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EFFECTS OF TEMPERAMENT ON PERFORMANCE AND CARCASS TRAITS OF RANGE-ORIGINATED FEEDER CALVES

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ABSTRACT: The objective was to evaluate the effects of temperament on performance and carcass traits of feeder calves originated from a range cow-calf operation. Ninety-seven Angus × Hereford calves (62 heifers and 35 steers) were evaluated for BW and temperament at weaning (d 0). Temperament was assessed by chute score (1–3 scale) and exit velocity (EV), which was subsequently converted into an EV score (1 = EV < 1 SD from the mean; 2 = EV within 1 SD from the mean, and 3 = EV > 1 SD from the mean). Calves were classified for temperament according to combined chute and EV scores [calm < 2 (n = 56), moderate = 2 (n = 25), and aggressive > 2 (n = 16)]. All calves were managed similarly in a single group during the preconditioning (60 d), growing (137 d), and finishing (110 d) phases. Calf BW was determined at the end of each phase. Trained personnel and a USDA grader evaluated carcass traits following a 24-h chill. Weaning age was similar (P = 0.59) across temperament classes. Weaning BW tended (P = 0.10) to be reduced for aggressive vs. moderate and calm calves (185.8, 192.0, and 197.8 kg, respectively). Average weaned calf value was $629.5, $656.5, and $656.7 for aggressive, calm, and moderate calves, respectively. No temperament effects were detected (P > 0.23) on performance during preconditioning, growing, or finishing phases. However, hot carcass weight tended (P = 0.15) to be reduced for aggressive vs. moderate and calm calves (352.5, 363.3, and 362.2 kg, respectively). Backfat thickness and KPH were reduced (P < 0.03) for aggressive vs. moderate and calm calves (1.20, 1.47, and 1.33 cm of backfat; 2.02, 2.44, and 2.46% for KPH, respectively). Carcass yield grade was improved (P = 0.04) whereas marbling score tended to be reduced (P = 0.09) for aggressive vs. moderate and calm calves (2.71, 3.15, and 2.99 for yield grade; 422, 460, and 445 for marbling score, respectively). Average carcass value was $1,102.5, $1,151.7, and $1,119.2 for aggressive, moderate, and calm calves, respectively. In summary, aggressive temperament is detrimental to performance and profitability of range-originated feeder calves at weaning and upon slaughter.

Key Words: performance, range calves, temperament

Introduction

For over a century, temperament has been defined as the behavioral responses of cattle when exposed to human handling (Fordyce et al., 1988). As cattle temperament worsens, their response to human contact or any other handling procedures becomes more aggressive and excitable. Cattle temperament has been shown to be detrimental not only to personnel safety, but also to productivity of beef operations. As an example, our research group demonstrated that aggressive beef females have reduced reproductive performance compared to cohorts with adequate temperament (Cooke et al., 2009; Cooke et al., 2010).

However, the deleterious effects of excitable temperament in cattle are not limited to reproduction. Previous research reported that feedlot calves with excitable temperament have decreased growth rates compared to calm cohorts (Voisinet et al., 1997a). These outcomes were mainly attributed to reduced feed intake because temperamental cattle spend more time inspecting their surroundings and reacting against "threats" instead of consuming their diets (Nkrumah et al., 2007). Also, excitable temperament has detrimental effects on carcass quality by decreasing final carcass weight, carcass yield grade, and meat tenderness, and increasing percentage of bruised and dark carcasses (Fordyce et al., 1988; Voisinet et al., 1997b). However, all the research studies associating temperament and feedlot performance evaluated calves originated from cowherds maintained in drylot and intensive systems, which differ in terms of overall temperament compared to the herds reared in Oregon's extensive rangeland scenarios (Fordyce et al., 1985). Also, the majority of research studies associating temperament and carcass quality evaluated *Bos indicus* cattle, and similar studies should be conducted with *B. taurus* cattle, which commonly exhibit excitable temperament and represent the majority of calves in the Oregon and U.S. beef industry. Therefore, the objective of this study was to evaluate the effects of temperament on performance and carcass traits of *B. taurus* feeder calves originated from a range cow-calf operation.

