Combi-Cross
- management and possibilities

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Støttet af Fødevareministeriet og EU

Landdistrikter.dk

Ministeriet for Fødevarer, Landbrug og Fiskeri

Den Europæiske Landbrugsfond for Udvikling af Landdistrikterne

Danmark og EU investerer i landdistrikterne.

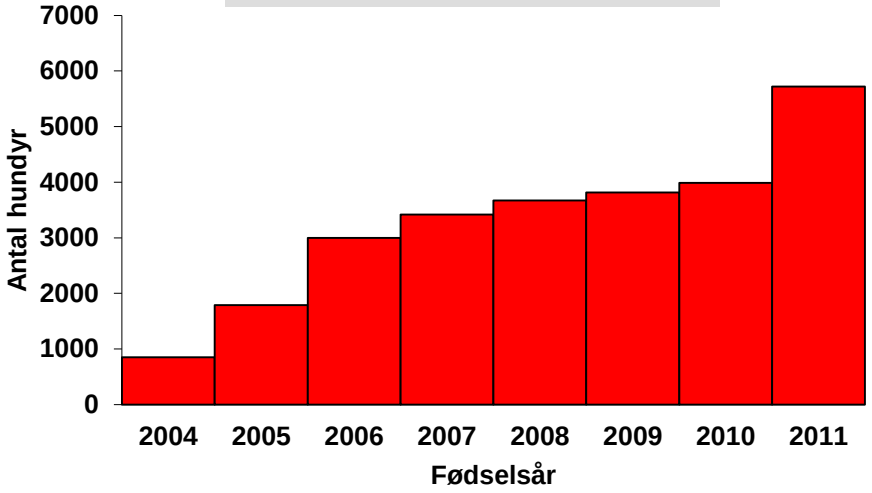
Det Europæiske Fællesskab ved Den Europæiske Fond for Udvikling af Landdistrikter og Ministeriet for Fødevarer, Landbrug og Fiskeri har deltaget i finansieringen af projektet.

Cross breeding in Danish dairy production

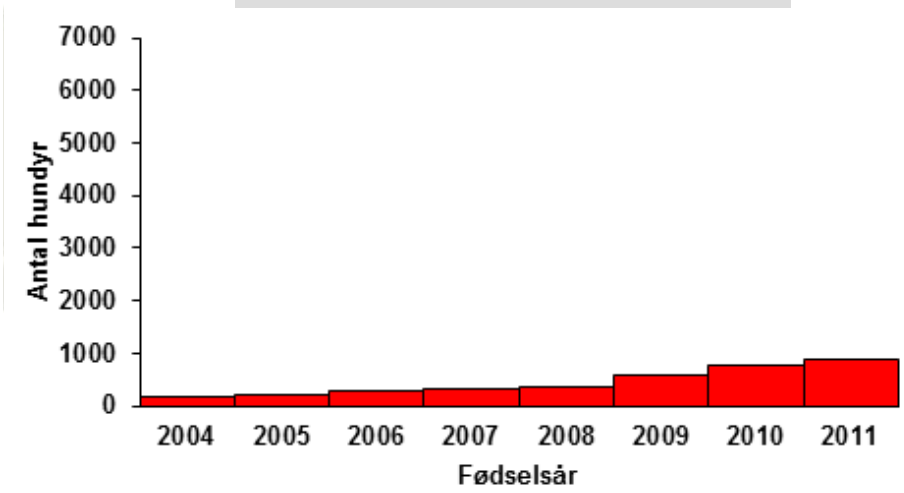
Increased interest over the last years

Examples

Red sire* Black cow



Jersey sire* Black cow



Survey among owners of crossbred herds in 2010

They wanted:

- **Improved management tools**
- **More knowledge about crossbreeding**
- **Accept among colleagues**

Work at VFL, VikingDenmark and AU in 2010-2011

Work to support and optimize use of crossbreeding:

