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Effects of Agrado™, an Antioxidant, on Odor of Cattle Feces

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Story in Brief

Two experiments were conducted to determine the impact of antioxidant addition to beef cattle finishing diets on feces odor. Three fresh samples of feces originating from finishing beef cattle (450kg) fed diets containing either 0 (C) or 150 ppm AgradoÔ (A), an antioxidant produced by Solutia Inc., St. Louis, MO, were tested. In both studies, samples were placed in 500 ml containers and evaluated by a sensory panel. Each sample contained a similar amount of feces and each panelist was asked to identify the intensity or degree of odor (I) and the offensiveness or unpleasantness (O) of the odor within 4 and 28 h of defecation. An unmarked scale ranging from 0 (no odor/pleasant) to 10 (very intense/very unpleasant) was used. Twelve panelists were asked to evaluate three samples, take a 5-min break to avoid odor fatigue, and then evaluate the other three samples. Samples were examined by panelists blind to sample identification and order of evaluation was varied among panelists. The entire experiment was conducted a second time (Trial 2) 6 mo later using 10 panelists and feces from a different set of steers. Feces coming from animals with diets containing antioxidant had lower intensity and offensiveness on d 1, while no differences were detected on d 2.

(Key Words: Odor, Beef Cattle, Feces, Antioxidant.)

Introduction

Odor is one of the major concerns in animal production, particularly in confined livestock operations. Proper design and management of waste facilities and use of certain products to treat waste can reduce odor problems (Ritter, 1981). These products include feed additives, masking agents, counteractants, digestive deodorants, and chemical deodorants.

The objective of these experiments was to determine if adding an antioxidant to finishing diets for steers altered odor of feces.

Materials and Methods

In Trial 1, 35 steers and 40 heifers (450kg) were assigned randomly to 15 pens and fed finishing diets consisting of ground corn grain (82%), alfalfa meal pellets (10.2%), and a pellet supplement (7.8% consisting of cottonseed meal, 4.61%; limestone, 1.11 %; soybean meal, .91%; urea, .50%; salt, .30%; cane molasses, .18%; potassium chloride, .15%; manganese oxide, .0062; zinc oxide, .0047%; and vit A 30,000 IU/g, .0010%), either with AgradoÔ , an antioxidant produced by Solutia Inc., St. Louis, MO fed at 150 ppm (A) or 0 ppm (C). Fresh fecal samples were collected from at least three different steers from each pen and pen composites with three pens per treatment were prepared. All samples were freshly defecated and were collected at 0800 on June 12, 1997 at 60° F and held sealed in plastic bags for not more than 1 h until composited. A total of six samples (three from each treatment) were placed in 500 ml containers and evaluated by a sensory panel. The odor panel consisted of graduate students and employees of the Department of Animal Science. Each sample contained a similar amount of feces and each panelist was asked to evaluate the sample, for the intensity or degree (I) and the offensiveness or unpleasantness (O) of the odor within 4 h of defecation. Each sample was given a random number and locations were altered to avoid patterns. An unmarked scale was given to each of the twelve panelists that ranged from 0 (no odor/pleasant) to 10 (very intense/very unpleasant). Panelists were asked to evaluate three samples, take a 5-min break to avoid odor fatigue, and then evaluate the other three samples. Samples were examined by panelists blind to sample identification and order of evaluation was varied among panelists. The same samples were again evaluated 24 h later (d 2) following the same procedure. Samples were held at 70° F in sealed containers during this 24-h interval.

In Trial 2, 6 months later, 12 different steers were assigned randomly to six pens. Their finishing diet consisted of dry corn rolled (62.8%), alfalfa pellets (6.2%), cottonseed hulls (14.3%) cane molasses (4.2%), soybean meal (10.20%), dicalcium phosphate (.55%), limestone (.56%), salt (.55%), urea (.11%) and potassium chloride (.56%). Fresh fecal samples were collected on January 13, 1998 at 35° F, from each of the two animals in each pen and composited within treatments. Similar treatments and sample preparation procedures were used except that only 10 panelists were used to evaluate intensity and offensiveness of fecal odors.

Data from both experiments were analyzed as a completely randomized design using the GLM procedures of SAS (1988). The two studies then were combined and analyzed including treatment and study as class variables.

Results and Discussion

Mean values for the two studies separately and merged are presented are presented on Table 1. In Trial 1, odor intensity on d 1 (P=.08) and odor offensiveness on d 1 (P=.01) were lower for feces produced by steers receiving the diet containing an antioxidant. No differences between treatments were detected on d 2 (P>.15). No differences between treatments were detected in pH or dry matter content of the fresh feces in Trial 1.

In Trial 2, differences were not significant for either odor intensity (P=.19) or odor offensiveness (P=.09) on d 1, though trends were similar to those of Trial 1. No differences were detected between treatments for d 2 (P>.28).

When results of Trial 1 and Trial 2 were merged, odor intensity on d 1 (P=.03) and odor offensiveness (P=.01) on d 1 were lower for feces produced by steers receiving the antioxidant. However, on d 2, both odor intensity (P=.0764) and odor offensiveness (P=.27) were higher for feces from cattle receiving the antioxidant.

Presumably, presence of the antioxidant is altering the concentrations or activity of intestinal or fecal bacteria and thereby delaying production or release of odoriferous compounds. Feeding the antioxidant also may have reduced specific oxidation of fecal products. Short-term control should be useful in arid environments where surface encrustration and drying of feces rapidly reduce the release of odor.

Literature Cited

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SAS. 1988. SAS/STAT® User's guide (Release 6.03) SAS Inst. Inc., Cary, NC.

Table 1. Mean values for odor intensity and offensiveness for both experiments.

	Agrado™	Day 1		Day 2	
Trial	Level ppm	Intensity	Offensiveness	Intensity	Offensiveness
1	0	5.17	5.18[a]	4.95	5.00
1	150	4.53	3.98 [b]	5.53	5.17
2	0	4.82	5.17	4.65	4.01
2	150	4.16	4.28	5.19	4.54
1 and 2	0	4.99[c]	5.19[a]	4.80	4.51
1 and 2	150	4.35[d]	4.12[b]	5.36	4.85

[a,b] Means within a row and trial with different superscripts differ (P<.01).
[c,d] Means within a row and trial with different superscripts differ (P<.05).

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