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CENTER FOR QUANTITATIVE GENETICS AND GENOMICS

Crossbreeding in Danish dairy cattle

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Den Europæiske Landbrugsfond for Udvikling af Landdistrikterne

Naturerhverv.dk

Danmark og Europa investerer i landdistrikterne.

Se "European Agricultural Fund for Rural Development" (EAFRD)

Some background

- Used for decades in pigs & poultry
- Getting more common in dairy cattle – relatively long tradition in NZ
- Quite a few studies done in the US:
  - Beltsville
  - Illinois
  - Minnesota
  - California
  - ….
- Lack of purebred animals when estimating breed effects

Some background

- Increasing popularity in Denmark
- A new system called Combi-Cross up and running
  - A cooperation between Viking Genetics, Advisory Center and University
  - Pure breeding and cross breeding are combined
  - Sexed Semen is used to maintain purebred nucleus
  - F1 crosses express full heterosis
  - 3-way crosses are mated to beef bulls

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Combi-Cross

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Level 1
Pure
breeding

Level 2
Two-cross

Level 3
Three-cross

Level 4
Beef cross

Some background

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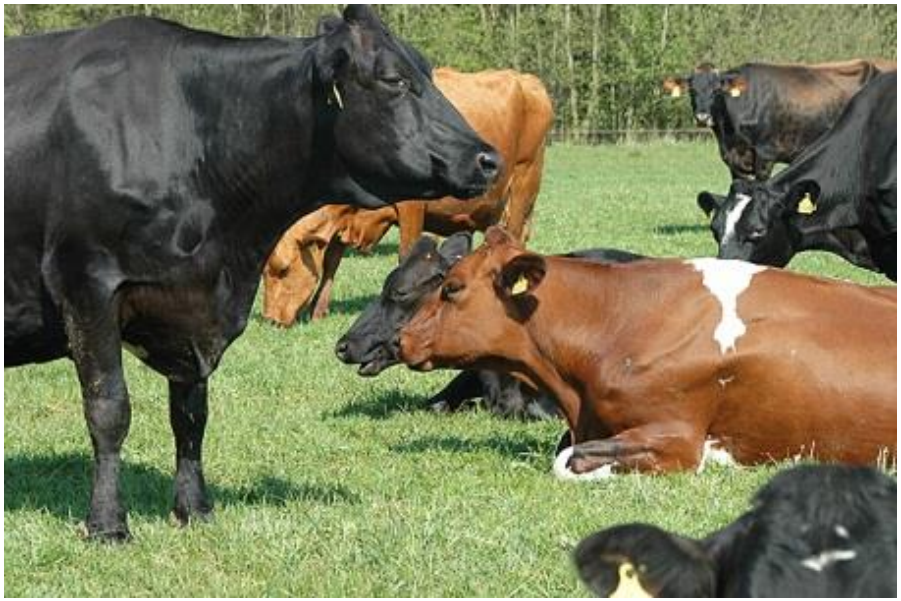
- Parameters need to be estimated

Aim:

Estimate heterosis and effect of breed proportion on milk yield traits in crosses between: Danish Holstein (DH), Danish Red (DR) & Danish Jersey (DJ)



Data

› 305d Milk, Fat and Protein Yield

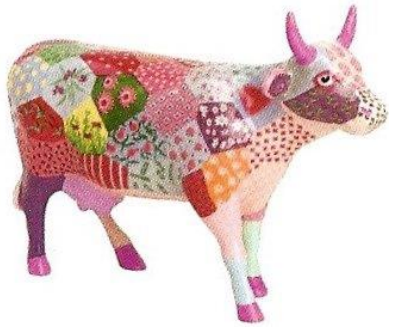
› 1st parity cows with more than 45 DIM and calving age 18-40 mo.

› 104 herds and ~ 56,000 animals

› About 50% were crosses between DH, DR and/or DJ

› Breed proportion in crossbred cows:

Danish Holstein:	51%
Danish Red:	38%
Danish Jersey	9%



Model

Yield	=	herd*year	fixed
		+ calving age	fixed
		+ calving month	fixed
		+ calving interval	fixed regression
		+ breed porportion	fixed regression
		+ heterozygozity	fixed regression
		+ add. gen. eff.	random
		+ e	random

Mean yield and effect of breed proportion (BP) - kg

	Milk Yield		Protein Yield		Fat Yield	
	Mean	Effect BP	Mean	Effect BP	Mean	Effect BP
Danish Holstein	8232	0	273.6	0	321.2	0
Danish Red	7659	-185*	265.5	-4.3*	322.2	-8.9
Danish Jersey	5204	-1775	208.7	-39.9	298.7	-0.41

*not significant

Heterosis

	Milk Yield		Protein Yield		Fat Yield	
	kg	%	kg	%	kg	%
DH x DR	170	2.14	5.99	2.22	8.77	2.73
DH x DJ	251	3.74	11.7	4.85	17.5	5.64
DR x DJ	371	5.77	14.2	5.99	20.2	6.51

Conclusions

› Effect of heterosis largest for Fat Yield

› Most heterosis between Danish Red x Danish Jersey

› Udder health and fertility next

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Thank you for your attention!