- **Development of the new crossbreeding system Combi-Cross**
- **Demonstration of Combi-Cross in five herds**
- **New management tools developed and tested**
- **Webpage about crossbreeding www.VFL.dk**

Work at VFL, VikingDenmark and AU in 2012-15

More work to support the use of crossbreeding in the project:

”Estimation of the value of crossbreeding and implementation of Combi-Cross”

The idea behind Combi-Cross

- The advantages of pure breeding and cross breeding are combined
- The level of the purebred nucleus is increased due to use of Sexed Semen
- The functional ”F1-animals” express their full heterosis
- The three-cross cows give birth to beef crosses

Combi-Cross

Level 1
Pure breeding

Level 2
Two-cross

Level 3
Three-cross

Level 4
Beef cross

The distribution of cows within the three ”breed” groups are dependent on:

- Conception rate among heifers and cows
- Replacement rate
- The frequency of live born heifer calves reaching first calving
- Strategy for use of Sexed Semen

Distribution of breed groups using Combi-Cross in a herd with 200 cows

70 pure bred cows

50 two bred cows

80 three bred cows

80 beef cross per year

One of our demonstration herds

2005: A stable for 265 cows was build and un-systematic crossbreeding started

2010: Heifers moved to a neighbor farm (heifer hostel) and environmental certification for 295 cows and 100 heifers “at home” was obtained

2010: Starting up with Combi-Cross

The herd

- Milking three times per day
- 265 cows and 250 heifers
- Both a pure “red” a pure “black” nucleus at a high genetic level
- Heavy use of Sexed Semen ensure easy calving and heifers for expansion

Management of Combi-Cross

We started with handheld management (dogma), which was very time consuming

In the project we have developed new tools

- **With the aim of minimizing the nucleus**
- **For reducing the work load related to advising at herd level**

