”Broad” organisation of crossbreeding work in the NAV area

- Meeting 14th of June 2011
- Foulum

This project has been subsidised by the European Union's Agricultural Fund for Rural Development and the Danish Ministry of Food, Agriculture and Fisheries.

Outline

- 1) Opening of the meeting including the intention for forming this group
- 2) Status on ongoing crossbreeding projects in the NAV area
- - Aspekter af systematisk krydsningsavl og heterosis x miljøvekselvirkning hos malkekvæg - modeludvikling, estimering og design. (Aspects of systematic crossbreeding and heterosis- environmental interaction)
- - Fremme af indtjeningsevne og dyrevelfærd i malkekvægholdet ved udvikling af optimale metoder og styringsredskaber til kombination af systematisk krydsningsavl og anvendelse af kønssorteret sæd (Improving economic profit and animal welfare using crossbreeding and Heatime)
- - Demonstration af strategier for kombination af systematiske krydsningsprogrammer, Heatime og anvendelse af kønssorteret sæd. (Demonstration of strategies for combining systematic crossbreeding programs, Heatime and use of sexed semen)
- - Swedish projects (among those a master project)
- - Finnish projects
- 3) Status on the general work on crossbreeding within Danish cattle, Svensk Mjølk, FABA and
- Viking.
- 4) How to involve our research institutes in the work
- 5) New application on crossbreeding
- - Fastlæggelse af værdien af krydsning og implementering af Kombi-Kryds. (Defining the value of crossbreeding and implementation of Combi-Cross)
- 6) Recommendations of crossbreeding systems
- 7) What is going on around us related to crossbreeding
- 8) Areas where we need more information and more analyses.
- 9) Optimal organisation of the work within crossbreeding between the ”players”

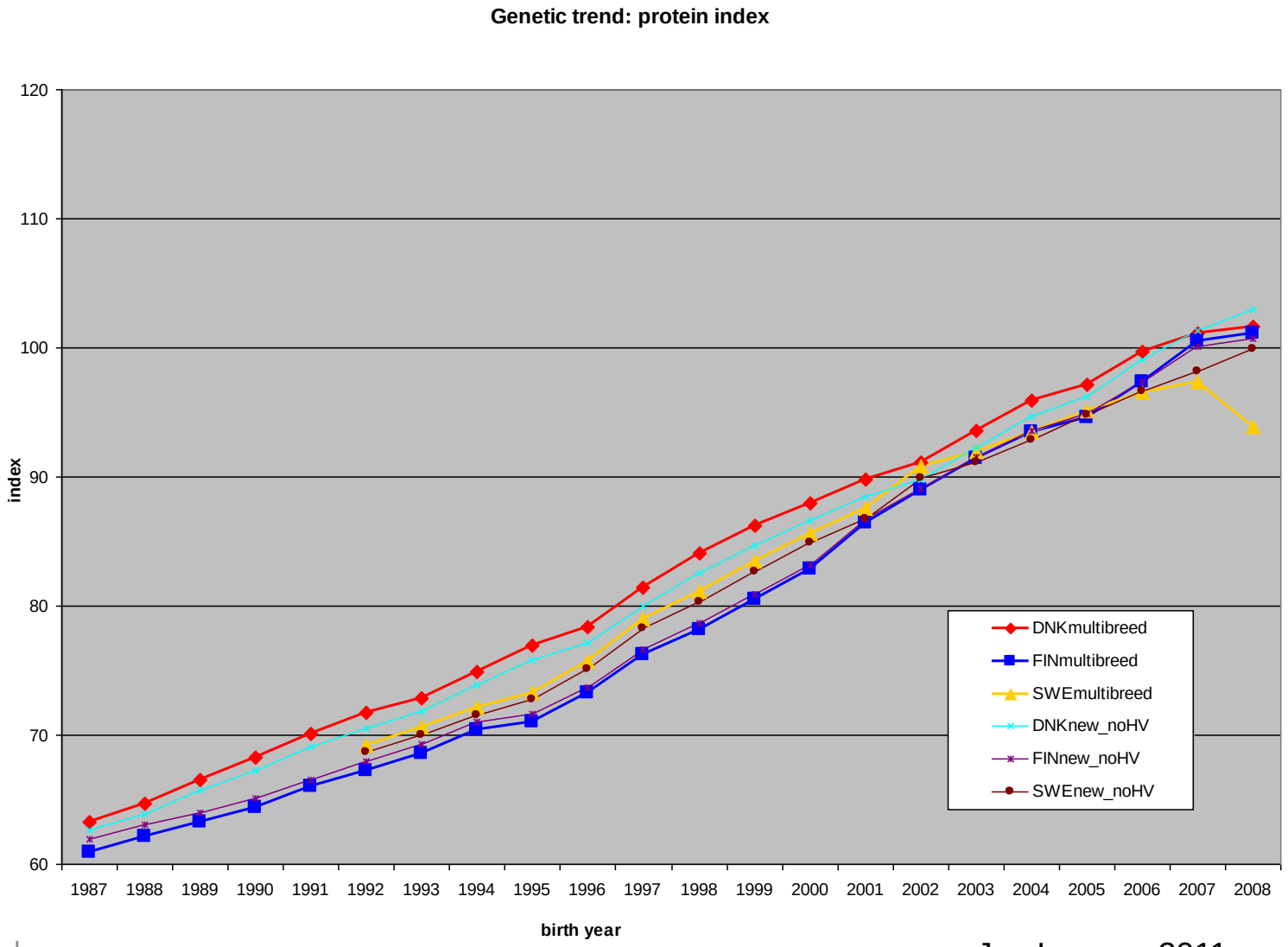
1) Opening of the meeting including the intention for forming this group

- General coordination of the work on crossbreeding in Finland, Sweden and Denmark from research to implementation
  - Avoid parallel work
- Coordination of new applications and projects
  - Research
  - Devellopment
  - Documentation of crossbreeding effects
  - Implementation
- Coordination of practical recommendations
- Tools needed at herd level

