Growth and carcass quality of grazing Holstein bulls and Limousine x Holstein bulls and heifers slaughtered at 17 months of age

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Objective

To investigate if use of crossbreeding with beef breeds in organic dairy herds can improve the production efficiency in organic beef production

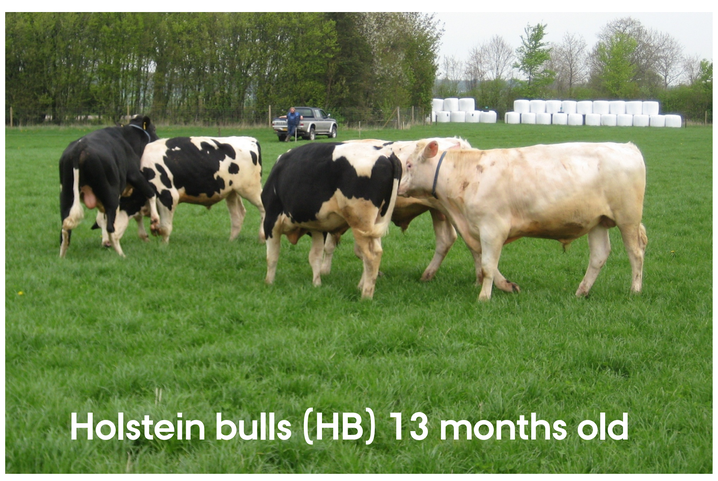
We examined the performance of spring-born crossbred Limousine x Holstein bulls (CB) and heifers (CH) compared with Holstein bulls (HB) when utilizing two grazing seasons and a fixed slaughter age (17 months)

Background

- The supply of organic beef from young animals is very low
- Dairy breed bulls calves from organic herds are currently sold to conventional fattening by rosé veal calf and young bull producers
- An efficient organic beef production will require high-yielding pastures cheap housing and winter feeding, robust animals, and utilization of the genetic growth potential
- Use of sexed semen (X) for the superior dairy cows will give room for use of beef breed semen to the less superior cows in the dairy herd
- An organic beef production will most likely include both bull and heifer calves
- Intact bulls will have better growth potential but most likely steers will be preferred by the farmers due to handling ease etc.

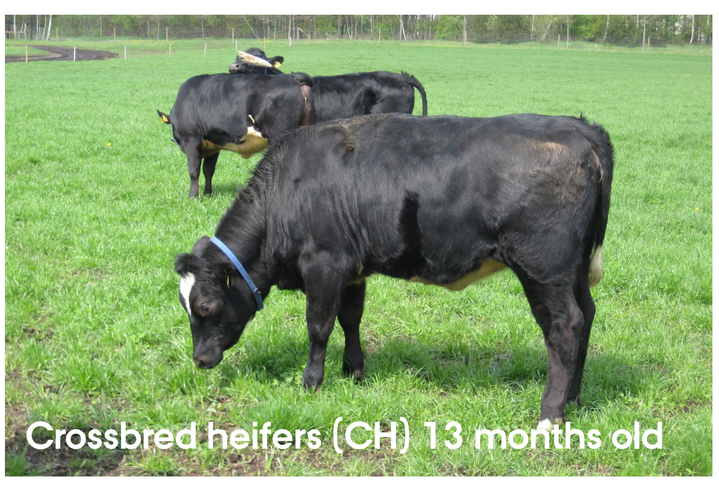
Table 1. Feeding value of TMRs (A, B and C) and of clover-grass swards (1st and 2nd summer)

	TMR A	Sward, 1st yr	TMR B	TMR C	Sward 2nd yr
DM, %	55	18	66	55	22
Ingredients /sward	Haylage (74%), barley, canola	Ryegrass, white clover	Haylage (67%), barley, canola	Grass haylage (90%), canola	Ryegrass, white clover
NE, MJ/kg DM	6.4	6.1	6.0-6.2	6.1	6.6
Crude protein, g/kg DM	153	200	149	113	211
Fatty acids, g/kg DM	28		22	18	
NDF, g/kg DM	385	394	411	443	362
Starch, g/kg DM	81		152	2	
Sugar, g/kg DM	78	115	78	129	154
Organic matter, g/kg DM	914		922	922	



