

First results from the cross-breeding experiment „Swedish Red x Holstein“ in Germany

W. Brade (LWK Niedersachsen/TiHo Hannover), J. Jaitner and F. Reinhardt (VIT Verden)

1. Introduction

After the publication of the first results of cross-breeding between different European breeds and US-Holsteins in California 2003/04 (Hansen, 2003; Heins et al., 2004 a,b, o.V., 2003, Hansen, 2004, o. V., 2004) interested milk-producers in the area of Hannover and Sachsen in Germany got the idea to initiate a cross-breeding experiment between selected bulls of the Swedish Red (SRB) breed and German Holstein cows (DH). The goal was to verify the American cross-breeding results under German conditions.

The general comprehension among all participants (dairy farmers, advisers etc) at the beginning of the experiment can be described as follows: The Holstein cow is *clearly* superior to all other breeds in milk yield. Other advantages are prominent milkability and udder conformation. However, the Holstein cow badly needs to be improved in length of life, calving performance (the frequency of stillbirths and difficult calvings) as well as in fertility. In these traits the crossbreds in the USA and especially the SRBxHolstein crossbreds turned out to have advantages (Hansen, 2004). In addition, it was also well known that the purebred SRB-cows were inferior to Swedish Holsteins in milk yield (Lindhé und Phillipsson, 2004).

All these facts should be considered at the start of the experiment as well as the reduction of the risks of the participating farmers.

2. Selection of bulls

5 SRB bulls, which were regarded as the best progeny tested bulls at the time of the start of the experiment (2004), were selected (Table 1).

Table 1. Selected SRB bulls for the cross-breeding experiment (Breeding values August 2008; Base: Angler)

Name	Herd-book no	RZG	RZM	RZS
B Jurist	595890	120	118	101
Orraryd	596823	137	138	102
Peterslund	597199	129	124	106
Larsgard	597200	123	117	109
Backgard	592942	126	123	114

RZG: Relative German total breeding value (= total merit index); RZM: relative breeding value for milk performance; RZS: relative breeding value for somatic cell score (general: about 100 = good; under 100 = bad). Average is 100. The standard deviation is 12 points.

In order to make sure that the best available Holstein bulls at the time should be used, the participating farmers received without extra costs limited amounts of semen (max 120 doses per herd) from selected bulls (Ramos, Laudan, Lexikon and Alves). However, it was not possible to compensate the largest herds (>100 cows + replacements) completely for the use of the best Holstein bulls.

At the interpretation of the following results the preselection of the bulls especially for yield should be remembered. It should also be mentioned that there was no intention to consider systematic cross-breeding parameters like dominance and epistasis in the experiment.

3. Actual available information

At the data collection in August 2008 it turned out that more than 400 F1 females (SRBxHolstein) has been inseminated, 226 cows have calved for the first time and 152 cows have been inseminated for the second calf.

Table 2. Number of records for fertility

Category	No of animals
Inseminated heifers	414
Inseminated cows after the first calving	152
Inseminated cows after the second calving	3

The number of F1-animals out different SRB-bulls is given in table 3

Table 3. Number of daughters in different fertility groups

SRB-Sires	HB-Nr.	No of animals		
		Heifers	Cows first lact	Cows second lact
B Jurist	595890	34	11	0
Orraryd	596823	89	47	3
Peterslund	597199	258	76	0
Larsgard	597200	31	18	0
Bredaker	597998	2	0	0
Total		414	152	3

4. Comparison of actual breeding values of the SRB- and the Holstein sires

Purebred SRB bulls have for long been used in the German Angler population.

In the common evaluation of breeding values of German Holsteins and Angler cattle well known differences appear as shown in Table 4. These figures can be used at the estimation of expected results of the F1 animals.

Table 4. Actual breed differences between German Holstein and Angler (VIT Verden 08/2008)

Difference	Milk-kg	Fat %	Fat kg	Prot %	Prot kg	RZS
Germ Holstein -Angler	+918	-0,41	+10,3	-0,17	+20,0	-4,2

These breed differences are used for the calculation of the figures in Table 5 which are based on the level of the German Holsteins.

Table 5. Average breeding values of the bulls used as sires in the experiment (Base: German Holsteins, 08/2008) – weighted with the number of daughters.

Trait	SRB-sires of the F1- animals	Sires of the purebred animals for comparison		
		Holstein Selected bulls*	Holstein (normal German bulls)	Holstein (= Other German bulls)
No of animals	414	861	3983	2610
Milk-kg	+194	+1218	+860	+1063
Fat kg	+28,1	+45,3	+26,1	+26,1
Prot kg	+23,7	+41,4	+25,5	+34,4
RZS	100,9	113,7	109,9	96,7
RZE	84	114,8	94,8	101,4

*Bulls: Laudan 810695, Ramos 253642, Lexikon 457651, Alves 830837 und Sandel 830837

RZS=relative breeding value for somatic cell count. Standard dev. =12 Units. Values above 100 are favourable.

RZE= relative breeding value for conformation.

The figures given in Table 5 illustrate the effects of the intentional pre-selection of SRB- and Holstein bulls.

5. Results

5.1 Fertility and maternal calving traits

In the actual data set the results so far are somewhat contradictory as regards fertility.