Materials and Methods

The experiment was conducted in accordance with an approved Oregon State University Animal Care and Use Protocol, and was divided into preconditioning (d 0 to 60), growing (d 61 to 197) and finishing phases (d 198 to 307). The preconditioning phase was conducted at the Eastern Oregon Agricultural Research Center, Burns. The growing (Top Cut; Echo, OR) and finishing (Beef Northwest; Boardman, OR) phases were conducted at commercial feedyards.

Ninety-seven Angus × Hereford calves (62 heifers and 35 steers) were evaluated for BW and temperament at

weaning (d 0). Temperament was assessed by chute score and chute exit velocity (EV). More specifically, chute score was assessed by a single technician when calves were restrained in the chute based on a 3-point scale, where 1 = no movement or occasional shifting, 2 = constant shifting with occasional shaking of the chute, and 3 = continuous and violent movement and shaking of the chute. Chute EV was achieved by determining the speed of the calf exiting the squeeze chute by measuring rate of travel over a 1.8-m distance with an infrared sensor (FarmTek Inc., North Wylie, TX). Chute EV was subsequently converted into an EV score (1 = EV < 1 SD from the mean; 2 = EV within 1 SD from the mean, and 3 = EV > 1 SD from the mean). Calves were classified for overall temperament class according to combined chute and EV scores [calm < 2 (n = 56), moderate = 2 (n = 25), and aggressive > 2 (n = 16)]. All calves were managed similarly in a single group during the preconditioning, growing, and finishing phases. Calf BW was determined at the end preconditioning and growing phases. Calves were slaughter at a commercial packing facility (Tyson Fresh Meats, Inc.; Pasco, WA) at the end of the finishing phase. Hot carcass weight was collected at slaughter. Finishing BW was calculated based on hot carcass weight adjusted to a 63% dressing percentage (Loza et al., 2010). Following a 24-h chill, trained personnel assessed carcass backfat thickness at the 12th-rib and LM area, whereas all other carcass measures were recorded from a USDA grader. Calf value at weaning or upon preconditioning were calculated based on local prices (available at: http://www.centraloregonlivestockauction.com/marketreports.htm; assessed on February 25, 2011). Carcass sale value was $143.70 per 45 kg of hot carcass weight.

Data were analyzed using the PROC MIXED procedure of SAS (SAS Inst., Inc., Cary, NC) and Satterthwaite approximation to determine the denominator df for the tests of fixed effects. The model statement used for performance traits contained the effects of temperament class (calm, moderate, or aggressive), sex, and the resultant interaction. Data were analyzed using calf (temperament × sex) as the random variable. Results are reported as least square means and separated using a single-df orthogonal contrast (aggressive vs. calm and moderate). Significance was set at $P \leq 0.05$, and tendencies were determined if $P > 0.05$ and ≤ 0.15.

Results & Discussion

No temperament × sex interactions were detected for any of the variables analyzed (P > 0.24); therefore, all results reported herein include data from steers and heifers All performance results are described in Table 1. Weaning age was similar (P = 0.59) across temperament classes. However, aggressive calves tended (P = 0.10) to have reduced weaning BW compared to calm and moderate cohorts. No differences were detected for preconditioning ADG (P = 0.91), hence aggressive calves also tended (P = 0.14) to have reduced BW at the end of preconditioning compared to control and moderate cohorts. As a result, calf value at weaning or after preconditioning was the lowest for aggressive calves. No temperament effects were detected for BW and ADG during growing and finishing phases.

Table 1. Performance traits of calves according to temperament at weaning.

	Temperament[1]				
Item[2]	C	M	A	SEM	P[3]
Weaning age, d	152.3	151.6	148.5	2.4	0.34
Weaning BW, kg	197.8	192.0	185.8	3.9	0.10
Weaning value, $	656.5	656.7	629.5	-	-
Preconditioning ADG, kg/d	0.23	0.31	0.28	0.04	0.91
Preconditioning BW, kg	211.7	210.9	202.6	4.0	0.14
Preconditioning value, $	700.6	714.5	690.4	-	-
Growing phase ADG, kg/d	1.16	1.17	1.18	0.03	0.51
Growing phase BW, kg	370.8	370.8	365.6	5.4	0.51
Finishing phase ADG, kg/d	1.78	1.80	1.70	0.05	0.23
Finishing phase BW, kg	572.4	576.7	559.6	8.7	0.23

