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Selection for claw health and feed efficiency in the Czech Holstein

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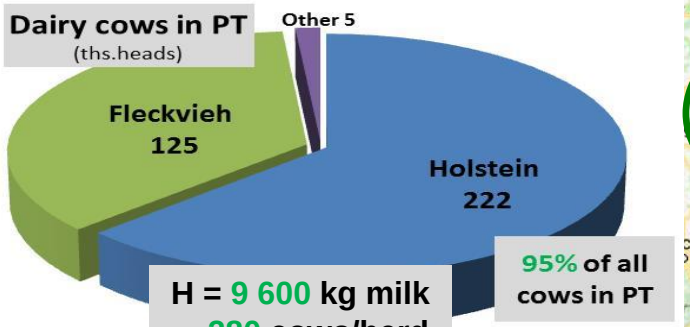
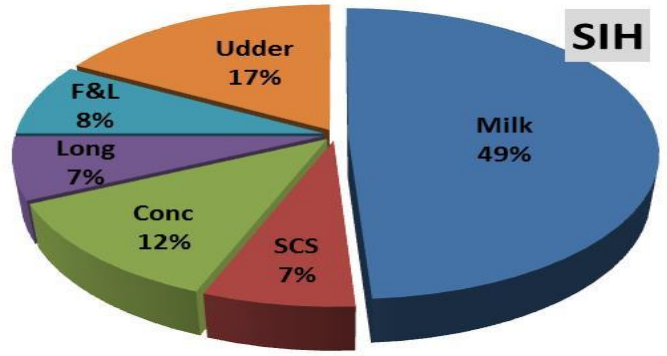
Actual situation in the Czech Republic



H = 9 600 kg milk
280 cows/herd

95% of all cows in PT



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Genetic evaluation:

Centralised *(www.plemdat.cz)*

SS GBLUP – *2015 validated Interbull*

H: EBV for **30 traits**

Economic weights

(ECOWEIGHT, Wolf et al., 2013)

Selection index for Holstein „SIH“

Health & feed traits:

SCS ✓EBV + EW

Mastitis, CLD, RFI

✖ EBV ✓EW

The aim:
calculate genetic & economic selection response in CLD and RFI

Material & Methods (1)

BREEDING OBJECTIVE & SELECTION INDEX

actually 10 traits & 17 traits

+ CLD + 3x RFI to improve claw health + feed efficiency

INFORMATION SOURCES

1. ECONOMIC WEIGHTS of actual objectives + new traits

direct impact of given trait on farm **profit**

calculated by program **EWDC**

(**ECOWEIGHT;** Wolf et al., 2013)

User's Manual for the Program Package ECOWEIGHT (C Programs for Calculating Economic Weights in Livestock), Version 6.0.4. Part 1: Programs EWBC (Version 3.0.4) and EWDC (Version 2.2.3) for Cattle

by Jochen Wolf, Marie Wolfová and Emil Krupa

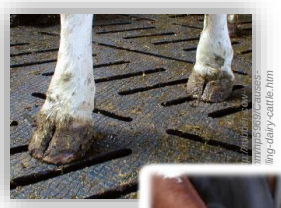
16th December 2013

$$ev_{CLD} = \left.\frac{\partial TP}{\partial TV_{CLD}}\right|_{TV_{CLD}=TV_{CLD_{av}}}$$

actual production and economic **data**

Trait	actual breeding objectives										newly suggested			
	MY	%F	%P	CR	SP	CL	AFC	MW	PL	CM	CLD	FRI_c	RFI_h	RFI_f
Mean	9 546	3.8	3.34	91	127	5.4	765	635	2.95	0.98	1	0	0	0
GSD	741.6	0.27	0.145	2.54	5	2	10	25	0.74	0.1	0.054	0.28	0.12	0.1

Source: database of the Breeders Association + literature (new traits): e.g. van der Linde et al. (2010); Williams et al. (2011).