Aspects of systematic crossbreeding and heterosis-environmental interaction

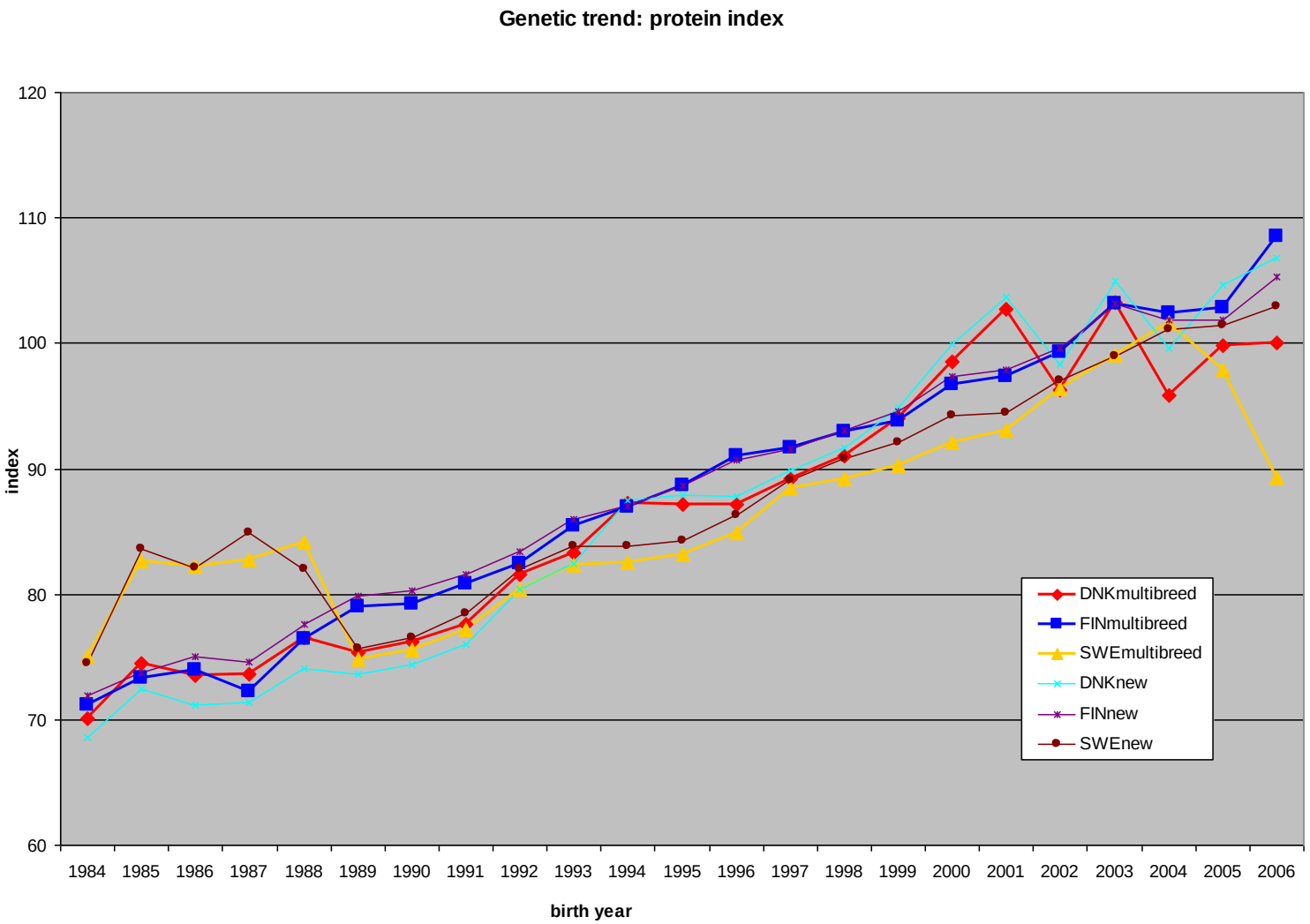
- Multibreed model for simultaneous breeding value estimation of purebred and cross bred animals
- Heterosis x environment interaction
- Skabelon til krydsningsforsøgsdesign (Far the smallest)

