

Quality, Tenderness, and Value of Beef from Heifers vs. Steers

Dan Buskirk & Jeannine Schwehofer, MSU Extension

Quality

Beef produced by heifers is nearly identical to that of steers. Slight differences are only apparent when examining large populations. Traditionally, heifers have generally produced higher quality grades than steers. Data from the most recent National Beef Quality Audit shows that heifers had slightly more marbling, yet USDA quality grade was not significantly different than steers (Table 1).

Table 1. Least squares means for carcass traits of steers vs. heifers from the 2011 National Beef Quality Audit (9,802 beef carcasses)

Trait	Steers	Heifers
USDA yield grade	3.0 ^a	2.9 ^a
USDA quality grade*	690 ^a	691 ^a
Adj. fat thickness, cm	1.23 ^b	1.41 ^a
Hot carcass weight, kg	386.8 ^a	352.1 ^b
<i>Longissimus</i> muscle area, cm ²	89.2 ^a	88.0 ^b
KPH, %	2.2 ^a	2.4 ^a
Marbling score**	436 ^b	448 ^a
Lean maturity***	154 ^b	155 ^a
Skeletal maturity***	158 ^b	169 ^a
Overall maturity***	156 ^b	163 ^a

^{a,b} Means within a row that do not have a common superscript letter differ (P<0.05).

*Scores are as follows: 600 = Select⁰⁰, 800 = Prime⁰⁰.

**Scores are as follows: 300 = Slight⁰⁰, 500 = Modest⁰⁰.

*** Scores are as follows: 100 = A⁰⁰ and 500 = E⁰⁰.

Source: Moore et al., 2012.

Tenderness

Beef from heifers has been shown to become tender slightly more slowly than steers (Table 2). Therefore, heifer beef (majority of research has been done with the *longissimus* (ribeye) only) may be slightly more tough when aged from 7 to 14 days, but may be slightly more tender at 21 days (Figure 1).

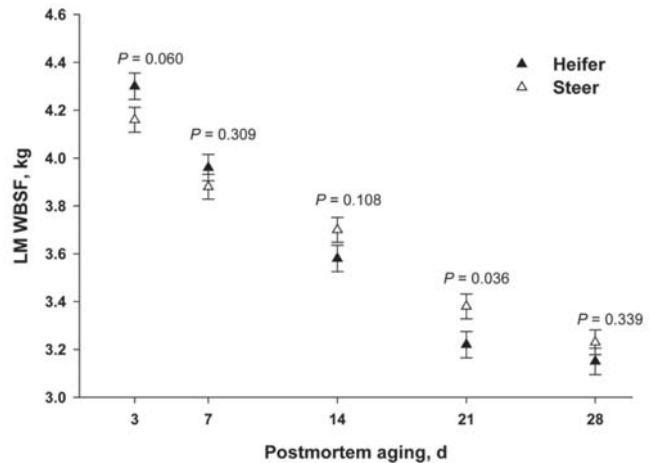


Figure 1. Least squares means for *Longissimus* muscle Warner-Bratzler shear force (WBSF) showing the interaction (P < 0.001) between sex class and postmortem aging.

Source: Woerner et al. (2011).

Value

Steers and heifers traditionally are of very similar value as finished cattle. Heifers may be worth slightly more for packers that need quality cattle, and slightly less for packers that need additional carcass weight. Currently, steer and heifer prices are nearly identical. Although often not differentiated, the USDA-AMS reports a separate average price for steers and heifers. The USDA-AMS Daily Direct Steer and Heifer Slaughter Cattle Summary for December 19, 2013 reported (for the 5-state area) a price per hundred weight for steers as \$129.46 and for heifers as \$129.58. (Available: <http://www.ams.usda.gov/mnreports/lstdsc.pdf>)

Table 2. Summary of Research Studies Comparing Mean Values for Warner-Bratzler Shear Force (WBSF) of *Longissimus* Samples from Heifers vs. Steers^a

Study	Aging period, d	Heifers		Steers		Mean WBSF difference ^b , kg
		No. of animals	WBSF, kg	No. of animals	WBSF, kg	
Greathouse (1985)	11	42	4.00	42	4.50	-0.50
Jeremiah et al. (1991) ^c	6	978	6.21	1985	5.68	0.53*
Huffhines et al. (1993)	18	198	2.95	200	2.74	0.21*
Wulf et al. (1996)	14	170	3.14	222	2.91	0.23*
O'Connor et al. (1997)	14	125	3.00	138	2.78	0.22*
Busby et al. (2001)	14	88	6.95	151	6.63	0.32*
Maher et al. (2004)	14	81	5.38	81	4.54	0.84*
Choat et al. (2006) Exp 1	14	51	3.62	96	3.31	0.31*
Choat et al. (2006) Exp 2	14	60	3.36	60	3.11	0.25*
Gruber et al. (2006)	14	77	3.5	79	3.56	-0.06
Standardized mean sex effect ^d						0.25

^aSummary from NCBA

^bMean WBSF difference = (Mean WBSF_{heifer} – Mean WBSF_{steer}).

^cWBSF measurements obtained using 2.5 cm cores. All other studies used 1.3 cm cores.

^dCalculated using methodology described by Lipsey and Wilson (2001).

*Denotes statistical significance ($P < 0.05$) between heifers and steers.

References

- M. C. Moore, M. C., G. D. Gray, D. S. Hale, C. R. Kerth, D. B. Griffin, J. W. Savell, C. R. Raines, K. E. Belk, D. R. Woerner, J. D. Tatum, J. L. Igo, D. L. VanOverbeke, G. G. Mafi, T. E. Lawrence, R. J. Delmore Jr., L. M. Christensen S. D. Shackelford, D. A. King, T. L. Wheeler, L. R. Meadows, and M. E. O'Connor. 2012. National Beef Quality Audit–2011: In-plant survey of targeted carcass characteristics related to quality, quantity, value, and marketing of fed steers and heifers. *J. Anim. Sci.* 90:5143–515.
- Tatum, J. D., S. L. Gruber, and B. A. Schneider. 2007. Pre-harvest factors affecting beef tenderness in heifers. Executive Summary prepared for the National Cattlemen's Beef Association. Available: <http://www.beefresearch.org/CMDocs/BeefResearch/Pre-Harvest Factors Affecting Beef Tenderness in Heifers.pdf>
- Woerner, D. R., J. D. Tatum, T. E. Engle, K. E. Belk, and D. W. Couch. 2011. Effects of sequential implanting and ractopamine hydrochloride supplementation on carcass characteristics and longissimus muscle tenderness of calf-fed steers and heifers. *J. Anim. Sci.* 89:201-209.