Management of Combi-Cross

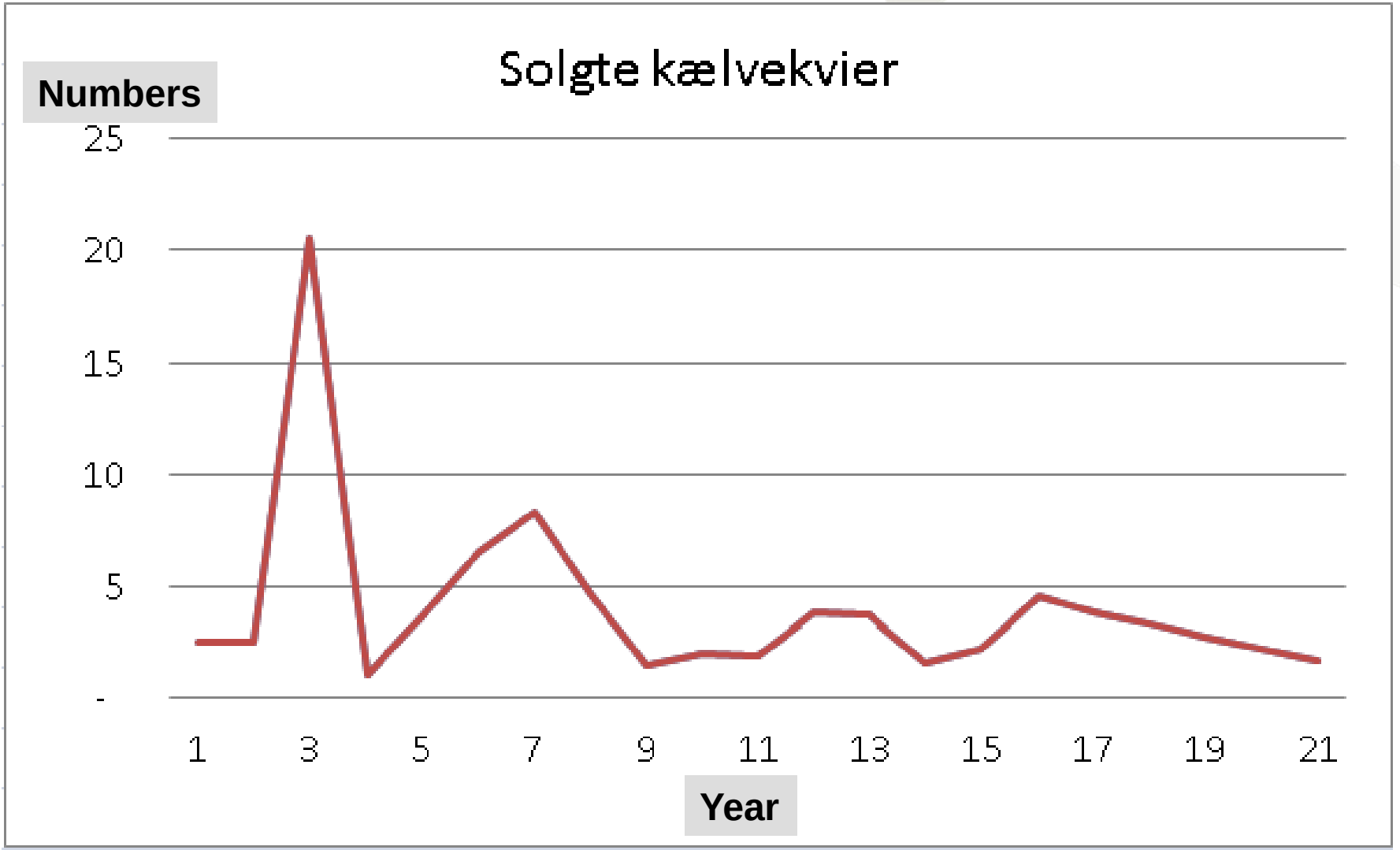
	RDC	HF	RDC/ HF /RDC	RDC/ HF /HF	HF /RDC /HF	HF /RDC /RDC	RDC/ RDC/ HF	JER/ HF /RDC	JER/ RDC/ HF	HF /HF /RDC	HF /JER /RDC
Antal forv. kviekalve fra aktuelle drægtigheder											
	15	5	6	4	20	5	1	1	2	1	2
Kviekalve 0-3 mdr.											
	03431	03449	03443		03430	03439		03435	03436		03433
	03432	03500	03444		03440	03503		03441			03442
	03434	03508	03506		03445			03460			03501
	03437	03509			03447			03504			
	03446	03510			03448						
	03505				03502						
	03511				03507						
	03512										
ANTAL DYR	**8**	**5**	**3**	**0**	**7**	**2**	**0**	**4**	**1**	**0**	**3**
Kviekalve 4-15 mdr.											
	03308	03318	03343	03336	03316	03412	03333	03331	03401	03309	03428
	03322	03349	03425	03345	03319	03419	03347	03402	03404	03312	
	03327	03358			03410	03427	03386		03420		
	03357	03375			03411		03405				
	03406	03408			03413		03417				
	03407	03418			03415		03422				
	03409	03421			03416		03423				
	03414	03424									
ANTAL DYR	**8**	**8**	**2**	**2**	**7**	**3**	**7**	**2**	**3**	**2**	**1**

Management of Combi-Cross

Antal årskøer	230
Start, inseminering	40
Dr% køer	50%
Ins% køer	40%
Udskiftnings tidspunkt	207
Udskiftning per år	35%
Kalv/ko	1,137
Kønsrate-NS	48%
Kønsrate-KSS	90%
Dr% kvier	60%
Ins% kvier	67%
Dr% kss	85%
Overlevelse (fødsel-kælvning)	90%

