1{,}5 + \frac{V}{200}) + 5 \times \text{Body weight gained in test period}}{SFU_{consumed}}$$

where

- V = Average weight in test period
- SFU = Scandinavian feed units.

Calculation method

The T-index, U-index and the index for feed conversion efficiency (FEF-index) are calculated by means of a BLUP single trait Animal Model.

The dependent variables of the models are:

- Weight at 7,5 months of age
- Body gain in test period
- Feed conversion efficiency
- Measurements of M. longissimus dorsi.

The fixed effects regarding weight at 7.5 months of age, body gain in test period and feed conversion efficiency are:

- Birth year × birth season
- Breed
- Day of measurement (only ultrasound measurements)
- Weight (only ultrasound measurements).

The random effects are:

- Animal
- Residual.

Fixed effects
The fixed effects are included as classes except for weight, which is a regression.

Random effects
The basic parameters are shown in table 5.

Table 5. Heritability of traits

Trait	Heritability
Weight at 7,5 months of age	0.27
Body gain in test period	0.40
Feed conversion efficiency	0.37
Measurements of M. longissimus dorsi	0.43

Genetic base
The breed averages for growth capacity and muscle area are based on all bulls having completed their performance test within the last 24 months.

Standard deviation
T-index: Approx. 5
U-index: Approx. 4
FEF-index: Approx. 4

Publication
Official T-, U- and FEF-indices are calculated once a week and the results are sent to the owners of the individual animals. 4 times a year the indices are recalculated at published on the central database. Performance test results can be found on www.landscentret.dk/kvaeg/diverse/individ.pdf.

6.2 Estimation of breeding values

In beef cattle 7 standardized breeding values and a total merit index are published for all animals. A survey of the total system is shown in figure 1.

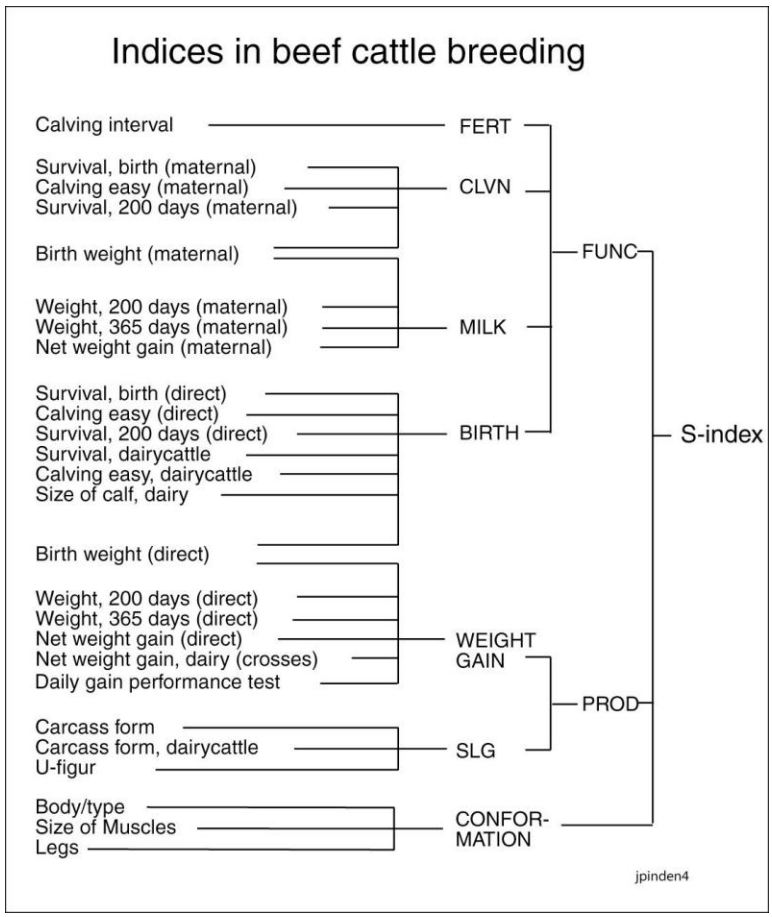

Figure 1. Traits included in the calculation of breeding values

Data

Data included in the estimation of breeding values:

- On-farm recording of basic information on pedigree, calving, non-A.I.-breeding, trade and culling, calf mortality, calving ease and weight of beef cattle
- Results on daily gain and area of L.D. from performance test stations for bulls
- On-farm recording of calf mortality, calving ease and size of calf of dairy crosses
- Slaughterhouse information on carcass weight and EUROP-score of form of beef cattle and on dairy crosses
- Conformation scores.

