Seasonlong grazing intensity and parasite load in yearling steers in the northern Great Plains

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A study to evaluate parasite loads with respect to stocking rates in grazing steers was conducted at the Central Grassland Research Extension Center. Results of this study suggest that parasite loads differ in intensity as stocking rates increase, that injectable deworming efficacy is consistent with product claims, and that in spite of repeated seasonlong grazing in the northern Great Plains, parasite load is relatively low. This study also confirms that individual animal parasite load is highly variable and suggests that susceptible young animals may exhibit higher parasite loads in heavily grazed pastures than in moderately or lightly grazed pastures.

Summary

Intestinal parasitism of grazing ruminants can result in poor performance and compromised systems, especially in younger animals, which are intrinsically more susceptible to infection (Stromberg and Gasbarre, 2006). In animals on pasture, the pattern of forage and fecal distribution is affected by the grazing system that is in place, which can be planned systematically to reduce transmission of parasites in grazing animals (Smith et. al, 2009). The intestinal parasite load in four long-term grazing intensity treatments from a light stocking rate to an extreme stocking rate was examined to evaluate the hypothesis that as cattle stocking rates increase in seasonlong systems, the parasite load within animals also increases. This study was conducted in the last year of a 26-year grazing intensity trial in the Missouri Coteau region of the northern Great Plains at the Central Grasslands Research Extension Center. Twelve pastures were stocked with yearling steers from mid-May to mid-October 2015 at four grazing intensities, as they had been for 25 years prior to this study: light (35 percent plant removal), moderate (50 percent plant removal), heavy (65 percent plant removal) and extreme (80 percent plant removal) (Patton and Nyren, 2015). Results demonstrated an increase in parasite load as grazing pressure increased through time. A difference in parasite egg counts per gram was detected among treatment groups ($P \leq 0.05$) in July. Injectable worming treatment before turnout proved effective in the early part of the grazing season because we found no difference among treatments in egg counts in June. In this study, the parasite load also appeared to be somewhat pasture-specific. We observed that the heaviest overall load was in pasture 6, which had an extreme stocking rate. As expected, individual animals within treatment groups showed variable susceptibility to parasitism. In August, individual animals in moderate, heavy and extreme treatments had eggs per gram (epg) at 100 or more. Egg counts of more than 100 epg is a baseline level for concern in animal performance and health (Stromberg et. al., 1997). This study demonstrates an association between high stocking density and increases in detectable parasite load, and supports the conclusion that yearling cattle performance may be impacted by increasing parasitism in seasonlong systems that are heavily stocked, even in the northern Great Plains, where the parasite load typically is not considered a significant issue.

Introduction

Internal parasites in young grazing animals can compromise performance due to parasitic gastroenteritis and/or competition for nutrients. Grazing management can encourage or discourage parasite load, depending on cattle exposure to plant base level and time spent in pasture.

Weight gain in weaned, yearling ruminants typically occurs through pasturing on grass in the warmer months, so animal performance is essential for cost-effective returns. Intestinal parasites are common inhabitants of pastures, and high levels of parasitism can result in decreased gains, which will decrease the economic potential of the animal (Mertz et. al, 2009).

Intestinal parasites referred to as strongyles include many common cattle pathogens, such as the cattle hookworm, barber's pole worm, brown stomach worm and hair worm, and are implicated in reduced production in cattle (Fox,

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1997). This group is in the nematode family and has a direct lifecycle in which eggs or young larvae are ingested, develop into adults within the digestive system of the animal and are finally shed in the manure as a second generation of eggs (Foreyt, 2001).

While some level of parasitism is normal, excessive loads can weaken animals, cause a decrease in feed intake and reduce the immune system. Gastrointestinal parasitism also can have a greater impact on younger grazing animals because they can be naive upon exposure (Stromberg and Gasbarre, 2006).

