

Effects of Short-term Concentrate Feeding and Postmortem Aging on Carcass and Palatability Characteristics of Selected Muscles from Cull Beef Cows¹

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Abstract

Twenty-four cull beef cows (Angus x Brahman) of similar age, body weight and body condition score were selected and randomly assigned to one of three feeding periods (0, 42, or 84 d). All cows were placed in a semi dry-lot allowing 0.6 hectares per cow. Cull cows were limit fed 11.36 kg per cow per d and were slaughtered in a federally inspected facility. Live performance traits were monitored including body weight, average daily gain and body condition score. After slaughter, carcass characteristics were measured and the right side of each carcass was fabricated so that whole muscles could be excised including the *Triceps brachii* – long head, *Triceps brachii* – lateral head, and *Infraspinatus* from the chuck, the *Longissimus lumborum*, *Psoas major*, and *Gluteus medius* from the loin, and the *Tensor fascia latae*, *Rectus femoris*, and *Vastus lateralis* from the round. Warner-Bratzler shear force, sensory panel evaluation (overall tenderness, overall juiciness, beef intensity flavor, and off-flavor), and collagen analysis (soluble and insoluble) was performed on selected muscles.

Cull cow body weight and average daily gain increased ($P < 0.02$) after 84 days on feed when compared to cows after 0 and 42 days on feed. Cow body condition score increased ($P < 0.01$) after 42 days on feed and then again ($P < 0.01$) after a subsequent 42 days on feed. Hot carcass weight, ribeye area, fat thickness, marbling score and muscling increased ($P < 0.02$) after 84 days on feed when compared to carcasses from cull cows fed for 0 and 42 d. Carcass lean was more ($P < 0.01$) youthful in appearance, had a brighter ($P < 0.01$) red appearance and was firmer ($P < 0.05$) in carcasses from cows fed for 84 d when compared to carcasses from cows fed 0 or 42 d. After 84 d on feed, soluble collagen content (mg/g) increased ($P < 0.01$) in the *Triceps brachii* – long head and *Longissimus lumborum*. There was a days on feed by muscle interaction ($P < 0.01$) for Warner-Bratzler shear force, with the *Longissimus lumborum* and *Gluteus medius* showing the most improvement with increasing days on feed. Sensory panelists rated steaks from cows fed for 84 d as more ($P < 0.01$) tender than steaks from cull cows fed for 0 or 42 d. Steaks exhibited less off-flavor after cows were on feed for 42 d with no more improvement after 84 d. No differences ($P > 0.05$) were detected for overall juiciness or beef intensity flavor. Aging muscles for 20 d increased tenderness ($P < 0.01$) ratings for Warner-Bratzler shear force and sensory overall tenderness; however, extended aging from 10 to 20 d did not ($P = 0.65$) increase off-flavors. Short-term concentrate feeding of cull cows increased total pounds of meat produced, improved carcass characteristics and tenderness of several muscles possibly increasing the value of these carcasses to the beef industry. Additionally, cull cow muscles may be aged for at least 20 d to increase tenderness without detrimental effects to beef flavor.

Table 1. Live cow production traits when fed for 0, 42, or 84 days

Live Traits	Days on feed		
	0 days	42 days	84 days
Initial			
Weight, kg	491.3	485.3	497.8
Age	5.3	5.5	5.6
BCS	4.9	4.7	4.4
Final			
Weight, kg	491.3 ^a	500.7 ^a	581.1 ^b
BCS	4.9 ^a	5.4 ^a	6.0 ^b
ADG, kg	0.00 ^a	0.37 ^a	0.99 ^b