Holstein bulls (HB) 13 months old

Crosbred bulls (CB) 13 months old



Crossbred heifers (CH) 13 months old

Materials and Methods

- 15 HOL bulls (HB), 15 LIM x HOL bulls (CB) and 15 LIM x HOL heifers (CH)
- Crossbred calves were half-sibs, as one Limousine (LIM) bull was used
- The 45 calves were purchased at 20 d of age (56 kg BW)
- Calves were kept indoor in groups of 5 animals until weaning at 3 mo, and were gradually introduced to a grass-silage based ration (TMR A) from 3 to 4 mo. (1st winter)
- Calves were then raised on a mixed ryegrass-white clover pasture (800 m^2/calf/d) + 2.2 kg DM/calf/d of the TMR A from 4 to 7 mo. (1st summer)
- From late October till mid-May, animals were housed in deep litter stalls and kept in the same groups of 5 animals (2nd winter)
- Animals had free access to a grass-haylage ration (TMR B from Oct to Dec and TMR C from Dec to May) during the 2nd winter
- Animals were grazing from mid-May until late-August (2nd summer) in a rotational paddock system (18 paddocks) in the same groups of 5 animals (9 groups) and generally moved to a new paddock every week
- HB and CB had 0.35 ha and CH animals 0.26 ha of pasture available
- During periods of low grass yield, animals were supplemented with TMR C amounting to 1.1 kg DM/animal/d
- Animals were slaughtered directly from the pasture at 16.9 mo of age
- Carcass weight, carcass conformation and fatness (EUROP scale) and carcass lean/fat colour was recorded and $pH_{24\,h}$ measured in filet

Conclusions

- **Across sexes, crossbreeding did not improve growth rate compared to HOL bulls**
- **Crossbreeding markedly improved conformation**
- **Heifers produced carcasses of acceptable fatness**
- **Fatness and lean/fat colour of pasture-fed bulls were not acceptable**

Table 2. Body weight (BW) and daily gain (ADG) of purebred Holstein bulls (HB), LIM x HOL crossbred bulls (CB), and LIM x HOL crossbred heifers (CH) in various growth phases

	HB	CB	CH	*P*-value
Number of animals, n	15	15	15	
BW at turn-out 1st summer, kg	141	145	136	0.32
BW after 1st summer, kg	201^{ab}	208^{a}	190^{b}	0.04
ADG, 1st summer (71 d), g/d	852^{a}	893^{a}	763^{b}	0.02
BW late Dec 2012, kg	312^{a}	329^{a}	290^{b}	0.001
ADG, 1st part, 2nd winter (84 d), g/d	1323^{a}	1437^{b}	1193^{c}	0.001
BW at turn-out 2nd summer, kg	445^{a}	463^{a}	415^{b}	0.002
ADG, 2nd part, 2nd winter (147 d), g/d	905	912	849	0.17
BW at slaughter, kg	534^{a}	575^{b}	480^{c}	0.001
ADG, 2nd summer (106 d), g/d	850^{a}	1160^{b}	681^{c}	0.001
ADG, birth to slaughter, g/d	948^{a}	1018^{b}	841^{c}	0.001

Table 3. Carcass quality characteristics

	HB	CB	CH	*P*-value
Carcass weight, kg	272^{a}	316^{b}	249^{c}	0.001
Dressing percentage	52.1^{a}	55.1^{b}	52.7^{a}	0.001
EUROP carcass conformation	3.0^{a}	7.0^{b}	5.3^{c}	0.001
EUROP fatness	1.0^{a}	1.2^{a}	2.9^{b}	0.001
Carcass lean/fat colour	4.0^{a}	3.9^{a}	3.3^{b}	0.001
pH in filet 24 h p.m. (n=30)	5.88	5.61	5.55	0.27

Results

- **ADG from birth to turn-out 1st summer was 828 g/d and not different between treatment groups**
- **During 1st summer, HB and CB had higher ADG than CH (P<0.02)**
- **ADG during 231 days of 2nd winter was 1012, 1052 and 930 g/d for HB CB and CH, respectively (P<0.002)**
- **During the first 11 wk of 2nd summer, ADG of HB, CB and CH were 1081, 1357 and 847 g/d (SE 50 g/d, P<0.001)**
- **LW at slaughter was 534, 575 and 480 kg and ADG from birth to slaughter was 948, 1018 and 841 g/d for HB, CB, and CH, respectively (P<0.001)**
- **Carcass wt, EUROP conformation, and fatness was 272, 315 and 249 kg, 3.0, 7.0 and 5.3, and 1.0, 1.2 and 2.9 for DB, CB and CH, respectively (P<0.001)**
- **Crossbreeding markedly improved conformation but fatness (too low) and lean/fat colour (too dark) of pasture-fed bulls were not acceptable**

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