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## **Recording and genetic evaluation for mastitis resistance**

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In January 1992 the first indexes for mastitis resistance were published in Denmark. In cooperation with veterinary organizations and local cattle husbandry organizations a registration system has been established with the possibility of reporting disease diagnoses.

### **Recording system**

The recording of disease diagnoses can be made in the following way:

- Transfer from the veterinarian organizations' invoicing system to the data base, if the registration number of the cow is quoted on the invoice.
- Other EDP-systems are used by the veterinarians.
- Registrations by the herdmanager and veterinarians in a standard system used for other purposes also (e.g. calvings, sales).

The recordings are primarily made by veterinarians and the information is saved together with other information from yield recording and AI associations in a central data base.

During the 1st quarter of 1992 a systematic recording of disease diagnoses was performed in app. 50 per cent of the herds.

### **Traits and genetic parameters**

The indexes for mastitis resistance are calculated on the basis of the following data:

- Mastitis diagnoses during the period from 10 days before calving till 180 days after calving in first lactation, recorded as a catagoric trait.
- Somatic cell counts in the period 10-180 days after calving. The geometric mean is used.

The genetic parameters are estimated on data from SDM (Black and White Danish Dairy Breed) and later used for all breeds.

$h^2$  mastitis : 0.04

$\sigma_A$  mastitis: 0.08

$h^2$  somatic cell count : 0.11

$r_g$  mastitis, cell count: 0.63

$r_p$  mastitis, cell count: 0.22

An MT-sire model with a relationship matrix was applied.

The fixed effects in the model were

Herd

Year-season

Calving age

**The repeatability of the index for resistance to mastitis**

The repeatability of the index for resistance to mastitis depends on the percentage of cows participating in systematic disease recording and on the size of the progeny group. Based on the calculated genetic parameters repeatability for different sizes of progeny groups in different degrees of disease recording is shown in table 1.

Table 1: The repeatability of indexes for mastitis resistance at different sizes of progeny groups and participation in systematic disease recording.

Size of progeny group	Participat. %	Repeatability				$\sqrt{r^2_{\mu}}$
		Mastitis	Cell count	Combined	Total	
100	20	0.16	0.29	0.38	0.46	0.68
100	40	0.29	0.29	0.45	0.52	0.72
100	60	0.38	0.29	0.51	0.56	0.75
100	80	0.45	0.29	0.55	0.60	0.77
100	100	0.50	0.29	0.59	0.63	0.79
150	60	0.47	0.32	0.58	0.62	0.79
150	80	0.55	0.32	0.63	0.66	0.81
1000	60	0.86	0.39	0.86	0.87	0.93

Participat %: Percentage of herds with systematic recording of disease diagnoses.

Mastitis: Index for resistance to mastitis based only on diagnoses of mastitis.

Cell count: Index for resistance to mastitis based only on the correlated trait, somatic cell count.

- Combined: Somatic cell count and diagnoses of mastitis combined.
- Total: Pedigree information included.
- $\sqrt{r^2_{IA}}$ : Correlation between the index and the true breeding value of resistance to mastitis.

#### Effect

The index for mastitis resistance has an average of 100. Bulls with indexes above 100 breed daughters with a better resistance to mastitis.

One unit of the index corresponds to a predicted difference for future daughters of -0.007 cases of mastitis per cow in the period from 10 days before calving till 180 days after calving in first lactation.

The calculation of the mastitis index carried out in January 1992, comprised 32,000 cows in herds with systematic recording of disease diagnoses and 180,000 cows with somatic cell count recordings. 370 bulls obtained an index with a repeatability of minimum 40 per cent. The difference in the index of mastitis resistance between the best and the poorest active Black and White AI-bulls were from 17 to 20 index units. The difference in percentage of cows with mastitis in the first half of 1st lactation is thus from 0,12 to 0,14 cases per cow between the best and the poorest progeny groups. Breed average is 0,25 cases of mastitis per cow in the period.

In table 2 are quoted the indexes for resistance to mastitis for foreign bulls tested in Denmark, as well as Danish bulls with a repeatability above 70%.

# Indexes for resistance to mastitis - January 1992

SD = 5

## SDM (Black and White Danish Dairy Breed)

CDN	327279	P S SHEIK	100	79
CDN	345895	WARDEN	102	57
CDN	352790	STARBUCK	98	81
CDN	369275	TAB	103	65
DK	12515	RGK ASTA	102	76
DK	13074	HMT ASO	100	73
DK	13096	SDJ TEMSA	99	88
DK	13739	JY WILLOW	98	93
DK	14058	SDJ ALDUM	101	75
DK	14075	KOL KELD	97	89
DK	14249	NJY CHERI	103	82
DK	14452	RGK LORI	102	89
DK	14887	VE SEBAS	99	71
DK	15068	RGK BECH	97	76
DK	15229	VAR IDE	106	85
DK	15233	VAR IRVIN	107	70
DK	15286	HV TANGO	98	71
DK	15541	HV TOPAS	105	97
DK	15613	VE KLAUS	104	95
DK	15632	VE KAP	102	87
DK	15655	THY CALMO	91	79
DK	15738	KOL TUE	100	92
DK	15780	RGK EBBE	107	96
DK	15809	NJY FROST	91	86
DK	15813	VAR JØRN	100	85
DK	15935	VE KIKA	110	77
DK	16049	VE WILKENS	104	77
DK	16076	HJ KREN	101	74
DK	16175	SDJ EKSIL	105	82
DK	16179	SDJ EPOX	101	87
DK	16224	ØDA SHERIF	99	73
DK	17069	JY JANNE	104	77
USA	1491007	ELEVATION	98	60
USA	1583197	CONDUCTOR	101	51
USA	1650414	S-W-D VALI	104	84
USA	1667366	BELL	90	75
USA	1700553	KINGWAY EV	98	71
USA	1723741	CHAIRMAN	103	75
USA	1725714	SPIRIT	95	64
USA	1764564	NITE TRAIN	100	56
USA	1785862	BASIC	104	59
USA	1806201	NED BOY	102	59
USA	1811342	GOLD	104	68
USA	1811374	BIT-O-WIND	94	69
USA	1814283	BERT	105	62

## RDM (Red Danish Dairy Breed)

DK	81244	FYN LINBRU	102	79
DK	81284	RGK FOCUS	108	85
DK	81301	KOL VILO	104	71
DK	81334	RGK FARAO	103	82
DK	81354	HV ELUND	95	78
DK	81371	HV EPRO	93	73
USA	173809	PROSPECT	96	67

## Jersey

DK	5780	FYN ÅLBÆK	99	74
DK	6204	FYN HAUG	98	71
DK	6246	SKÆ HEDE	98	79
DK	45021	FYN DANTE	102	85
DK	45032	FYN BOV	103	83
DK	45033	FYN BRUCE	100	83
DK	45040	FYN ALTI	106	71
DK	45127	SKÆ STRIB	106	84
DK	45310	FYN INDEX	104	85
DK	45516	ØJY MIKKEL	93	74
USA	630622	TOP BRASS	95	78
USA	634142	JS Q ROYAL	95	57