[1] Temperament classification based on chute score and exit velocity; C = calm temperament, M = moderate temperament, and A = aggressive temperament.
[2] All calves were managed similarly in a single group during the preconditioning (60 d), growing (137 d), and finishing (110 d) phases. Calf BW was determined at the end of preconditioning and growing phases. Finishing BW was calculated based on hot carcass weight (assuming 63% dressing; Loza et al., 2010).
[3] P-value relative to single-df orthogonal contrast (aggressive vs. calm and moderate)

All carcass results are described in Table 2. Hot carcass weight tended (P = 0.15) to be reduced for aggressive calves compared to calm and moderate cohorts. Backfat thickness and KPH were also reduced (P < 0.03) in aggressive calves compared to calm and moderate cohorts. Carcass yield grade was improved (P = 0.04) whereas marbling score tended to be reduced (P = 0.09) for aggressive vs. moderate and calm calves. As a result, mean carcass sale value was the lowest for aggressive calves.

Table 2. Carcass traits of calves according to temperament at weaning.

	Temperament[1]				
Item[2]	C	M	A	SEM	P[3]
Hot carcass weight, kg	362.2	363.3	352.5	5.4	0.15
Fat,[4] cm	1.33	1.47	1.20	0.06	0.03
LM area, cm^2	87.9	87.5	87.6	1.6	0.96
KPH, %	2.46	2.44	2.02	0.11	0.01
Yield grade [5]	2.99	3.15	2.71	0.12	0.04
Marbling [6]	444.7	459.9	422.7	12.1	0.09
Retail product,[7] %	49.8	49.4	50.4	0.3	0.03
Carcass sale value, $	1,119.2	1,151.7	1,102.5	-	-

[1] Temperament classification based on chute score and exit velocity; C = calm temperament, M = moderate temperament, and A = aggressive temperament.
[2] All calves were managed similarly in a single group during the preconditioning (60 d), growing (137 d), and finishing (110 d) phases. Calf BW was determined at the end of each phase for ADG calculation.
[3] P-value relative to single-df contrast (aggressive vs. calm and moderate)
[4] Backfat thickness measured at the 12th rib.
[5] Calculated as reported by Lawrence et al. (2010).
[6] Marbling score: 400 = Small[00], 500 = Modest[00].
[7] USDA Retail Yield Equation = 51.34 – (5.78 × backfat) – (0.0093 × hot carcass weight) – (0.462 × KPH) + (0.74 × LM area)

These results indicate that calves with aggressive temperament were lighter at weaning compared to cohorts with adequate temperament (calm and moderate temperament), and this BW difference persisted until slaughter based on results detected for hot carcass weight. Further, aggressive calves had reduced carcass backfat and marbling compared to cohorts with adequate temperament, which suggests that carcass development and fat deposition was delayed in aggressive calves mainly due to reduced weaning BW. Differently than previous research efforts (Nkrumah et al., 2007; Cafe et al., 2010), temperament did not influence feedlot ADG in the present study. However, to our knowledge, the effects of temperament on weaning BW are novel, influence calf overall productivity, and potentially impact profitability of beef producers that either market calves at weaning or retain ownership until slaughter. The reasons to why aggressive calves were lighter at weaning is unknown and deserve further investigation. Potential theories include reduced milk production and maternal ability of aggressive brood cows rearing aggressive calves given that temperament is a moderately heritable trait (Shrode and Hammack, 1971; Stricklin et al., 1980), reduced milk and feed intake of aggressive sucking calves, detrimental effects of temperament on calf health and physiologic parameters (Cooke et al., 2009; Burdick et al., 2010), or even a direct genetic interactions among temperament and performance traits. Therefore, additional research is warranted to assess the relationship between temperament and weaning weights in beef calves

Implications

Range-originated feeder calves with aggressive temperament have impaired BW at weaning compared to cohorts with adequate temperament, and such BW difference persists until slaughter and results in impaired carcass quality. Therefore, temperament directly impacts profitability of range beef operations that market calves at weaning, or retain ownership until slaughter.

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