



Petes Photo

**10-year comparison of fertility and
305-day production of
ProCROSS and Holstein cows in
well-managed Minnesota herds**

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Traits ignored for selection in the U.S.

- **longevity (1994)**
- **fertility (2003)**
- **calving difficulty (2006)**
- **stillbirth (2006)**
- **livability (2017)**
- **health (2018)**

These traits were not ignored by other breeds of dairy cattle globally

Genetic change for days open in U.S.

Birth year

Holstein

Jersey

----- (days) -----

1957

0

0

1965

+5

+4

1975

+15

+10

1985

+31

+23

1995

+59

+40

2005

+61

+56

2010

+62

+60

2015

+57

+67

Inbreeding of U.S. Holstein females

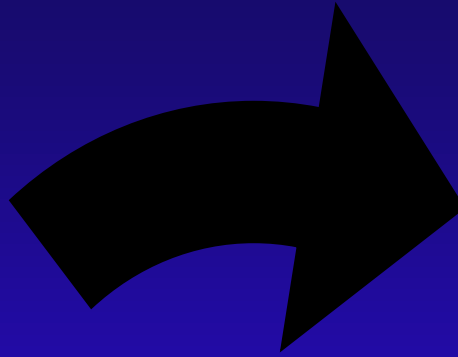
(Context: bull-daughter mating has inbreeding of 25%)

Birth year	Average inbreeding	Annual increase
	----- (%) -----	
2000	4.5	+.14
2003	4.9	+.13
2006	5.2	+.11
2009	5.5	+.11
2012	5.9	+.12
2015	6.6	+.23
2018	7.7	+.35
2020	8.6 (first 1/3 born)	+.45

Council on Dairy Cattle Breeding

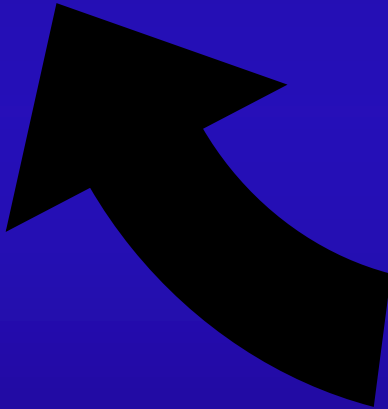


Holstein



Viking Red

ProCROSS



Montbeliarde



Number of cows analyzed for production

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
Holstein	1180	1073	417	883	582	451	228
VR-sired	582	505	----	461	309	281	143
MO-sired	556	462	----	443	291	297	134
HO-xx	----	----	257	----	----	----	----

Included 7 herds, except 3rd lactation 3-breed included 6 herds because 3 cows required per herd and breed group

Age at calving

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (months) -----						
Holstein	23.8	23.2	22.9	36.5	35.9	48.9	48.5
VR-sired	23.8	22.7 **	---	36.4	35.0 **	48.5	46.8 **
MO-sired	23.8	22.9 *	---	36.4	35.3 **	48.4 †	46.9 **
HO-xx	---	---	22.6 *	---	---	---	---

** Difference from Holstein $P < 0.01$, * $P < 0.05$, † $P < 0.10$

First-service conception rate

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (%) -----						
Holstein	37	43	43	29	35	30	35
VR-sired	45 **	52 **	---	36 **	42 †	31	42
MO-sired	43 *	51 **	---	40 **	47 **	41 **	48 *
HO-xx	---	---	46	---	---	---	---

**** Difference from Holstein $P < 0.01$, * $P < 0.05$, † $P < 0.10$**

Overall conception rate (first 5 services)

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (%) -----						
Holstein	37	41	42	31	36	31	33
VR-sired	41 *	48 **	---	35 *	42 *	32	44 **
MO-sired	45 **	50 **	---	40 **	44 **	40 **	48 **
HO-xx	---	---	46	---	---	---	---

**** Difference from Holstein $P < 0.01$, * $P < 0.05$**

Times bred (up to 5 services)