2) Ongoing projects
The multibred model – HF cow trend



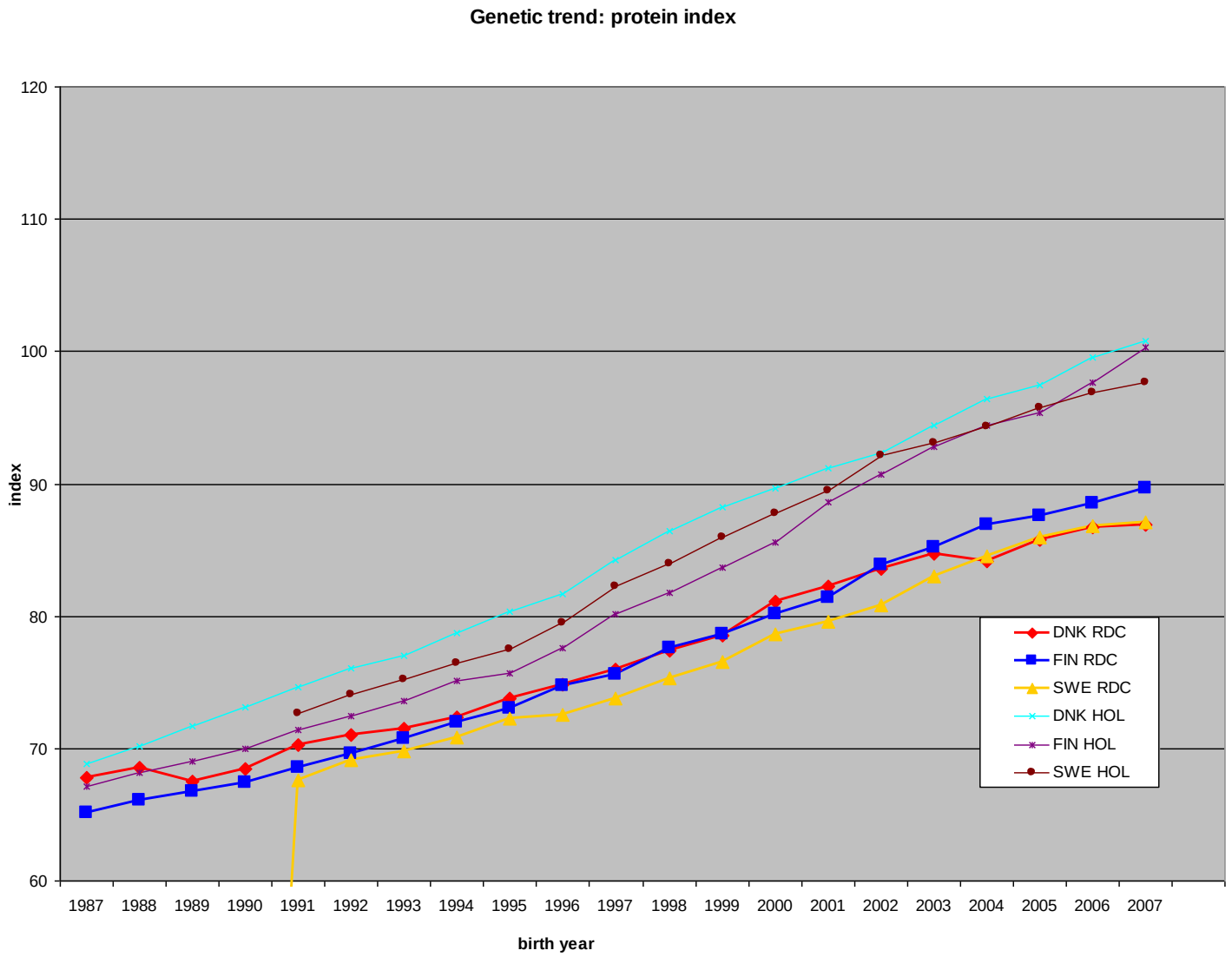
Jan Lassen, 2011

2) Ongoing projects
The multibred model – RDC bull trend



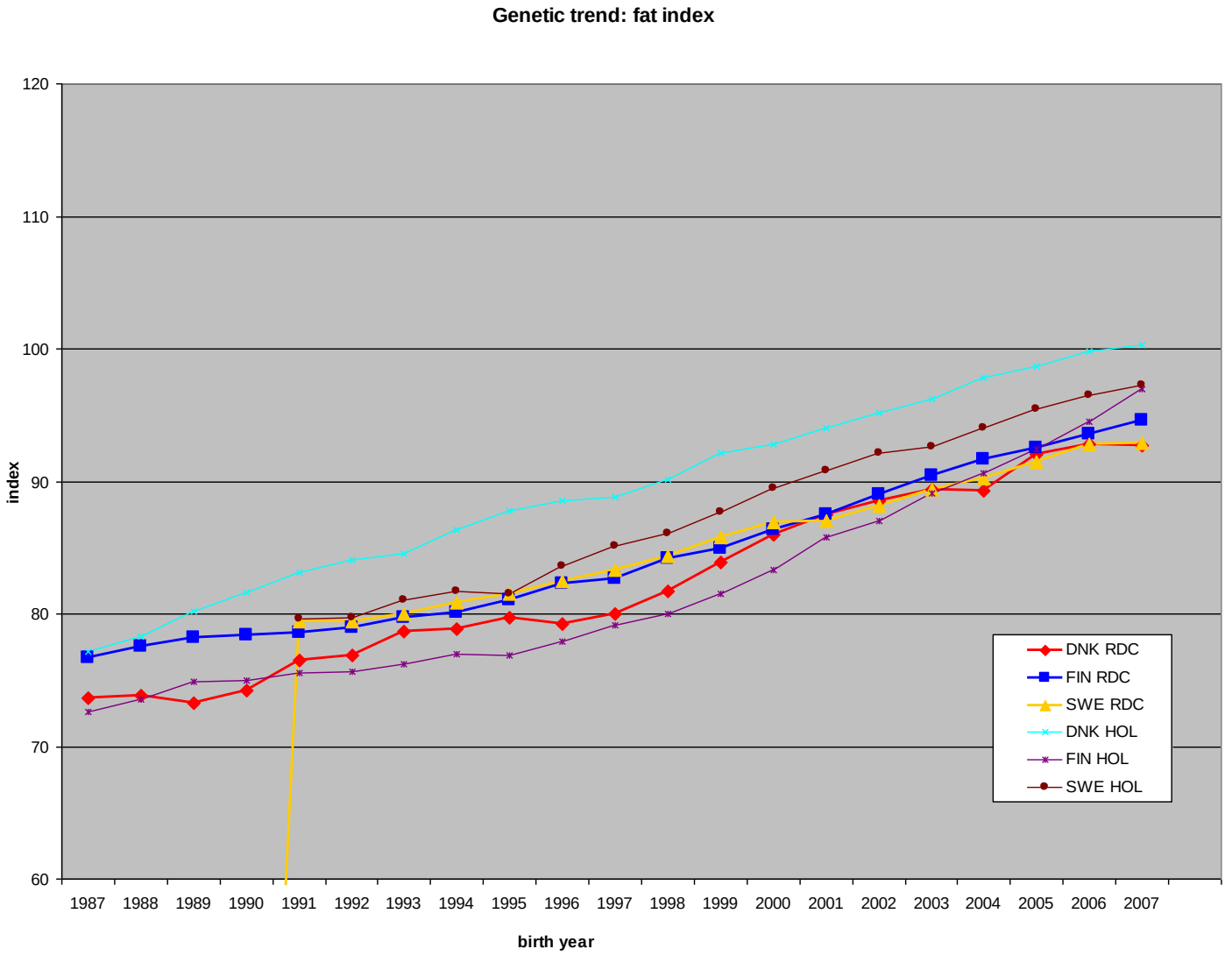
Jan Lassen, 2011

2) Ongoing projects
The multibred model cow trends (preleminary results)



Jan Lassen, 2011

2) Ongoing projects
The multibred model cow trends (preleminary results)



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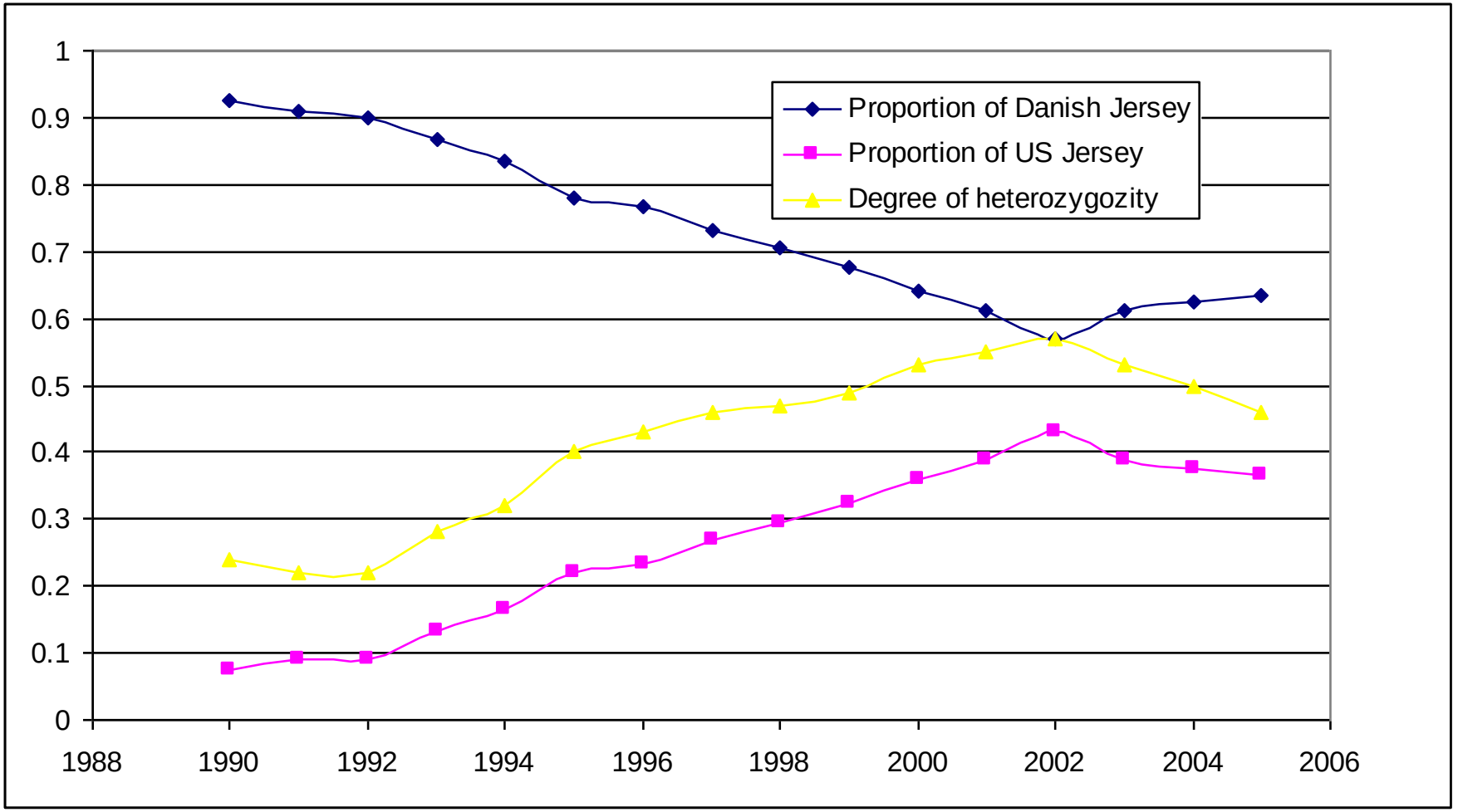
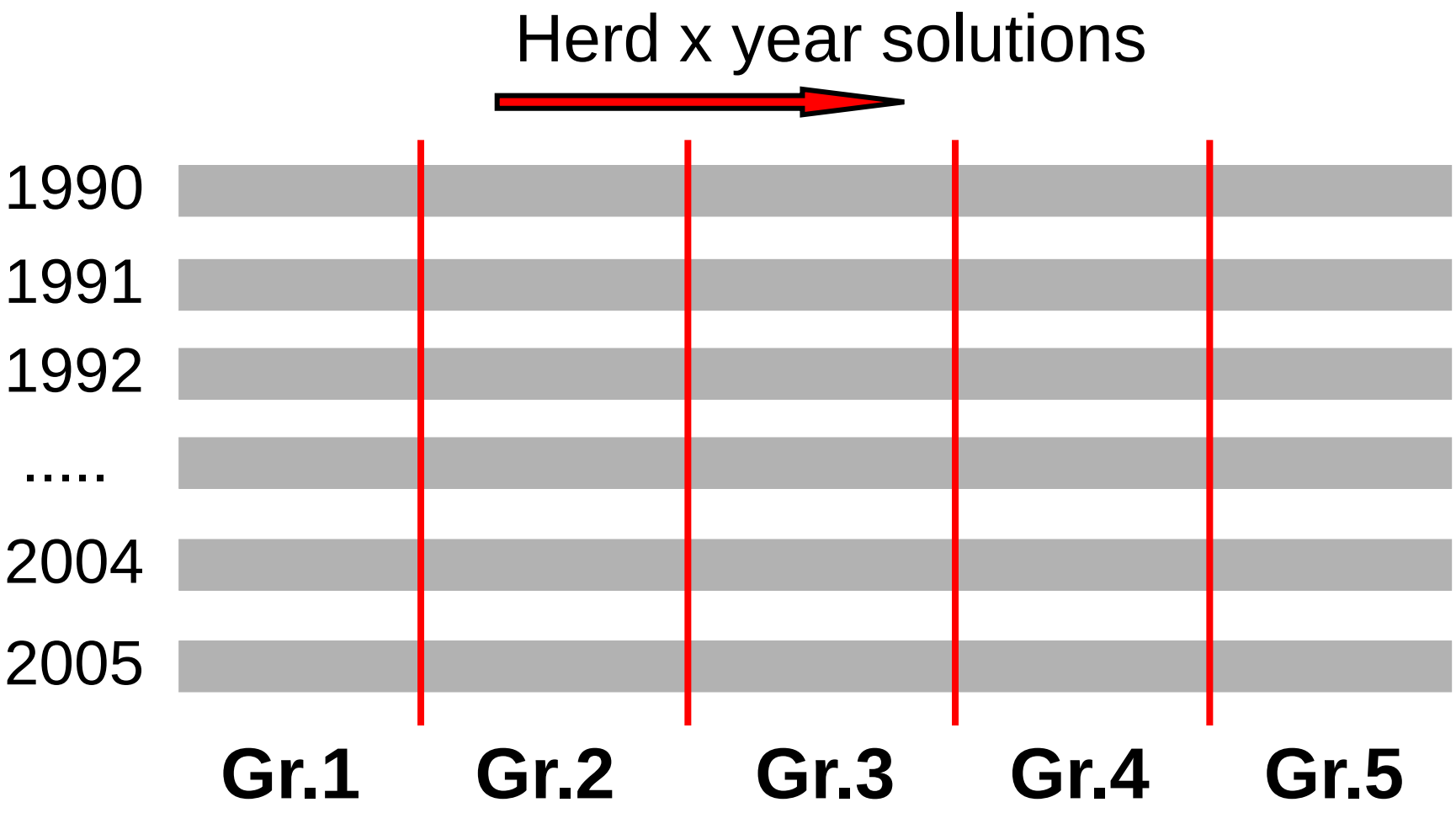
2) Ongoing projects
Heterosis by environment interactions within Jersey



