Season-long Grazing Intensity and Parasite Load in Yearling Steers in the Northern Great Plains

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The intestinal parasite load of yearling steers was examined to evaluate the hypothesis that high cattle stocking rates encourage high parasite numbers in season-long grazing systems.

The parasite load was examined during five months in yearling steers that were grazing pastures at four stocking rates: light, moderate, heavy and extreme.

Parasites in young grazing animals can compromise performance due to parasitic gastroenteritis and/or competition for nutrients. Parasite loads are influenced by cattle exposure to plant bases and time spent in pasture. Fecal-oral parasite transmission can increase through time as plant defoliation exposes the base of the plant, where parasites accumulate. Grazing management is an important component in maintaining the health of young grazing ruminants with respect to parasitic load and performance.

Summary

Intestinal parasitism of grazing ruminants can result in poor performance and compromised systems, especially in younger animals that are intrinsically more susceptible to infection. These parasites typically enter the grazing animal through the fecal-oral route of transmission, and complete their life cycle within the gastrointestinal tract. In animals on pasture, the pattern of forage and fecal distribution is affected by the grazing system, which can be planned systematically to reduce transmission of parasites in grazing animals (Smith *et al*. 2009).

This study was conducted in conjunction with a 27-year-long grazing intensity trial in the Missouri Coteau region of the northern Great Plains (Patton and Nyren 2014). Twelve pastures were stocked with four grazing treatments: light (35 percent plant removal), moderate (50 percent plant removal), heavy (65 percent plant removal) and extreme (80 percent plant removal).

In 2015, yearling steers grazed the pastures from mid-May to mid-October. Prior to turnout, the steers were dewormed as well as implanted with Revalor G™ to maximize live weight gains. On pasture, animals also were supplemented with dried distiller's grains at 0.3 percent of body weight daily. Fecal samples, along with the weight of the individual steer, were collected monthly.

Results demonstrate an increase in the level of parasite infestation with respect to grazing pressure through the season. The injectable worming treatment before turnout proved effective in the early part of the grazing season because egg counts in June showed no difference among treatments. However, a significant difference was detected among treatment groups ($P \leq 0.05$) in July.

In this study, the level of parasitism also appeared to be somewhat pasture-specific, with the heaviest load in one that had an extreme stocking rate. As expected, animals within treatment groups showed variable susceptibility to parasitism. In August, several animals in moderate, heavy and extreme treatments had eggs per gram of feces (EPG) at 100 or more, which is considered the baseline level for concern.

This study demonstrates an association between high stocking density and high parasite load, and supports the conclusion that yearling cattle performance may be impacted by increasing parasitism in season-long systems that are heavily stocked.

Introduction

Maximizing weight gain in young ruminants is done typically through pasturing on grass in the warmer months, so good grazing management is essential for cost-effective returns. Intestinal parasites are common inhabitants of pasture, and high levels of parasitism can result in decreased gains, and thus decrease the economic potential of the animal (Mertz *et al.* 2005).

The most common intestinal parasites implicated in reduced performance in cattle are strongyles, which include cattle hookworm, barber's pole worm, brown stomach worm and hair worm. The strongyle group is in the nematode family, and has a direct life cycle 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, reduce performance and even lead to death. Gastrointestinal parasitism can have a greater impact on younger grazing animals because they do not acquire natural immunity to parasitism until a full grazing season is complete (Mertz *et al*. 2005).

Exposure to parasite eggs is intensified as the animal grazes closer to the base of the plant. Although grazing animals typically will avoid manure-soiled areas, heavy grazing pressure for an extended time can expose them to more contaminated areas and thus 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). Also, most product efficacy is only for four to six weeks.

Rodney Schmidt loading yearling cattle.

Procedures

This study was conducted at the Central Grasslands Research Extension Center in Kidder County northwest of Streeter, N.D., in the Missouri Coteau region, which is characterized by natural potholes and glacial shaping.

Twelve pastures were stocked with yearling steers starting May 13, 2015. The pastures have been grazed at the same intensities since 1989, a period of 27 years (see Pages 7-27). 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.

Each treatment was replicated three times. Average pasture size was 30 acres. Grazing animals shared a common water source, although open water was available in four pastures. Animal handling and care procedures in this study were approved by the NDSU Animal Care and Use Committee.

For the grazing intensity study, a total of 200 steers were allocated across the four treatment groups. Prior to turnout, all animals were weighed and treated with Dectomax injectable wormer subcutaneously at a dose of 1 cc/110 pounds live body weight. Depending on the number of steers per pasture, four to 12 animals were chosen randomly per pasture for inclusion in our study, resulting in a minimum of 34 percent of the animals per grazing treatment. Fecal samples were collected directly from the rectum of these animals.

During the subsequent 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 also were obtained as previously described for animals included in this study.

Samples were processed using the Modified Stoll Test (Zajac and Conboy 2012). Briefly, 5 grams of fecal material was diluted with 20 milliliter (ml) of water. The sample was stirred, and 1 ml was placed in a 15-ml conical centrifuge tube. Approximately 12 ml of zinc sulfate fecal flotation solution (Centaur Animal Health, Olathe, KS) was added to each tube. Samples were spun with a Beckman Model TJ-6 Centrifuge Unit for 15 minutes at 1,500 revolutions per minute.

Additional zinc sulfate solution was added and a coverslip added to the top of the tube. Tubes were allowed to sit for a minimum of 10 minutes, after which the coverslip was transferred to a microscope slide and examined for parasite ova. Eggs per gram (EPG) of feces was determined for each sample. Fecal samples were analyzed by the same two individuals for the duration of this study.