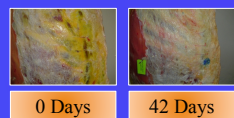
0 Days



84 Days

Table 2. Cull cow carcass traits when fed for 0, 42, or 84 days

Carcass Traits	Days on feed		
	0 days	42 days	84 days
HCW, kg	229.3 ^a	261.6 ^a	311.1 ^b
Dressing %	47.7 ^a	53.4 ^b	54.7 ^b
Fat thickness, cm	0.24 ^a	0.41 ^a	0.95 ^b
Ribeye area, cm ²	64.35 ^a	72.02 ^{ab}	78.87 ^b
Marbling	Traces 55 ^a	Slight 13 ^{ab}	Slight 60 ^b
Lean texture	4.5	4.3	3.8
Lean firmness	3.8 ^a	2.6 ^{ab}	2.4 ^b
% Lean	86.4 ^a	85.1 ^{ab}	82.9 ^b



0 Days



42 Days



84 Days

Table 3. Subjective and objective fat color

Fat Color	Days on feed		
	0 days	42 days	84 days
Subjective	5.0 ^c	3.9 ^b	2.8 ^a
Objective			
L*	78.85 ^a	76.15 ^b	74.13 ^c
a*	3.17 ^c	9.90 ^b	12.60 ^a
b*	27.92 ^a	24.64 ^b	22.70 ^c

Table 4. Subjective and objective lean color

Lean Color	Days on feed		
	0 days	42 days	84 days
Subjective	5.3 ^a	4.9 ^{ab}	4.1 ^b
Objective			
L*	35.68 ^c	37.75 ^a	36.97 ^b
a*	24.48 ^b	25.97 ^a	26.12 ^a
b*	9.72 ^b	10.66 ^a	10.50 ^a



0 Days



42 Days



84 Days

Figure 1. Collagen content for the *Longissimus lumborum* and *Gluteus medius*

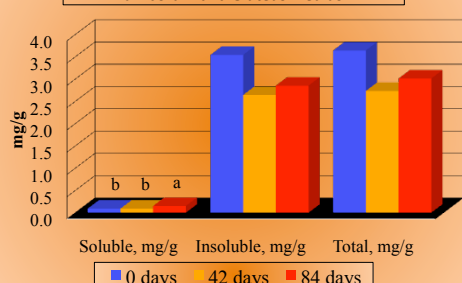


Table 5. Warner-Bratzler shear force when fed for 0, 42, or 84 days

Muscle, kg	Days on feed		
	0 days	42 days	84 days
<i>Gluteus medius</i>	6.09 ^a	6.59 ^a	4.61 ^b
<i>Infraspinatus</i>	3.37	3.25	3.62
<i>Triceps brachii-lateral</i>	5.28	6.02	5.54
<i>Triceps brachii-long</i>	5.32 ^b	6.26 ^a	5.61 ^{ab}
<i>Longissimus lumborum</i>	9.00 ^a	6.15 ^b	5.30 ^b
<i>Psoas major</i>	3.17	2.78	3.19
<i>Rectus femoris</i>	4.32	4.63	5.25
<i>Tensor fasciae latae</i>	4.78	5.65	5.21
<i>Vastus lateralis</i>	6.79 ^b	7.54 ^{ab}	7.79 ^a

Implications

Short-term concentrate feeding of cull beef cows prior to slaughter improved carcass characteristics and muscle quality attributes. Several muscles from the chuck and round were comparable to the LOL in tenderness and sensory characteristics, which may lead to greater product utilization of these muscles, and ultimately, increased value of cull cows. Results from this work also demonstrate that processors can age cow beef up to 20 days without detrimental effects to beef flavor.

Table 6. Sensory traits when fed for 0, 42, or 84 days and aged for 10 or 20 days postmortem

Sensory Trait	Days on feed			Days of aging	
	0 days	42 days	84 days	10 days	20 days
Overall tenderness	4.27 ^b	4.47 ^b	4.99 ^a	4.47 ^c	4.68 ^y
Beef flavor intensity	5.32	5.27	5.49	5.33	5.39
Overall juiciness	5.21	4.99	4.99	5.08	5.05
Off-flavor	5.10 ^b	5.45 ^a	5.49 ^a	5.34	5.36

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