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Spices Fed to Growing Heifers on Bromegrass Result in Increased Gains with Some Effects on Tick Populations

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Abstract

Alternative methods to antibiotics/chemical usage in cattle production have been of interest in recent years and essential oils/spices have been promoted to fill this niche. The purpose of this research was to evaluate effect of feeding spices on heifer gains and as a control method for ticks. Eight bromegrass pastures were stocked (March to November) with four heifers per pasture to compare control mineral (CON) to mineral containing spices (SPICE; garlic + proprietary blend of 4 spices). Mineral (4 oz/hd/d) was blended in dried distillers grains (DDGs) and total blend was supplemented daily at 0.5% of heifer body weight. Heifers were weighed on two consecutive days at the start and end of the study and every 28 d. Weekly (first 10 weeks), ticks were counted and removed from every heifer. Average daily gain was increased by 0.15 lb/d with the SPICE mineral, and heifers on SPICE gained 33 lb more over the entire grazing period than heifers on CON. The gain advantage for SPICE was observed within the first four months on supplement and continued through the end of the study. Overall, these heifers had a low tick population (137 total ticks collected). Even so, there was a tendency for SPICE heifers to have more ticks/heifer than CON heifers when measured on weeks 2 and 3, yet at weeks 8 and 10 SPICE heifers tended to have fewer ticks/heifer than CON. SPICE in a mineral blended with DDGs increased heifer gains and appeared, after a minimum of 4 weeks of consumption, to show some repellent effects to ticks.

Keywords

essential oils, ectoparasites, garlic

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Spices Fed to Growing Heifers on Bromegrass Result in Increased Gains with Some Effects on Tick Populations

J.K. Farney

Summary

Alternative methods to antibiotics/chemical usage in cattle production have been of interest in recent years and essential oils/spices have been promoted to fill this niche. The purpose of this research was to evaluate effect of feeding spices on heifer gains and as a control method for ticks. Eight bromegrass pastures were stocked (March to November) with four heifers per pasture to compare control mineral (CON) to mineral containing spices (SPICE; garlic + proprietary blend of 4 spices). Mineral (4 oz/hd/d) was blended in dried distillers grains (DDGs) and total blend was supplemented daily at 0.5% of heifer body weight. Heifers were weighed on two consecutive days at the start and end of the study and every 28 d. Weekly (first 10 weeks), ticks were counted and removed from every heifer. Average daily gain was increased by 0.15 lb/d with the SPICE mineral, and heifers on SPICE gained 33 lb more over the entire grazing period than heifers on CON. The gain advantage for SPICE was observed within the first four months on supplement and continued through the end of the study. Overall, these heifers had a low tick population (137 total ticks collected). Even so, there was a tendency for SPICE heifers to have more ticks/heifer than CON heifers when measured on weeks 2 and 3, yet at weeks 8 and 10 SPICE heifers tended to have fewer ticks/heifer than CON. SPICE in a mineral blended with DDGs increased heifer gains and appeared, after a minimum of 4 weeks of consumption, to show some repellent effects to ticks.

Introduction

The major driver for the economics of cattle production is still the increase in pounds of beef. Tools to improve gains are important options for producers. Essential oils have been promoted as a “natural method” to increase cattle gains and a method to control ticks and flies. Work completed mainly in feedlots located in South America showed that feeding spices (aka essential oils) increased calf gain more than no additive feeding. Additionally, some research has found that feeding spices/essential oils has resulted in similar gains in feedlot cattle as feeding the ionophore monensin.

Ticks are ectoparasites that reduce profits and preventing/controlling ticks is important in many types of cattle operations. Controlling ticks is especially important for anaplas-

mosis management. Essential oils from garlic and oregano have been shown to have the potential to kill ticks. Spraying a garlic extract with distilled water on cattle removed all ticks within 2 days of spraying and kept the ticks off the cattle for 7 days. Additionally, in a grazing dairy cow study, feeding garlic for 3 days reduced ticks on cattle, even when measuring 11 days after feeding ended. Most studies that have shown effectiveness in controlling ticks have included methods of spraying cattle with essential oils.

A limited number of studies evaluated growing calf gains on grass with essential oils, and a limited number of studies evaluated tick management while feeding essential oils, especially on beef species. Therefore, the purpose of this study was to evaluate heifer gains on bromegrass while feeding spices and to evaluate the ability of spices to control ticks.