The geometric means of the EPG from animals sampled in each pasture were determined and these values were used for analyses (PROC GLM SAS 9.4).

Results

Prior to the administration of Dectomax in May, strongyle egg counts differed significantly among certain treatment groups; however, these differences were not apparent in June, demonstrating the efficacy of the deworming treatment.

In July, strongyle worm egg counts began to increase again (Figure 1). The extreme treatment had significantly higher egg

Steer in weigh chute.

counts than the light or heavy treatments ($P \leq 0.05$). Values for the moderate and heavy treatments fell between those for the light and extreme treatments but were not significantly different from each other. One extreme treatment pasture had the greatest number of strongyle egg counts throughout the course of the study.

Individual animal egg counts were highest in August (Figure 2). In August and September, egg counts per gram were above the baseline of 100 in several animals, indicating significant parasitism with potential economic consequences (Stromberg *et al*. 1997).

Steers in the light grazing treatment pastures all showed lower levels of egg counts throughout the course of the study. Egg counts in animals in the moderate and heavily grazed pastures varied, with those in some pastures tending towards higher loads, and others staying relatively low.

For this study, average daily gains of animals were not analyzed in relation to the level of parasitism due to other variables in the study such as supplementation, implantation and forage availability by grazing treatment.

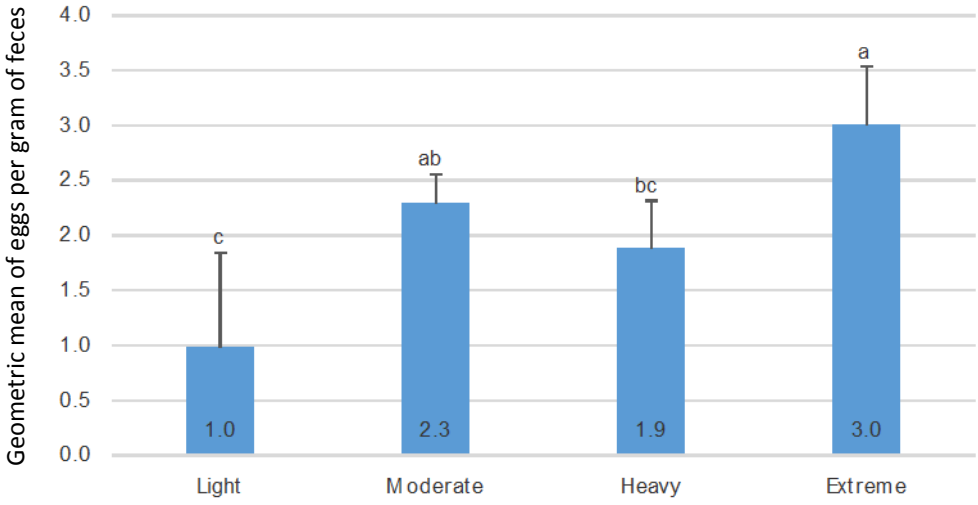

Figure 1. Strongyle egg counts in July, 2015. Grazing treatments labeled with the same letter are not significantly different at the P=0.05 level.

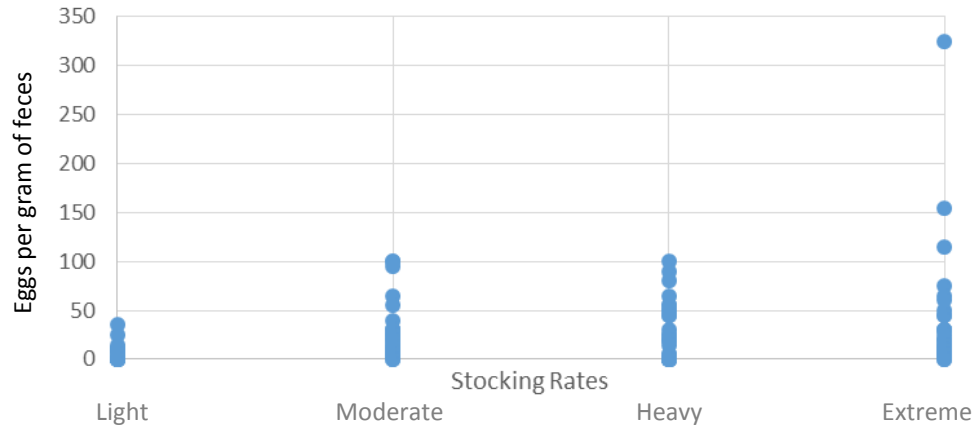

Figure 2. Individual animal strongyle egg counts in August, 2015.

Discussion

Yearling cattle that graze on the northern Great Plains should utilize 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 of nine ranches in South Dakota showed that internal parasitism affected average daily gains in steers, with significant differences between dewormed and unwormed animals (Foreyt 2001).

Our study examined parasitism relative to grazing treatment. While deworming products are effective and relatively inexpensive, efficacy of treatment, as expected, did not last for this five-month-long season-long grazing study. Product efficacy was consistent with a four- to six-week window.

Season-long grazing potentially exposes grazing animals repeatedly to contaminated plants, especially as grazing pressure increases. At the extreme level of grazing, with 80 percent utilization, fecal egg count means were consistently the highest among treatments, significantly in July.

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

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

Acknowledgments

We thank Dwight Schmidt, Rodney Schmidt and Cody Molle, who helped in the field with this study. We also thank Kayla Chilcoat, an NDSU graduate student, with her assistance in the field and her time at the chute. We thank Zoetis, Inc. for supplying the pharmaceuticals used in this study.

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