The potential parasite load is intensified as the animal grazes closer to the base of the plant near the ground (Silangwa, 1964). Although grazing animals typically will avoid manure-soiled areas, heavy grazing pressure for an extended time can expose them to more contaminated areas, which can increase the risk of acquiring a large worm burden.

Interventions, including deworming cattle early in the season before turnout, can be beneficial to cattle producers. Unfortunately, deworming efficacy can be variable and, depending on the product used and the parasite being treated, can be as low as 42 percent (Gasbarre et. al., 2009).

Experimental Procedures

This study was conducted at the Central Grasslands Research Extension Center in Stutsman County northwest of Streeter, N.D., in the Missouri Coteau region. Animal handling and care procedures in this study were approved by the NDSU Animal Care and Use Committee.

Twelve pastures were stocked with yearling steers starting May 13, 2015. These pastures have been grazed at the same intensities for 26 years. The target was to leave 65, 50, 35 and 20 percent of the forage produced in an average year on the light, moderate, heavy and extreme treatments, respectively. Therefore, yearling cattle grazed 35 percent of the light treatment, 50 percent of the moderate treatment, 65 percent of the heavy treatment and 80 percent of the heavy treatment. Each grazing treatment was replicated three times.

Pasture size was 30 acres, on average. Grazing animals shared a common water source, although some pastures had individual open water.

Two hundred steers were allocated across the four treatment groups. Our study sampled a minimum of 10 animals from each replication or 30 percent of the group, whichever was greater. Therefore, the light treatments with the low stocking rate had fewer sampled animals than the extreme treatment with the high stocking rate.

Prior to turnout, all animals were weighed and then randomly chosen from within assigned treatment groups for inclusion in the study. Fecal samples were collected rectally from these animals before deworming. All steers then were dewormed with Dectomax injectable wormer subcutaneously at a dose of 1 cc/110 pounds of live body weight.

During the study period, all cattle were brought in from the pastures to a central point in the field and weighed monthly using a portable livestock chute and digital scale (Weigh-Tronix). Fecal samples were collected from the treatment steers at each weighing period. The same animals in each treatment group replication were used for sampling throughout the course of the study.

All steers also were implanted with Revalor-G to enhance live weight gains. On pasture, all animals were supplemented daily with dry distillers grains with solubles at 0.3 percent of body weight.

Samples were processed for analysis using the Modified Stoll Test (Zajac and Conboy, 2012) and then analyzed under a microscope for the egg per gram of feces. Fecal samples were analyzed by the same two individuals for the duration of this study. Egg counts were transformed and geometric means were used for analyses (PROC GLM SAS 9.4) (Smothers et.al., 1999).

Results and Discussion

Strongyle egg counts differed among certain treatment groups in May, prior to the administration of Dectomax; however, these differences were not apparent in June, demonstrating the efficacy of the deworming treatment. In July (Figure 1), strongyle egg counts began to increase.

The extreme treatment had significantly higher egg counts than the light treatment ($P \leq 0.05$). Moderate and heavy fell between these two values but were not significantly different from each other. We also observed that pasture 6, an extreme treatment, had the greatest number of strongyle egg counts through the course of the study.

In August and September, egg counts per gram were above a baseline of 100 in 23 percent of the animal total in the extreme stocking rate treatment, indicating potentially significant economic parasitism (Zajazc and Conboy, 2012).

Individual animal egg counts were highest in August (Figure 2). Although not statistically different in August, the difference in individual animals within treatment groups is worth noting. The light grazing treatments all showed lower levels of egg counts throughout the course of the study. The moderate and heavily grazed pastures varied, with some pastures tending toward higher loads and others staying relatively low.

Average daily gains of animals in this study were not analyzed relative to pasture load due to other variables in the study, such as protein supplementation and fluctuating forage quality.

Yearling cattle that graze on the northern Great Plains should capitalize on forage resources for maximum economic benefit to the producer. Gastrointestinal parasitism can affect performance because young animals still are developing immunity to parasites. A three-year study conducted on nine ranches in South Dakota showed that beef yearling gains were greater in dewormed animals, compared with control animals (Mertz et.al, 2005).