2) Ongoing projects
Heterosis by environment interactions

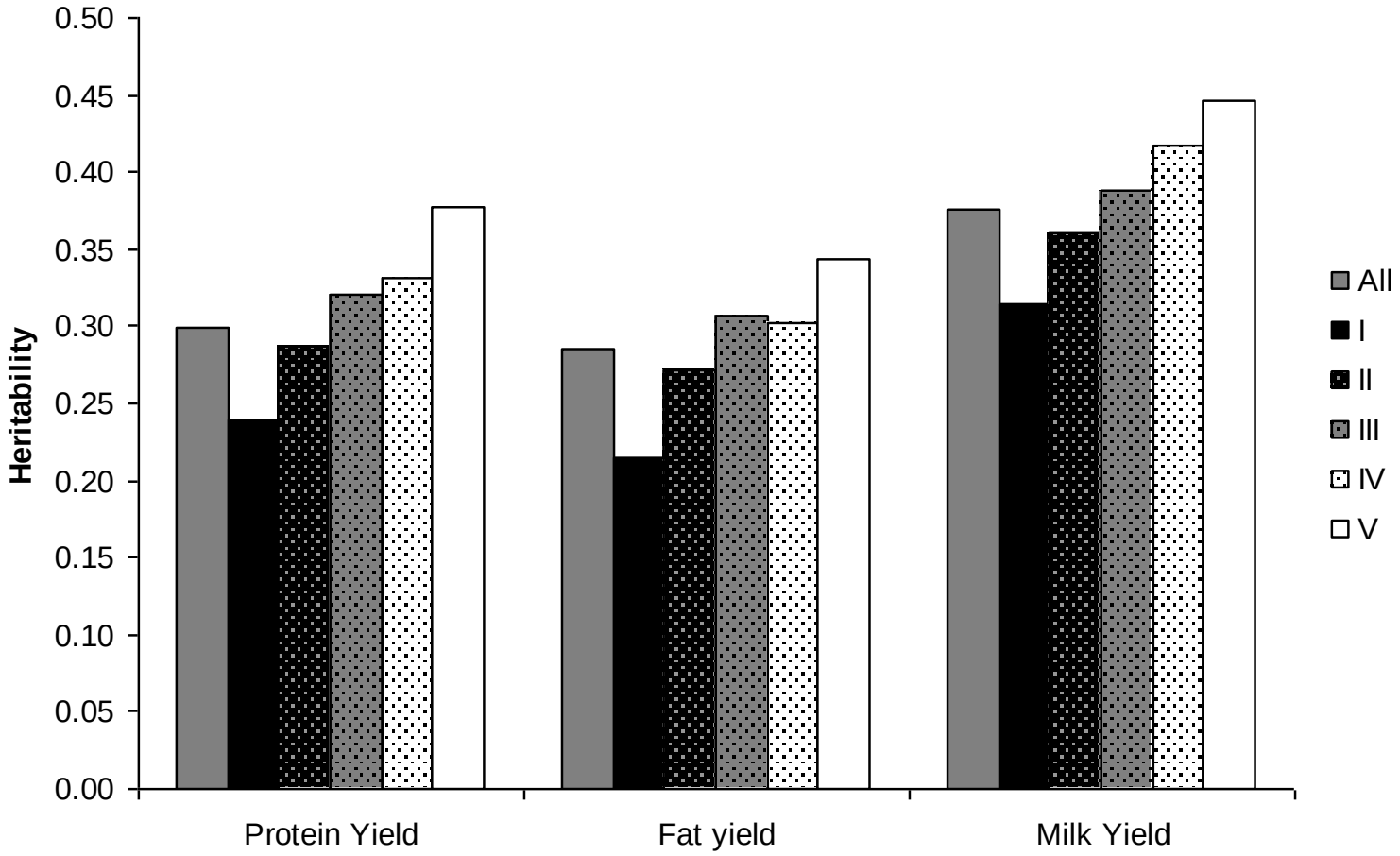


2) Ongoing projects
Heterosis by environment interactions

Table 1. Total no. and no. of cows and herds represented in the full data set (All) and in the 5 environmental groups (I-V) and average kg protein (PY), milk (MY) and fat (FY) within these groups.

	No. of cows	No. of herds	PY	FY	MY
All	**312,859**	**1,746**	**195**	**291**	**4,853**
I	**54,956**	**843**	**164**	**247**	**4,124**
II	**61,122**	**1,002**	**183**	**275**	**4,577**
III	**63,886**	**1,034**	**194**	**291**	**4,844**
IV	**65,643**	**951**	**204**	**305**	**5,079**
V	**67,252**	**715**	**221**	**327**	**5,493**