Material & Methods (2)

2. GENETIC PARAMETERS of objectives & **SIH**

genetic correlation among traits and **GSD**

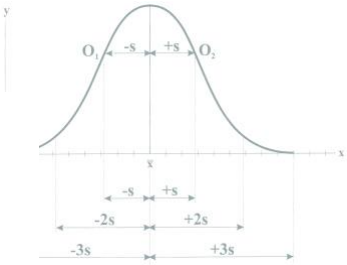
reliability (r^2) of EBV (0.3 to 0.8)

selection intensity 1.00 GSD

contribution of traits in SIH:

A)

MILK	SCS	CONC	EXT	LONG	CLD	RFI_c	RFI_h	RFI_f
43	6	11	22	6	5	5	5	1



B) optimised to reach the max. ΔG and r_{IH} *(new: 10 : 5 : 2 : 1)*

matrix program in the SAS environment (Přibyl et al., 2004)

to calculate **ΔG**:

Parameter (unit)	SB	SC	DB	DC
selection intensity (%)	5	10	1	90
generation interval (years)	3	5	2.5	5

SB = sires of bulls, SC = sires of cows, DB = dam of bulls, DC = dam of cows

Trait[1]
%F
kgF
%P
kgP
SCS
CR
LONG
RLRV
FA
LOC
LEGS
FUA
FTP
TL
UD
RUH
CL
CLD
RFI_c
RFI_h
RFI_f

0.50			
0	0.30		
0	0.600	0.30	
0	0.500	0.600	0.30

Source: database of the Breeders Association + literature (new traits): e.g. van der Linde et al. (2010); Williams et al. (2011).

Results (1)

ECONOMIC WEIGHTS (€/unit/♀/yr) of **actual** objectives + **new** traits

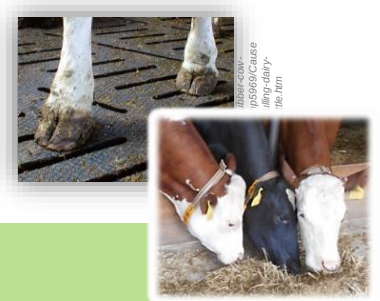
	Trait (unit)	Mean	EW
1	Milk yield/lactation (kg)	9 546	0.13
2	Milk fat content (%)	3.8	196
3	Milk protein content (%)	3.34	406
4	Conception rate for cows (%)	91	7.40
5	Service period (days)	127	-0.024
6	Losses of calves before weaning (%)	5.4	-1.61
7	Age at first calving (days)	765	-0.098
8	Mature weight of cows (kg)	635	-0.89
9	Productive lifetime of cows (years)	2.95	77.5
10	Clinical mastitis incidence (cases)	0.98	-115
11	CLD (cases)	1.00	**-100**
12	RFI of cows (kg DM/d)	0	**-79.4**
13	RFI of breeding heifers (kg DM/d)	0	**-37.1**
14	RFI of fattened animals (kg DM/d)	0	**-6.33**

Mean: own calculation from database of the Czech and Moravian Breeders´ Association or based on the personal commun. with the Holstein Cattle Breeders Association in the CR.

CLD = discarded milk + additional costs

RFI = addit. feed. costs

Impact of the traits among each other not considered **to avoid double counting**



Results (2)

