# Evaluation of a refugia-based strategy in pastured stocker cattle treated with LongRange®

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## Introduction

Anthelmintic resistance (AR) in gastrointestinal nematodes of cattle is becoming increasingly prevalent worldwide, so there exists a need to develop novel approaches to manage and slow this progression. Refugia are the proportion of the worm population not selected by drug treatment, and the greater the proportion of the worm population left untreated (in refugia), the slower the progression of AR. Sources of refugia include worms in animals left untreated, stages of parasites not affected by the treatment, and free-living stages in the environment (e.g. eggs/larvae on pasture). Studies in sheep demonstrate that managing refugia will reduce the progression of AR without negatively impacting the health or productivity of the flock. However, many of these strategies are impractical for use with cattle, and consequently have not been tested or widely implemented in cattle. One refugia-based strategy with good potential applicability to the cattle industry is 'selective non-treatment' where a percentage of the herd is deliberately left untreated. In this study, we examined the use of a selective non-treatment strategy in stocker cattle.

## Materials and Methods

One hundred eighty stocker calves ranging in weight from 405.6 to 736.3 lb (184 to 334 kg) were purchased by an order-buyer at livestock markets in the southern US. Shortly after arrival, calves were vaccinated and given metaphylaxis with gamithromycin (Zactran®). Calves were then allocated to 1 of 3 treatment groups: 100% treated with doramectrin (Dectomax®), 100% treated with eprinomectrin (LongRange®), and 90% treated with eprinomectrin (LongRange®). For allocation to treatment, cattle were assigned randomly to treatments in a stochastic process that stopped when mean body weights of groups did not differ by >10 lb (4.54 kg), and mean fecal egg counts (FEC) did not differ by >30 eggs per gram (EPG). In the 90% extended release eprinomectrin group, the 6 animals that remained untreated (refugia calves) were selected randomly from the interquartile range (middle 50%) for FEC.

Following treatment, cattle were placed onto newly sown wheat/rye grass pastures for 112 days. Health monitoring was performed daily to assess primarily for signs of bovine respiratory disease (BRD), and additional treatments were given as needed. Cattle were weighed and fecal samples collected for FEC and coprocultures at the time of treatment, and then monthly for 4 months. Due to its high detection sensitivity of 5 EPG and high accuracy, the Mini-FLOTAC® protocol was selected for FEC.

## Results

After 112 days of grazing, there were no significant differences between the 3 treatment groups in total weight gain ($P = 0.74$), average daily gain ($P = 0.83$), or numbers of cases of BRD ($P = 0.44$). Mean FEC at time of treatment was 514 EPG, with *Cooperia, Haemonchus, Ostertagia*, and *Oesophagostomum* all observed on coprocultures, and *Cooperia* being the most prevalent. FEC reductions 28 days post-treatment were, 70.4%, 92.1%, 87.9% for the doramectrin, 100% extended release eprinomectrin, and 90% extended release eprinomectrin groups, respectively, with resistance only detected for *Cooperia*. EPG levels dropped each month, and by 112 days the EPG of all groups were low and not significantly different ($P = 0.87$), averaging 12.8.

## Significance

Due to the increasing prevalence of AR, it is important to develop and test novel strategies to help slow this progression. In this study we found that treating only 90% of the herd with LongRange® had minimal impact on parasitological parameters, and did not significantly affect total weight gain, average daily gain, or incidence of BRD. These results also confirm those of similar studies performed in sheep indicating that no significant production losses are associated with leaving a small percent of animals untreated. Data from this study suggest that a selective non-treatment approach may be a sound approach for integrating a refugia-based strategy for parasite control in cattle, thereby increasing the useful effective longevity of existing anthelmintics, and thus improving the long-term sustainability of parasite control using anthelmintics.