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Department of Animal and Range Sciences

CLAYTON LIVESTOCK RESEARCH CENTER

PROGRESS REPORT

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Ozone-treated water for finishing beef heifers and cows[1]

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Limited research suggests that treatment of drinking water with ozone might enhance performance of beef cattle. We conducted two experiments to evaluate effects of ozone-treated water on performance of finishing beef heifers and cows.

Ninety-six beef heifers (British x British and British x Brahman; Trial 1) and 80 beef cows (British, British x British and British x Continental; Trial 2) were weighed on two consecutive days at the beginning of each experiment. Initial body weight (BW) was the average of the two weights. Heifers in Trial 1 and cows in Trial 2 had been implanted previously with Synovex H. In each trial, lightest BW heifers and cows were assigned to a light block, while heaviest BW heifers and cows were assigned to a heavy block. Within blocks, cattle were allotted randomly to either control or ozone-treated water groups, yielding two pens per treatment per block. Four of the eight pens used in the experiments were assigned randomly to receive either standard Clayton Livestock Research Center water supply or water treated with an Oxion ozone generator. One Oxion ozone generator unit was used to treat water in four (22 in x 9 in x 7 in) water tanks. Cattle were fed free choice an 84% concentrate diet (dry matter basis; Table 1) once daily; cattle were adapted to this diet for at least 2 weeks before beginning the experiments. In Trial 1, subsequent BW measurements were obtained on all heifers on day 28 of the experiment. Heavy-block heifers were determined to have reached market weights by 42 days, and final trial BW data were obtained on days 41 and 42. Light-block heifers also were weighed on day 42. One heifer in the light block had a vaginal prolapse on day 42 and was removed from the experiment. Light-block heifers were weighed on day 56, and final BW data were obtained on days 69 and 70. In Trial 2, cows were weighed on day 28 of the experiment, and final BW data were obtained on days 55 and 56. One cow died from causes not related to treatment. Cows used in Trial 2 were shipped to a commercial slaughter plant and carcass measurements were obtained.

Weekly diet samples were obtained to determine dry matter and chemical constituents (Table 1). In Trial 2, water pH was measured weekly using a combination electrode. Feedlot performance and carcass characteristics were analyzed statistically with pen as the experimental unit. Water pH was analyzed as a split-plot in time with treatment in the main plot and week in the sub-plot.

Averaged across weeks, ozone treatment increased ($P<.01$) water pH (7.4 vs 7.7 for control and ozone-treated water, respectively). Ozone treatment of water did not influence ($P>.10$) average daily gain, dry matter intake or feed-to-gain ratio in either experiment (Table 2). Likewise, no differences ($P>.10$) were observed in Trial 2 for hot carcass weight, ribeye area, fat thickness, maturity, marbling, quality grade, yield grade and dressing percentage (Table 2). Kidney, pelvic and heart fat was increased slightly ($P<.10$) in cows consuming ozone-treated water vs those consuming control water.

Results suggest that ozone-treated drinking water does not alter performance or carcass characteristics in finishing beef heifers and cows. Suggestions that ozone-treated water may be beneficial for newly weaned cattle, or those cattle suffering from respiratory disease, will need to be addressed in future research.

Table 1. Ingredient and chemical composition of the 84% concentrate diet fed to finishing beef heifers and cows

	——— %, Dry matter basis ———	
Ingredient	Trial 1	Trial 2
Sorghum sudangrass hay	10.71	10.65
Alfalfa	5.27	5.31
Whole shelled corn	32.60	32.22
Steam flaked milo	43.28	43.52
Molasses	5.15	5.27
Limestone	1.10	1.11
Dicalcium phosphate	.71	.72
Salt	.55	.55
Urea	.53	.54
Premix[a]	.10	.11
	Chemical composition[b]	
Dry matter	81.8	81.3
Ash	5.8	5.2
Crude protein	11.7	10.1
Acid detergent fiber	11.4	9.5

[a]Premix included via a Micro-Ingredient Machine; Micro-Chemical, Inc., Amarillo, TX; Supplied trace mineral, 2 lb/ton of diet; Rumensin, 200 mg/animal daily; vitamin A, 1,000 IU/lb of diet; and vitamin E, 200 IU/animal daily.

[b]Average of samples collected throughout the experiments. Values other than dry matter are expressed on a dry matter basis.

[1]We thank Oxion, Inc. for supplying the ozone generator and paying for carcass measurements, and Dr. Ted Montgomery for collecting carcass measurements. Appreciation also is expressed to Syntex Animal Health, Inc. for supplying Synovex H and to Elanco Products Co. for supplying Rumensin and Tylan.

Table 2. Influence of ozone-treated water on performance and carcass characteristics of finishing beef heifers (Trial 1) and cows (Trial 2)

	Trial 1			Trial-2		
	Treatment[a]			Treatment[a]		
Item	Control	Ozone	SE[b]	Control	Ozone	SE[b]
Initial wt, lb	876	876	1.6	1,000	994	2.2
Final wt, lb	1,030	1,026	6.2	1,234	1,199	17.9
Daily gain, lb	2.75	2.69	.07	4.17	3.61	.33
DM intake, lb	20.2	19.9	.3	28.8	27.1	.3
Feed:gain	7.35	7.43	.17	7.03	7.60	.63
Hot carcass wt, lb				711.2	703.7	4.6
Ribeye area, sq in				14.4	14.2	.14
Kidney, pelvic, heart fat, %				1.5[c]	1.6[d]	.03
Fat thickness, in[e]				.54	.55	.02
Maturity[f]				2.49	2.52	.05
Marbling[g]				3.9	3.9	.09
Quality grade[h]				10.1	9.7	.4
Yield grade				2.2	2.3	.07
Dressing %				57.7	58.7	.6

[a]Control = Clayton Livestock Research Center standard water supply; Ozone = water treated with an Oxion ozone generator.

[b]Standard error of treatment means; n = four pens per treatment.

[cd]Means in a row that do not have common superscripts differ (P<.10).

[e]Measured between 12th and 13th rib.

[f]2 = B maturity; 3 = C maturity.

[g]3 = slight; 4 = small.

[h]11 = Select^{o}; 10 = Select^{-}; 9 = Standard^{+}.

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