2) Ongoing projects
Heterosis by environment interactions



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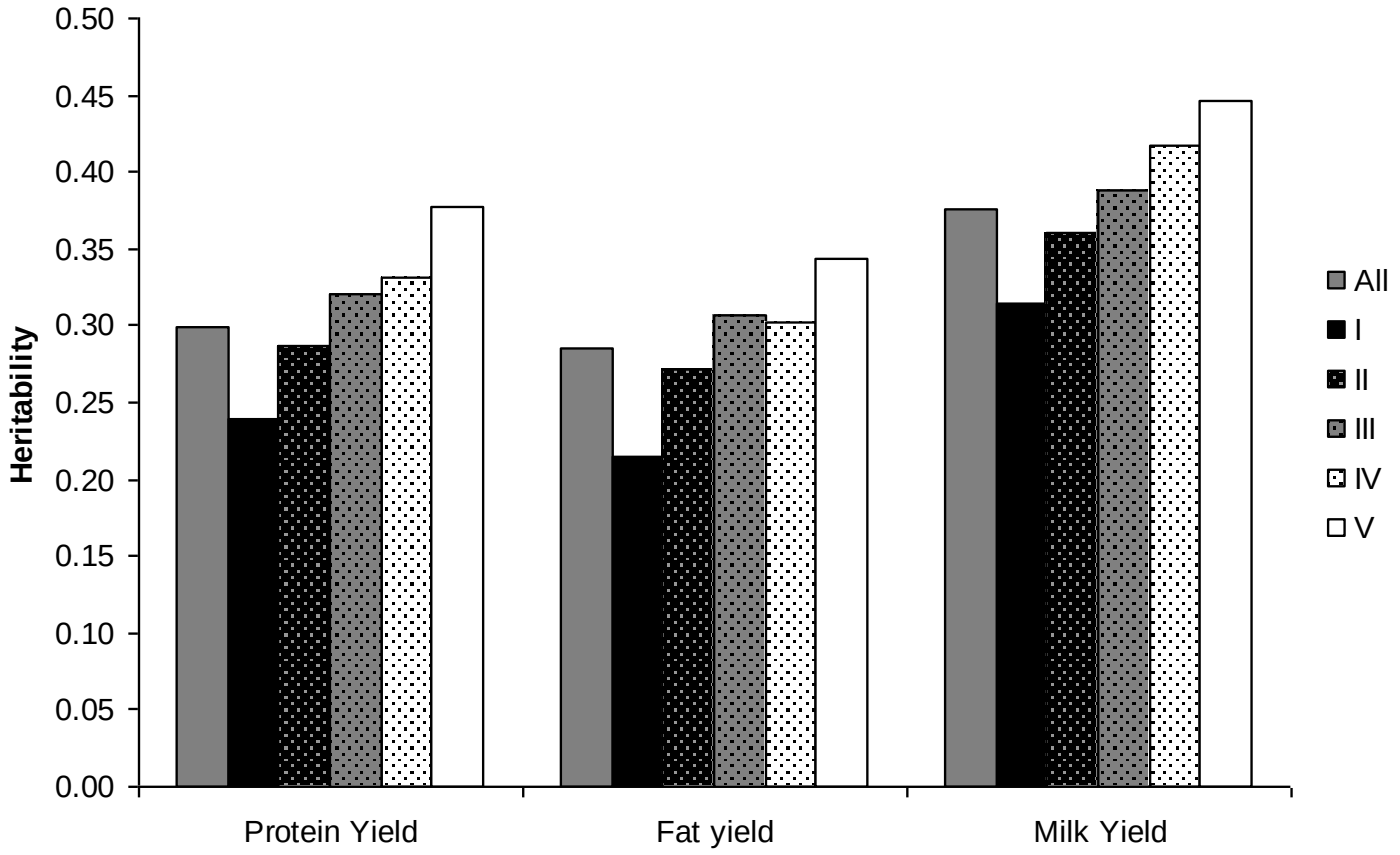
Heterosis by environment interactions



Heterosis x environment interaction using reaction norm model with unknown covariate

Su et al., J. Dairy Sci. 92:2204–2213

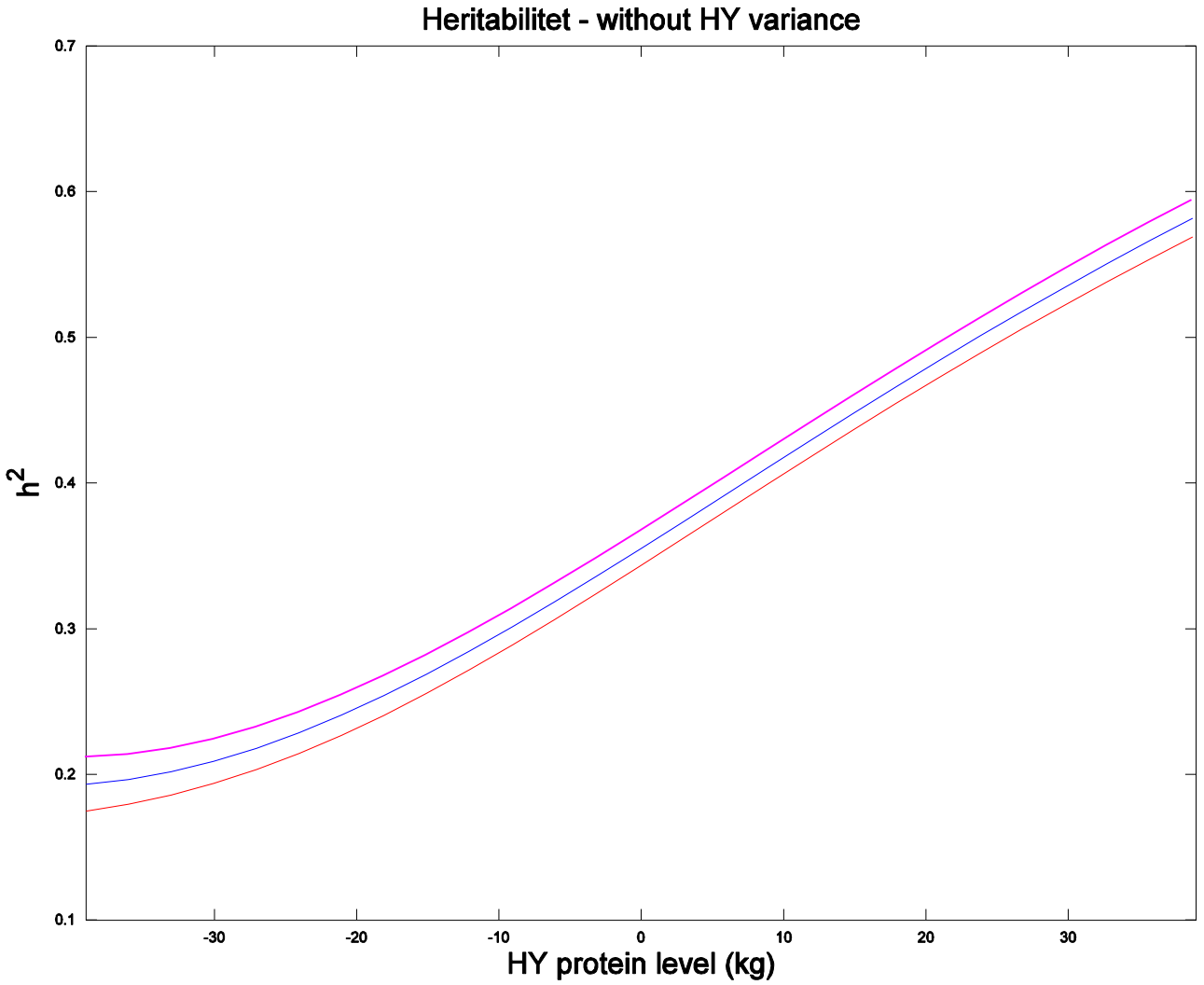
heterosis =*bh* h: heterozygosity

In the situation of H × E, *b* are different in different environments

b in environment j can be described as

$$b_j = \beta_0 + \beta_1 E_j$$

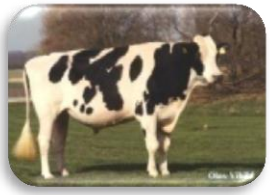
2) Ongoing projects
Heterosis by environment interactions



2) Ongoing projects
Improving economic profit and animal welfare using crossbreeding and Heatime

Combi Cross

Step 1
Pure breeding



Step 2
Two cross

Step 3
Three cross

Step 4
Terminal cross

Proportion of cows within the three groups depends on:

- **Pregnancy rate among heifers and cows**
- **Replacement rate**
- **Stillbirth rate**
- **Proportion of live born heifers reaching first calving**
- **Strategy for use of sexed semen**

Distribution of breed groups using Combi Cross in a 200 cow herd

70 pure bred cows

50 two cross cows

80 three cross cows

80 beef cross per year

The Combi Cross project

- **Combines purebreeding and cross breeding**
- **Devellopment of optimal crossbreeeding programs**
- **Devellopment of program for calculation of sizes of the different groups depending on herd assumptions**
- **Tools for monitoring the herd**
- **Guidelines for use of breeds**
- **5 demonstration herds**