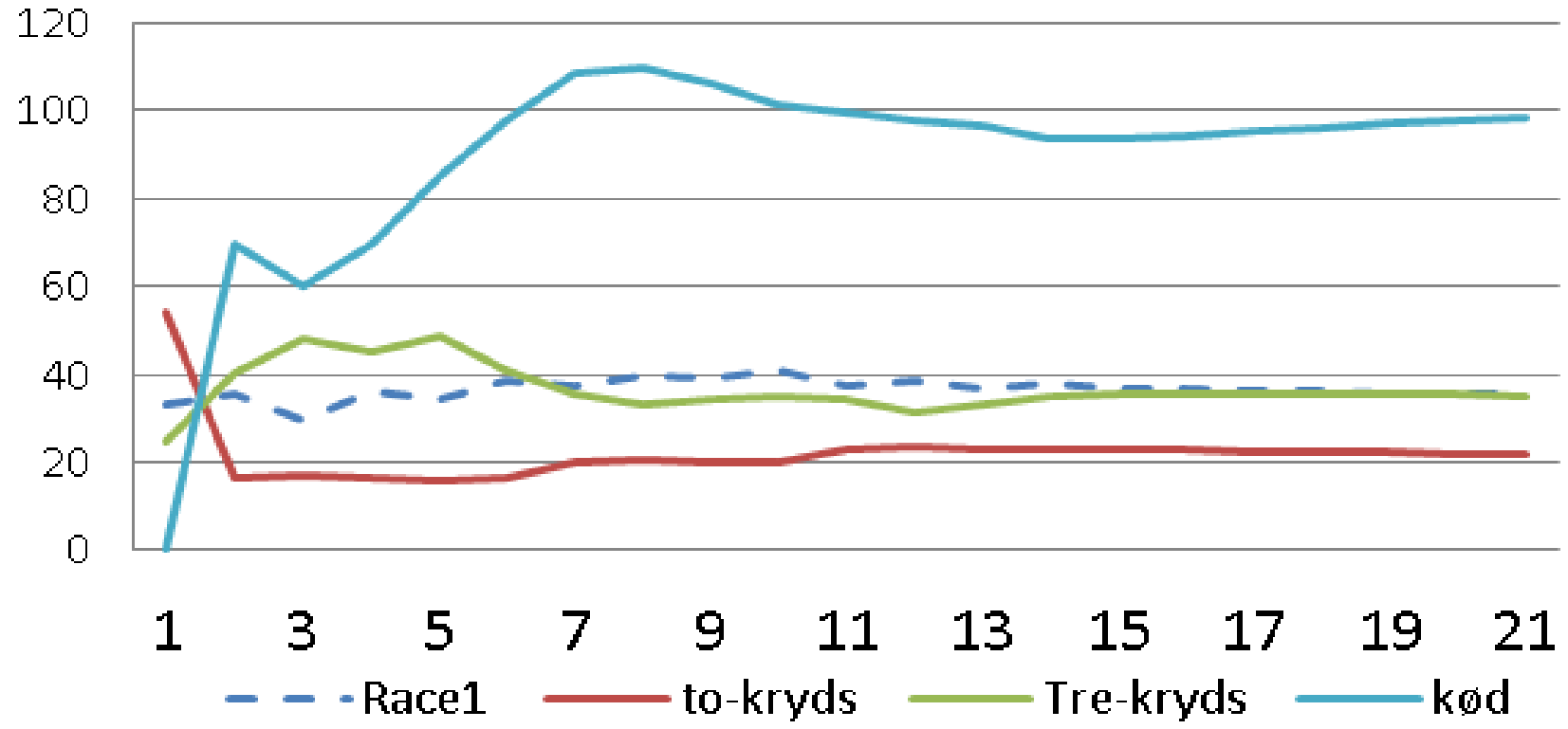
Start situation	Race 1	To-kryds	Tre-kryds	I alt
Kviekalve	33	54	25	**112**
Løbekvier	40	42	12	**94**
Kælvninger 1. kalvs	36	43	3	**82**
Kælvninger ældre køer	80	120	5	**205**