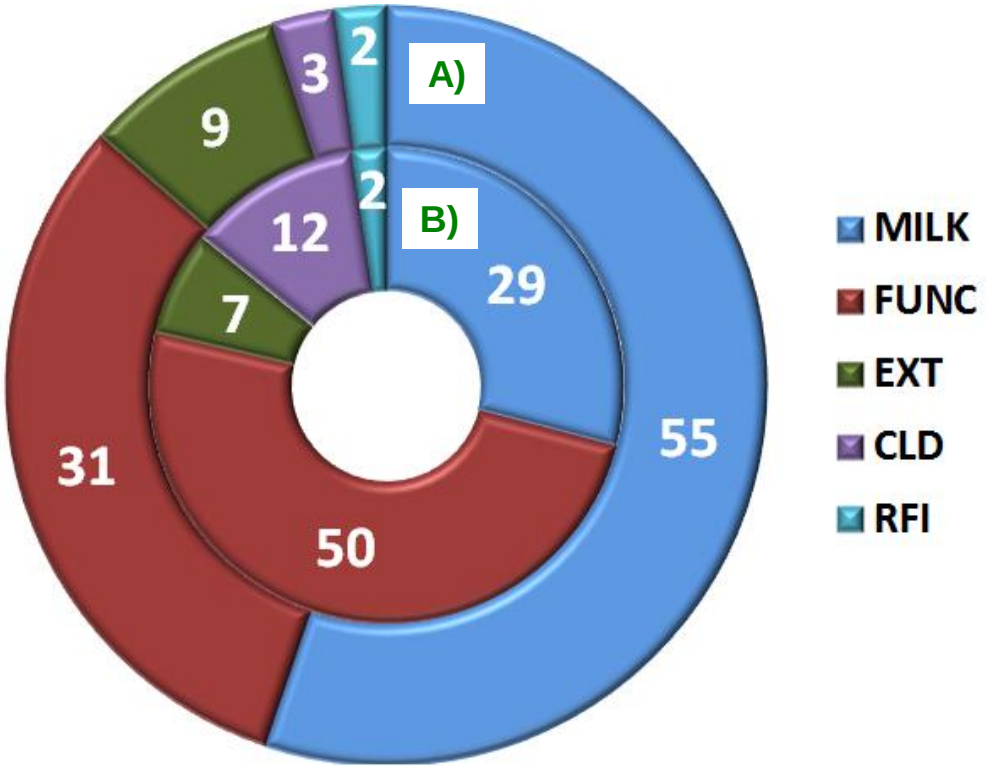
SELECTION RESPONSE (genetic & economic)

	Trait / Parameter (unit)	ΔG (unit/yr)		
		actual	new A)	new B)
1	Milk yield/lactation (kg)	85.91	73.1	86.1
2	Milk fat content (%)	0.019	0.016	0.025
3	Milk protein content (%)	0.017	0.014	0.019
4	Conception rate for cows (%)	0.204	0.197	0.198
5	Service period (days)	-0.393	-0.353	-0.485
6	Losses of calves before weaning (%)	-0.014	-0.013	-0.017
7	Age at first calving (days)	0.23	0.204	0.286
8	Mature weight of cows (kg)	0.258	0.273	-0.543
9	Productive lifetime of cows (years)	0.079	0.071	0.101
10	Clinical mastitis incidence (cases)	-0.012	-0.011	-0.011
11	CLD (cases)	-	**-0.008**	**-0.005**
12	RFI of cows (kg DM/d)	-	**-0.004**	**-0.006**
13	RFI of breeding heifers (kg DM/d)	-	**-0.001**	**-0.002**
14	RFI of fattened animals (kg DM/d)	-	**-0.001**	**-0.002**
	ΔE (€/yr)	**30.45**	**27.53**	**36.00**
	r^2_{IH}	**0.633**	**0.518**	**0.610**

Δ G **favourable + slightly reduced** in favour of the new traits

Results (3)

CONTRIBUTION ON SELECTION RESPONSE (group of traits in %)



Trait / Parameter (unit)	ΔG		
	actual	new A)	new B)
ΔE (€/yr)	30.45	27.53	36.00
r^2_{IH}	0.633	0.518	0.610

Conclusion

Claw health and **feed efficiency**

new breeding objectives & **SIH traits**

- ✓ direct **selection will reduce the CLD** (-0.01 case/yr) and **RFI** (-0.01 kg DMI/d)
- ✓ ***Δ G*** in the current traits **remained favourable** & **same**
- ✓ r^2_{IH} slightly reduced (↓ r^2 of EBV of the new traits)
- ✓ **optimising** the SIH: ↑contribution of **health traits** (11% to 25%)

Future: **optimise** and **evaluate** the **breeding programme** (EBV and EW)

- ✓ **routine testing & EBV of the** new traits
- ✓ **CLD** (overall trait), **or specific disease/s** (sole ulcer, dermatitis, …)
- ✓ **RFI as indicator traits** (♂ at test station; lactating ♀,…)
- ✓ **genetic parameters** of health traits

(the first results Theatre session **55** (**Zavadilova** et al.); Poster session **24** (**Kasna** et al.)

Thank you for attention

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