Herds in the Combi Cross project

- I/S Søndergård, Bredebro
- I/S Oksbjerg, Tim
- Kristoffer Kappel, Heltborg
- I/S Myrdalsgård, Kalundborg
- Britt Brøchner-Nielsen, Vroue

Kombi-Kryds styring

Antal årskøer	200
Start, inseminering	40
Dr% køer	60%
Ins% køer	60%
Udskiftnings tidspunkt	250
Udskiftning per år	30%
Kalv/ko	1.127
Kønsrate-NS	48%
Kønsrate-KSS	90%
Dr% kvier	60%
Ins% kvier	60%
Dr% kss	85%
Overlevelse (fødsel-kælvning)	85%

Start situation	Race 1	To-kryds	Tre-kryds	I alt
Kviekalve	80	0	0	80
Løbekvier	80	0	0	80
Kælvninger 1. kalvs	50	0	0	50
Kælvninger ældre køer	100	0	0	100
Krydsningskalve født	0			
% af kvier drægtig med KSS	0%			
% af køer drægtig med KSS	0%			

Vejledning

Indtast besætningens reproduktionseffektivitet, overlevelse og udskiftningsprocent (cellerne B1-B13)

Indtast den nuværende situation angående kælvninger (af forskellige racekombinationer) i den grå kasse (celle A17)

Indtast insemineringsstrategien: i cellerne K2 -K29 (start øverst)

	Dyrets race	Sædtype	År	1	2	3	4	5
Kvier	Race1	Race1	% NS	27%	27%	27%	27%	27%
			% KSS	48%	48%	48%	48%	48%
	Tilpas		# KSS	3	3	3	3	3
			% NS	6%	6%	6%	6%	6%
	1=2-20	Race2	% NS	20%	20%	20%	20%	20%
			% KSS	5%	5%	5%	5%	5%
			# KSS	3	3	3	3	3
			% NS	1%	1%	1%	1%	1%
	To-kryds	Race3	% NS	30%	30%	30%	30%	30%
	Tilpas		% KSS	70%	70%	70%	70%	70%
			# KSS	2	3	3	3	3
	1=2-20		% NS	17%	17%	17%	17%	17%
		Kød	% NS	0%	0%	0%	0%	0%
	Tre-kryds	Kød	% NS	100%	100%	100%	100%	100%
Køer	Race 1	Race 1	% NS	15%	15%	15%	15%	15%
			% KSS	25%	25%	25%	25%	25%
	Tilpas		# KSS	2	2	2	2	2
			% NS	6%	6%	6%	6%	6%
	1=2-20	Race2	% NS	15%	15%	15%	15%	15%
			% KSS	35%	35%	35%	35%	35%
			# KSS	2	1	1	1	1
			% NS	8%	17%	17%	17%	17%
		Kød	% NS	10%	10%	10%	10%	10%
	To-kryds	Race3	% NS	0%	0%	0%	0%	0%
	Tilpas		% KSS	100%	100%	100%	100%	100%
			# KSS	1	1	1	1	1
	1=2-20		% NS	49%	49%	49%	49%	49%
		Kød	% NS	0%	0%	0%	0%	0%
	Tre-kryds	Kød	% NS	100%	100%	100%	100%	100%

Strøm af dyr	Fødte kviekalve	År	1	2	3	4	5
	Race1		80	55	58	48	46
	To-kryds		0	39	40	40	37

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			% KSS	5%	5%	5%	5%	5%
			# KSS	3	3	3	3	3
			% NS	1%	1%	1%	1%	1%
	To-kryds	Race3	% NS	30%	30%	30%	30%	30%
	Tilpas		% KSS	70%	70%	70%	70%	70%
			# KSS	2	3	3	3	3
	1=2-20		% NS	17%	17%	17%	17%	17%
		Kød	% NS	0%	0%	0%	0%	0%
	Tre-kryds	Kød	% NS	100%	100%	100%	100%	100%

Køer	Race 1	Race 1	% NS	15%	15%	15%	15%	15%
			% KSS	25%	25%	25%	25%	25%
	Tilpas		# KSS	2	2	2	2	2
			% NS	6%	6%	6%	6%	6%
	1=2-20	Race2	% NS	15%	15%	15%	15%	15%
			% KSS	35%	35%	35%	35%	35%
			# KSS	2	1	1	1	1
			% NS	8%	17%	17%	17%	17%
		Kød	% NS	10%	10%	10%	10%	10%
	To-kryds	Race3	% NS	0%	0%	0%	0%	0%
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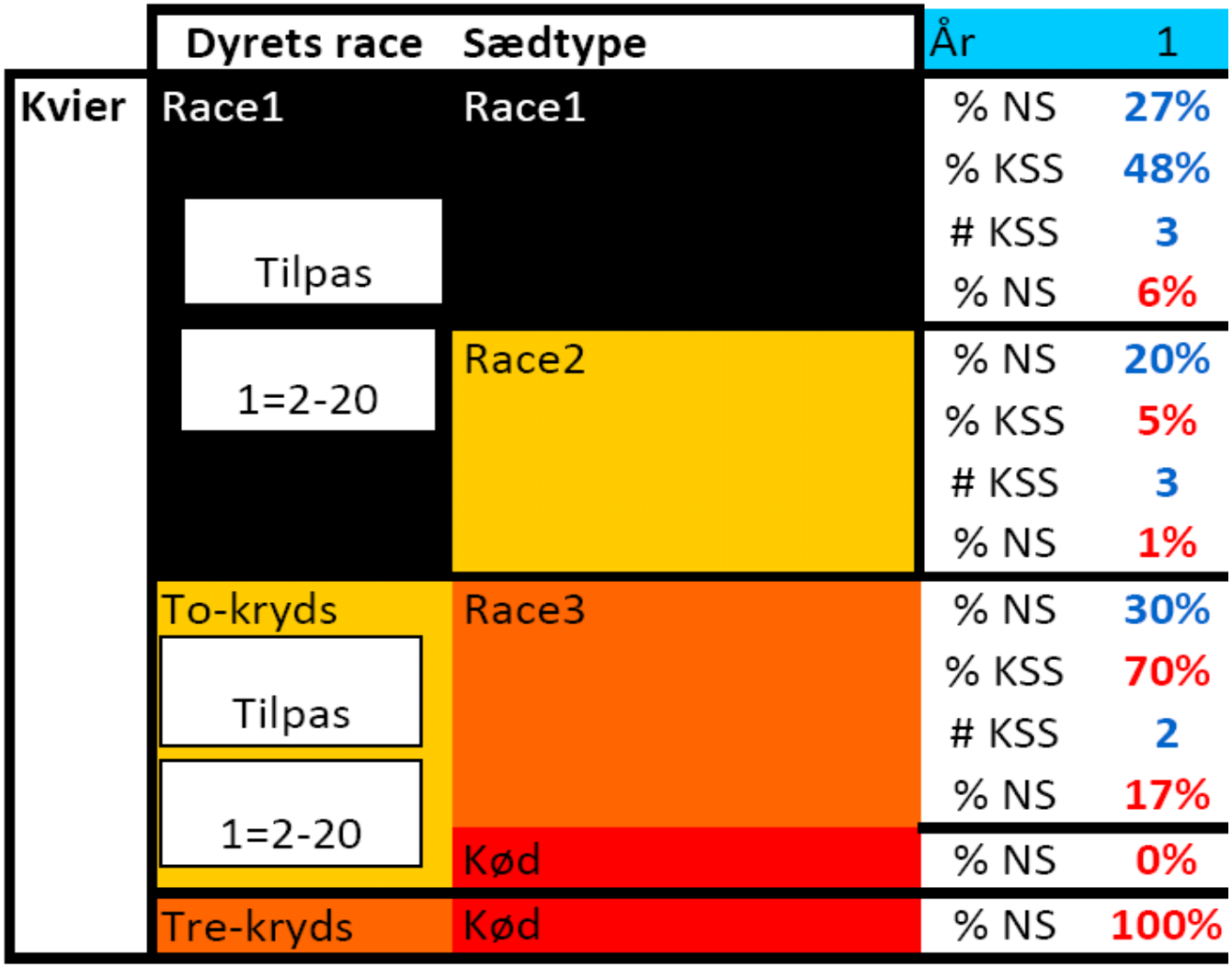