Experimental Procedures

Eight pastures (5 acres each) of smooth bromegrass were stocked with 4 heifers per pasture beginning April 9, 2019. All heifers were fed dried distillers grains daily at 0.5% of body weight on a dry matter basis. This was adjusted every 28 days based on weights. The two treatments consisted of complete mineral mixed into the DDGs. The two minerals (Table 1) were a control mineral with 25% of magnesium, copper, manganese, and zinc coming from a chelated source or that same base mineral with garlic (3 pounds/ton) and Solus (18 pounds/ton; SPICE). Animals were fed four ounces of the mineral type for their group, mixed with the DDGs and offered daily. We hand-fed the mixture for a more accurate consumption base measurement and to know that all heifers ate the mineral every day. There were four pastures of each treatment type. Heifers were individually weighed every 28 days.

Beginning one week after heifers were placed on brome pastures each heifer was run through the chute and the number of ticks were counted and then removed from the heifer. The tick type, sex, and engorgement were recorded. Ticks were counted and collected weekly until May 22, when infestation level was drastically reduced. Ticks were counted and removed again on June 6 and June 20 when only 4 heifers had ticks. Generally, at this location there were no ticks on the cattle after the first month of grazing.

Results and Discussion

Heifer Gains

Average daily gain was increased by 0.15 lb/d with the SPICE mineral, and heifers on SPICE gained 33 lb more over the entire grazing period than heifers on CON (Table 2). By ~4 months on supplement, the SPICE heifers had gained more than the CON heifers (Figure 1) and they continued this advantage through end of study.

Tick Control

Overall, there were more ticks on the SPICE heifers than those on the CON mineral (73 total ticks over the study versus 64 total ticks). However, there fewer overall number of ticks on the SPICE heifers that were engorged (7 ticks engorged for SPICE and 14 engorged for CON). Engorgement means ticks had been attached for a long enough period that they increased in size. Potentially the SPICE cattle had a less desirable blood

flavor that did not attract these ticks to stay on the animal for longer period of time. The greatest number of ticks was observed 1 month after grazing started (Figure 2). It took a month or more for the SPICE to have an effect on the ticks that attached to the heifers. By week 5 there were fewer ticks on heifers receiving the SPICE mineral, and a beginning of a trend for fewer heifers to have ticks (Figure 2). This might indicate a time to “build up” tick resistance with the levels of spices fed.

Table 1. Mineral composition

Item (on dry matter basis)	Control mineral	Spice mineral ¹
Crude protein (%)	5.69	5.50
Calcium (%)	16.67	16.17
Phosphorus (%)	3.33	3.44
Salt (%)	22.54	22.53
Magnesium ² (%)	2.51	2.48
Potassium (%)	0.89	0.88
Iron (ppm)	5546	5529
Copper ³ (ppm)	1153	1153
Zinc ³ (ppm)	3471	3471
Manganese ³ (ppm)	1817	1818
Selenium (ppm)	22	22
Iodine (ppm)	333	333
Cobalt (ppm)	13	13
Vitamin A (IU)	141,667	141,667
Vitamin D (IU)	14,167	14,167
Vitamin E (IU)	172	172

¹Spice mineral similar base as control mineral with addition of 3 pounds per ton garlic oil and 18 pounds per ton of Solace (Wildcat Feeds Inc., Topeka, KS) that replaced dried distillers grains and limestone in control mineral.

²Nuplex Mg/K, Nutech Biosciences Inc. (Oneida, NY) contributed 25% of the magnesium in the minerals.

³Nuplex 3-chelate blend, Nutech Biosciences Inc. (Oneida, NY) contributed 25% of the copper, zinc, and manganese of the total trace mineral supplied in the minerals.

Table 2. Gain differences based on treatment

Item	Control	Spice	<i>P</i> -value
Initial weight, lb	438.7	438.8	0.99
Final weight, lb	773.7	806.0	0.13
Average daily gain, lb/d	1.72	1.88	0.04

