

A survey to evaluate anthelmintic resistance of gastrointestinal strongyles in Iowa cow/calf operations

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Introduction

Parasite resistance, a widespread problem in small ruminants, is starting to appear with increased frequency in beef cattle populations. Reports of parasite resistance in cattle have surfaced in Australia, New Zealand, northern Europe, South America, and the United States. The objectives of this study were to determine whether parasite resistance to commonly used anthelmintics is present in Iowa cow/calf operations, attempt to identify factors that contribute to development of parasite resistance, and utilize qualitative PCR testing to determine which genera of parasites are associated with resistance.

Materials and Methods

Iowa State University beef cattle extension specialists provided a producer list from each of the six extension regions. From each regional list, randomly selected producers were contacted by phone to determine their eligibility (at least 20 spring-born calves), and if eligible, they were invited to enroll. If a producer declined to participate, the next randomly chosen producer was contacted until five producers from each district were enrolled (30 herds total). Of these, 26 herds were actually surveyed and sampled. On each operation, fecal samples from 20 calves in a particular management group were collected on the day of deworming and again 10 to 14 days later. The anthelmintic used was at the discretion of the producer and the herd veterinarian. A standard set of 10 questions was used to determine deworming history and cattle management on the farm. The Fecal Egg Count Reduction Test (FECRT) was performed on all samples using the Modified Wisconsin technique. A reduction in eggs per gram (epg) of < 90% was considered to indicate resistance. Fecal samples from resistant herds were also tested using PCR assay to determine which parasites were present before and after treatment. Fecal sampling began in July and ended in November

2011, and was fit into the routine herd working patterns on individual farms.

Results

Fecal egg counts on the day of deworming were consistently low throughout the sampling period (range, 0.61 to 126.5 epg) in these herds. Twenty of the herds used a macrocyclic lactone (ML), five used an oral benzimidazole (BZ), and one used a BZ+ML combination in the calves. Of these 26 herds, 13 failed to exhibit a decrease of at least 90% in post-treatment fecal egg counts. Values for mean fecal egg count at the time of deworming were log-transformed and analyzed by linear models with explanatory variables. The associations between presence of resistance and class variables were analyzed with a Fisher's exact test; whereas the associations between presence of resistance and quantitative variables were analyzed with a *t*-test. As the number of consecutive years a herd had used the same class of dewormer increased, the more likely they were to show resistance ($P \leq 0.03$). None of the other herd management variables had a significant effect on within-herd parasite resistance or calf fecal egg counts at the time of deworming. For herds with parasite resistance, results of pooled PCR testing within each herd indicated that *Cooperia* was present in all post-treatment samples. Other genera present in herds with parasite resistance were *Ostertagia* ($n = 5$ herds), *Haemonchus* (2 herds), and *Trichostrongylus* (1 herd).

Significance

These results indicate that strongyle resistance is present in Iowa cow/calf operations and the development of resistance is affected by deworming practices on individual farms. However, further work is needed to better understand parasite epidemiology and other management practices that contribute to the development of resistant parasites.