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			% NS	1%	1%	1%	1%	1%
	To-kryds	Race3	% NS	30%	30%	30%	30%	30%
	Tilpas		% KSS	70%	70%	70%	70%	70%
			# KSS	2	3	3	3	3
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Køer	Race 1	Race 1	% NS	15%	15%	15%	15%	15%
			% KSS	25%	25%	25%	25%	25%
	Tilpas		# KSS	2	2	2	2	2
			% NS	6%	6%	6%	6%	6%
	1=2-20	Race2	% NS	15%	15%	15%	15%	15%
			% KSS	35%	35%	35%	35%	35%
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	Tilpas		% KSS	100%	100%	100%	100%	100%
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Kombi-Kryds styring

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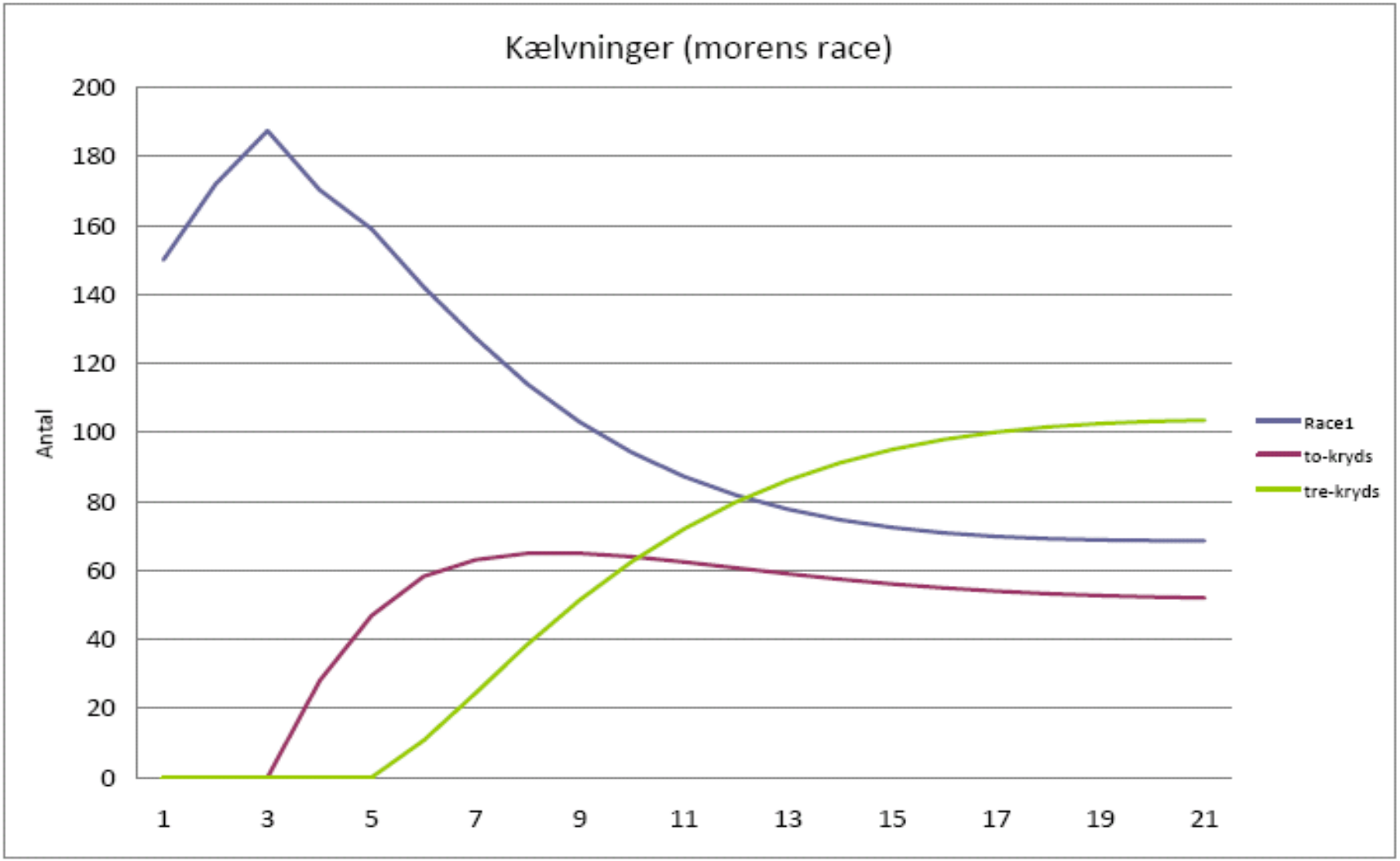
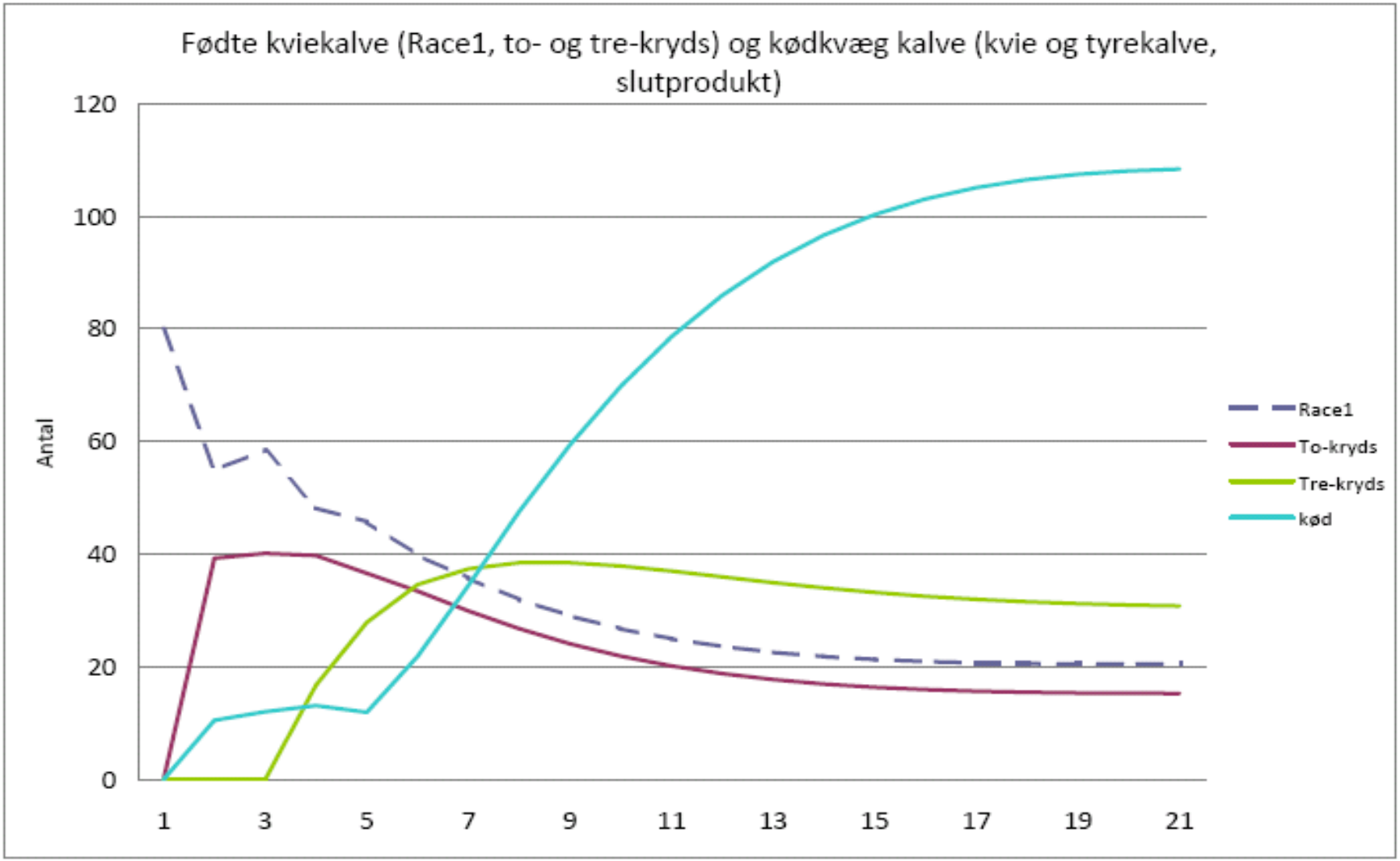
Kombi-Kryds styring



