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Abstract

To determine the effect of deworming fallborn yearling heifers on reproductive parameters, 78 heifers were allotted to a either Ivomec® or control treatments. The heifers were dewormed in June and October when they were approximately 7 and 11 months old, respectively. Ivomec effectively lowered fecal egg counts from treated heifers compared to controls. In these heifers that were maintained on a marginal plane of nutrition, deworming not only improved weight gains but also hastened onset of puberty and improved conception rate during a 60-day breeding season. The positive effect of Ivomec on these reproductive characteristics could not be explained by increased weight gain alone, because the correlation between weight gain and puberty was not significant.

Keywords

Cattlemen's Day, 1992; Kansas Agricultural Experiment Station contribution; no. 92-407-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 651; Beef; Beef heifers; Deworming; Puberty

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EFFECT OF DEWORMING WITH IVOMEC® ON REPRODUCTIVE PERFORMANCE OF YEARLING BEEF HEIFERS[1]

R. L. Larson, L. R. Corah, M. F. Spire[2], and R.C. Cochran

Summary

To determine the effect of deworming fall-born yearling heifers on reproductive parameters, 78 heifers were allotted to a either Ivomec® or control treatments. The heifers were dewormed in June and October when they were approximately 7 and 11 months old, respectively. Ivomec effectively lowered fecal egg counts from treated heifers compared to controls. In these heifers that were maintained on a marginal plane of nutrition, deworming not only improved weight gains but also hastened onset of puberty and improved conception rate during a 60-day breeding season. The positive effect of Ivomec on these reproductive characteristics could not be explained by increased weight gain alone, because the correlation between weight gain and puberty was not significant.

(Key Words: Beef Heifers, Deworming, Puberty.)

Introduction

Internal parasites are important economic burdens to the beef cattle industry. They can reduce virtually every production parameter. The recent advent of broad spectrum dewormers such as Ivomec (ivermectin) offers the potential of improving production efficiency through control of internal and external parasites. Although numerous studies have demonstrated the efficacy of ivermectin for internal and external parasite control, few trials have evaluated ivermectin's effects on reproductive characteristics of replacement heifers. This study was designed to investigate the effects of deworming with Ivomec on heifer weight gain, body condition score, uterine/ovarian score, pelvic area, age at puberty, and conception rate during a 60-day breeding season.

Experimental Procedures

The trial was initiated in June, 1990 to determine the efficacy of deworming with ivermectin on production characteristics of 78 fall-born, weaned, beef heifers. The replacement heifers were stratified by weight and allotted to 10 native grass pastures on June 20 (day 1). Five pasture replicates of eight animals per pasture were injected subcutaneously with ivermectin (90 µg/lb body wt), whereas five pastures of eight heifers each served as untreated controls. The treated heifers received a second dose of ivermectin on October 10 (day 113).

The heifers were weighed on day 1 after being held off feed and water overnight and again at 28-day intervals until the trial concluded on January 15, 1991. On each weigh date, fecal samples were collected from the

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same representative heifers. Fecal sample analysis was done at Texas A&M University.

At the time of re-deworming (day 113), the heifers were evaluated for body condition score (1 = thin; 9 = fat), pelvic measurement (Rice pelvimeter), and uterine/ovarian score. To determine the onset of cyclicity, jugular blood samples were collected at 10-day intervals from August 15 (day 57) until December 26 (day 190) and analyzed for progesterone utilizing conventional radioimmunoassay techniques. When serum progesterone exceeded 1 ng/ml, heifers were considered puberal. At the conclusion of the fall grazing period (Nov 7), two breeding groups were established by combining the five dewormed replicates into one pasture and the five control replicates into an adjacent pasture. Each breeding group of 39 heifers was exposed to two bulls, which had passed a breeding soundness examination. The breeding period ran from November 16 to January 15 (days 150 to 210), with the bulls rotated between the two breeding groups every 7 days. To determine pregnancy rates, the heifers were palpated 45 days after the end of the breeding season.

Rainfall during the summer of 1990 was below normal, so available summer and fall forage was reduced. Moreover, tallgrass prairie typically is low in protein and energy during the fall and winter. This grazing situation resulted in marginal nutritional development of heifers and is not unusual for cattle raised in the Kansas Flint Hills or other areas of tallgrass prairie. The heifers had free-choice access to a salt/phosphorus mineral mix during the entire trial. Starting in September, all heifers were fed a 20% protein supplement (whole soybeans/dehydrated alfalfa) at 3.5 lbs/heifer, three times a week. At the start of the breeding season, this was increased to 6.0 lbs/heifer/day.

Results and Discussion

Ivomec lowered ($P < .01$) fecal egg counts following treatment on both day 1 and day 113 compared to controls. There appeared to be an environmentally induced period of suppressed fecal egg counts in both treatment and control groups during July and August, a pattern also observed in the southern United States. Both treatment and control groups exhibited a marked rise in fecal egg counts in September. More than 90% of identified larvae were *Cooperia*, except for the mid-July collection, which exhibited a rise, although not statistically significant, in *Ostertagia*.