Calculation method

An Animal Model is used to estimate all breeding values of all traits recorded for purebred beef cattle. A modified version of the Animal Model is used for the traits recorded on dairy crosses. All dairy crosses are considered repeated observations of the sire and the genetic parameters are modified accordingly. The estimates are calculated separately for 6 different breed groups and for 5 different groups of traits.

The breed groups are:

- Limousine (LIM), Blonde d'Aquitaine (BDA), Piemontese (PIE) and Belgian Blue (BBK)
- Hereford (HER)

- Charolais (CHA)

- Simmental (SIM), Brown Swiss (BRU), Grauvieh (GRA), Gelbvieh (GUL), Galloway (GAL) and Salers (SAL)
- Aberdeen Angus (ANG) and Shorthorn (DKK)
- Highland Cattle (HLC) and Dexter (DEX).

Table 6 and 7 lists the groups of traits. All groups of traits that include more than one trait are evaluated by means of a multi-trait model. Table 6 and 7 also shows the fixed and random effects (except residuals) that are included in the models.

Fixed effects
- *Breed within breed group*. When breed is included in this way, the dominant breed of the breed group determines the estimates of the other fixed effects
- *Herd × year* is assumed to be a fixed effect for all traits recorded on purebred animals. The performance test station is considered as one herd
- *Season of calving* is month of calving. Months with few calvings are pooled
- *Age of dam* is 1st, 2nd and subsequent calvings. Additionally, 1st calving is divided into sub-groups according to age at 1st calving
- *Sex.* Male or female
- *Age of calf × sex* is included for weight and carcass records, because there are large differences between animals for these traits
- *Twin.* Single or twin calf
- *Breed of dam.* This effect is only used for results from dairy crosses and includes effect of heterosis
- *Artificial or natural insemination* in model for calving interval. If a cow has been inseminated at least once it is classified in a special group. In addition, all calving intervals of donor cows are excluded from the calculations.

Random effects
- *Herd × year.* Very often only one or two dairy crosses are born in a dairy herd per year. Therefore this effect is considered random for all results on dairy crosses
- *Permanent environmental effect* is included for all maternal traits
- *Maternal animal effect* is an estimate of the maternal breeding value
- *Direct animal effect* is an estimate of the direct breeding value.

Pedigree is traced back as far as possible and genetic groups are formed. Some genetic parameters have been estimated on Danish beef cattle records. The rest are based on analyses of other beef cattle populations. The genetic parameters were assumed to be identical for all breeds. The genetic parameters are listed in table 8-13.

Sub-indices and total merit index
The estimates of breeding values are summarized into 7 sub-indices, 2 indices where related indices are grouped and a total merit index as shown in figure 1. The indices are calculated using the economic weights listed in table 14.

Standard deviation
The sub-indices and the total merit index are standardized to an average of 100 and a standard deviation of 10 for all animals belonging to the base.

Base
A rolling base is used. The base includes all animals born 3-7 years before the publication year.

Publication
The breeding values are calculated 4 times a year (February, May, August and November) and are published on the homepage of The Danish Agricultural Advisory

Service (www.landscentret.dk) at www.lr.dk/Applikationer/Kvaeg/avl/soeg/kodtyrvalg.asp and www.lr.dk/Applikationer/Kvaeg/avl/soeg/kodkovalg.asp.