Kombi-Kryds styring



Kombi-Kryds styring

Fordeling på sigt		
Race1	69	31%
To-kryds	52	23%
Tre-kryds	104	46%
	224	

Kombi-Kryds styring

Kombi-Kryds opgørelsen
Combi Cross status in dyre registreringen (work in progress)

- The aim with this output (udskrift) is that advisers can get an overview over the herd regarding distribution on breeds and breed combinations. This is an requisite to handle the breeding program and the inseminations within herd in a Combi-Cross scheme.
- Animals is grouped in accordance to combinations of sire breed, maternal grandsire (mf) breed and maternal great grandsire (mmf) breed
- Animals ranged on NTM within group.

Combi-Cross status

	HOL	HOL/RDM/KRY	KRY/HOL
Antal forv. Kviekalve fra aktuelle drægtigheder	2	3	2
Kviekalve 0-3 mdr	12345-1501 12345-1503 12345-1509	12345-1508	12345-1811 12345-1122
Kviekalve 4-15 mdr	12345-1515	12345-1210 112345-1111	
Kviekalve 16 mdr til klv.	12345-1414	12345-6666 12345-1234	
1. kalvskøer	12345-1616	12345-1415 12345-1478	
Øvrige køer	12345-1919 12345-2000 12345-2121 12345-6666		

Improvement in the inseminationplan program

- We (VFL|cattle) still hope there will be money for that within the last part of 2011 (financing is a diffecult task!)
- We need to have the inseminationplan program geared to handle different cross breeding stategies

2) Ongoing projects

- Swedish Projects
- Finnish projects

3) Status on the general work

- VFL | cattle
- Svensk Mjölk
- FABA
- Viking (Genetics and national)

3) Status on the general work VFL | cattle

- Part of the mentioned projects
- Preparing a homepage (Can some of the ideas be used in Sweden and Finland?)

The homepage

Du er her: LandbrugsInfo > Diverse > Udgivelse > Krydsning

Krydsning

3 gode grunde til at krydse:

- 10% højere dækningsbidrag pr årsko - uden ekstra investering
- Krydsningsdyr er mere robuste, lever længere og har bedre sygdomsresistens
- Effekt af krydsning - uanset pasningsniveau

Overvejelser før du krydser:

Mælkekvote

Racer

Systemer

Kontaktbesætninger:

Kombikryds
Rotationskryds

Baggrundsviden om krydsning:

Baggrundsinformation om krydsning
Krydsningsfrodighed fra teoretisk synsvinkel
Forståelse af krydsningsresultater

Artikler på dansk:

En kvægavler kan også kave krydsningskøer - artikel i Bovilogisk - april 2011
Stort potentiale for krydsning i praksis - artikel i NyKvægForskning nr. 3 - 2010 (side2)
Krydsning - et globalt overview - artikel i Bovilogisk - december 2009
Krydsning - et stærkt alternativ - bilag - diasshow - indlæg på Kongressen 2010
Krydsning, et stærkt alternativ - Tema om avl i "Dansk Kvæg Nyt" nr. 6 - 2010
Tjen ekstra uden at røre en finger - Tema om krydsningsavl i "Dansk Kvæg Nyt" nr. 10 2009
Er malkeracerne ligeværdige? - Indlæg v. informationsmøde om avl 2009

Papers in English - artikler på engelsk:

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Artikler

En kvægavler kan også have krydsningskøer
Artikel fra Bovilogisk tidskrift - april 2011 om krydsningskøer i avlsbesætning.
10-05-11

4) How to involve our research institutes in the work

- Who is working on cross breeding within research institutes in
  - Denmark
    - Jehan Ettema
    - Morten Kargo
  - Sweden
  - Finland

5) New application on crossbreeding

- This was my starting point for thinking on the present meeting
- At least one Danish to be put in during summer
  - Will we be able to coordinate the efforts within this project with effort in Sweden and Finland?

5) New application on crossbreeding
The Danish application for Promillefonden
The very short argumentation:

- Anvendelse af systematiske krydsningsprogrammer indenfor kvægbruget har indtil for få år siden haft meget begrænset udbredelse. De sidste års fokus på emnet fra VFL|Kvæg og andres side har dog øget interessen for krydsning (og dermed antallet af besætninger som anvender systematisk krydsningsavl), bl.a. med introduktion af Kombi-Kryds, hvor renavl og systematisk krydsningsavl kombineres. Det overordnede mål med projektet er at synliggøre de økonomiske potentialer krydsning indeholder. Baseret på den tilgængelige information vil en gennemsnitlig kvægbruger med 140 køer kunne øge indtjeningen med 80-100.000 kr. uden ekstra omkostninger.
- Two parts

Part 1

- 1) Estimation of heterosis effects based on crosses from systematic crossbreeding programs.
- 2) Estimation of the economic effect of crossbreeding based on animals in herds with systematic crossbreeding programs
- 3) Estimation of economic effects of cross breeding through Simherd simulations
- 4) Devellopment of crossbreeding programs for different mangement systems

Part 2

- 1) Produce information material (something a la advising concept for repromanagement)
- 2) Regional meeting on cross breeding in collaboration with local centres and VikingGenetics
- 3) Massive information in relevant ”cattle” medias
- 4) Attend with a stand on eg. Agromek, The national show, or the congress
- 5) Set up a homepage on crossbreeding on VFL | cattle homepage and update of the page
- 6) Take inatative for a cross breeding year meeting

Partner (so far)

- **Project leader** Morten Kargo
- **Collaborators:** AU GBI (Elise Norberg, Morten Kargo) HBS (Søren Østergård, Jehan Ettema), Viking Danmark (Mads Fjordside and more), Viking Genetics (Hans Stålhammer, Sverige and more)

Financing

- Promillefonden: Applied for 700.000 kr per year
- Land districkt Foundation: We can search for the same amount as we recieve from Promillefonden.
- Viking involved with 400.000 kr per year.

- A four year project

Cooperation

- Possibilities for Swedish or Finnish input to the present project?
- Possibilities for new related Swedish of finnish projects?

6) Recommendations of crossbreeding systems

- Rotational systems
- Combi Cross systems
- For both systems:
  - The breeds to be involved is depending on production goal (milk/meat and production level) and management system
  - Decision on crossbreeding system is a part of overall management system at herd level
- Promotion of crossbreeding systems need to be a balance between flexibility and possibility for promotion
- To me flexibility is very important.
- Focus must be at farm level not at company level

7) What is going on around us related to crossbreeding

- We have had a lot of focus towards US trails
- We need to focus more on research and implementation going on in:
  - - New Zeeland
  - Canada
    - Europe
      - Germany
      - Holland
      - Ireland
      - Others

8) Areas where we need more information and more analyses

Optimal organisation

- Are meetings like this relevant?
- If yes:
  - Who are the ”players” to be involved?
    - This also defines the subjects to be discussed.
  - Who are going to join the meetings?
  - Meetings every half year (video meetings?)
  - coordination