Tabel 6. Fertility records

Criterion	Diff. Crossbreeds – Purebreds	Significance level
Heifers Non-Return-Rate 56	-3,3%	n. s.
<u>Cows:</u> Days Open	-8,1	**
<u>Cows:</u> Non-Return-Rate 56	-4,6%	n. s.

The crossbreeds have a significant shorter empty period (~8 Tage), however, a superior Non-Return rate has yet to be proven (not expected). The Non-Return rate is dependent on a large number of different factors with a high environmental variability. The final results, based on sufficient numbers, will not be available until 2009

Tabel 7. Maternal calving results. Only single births. Sires of the calves=German Holsteins.

Criterion	Purebreds	F1- animals	Significance level
Calving difficulties (0/1)	3,9%	2,4%	n. s.
Stillbirths (0/1)	9,6%	2,8%	*

The calving performance of the F1 animals is very advantageous. The difference is statistically significant for stillbirths as can be seen in Table 7.

5.2 Milk yield

The evaluation of the milk yield is based on 226 F1 first calvers and 2460 purebred Holstein first calvers. Table 8 illustrates the absolute yield in the first three test days.

**Table 8. Absolute yield of milk in the first three test days.
11 herds with at least 7 F1- animals**

	Purebred Holsteins	F1- animals (SRB x Holsteins)
No of cows (1./2./3. test days)	2460/2174/1994	226/190/175
Average number of test days *	6,7	5,9
Milk kg per day (1./2./3. test days)	27,8/31,9/31,9	28,2/32,3/31,8
Fat kg per day (1./2./3. test days)	4,4/3,7/3,7	4,4/3,8/3,8
Protein kg Tier/Tag (1./2./3.test days)	3,2/3,1/3,2	3,3/3,2/3,3
Cell count (1./2./3. test day)	308,6/191,7/177,2	296,9/103,6/142,3

*August 2008

In order to consider diverse environmental effects like herd, season, age at first calving etc. a Random Regression Test Day model has been used. The model will be described more detailed at the meeting where the results will be presented.

In Table 9 the LSQ-means for the two animal groups is presented with corrections for the systematic environmental effects.

Table 9. LSQ-means for average day yield

Trait	Purebred Holsteins N = 2460 Kühe	F1 (SRB x Holstein N = 226 Kühe	Significance
Milk kg	25,8	25,2	n. s.
Fat-kg	1,01	1,03	*
Fat-%	3,98	4,12	*
Protein kg	0,87	0,88	n. s.
Protein %	3,40	3,52	*
Cell count (thousand / ml milk)	205	183	n. s.

n. s. = not significant;

As expected the F1 animals have lower yield of milk. However fat- and protein percentage is higher for the crossbreds with the results that the yield in kg fat and protein is higher for the crossbreds. (Table 9).

Summary

Dependent on the limited number of animals recorded so far the results above should only be regarded as the first tendencies regarding the differences between the purebred German Holsteins and the SRB cross-breds. However, the results coincide well with earlier published results in the same field.

Literature

- Brade, W. (2004): Crossbreeding project SRB x German Holsteins
Vortrag, Arbeitsbesuch Nds. Rinderzüchter bei Svensk Avel in Skara (Schweden)
am 17.06.2004
- Hansen, L. B. (2003): Which traits and which breeds for dairy cattle in the future.
Vortragpapier, Swedish Agricultural University; May 19, 2003 in Uppsala, Sweden
- Hansen: L.B. (2004): Crossbreeding. An alternative in dairy cattle breeding?
In: Herausforderung für die Gestaltung der Rinderzucht von Morgen.
Internat. Rindertag, Leipzig, 4.März 2004. DGfZ-Schriftenreihe, Heft 34: 18-32.
- Heins, B. J., L. B. Hansen and A. J. Seykora (2004a): Comparison of first-parity Holstein,
Normande-Holstein crossbred, Montbeliarde-Holstein crossbred, and Scandinavian-Holstein crossbred cows for dystocia and stillbirths. J. Dairy Sci. 87
(Suppl. 1):524.
- Heins, B. J., L. B. Hansen and A. J. Seykora (2004b): Crossbreds of Normande-Holstein,
Montbeliarde-Holstein and Scandinavian-Holstein compared to pure Holsteins for
production and SCS during the first 15 days of production. J. Dairy Sci. 87
(Suppl. 1):41.
- Heins, B. J., L. B. Hansen and A. J. Seykora (2006a): Fertility and survival of pure Holsteins
versus crossbreds of Holstein with Normande, Montbeliarde and Scandinavian
Red. J. Dairy Sci. 80: 4944-4951.
- Heins, B. J., L. B. Hansen and A. J. Seykora (2006b): Production of pure Holsteins versus
crossbreds of Holstein with Normande, Montbeliarde and Scandinavian Red. J.
Dairy Sci. 89: 2799-2804.
- Lindhe, B.; J. Phillipsson (2004): Two competitive Swedish dairy breeds with different profiles
www.svenskavel.com (Zugriff am: 30.03.2004)
- o. V. (2003): Die ersten Resultate eines Kreuzungsversuches.
Holstein International Heft 12/2003, S. 28-29
- o. V. (2004): Die „Skandinavier“ auffällig im Kreuzungsversuch. Wer sind sie?
Holstein International, Heft 1/2004, S. 54-55