Table 6. Fixed and random effects in the Animal Model for estimation of breeding values

Trait	Fixed effects								Random effects			
	Herd x year	Breed	Season	Sex	Age of cow	Age of calf x sex	Twin	Breed of dam	Herd x year	Permanent env.	Direct	Maternal
Fertility (single trait evaluation)												
Calving interval	+	+	+		+					+		+
Reproduction (single trait evaluation)												
Survival, 3 month	+	+	+	+	+		+			+	+	+
Reproduction (multi trait evaluation)												
Survival at birth	+	+	+	+	+		+			+	+	+
Calving ease	+	+	+	+	+		+			+	+	+
Birth weight	+	+	+	+	+		+			+	+	+
Survival, dairy crosses		+	+	+	+		+	+	+		+	
Calving ease, dairy crosses		+	+	+	+		+	+	+		+	
Size, dairy crosses		+	+	+	+		+	+	+		+	
Production (multi trait evaluation)												
Birth weight	+	+	+	+	+		+			+	+	+
Weaning weight	+	+	+		+	+	+			+	+	+
Yearling weight	+	+	+		+	+	+			+	+	+
Daily gain		+	+		+	+	+				+	
Daily gain, performance test	+	+	+								+	
Daily gain, dairy crosses		+	+		+	+	+	+	+		+	
Carcass-quality (multi trait evaluation)												
EUROP-score		+	+			+			+		+	
Area of L.D., performance test	+	+	+								+	
EUROP-score, dairy crosses		+	+			+			+	+	+	

Table 7. Fixed and random effects in the Animal Model for estimation of breeding values for conformation (single trait)

	Fixed effects					Random effects	
Trait	Breed x sex	Sea-son	Sex	Calving age x sex	Interval from calving to classification	Herd x year	Perma-nent env.
Body, muscle and feet and legs	X	X	X	X	X	X	X

Table 8. Genetic parameters of reproduction traits, heritabilities on the diagonal, genetic correlations above the diagonal

	MSU	MCE	MBW	DSU	DCE	DBW	DCSU	DCCE	DCSI
Maternal survival, birth (MSU)	0.04	0.30	0.00	-0.20	0.00	0.00	-0.10	0.00	0.00
Maternal calving ease (MCE)		0.10	-0.20	0.00	-0.20	0.00	0.00	-0.10	0.00
Maternal birth weight (MBW)			0.07	0.00	0.00	-0.20	0.00	0.00	-0.10
Direct survival, birth (DSU)				0.08	0.20	0.00	0.70	0.10	0.00
Direct calving ease (DCE)					0.10	-0.30	0.10	0.70	-0.15
Direct birth weight (BBW)						0.30	0.00	-0.15	0.70
Survival, dairy crosses (DCSU)							0.08	0.16	0.00
Calving ease, dairy crosses (DCCE)								0.10	-0.10
Size, dairy crosses (DCSI)									0.15
Permanent effect	0.01	0.02	0.03	-	-	-	-	-	-
Herd x year effect	-	-	-	-	-	-	0.08	0.10	0.15

Table 9. Genetic parameters of production traits, heritabilities on the diagonal, genetic correlations above the diagonal

	MBW	MWW	MYW	DBW	DWW	DYW	NDG	PDG	DCDG
Maternal birth weight (MBW)	0.12	0.38	0.21	-0.07	-0.01	-0.02	-0.03	0.08	0.07
Maternal weaning weight (MWW)		0.12	0.87	-0,09	-0.16	-0.11	-0.06	0.03	-0.06
Maternal yearling eight (MYW)			0.07	-0.06	-0.06	-0.13	-0.08	0.08	0.01
Direct birth weight (DBW)				0.36	0.48	0.46	0.40	0.20	0.50
Direct weaning weight (DWW)					0.27	0.85	0.34	0.31	0.55
Direct yearling weight (DYW)						0.27	0.48	0.44	0.51
Net daily gain (NDG)							0.22	0.59	0.40
Daily gain, performance test (PDG)								0.40	0.64
Net daily gain, dairy crosses (DCDG)									0.40

Table 10. Parameters for permanent environment (production traits) permanent environmental variation related to total variation on the diagonal, correlations above the diagonal

	BW	WW	YW	NDG	PDG	DCDG
Birth weight (BW)	0.06	0.26	0.07	0.09	0.00	0.00
Weaning weight (WW)		0.09	0.89	0.91	0.00	0.00
Yearling weight (YW)			0.07	0.72	0.00	0.00
Net daily gain (NDG)				0.05	0.00	0.00
Daily gain, performance test (PDG)					0.00	0.00
Net daily gain, dairy crosses (DCDG)						0.00

Table 11. Genetic parameters of carcass traits, heritabilities on the diagonal, genetic correlations above the diagonal and environmental correlations below the diagonal