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
Holstein	2.4	2.2	2.2	2.6	2.4	2.5	2.4
VR-sired	2.2 *	1.9 **	---	2.3 **	2.2 *	2.5	1.9 **
MO-sired	2.1 **	2.0 **	---	2.2 **	2.1 **	2.2 *	1.9 **
HO-xx	---	---	2.1	---	---	---	---

** Difference from Holstein $P < 0.01$, * $P < 0.05$

Days open

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
Holstein	127	126	128	139	134	143	134
VR-sired	120	111 **	---	128 *	114 **	139	119 †
MO-sired	115 **	110 **	---	117 **	117 **	120 **	109 **
HO-xx	---	---	121	---	---	---	---

** Difference from Holstein $P < 0.01$, * $P < 0.05$, † $P < 0.10$

Pregnancy rate

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (%) -----						
Holstein	27	28	27	24	25	23	25
VR-sired	30	34 **	---	27 *	33 **	24	30 †
MO-sired	32 **	35 **	---	31 **	31 **	30 **	36 **
HXXH	---	---	30	---	---	---	---

** Difference from Holstein $P < 0.01$, * $P < 0.05$, † $P < 0.10$

305-d actual fat production

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (lb) -----						
Holstein	927	963	993	1054	1084	1103	1141
VR-sired	+13	-51 **	---	-2	-63 **	0	-85 **
MO-sired	+22 **	-30 **	---	+14	-35 **	+3	-53 **
HO-xx	---	---	-10	---	---	---	---

** Difference from Holstein $P < 0.01$

305-d actual fat percentage

	<u>1st lactation</u>			<u>2nd lactation</u>		<u>3rd lactation</u>	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (%) -----						
Holstein	3.70	3.70	3.68	3.58	3.63	3.59	3.62
VR-sired	+.19	+.20	-----	+.22	+.16	+.18	+.11
MO-sired	+.06	+.19	-----	+.05	+.12	+.03	+.12
HO-xx	-----	-----	+.14	-----	-----	-----	-----

Ratio traits not statistically tested

305-d actual protein production

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (lb) -----						
Holstein	760	790	823	900	914	939	959
VR-sired	+10	-34 **	---	-7	-35 **	+1	-38 **
MO-sired	+29 **	-19 **	---	+30 **	-3	+27 **	-6
HO-xx	---	---	-13	---	---	---	---

** Difference from Holstein $P < 0.01$

305-d actual protein percentage

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (%) -----						
Holstein	3.03	3.04	3.05	3.06	3.06	3.06	3.04
VR-sired	+.16	+.19	-----	+.17	+.20	+.15	+.22
MO-sired	+.10	+.18	-----	+.10	+.19	+.10	+.23
HO-xx	-----	-----	+.10	-----	-----	-----	-----

Ratio traits not statistically tested

305-d actual milk (1000 lb)

	1 st lactation			2 nd lactation		3 rd lactation	
	2-breed	3-breed	HO-xx	2-breed	3-breed	2-breed	3-breed
	----- (1000 lb) -----						
Holstein	25.1	26.0	27.0	29.4	29.9	30.7	31.5
VR-sired	-0.9 **	-2.7 **	---	-1.7 **	-2.9 **	-1.5 **	-3.2 **
MO-sired	+0.2	-2.1 **	---	0	-1.9 **	-0.2	-2.4 **
HO-xx	---	---	-1.3 **	---	---	---	---

** Difference from Holstein $P < 0.01$

Daily fat + protein

	2-breed	3-breed
	----- (lb) -----	
Holstein	5.53	5.63
VR-sired	-.05 ** -1%	-.14 ** -2%
MO-sired	+.13 ** +2%	+.06 ** +1%

**** Difference from Holstein $P < 0.01$**

Thank you

- **Owners and managers of the 7 herds**
- **5 funding organizations**
 - **Coopex Montbeliarde**
 - **Viking Genetics**
 - **Creative Genetics of California**
 - **Select Sires, Inc.**
 - **MN Select Sires Co-op**



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