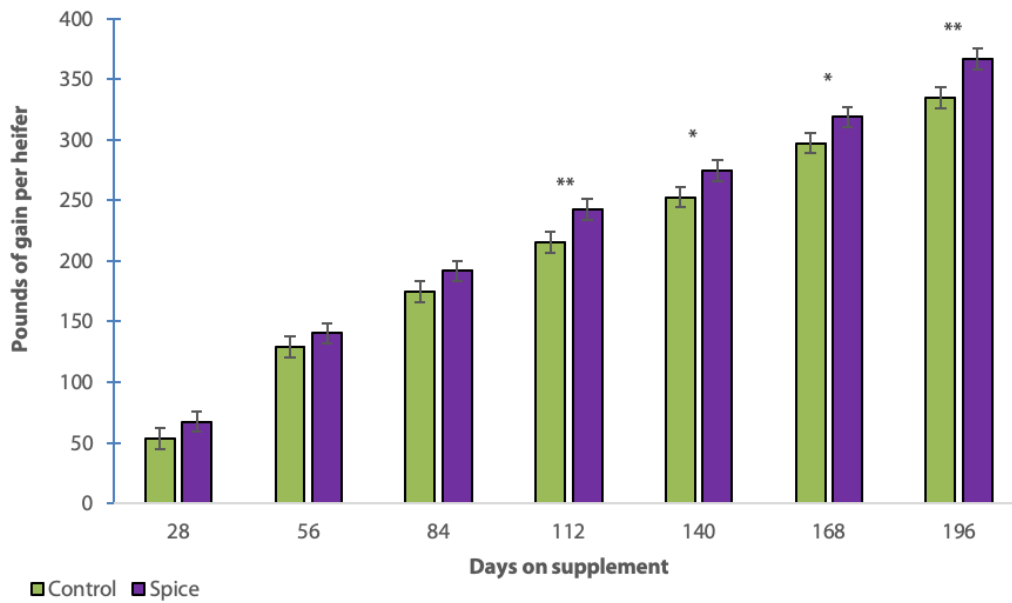


Figure 1. Average weight gain (pounds/heifer) while grazing bromegrass and fed with dried distillers grains with mineral daily.

Control mineral is in green bars, spice mineral in purple bars.

*Indicates gains tended to be different between treatments at $0.05 < P < 0.10$.

**Indicates gains tended to be different between treatments at $P < 0.05$.

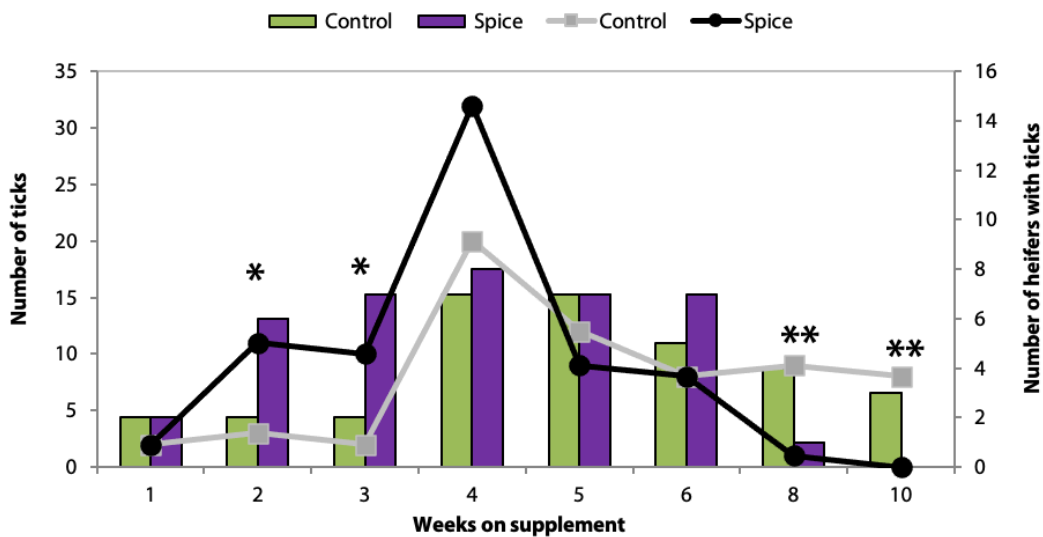


Figure 2. Weekly number of ticks and heifers with ticks by treatment.

Black line is the number of ticks collected off of heifers each week that were fed SPICE mineral. Grey line is the number of ticks collected off of heifers each week that were fed CON mineral.

Green bars are the number of heifers with ticks that were fed the CON mineral. Purple bars are the number of heifers with ticks that were fed the SPICE mineral. No effect $P > 0.10$ on number of heifers with ticks. Treatment \times week ($P = 0.02$) was different for tick numbers.

*Indicates gains tended to be different between treatments at $0.05 < P < 0.10$.

**Indicates gains tended to be different between treatments at $P < 0.05$.