Our study examined parasite load relative to grazing treatment. While deworming products are effective and relatively inexpensive, efficacy of treatment, as expected, did not last for this five-monthlong seasonlong grazing study. Product efficacy was consistent within a four- to six-week window.

Seasonlong grazing potentially exposes grazing animals repeatedly to contaminated pastures, especially as grazing pressure increases with stocking rates. At the extreme level of grazing, in which 80 percent of the growing forage was defoliated by grazing cattle before removal, fecal egg count means were consistently highest among treatments and significantly different in July.

Mid-July and August are pasture periods of lower forage quality in native and introduced pasture systems. Because this was the period of increased level of parasitism in this study with yearling cattle, performance could stagnate or decrease with the added burden of high levels of parasitism.

Ensuring that grazing yearling animals remain in peak performance to capitalize on ranch resources and investments is imperative. Grazing management should target animal movement and sustainable stocking rates to avoid risking high rates of gastrointestinal parasitism in grazing young animals.

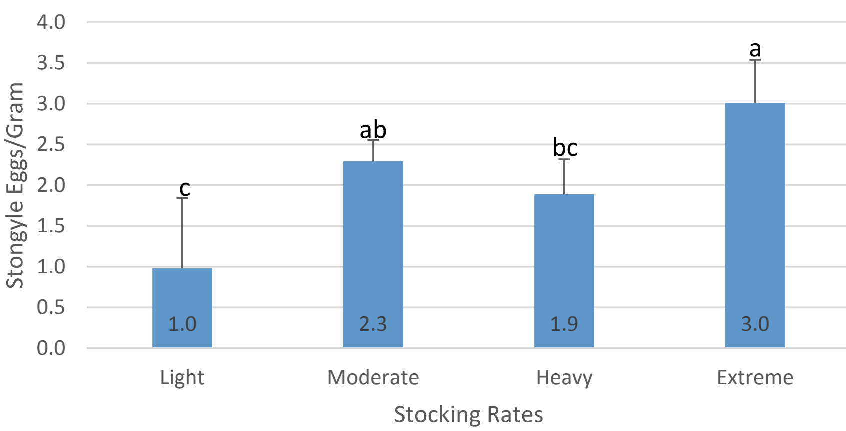

Figure 1. Srongyle Eggs/Gram[1], July 2015

[1]Data for egg counts per gram were transformed to a geometric means for comparitive analyses as represented in this figure.
Treatments labeled with the same letter are not statistically different at the p = 0.05 level.

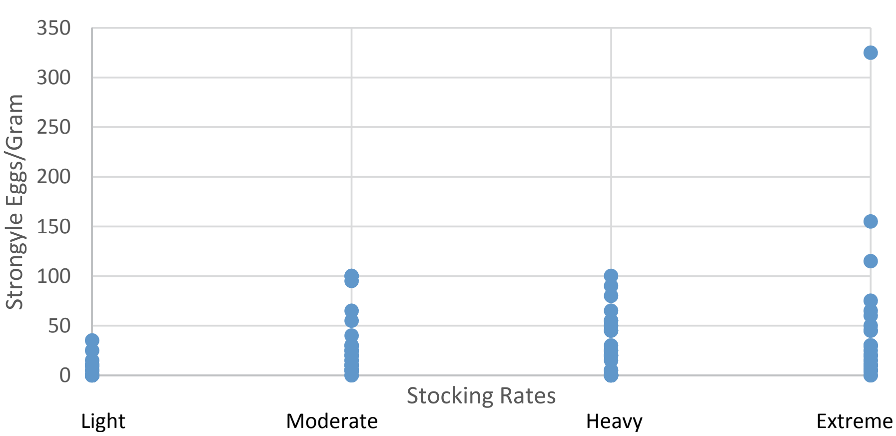

Figure 2. Individual Animal Strongyle Egg/Gram Counts, August 2015

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