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Evaluation of phytogenic feed additive with essential oils and plant extracts on growth performance and in newly-received beef steers

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Rationale and Approach

The period when calves are newly received following being transported to the feedlot is a critical time in the beef production system. This period is arguably the most stressful event in beef cattle production as cattle are transported, deprived of feed and water, and introduced to an unfamiliar feed source. Specifically, this period of reduced feed intake and transit stress can lead to respiratory distress such as bovine respiratory disease complex. Furthermore, antimicrobial resistance is a large concern to animal producers. Continued and unwarranted use of antimicrobials in livestock production results in increased pools of antimicrobial resistant genes among bacteria. Essential oils and phytomolecule compounds have been shown to reduce inflammation and modulate immune function. Combining these products with commonly used treatments such as antimicrobials might aid in controlling systemic inflammation and reduce the overall need for antimicrobials. The objective of this research was to determine if a phytogenic feed additive (PFA) influences measures of growth or growth efficiency during the feedlot receiving phase. Two treatments were used: 1) no phytogenic feed additive (Control) and 2) PFA fed at a rate of 0.25 g/cwt (PFA). This study used 10 pens per treatment and each pen contained 8 steers (n = 80 steers/treatment), steers were allocated to study pens within 24 hours of arrival to the feedlot. The diet was based upon (DM basis): corn silage (74%), dried distillers grains plus solubles (21%), a liquid supplement (5%), and was fortified with vitamins and minerals to exceed nutrient requirements.

Findings

No steers were removed from the study, one steer from the control treatment was treated for respiratory disease. No mortality was noted in the present experiment. Growth performance data is presented in Table 1. No appreciable differences were noted for BW, ADG, variation in ADG, DMI, or feed conversion efficiency during the 53-d receiving period ($P \geq 0.11$). Performance based NEm and NEg was not influenced by dietary treatment ($P \geq 0.79$). The ratio of observed-to-expected dietary net energy was not impacted by dietary treatment ($P \geq 0.71$).

Implications

These were healthy, high-growth potential Northern Plains steers. There was minimal morbidity (0.63%) and no mortality noted during the 53-d receiving study. Steers performed well and met growth performance expectations (the ratio of observed-to-expected NEm = 1.00), hence, it was not anticipated that the PFA would appreciably influence growth or health outcomes under the conditions of this experiment.

Table 1. Growth performance responses for Control and PFA during the 53-d receiving period.

	Treatment			
Item	**Control**	**PFA**	**SEM**	***P* - value**
Steers, n	80	80	-	-
Pens, n	10	10	-	-
Body weight				
Initial BW[1], lbs	668	667	-	-
d 53 BW[2], lbs	847	841	5.2	0.25
Growth performance				
ADG, lbs	3.38	3.29	0.099	0.40
S.D. ADG	0.441	0.537	0.0542	0.11
DMI, lbs	19.22	18.90	0.193	0.12
G:F	0.176	0.174	0.0041	0.68
F:G[3]	5.68	5.75	-	-
Applied Energetics[4]				
NEm, Mcal/cwt	80.22	79.93	1.054	0.79
NEg, Mcal/cwt	51.75	51.51	0.925	0.79
O/E Nem[5]	1.00	1.00	0.013	0.89
O/E Neg[6]	0.99	0.98	0.014	0.71

[1] No shrink was applied to initial BW.
[2] A 4% shrink was applied to account for digestive tract fill.
[3] Calculated as: 1/G:F.
[4] Calculated assuming a mature BW of 1325 lbs.
[5] Observed to Expected net energy for maintenance
[6] Observed to Expected net energy for gain