	ES	AREA	DCES
EUROP-score (ES)	0.30	0.40	0.70
Area of L.D. (AREA)	0.00	0.45	0.28
EUROP-score, dairy crosses (DCES)	0.00	0.00	0.21
Herd x year	-	-	0.21

Table 12. Environmental correlations between reproduction traits

	SU	CE	BW	DCSU	DCCE	DCSI
Survival (SU)		0.25	0.00	0.00	0.00	0.00
Calving ease (CE)			-0.30	0.00	0.00	0.00
Birth weight (BW)				0.000	0.00	0.00
Survival, dairy crosses (DCSU)					0.25	0.00
Calving ease, dairy crosses (DCCE)						-0.30
Size, dairy crosses (DCSI)						

Table 13. Parameters for environment (production traits). Environmental variations related to total variation on the diagonal, correlations above the diagonal

	BW	WW	YW	NDG	PDG	DCDG
Birth weight (BW)	0.44	0.03	0.09	-0.17	0.00	0.00
Weaning weight (WW)		0.51	0.37	0.32	0.00	0.00
Yearling weight (YW)			0.59	0.55	0.00	0.00
Net daily gain (NDG)				0.66	0.00	0.00
Daily gain, performance test (PDG)					0.90	0.00
Net daily gain, dairy crosses (DCDG)						0.60

Table 14. Relative (economic) weights used to calculate of the total merit index (December 2002)

		Breed										
	Unit	LIM	BBK, PIE	HER	CHA	SIM	DSH, ANG	HLC	DEX	BDA	SAL	BRU, GRA, GUL
Calving interval	days	-9.6	-9.6	-5,4	-9.0	-7.8	-8.3	-4.4	-5.2	-10.7	-5.1	-8.3
Maternal survival, 3 months	calf	6631	5305	3717	5305	3062	4010	3893	4635	3501	3062	3257
Maternal survival, birth	calf	6031	4825	3377	4830	2782	3650	3535	4208	3186	2782	2960
Maternal calving ease	score	-625	-500	-500	-500	-342	-500	-690	-822	-333	-342	-364
Maternal yearling weight	kg	8.1	4.1	8.2	4.9	7.5	4.1	8.8	10.5	6.0	9.3	6.9
Maternal net body gain (beef)	kg	2,6	1,1	3.0	1.5	2.4	1.1	2.9	3.5	2.1	2.9	1.9
Direct survival, 3 months	calf	5902	6631	3366	6631	4063	4440	2783	2961	3912	4063	4322
Direct survival, birth	calf	5368	6031	3058	6031	3691	4036	2577	2688	3558	3691	3927
Direct calving ease	score	-556	-625	-453	-625	-454	-554	-494	-525	-369	-454	-483
Direct yearling weight	kg	2,8	7.8	1.5	5.2	8.2	4.0	1.2	1.7	7.3	4.0	9.1
Direct net body gain (beef)	kg	0,9	3.1	0.4	1.4	3.2	1.3	0.2	0.3	2.8	1.6	3.7
Direct net body gain (dairy)	kg	0,9	3.1	0.4	1.4	3.2	1.3	0.2	0.3	2.8	1.6	3.7
Net body gain – performace test	kg	0,3	1.1	0.1	0.5	1.2	0.5	0.1	0.1	1.0	0.6	1.3
EUROP classification	score	249	300	286	300	288	161	92	109	333	370	200
Body	score	33	0	40	0	0	0	33	0	66	54	0
Muscularity	score	33	0	54	0	0	0	25	0	66	135	0
Feet & legs	score	17	0	40	0	0	0	25	0	33	81	0

7. Conclusion

This publication describes the principles of the Danish breeding evaluation system for beef breeds as per November 2011.

Continuous development may already have caused changes in the rules and the examples mentioned. We therefore invite you to contact Knowledge Center for Agriculture, Cattle (www.landscentret.dk) at the address below for further information or look at our Internet homepage www.landscentret.dk/kvaeg/diverse/principles.pdf where the latest updated version of this publication is available.

At the address below Knowledge Center for Agriculture, Cattle is situated and you can get further details on breeding and production status and the possibilities of purchasing Danish genetics.

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