Table 1. Weight Change and Body Condition Score

Item	Control	Treatment
Number	39	39
Weight change		
Starting weight	492.8	484.4
Fall weight, day 113	610.2	611.7
Period 1 gain, day 1 to 113	117.4[a]	127.3[b]
Pre-breeding weight, day 141	591.2	613.0
Period 2 gain, day 1 to 141	98.4[c]	128.7[d]
Post-breeding weight, day 210	640.1	645.6
Period 3 gain day 1 to 210	147.3[a]	161.2[b]
Body condition scores*		
Yearling, day 122	4.3[c]	4.5[d]
Post-breeding, day 210	5.1[c]	5.3[d]

*1-9, 1 = thin, 9 = obese.
[ab]$P = .09$.
[cd]$P < .01$.

As shown in Table 1, deworming significantly improved weight gain. Most of the Ivomec response occurred during the first 28 days after each deworming ($P < .05$). The observed weight gain response was corroborated by an increase ($P < .0l$) in body condition score of the Ivomec-treated heifers. The numerical difference (.2) in body condition scores between treatments corresponded to 15 to 16 lb, which was in line with actual weight changes.

It is important to note that the overall daily gain (.70 vs .77 lb/day for control and dewormed heifers respectively) during the 210-day trial reflected marginal nutrition, which could have impacted the deworming response and probably explains the poor pregnancy rates discussed later.

Deworming significantly increased yearling pelvic area by 7.5%, but had no effect on the uterine/ovarian score. At one year of age, 33.3% more treated heifers (Figure 1) were puberal than controls (56% vs 31%). Because time of puberty is influenced by age, weight, and breed, the facts that only 71.8% of the control animals attained puberty by the end of the trial and that their body condition scores were low reflected the minimal level of nutrition.

The criterion used to determine puberty was reaching 1 ng/ml of serum progesterone. This criterion was not met by 12.8% of heifers, with a majority of these failures in the control group. Once heifers reach 1 ng/ml of progesterone, values in excess of 2 ng/ml reflect normal estrus cycles. In this trial, 33.3% of the heifers attained 1 ng/ml but did not achieve 2 ng/ml. Those heifers were reclassified (Figure 2) as having questionable pubertal status. None of the heifers in the questionable (below 1 ng/ml) classification became pregnant. Deworming increased ($P < .05$) pregnancy rates from 25.6% in control heifers to 56.4% in Ivomec heifers. Among those with serum progesterone levels above 2 ng/ml, pregnancy rates were 84.6% for dewormed heifers and 71.4% for control heifers.

Because weight is a key factor influencing onset of puberty, it is of interest to note that in both the dewormed and control groups, the correlations between puberty and initial weight, weight gain, or pre-breeding weight were not significant. The correlations actually approached zero and were lower in the dewormed than in the control heifers, indicating that the early gain responses to Ivomec were not associated with onset of puberty.

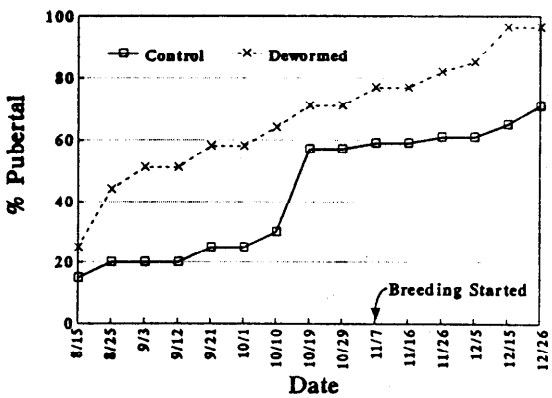

Figure 1. Percent Puberal Heifers, Using 1 ng/ml Serum Progesterone as Indication of Puberty.

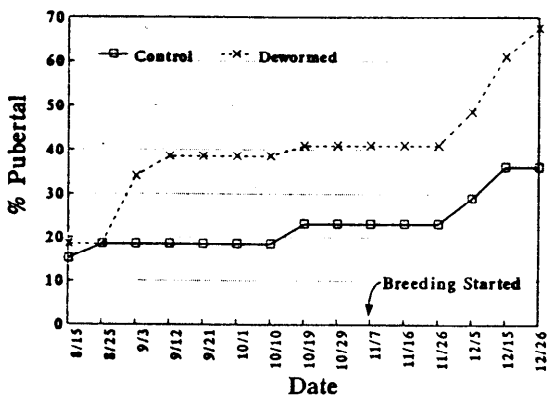

Figure 2. Percent Puberal Heifers Using 2 ng/ml Serum Progesterone as Indiction of Puberty.