BEEF CATTLE RESEARCH UPDATE

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Effect of BRD during Preconditioning on Subsequent Feedlot Performance & Carcass Characteristics

Numerous studies that have shown that morbidity due to bovine respiratory disease (BRD) in feedlots suppresses performance and carcass quality and value.[1,2,3,4,5,6,7] However, in all of these studies, cattle have been fed a common days on feed not to a common compositional endpoint. Furthermore, in these studies, healthy and morbid cattle were commingled in common pens. Thus, it was not possible to measure the effect of BRD incidence on dry matter intake (DMI) and feed efficiency.

Recent Oklahoma State University research evaluated the effects of segregation of commingled, newly received heifer calves with an increased risk of developing BRD into BRD-outcome groups (never treated vs. number of times treated) on feedlot performance and carcass characteristics when heifers in outcome groups were fed to a similar compositional endpoint.[8] In this study, 360 crossbred heifers (532 lb initial weight) were assembled at a Kentucky order-buyer facility and delivered to Stillwater, OK, in September 2007 where they were preconditioned for 63 days. During the preconditioning period, morbidity and mortality attributed to BRD were 57.6 and 8.6%, respectively. Immediately after preconditioning, 193 heifers were selected to begin the finishing phase of the experiment and divided into the following BRD treatment categories based on the number of treatments received during the preconditioning period: never treated (0X; 9 pens), treated 1 time (1X; 9 pens), treated 2 times (2X; 6 pens), treated 3 times (3X; 6 pens), and heifers designated as chronically ill (CI; 2 pens). All heifers were the adapted to a common finishing diet. Ultrasound measurements taken on days 65 and 122 of the finishing period were combined with weight gain and visual appraisal to target the heifers for a slaughter at equal compositional endpoints. At slaughter, strip loins were fabricated from each carcass. These strip loins were used to evaluate meat shelf-life and tenderness and palatability attributes of the beef.

The performance and carcass characteristics of heifers in the various BRD treatment categories are shown in Table 1. Arrival weights at the beginning of the preconditioning period did not differ among treatment categories. However, after the 63-day preconditioning period (day 0 of finishing) there was a linear decrease ($P < 0.001$) in body weight as the number of treatments for BRD increased from 0 to 3. The weights ranged from 602 to 701 lb. In addition, CI heifers weighed 66 lb less ($P < 0.001$) than 3X heifers (536 vs. 602 lb). Final weights were similar for heifers treated 0, 1, 2, or 3 times (1175 lb average), but CI heifers weighed less than 3 X heifers (1116 vs. 1180 lb). On average, heifers were slaughtered on day 163 for 0X, 1X, and 2X, day 182 for 3X, and day 189 for CI ($P < 0.01$). During the preconditioning period, average daily gain (ADG) linearly decreased ($P < 0.001$) as the number of BRD treatments increased from 0 to 3 with CI heifers gaining less than 3X heifers (0.29 vs. 1.01 lb, $P < 0.001$). Similar patterns in ADG were noted over the total feeding period (preconditioning + finishing). However, during the finishing period, ADG did not differ among heifers in the various treatment categories (3.09 lb average). These researchers noted that even though a compensatory response in ADG was observed during the finishing phase that 3X and CI heifers never fully compensated, and the similar final weight observed between 0X, 1X, 2X, and 3X heifers was measured with an average of 19 additional days on feed for 3X heifers.

Feed intake during the finishing period did not differ due to the number of BRD treatments (19.34 lb /day average, $P = 0.13$). However, CI heifers consumed less feed than 3X heifers (16.82 vs. 18.96 lb/day, $P = 0.007$). When DMI was expressed as a percentage of mean body weight, no differences in DMI among treatment groups over the finishing period were observed. Efficiency (gain/feed) over the finishing period, linearly increased from 0X to 3X ($P = 0.002$) and CI heifers were more efficient than 3X heifers (0.186 vs. 0.168, $P = 0.04$).

Similar to final body weight, carcass weight did not differ due to the number of BRD treatments (745 lb average) but was decreased in CI compared with 3X heifers 688 vs. 745 lb, $P = 0.007$). Marbling score tended ($P = 0.06$) to decrease linearly as the number of treatments increased, but no other differences ($P \geq 0.24$) in carcass traits were detected. No differences were observed in beef tenderness and no consistent trends were noted in retail display or palatability data (data not shown).

In summary, data from this study shows that BRD treatment decreases body weight and ADG during the preconditioning phase. However, after segregation according to previous BRD treatments during finishing, a compensatory response in ADG and efficiency was observed in treated animals. When slaughtered at a common endpoint, heifers, regardless of the number of BRD treatments, had similar final weights, carcass weights, and carcass characteristics with the exception of marbling score (tended to decrease linearly as the number of BRD treatments increased). Based on these results, these researchers concluded that isolating cattle with multiple BRD treatments and extending the days on feed for those animals may be a viable management alternative for increasing the value of animals treated for BRD.

Table 1. Finishing performance and carcass characteristics of heifers that received 0, 1, 2, or 3 treatments for bovine respiratory disease (BRD) or were deemed chronically ill (CI) during the preconditioning phase.

	BRD Treatment Category[1]					P-values[2]		
Item	0X	1X	2X	3X	CI	Overall	Linear	3X vs. CI
Body Weight, lb								
Arrival[3]	531	536	523	534	516	0.17	0.86	0.08
Day 0[4]	701	673	648	602	536	<0.001	<0.001	<0.001
Final	1184	1173	1162	1180	1116	0.056	0.58	0.01
Finishing DOF[5]	163	163	163	182	189	<0.001	<0.001	0.007
ADG, lb/day								
Preconditioning	2.51	2.03	1.90	1.01	0.29	<0.001	<0.001	<0.001
Finishing	2.98	3.09	3.15	3.18	3.06	0.13	0.01	0.38
Total	2.84	2.78	2.78	2.60	2.34	0.001	0.008	0.05
DMI, lb/day								
Finishing	19.60	19.62	19.16	18.96	16.82	0.007	0.13	0.007
DMI, % of BW								
Finishing	2.08	2.13	2.12	2.13	2.03	0.60	0.41	0.22
Gain to Feed								
Finishing	0.152	0.157	0.165	0.168	0.186	0.001	0.002	0.04
Carcass Characteristics								
Carcass wt, lb	756	743	736	745	688	0.03	0.41	0.007
Dressing %	63.8	63.3	63.3	63.3	61.7	0.31	0.50	0.11
Ribeye area, in^2	12.01	12.04	12.07	12.62	11.67	0.46	0.15	0.13
Fat thickness, in	0.58	0.55	0.53	0.53	0.45	0.24	0.16	0.22
Yield Grade	3.36	3.23	3.13	3	2.89	0.33	0.07	0.74
Marbling[6]	480	461	446	440	399	0.10	0.06	0.22

[1]BRD treatment category during the preconditioning phase: 0X = never treated; 1X = treated 1 time for signs of BRD; 2X = treated 2 times for signs of BRD; 3X = treated 3 times for signs of BRD.
[2]Significance: Overall, Linear effects of number of BRD treatments, and 3X vs. CI heifers.
[3]Arrival = day of arrival at facility, beginning of preconditioning period.
[4]Day 0 = beginning of finishing period.
[5]Days on feed during finishing period.
[6]300 = slight 0; 400 = small 0; 500 = modest 0.
Source: Holland et al., 2010.

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