Management of Combi-Cross

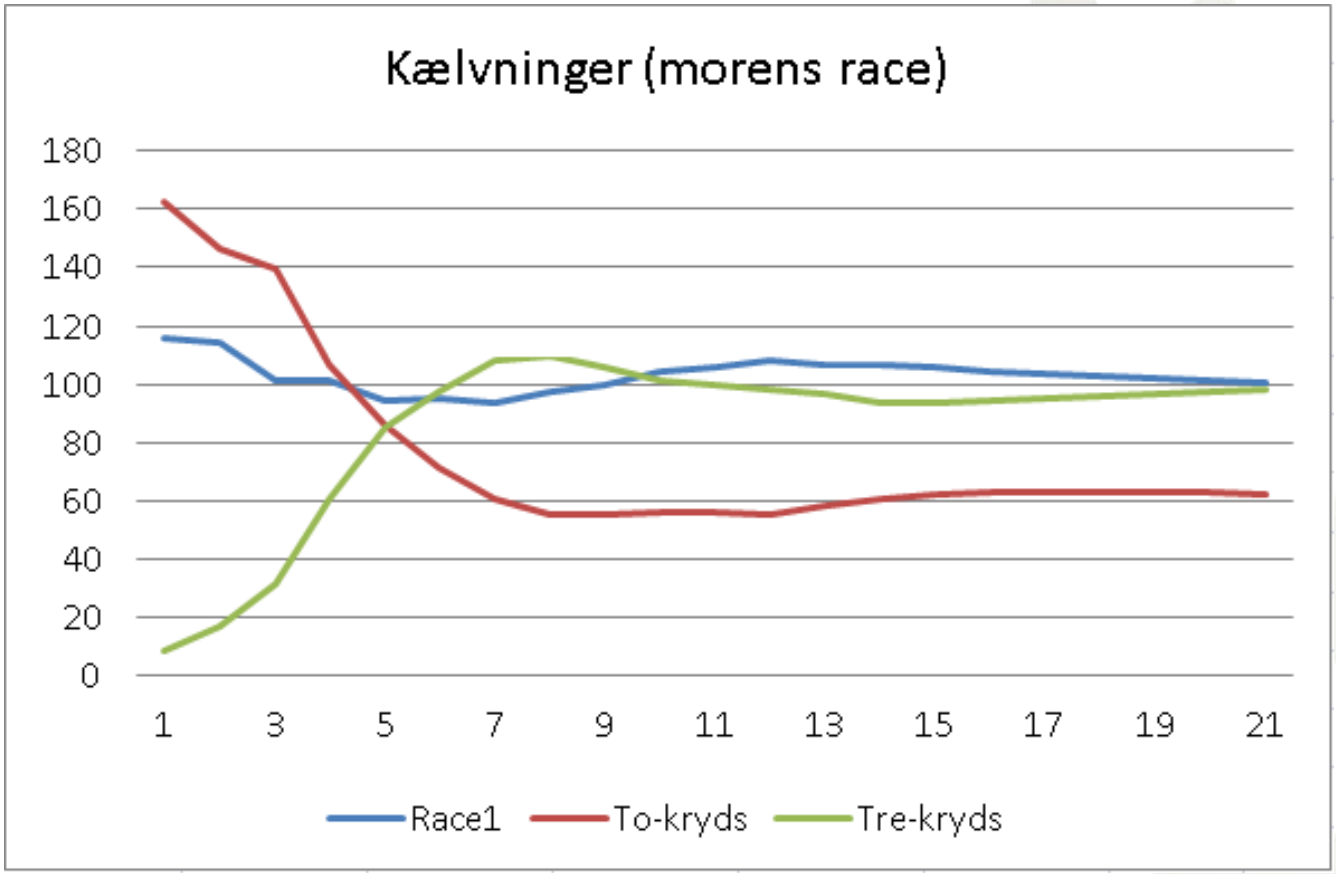


Management of Combi-Cross

Numbers of born heifers calves (pure, two-cross and three-cross) and numbers of born beef cross (male and heifers)



Distribution of cows in the future



Danish crossbreeding results

Demands for animals included in the analyses:

- **At least 6 producing crosses and at least 6 producing Holstein cows per birth year within herd**
- **Crosses are defined as animals with ”red” sire and ”black” dam**
- **Animals born in 2004 and later**

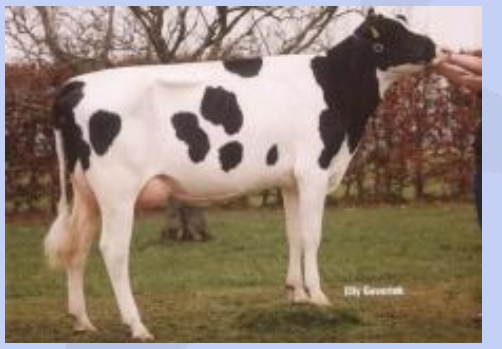
About the results

- **Results are given as within herd differences between crosses and Holstein**
- **The level of crosses is:**

½ X  + ½ X  + heterosis

Data

x



3701 cows
(1728)

x

8759 cows
(3816)

305 d yield
(SRB crosses)

	Milk, kg	Fat, kg	Protein, kg
1st lactation	- 179 (-142)	+ 5 (+9)	- 1 (+2)
2nd lactation	- 390 (-336)	+ 1 (+2)	-5 (- 2)

1st lactation 305 d yield
Final results from US

	Pure Holstein	Montbeliarde-Holstein	Skand. Red-Holstein
# cows	380	491	314
Milk, kg	9972	-408	-376
Fat, kg	357	-15	-9
Protein, kg	309	-6	-3

Modified after Heins & Hansen, 2012
No correction for days empty

Calving ease

(SRB crosses)

	Stillbirth percentage*
Heifer calvings	- 1.4 (- 2.3)

* Given as percentage point

Longevity

(SRB crosses)

Survival to 2nd calving %*	+ 2.6 (+ 2.9)
Survival to 3rd calving, %*	+ 6.2 (+ 10.5)

* Given as percentage point

Survival percentages
Final results from US

	Pure Holstein	Montbeliarde-Holstein	Skand. Rødt-Holstein
Up to 2nd lactation	75	+14	+10
Up to 3rd lactation	51	+24	+20

Modified after Heins & Hansen, 2012

Fertility

(SRB crosses)

	Days from first to last ins.	Number of inseminations
1st lactation cows	- 7 (- 8)	- 0.10 (- 0.12)
2nd lactation cows	- 7 (- 9)	- 0.09 (- 0.12)

Mastitis treatments

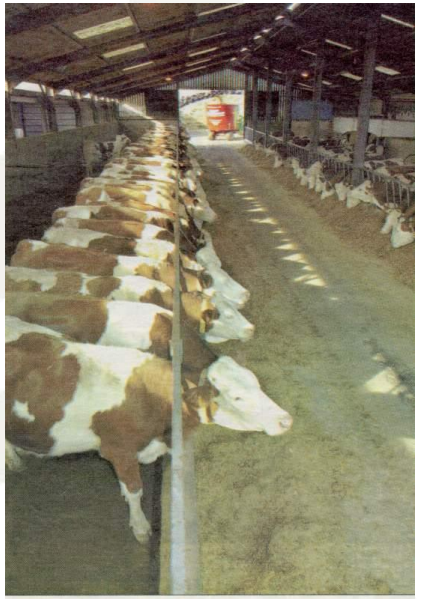
(SRB crosses)

1st lactation, %*	- 1.4 (- 1.1)
2nd lactation, %*	- 4.1 (- 4.2)

* Given as percentage point

Recommended breeds

- **Breed group I:**
  - **Holstein**
- **Breed group II:**
  - **Viking Red**
    - **SRB (Swedish Red)**
    - **FAY (Finish Ayrshire)**
    - **RDM (Danish Red)**
  - **NRF (Norwegian Red)**
- **Race group III:**
  - **Jersey**
  - **Montbéliarde**
  - **”Braunvieh”**
  - **”Fleckvieh”**



Part of the new Montbeliarde dairy herd. Pictures: ADRIAN LEGGE.