

Are Parasites Becoming Resistant to Dewormers?

Summary of the 2007-2009 Southern Bull and Replacement Heifer Test Parasite Control Study, a comparison of results using Safe-Guard® (*fenbendazole*) oral drench versus Ivomec® (*ivermectin*)

The damaging impact of internal parasites on cattle productivity and beef quality is well documented. Internal parasites reduce feed intake, decrease weight gain, and reduce the animal's ability to ward off disease because of impaired immune function.

Researchers observed that the 2005 and 2006 Research Station test cattle developed more health problems than expected. Fecal samples were collected after the application of a pour-on dewormer and egg counts were found to be high in many cases. Had internal parasites become resistant to this commonly applied class of cattle dewormer?

The Research Station implements a rigorous vaccination program on arrival. Additionally, all test cattle are historically dewormed with a pour-on endectocide dewormer at processing.

In 2007, a research study was conducted to test the efficacy of two leading cattle dewormers, Safe-Guard oral drench and Ivomec pour-on. Results indicate reduced efficacy to the Ivomec pour-on dewormer tested. A follow-up study conducted in 2008 suggested potential internal parasite resistance to both the name brand pour-on and injectable dewormers tested. Safe-Guard efficacy remained very high.

Sub-clinical disease caused by parasite infection that goes undetected is estimated to cost beef producers \$190 per animal, according to a recent study from Iowa State.¹

The overuse of cattle pour-ons may be contributing to the possibility of a growing problem with parasite resistance, selecting for higher populations of anthelmintic resistant parasites even among treated animals. In addition to concerns related to drug resistance, pour-on cattle wormers have disadvantages compared to other formulations.² They can be inconsistently absorbed into the bloodstream, and can take four days to reach therapeutic levels. This leads to reduced levels of active ingredient being delivered to the parasitic infection in the stomach and intestinal tract.

“I don't know what the economic threshold is, but I do know that having a high egg count reduces cattle efficiency, and I understand it reduces their vaccination responses in some cases also.” – Rodney Wallbrown, West Virginia University Extension Service Agent, Mason County.

The research was conducted as part of the Southern Bull and Replacement Heifer Test Program, a joint effort among the West Virginia University Extension Service, the West Virginia Department of Agriculture, and the West Virginia Cattleman's Association. Researchers observed that, although they follow a strict vaccination program on arrival, and administer a pour-on dewormer, participating animals still develop more health problems than expected.

In 2006, it was suspected that poor health response might be linked to high levels of internal parasites. Fecal samples were taken from approximately half of participating bulls, which come from herds all over the state of West Virginia. The samples were found to have high egg counts in many cases, even though the animals had been treated multiple times with cattle wormers and received a pour-on treatment on delivery to the test station. As a result, researchers conducted a study in 2007 to evaluate dewormer efficacy and impact of internal parasites on cattle health.

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The research method chosen was based on guidance from research professionals such as Dr. Lou Gasbarre, ARS Research Leader USDA; Dr. Joe Starcher, Director West Virginia Department of Agriculture Animal Health; and Dr. Bill Crank, Southern Bull Test Station veterinarian.

All animals were ear tagged for identification purposes. The animals came from herds all over the state of West Virginia. Fecal samples were collected from a total of ninety (90) heifers and eighty-five (85) bulls on delivery to the test station. The fecal samples were analyzed for parasite egg count, and these numbers were used as a baseline.

Internal parasite treatments were then given: Ivomec pour-on to the heifers and Safe-Guard oral drench to the bulls. Researchers also administered the antibiotic Excede to all animals to lessen the possibility of different outcomes related to other health issues.

Fourteen days following treatment, fecal samples were taken from all test animals again and analyzed for parasite egg counts to evaluate the effectiveness of the wormers. Fecal sample analysis was conducted by the Agricultural Research Service (ARS) Lab in Beltsville, MD. Collected data was analyzed by Dr. Louis Gasbarre, Dr. Joe Starcher and Dr. Bill Crank.

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In the 90 head of heifers tested, the average eggs per gram before treatment was 47.18 with a high of 512 eggs per gram and a low of 0 in 21 heifers. After treatment with Ivomec pour-on, the average number of eggs per gram was 25.7, representing 45.5% efficacy.

In the 85 head of bulls tested, the average eggs per gram before treatment was 41.86 with a high of 478 eggs per gram and a low of 0 in 18 bulls. After treatment with Safe-Guard oral drench, the average number of eggs per gram was 2.18; representing 95% efficacy. Fecal egg counts went down in 81 bulls and up in four; 78 bulls had an egg per gram count of zero after treatment with Safe-Guard.

In addition, average veterinary expenses per head for bulls treated with Safe-Guard decreased to \$22.20 per head compared to \$31.01 per head the previous year.

In this study, bulls responded faster and more effectively to Safe-Guard oral drench when compared to the response of heifers dewormed with Ivomec pour-on. Further research is needed to confirm whether this is caused by internal parasite resistance to Ivomec pour-on.

“These results would indicate that the increased use of pour-on endecticides may be selecting for parasite populations that are more resistant or less responsive to the drug. At the same time, the drug use has increased because they’ve become cheaper,” said Dr. Gasbarre, Bovine Functional Genomics Laboratory Research Leader of the Agricultural Research Service (USDA).

If confirmed, resistance is a problem that could have far reaching effects on cattle producers. To determine how the results of this study compare with cattle populations nationally, a similar study has just been completed as part of the USDA NAHMS. “The last samples were collected in December 2008 and the data is being analyzed and should be available in late spring or early summer 2009,” Dr. Gasbarre says.

Table: 2007 Southern Bull and Replacement Heifer Parasite Control Study

# animals treated	Eggs per gram before treatment	Highest eggs per gram / Lowest eggs per gram	Treatment given	Eggs per gram 14 days after treatment	Efficacy %	# with decreased egg count	# with increased egg count
90 heifer	47.18	512 / 0	Ivomec pour-on	25.7	45.5%	75	15
85 bulls	41.86	478 / 0	Safe-Guard oral drench	2.18	95%	81	4

“It should also be noted that after treatment with Safe-Guard oral drench, 78 bulls had an eggs per gram count of zero.

In 2008 a follow-up study was completed on 130 heifers comparing the results of Ivomec to Safe-Guard. Once again, the heifers came from herds all over the state. Following treatment, those treated with Safe-Guard showed far fewer parasite eggs than those treated with Ivomec.

In this study fecal samples were taken on the 130 head of heifers on delivery to the test station. This pre-trial fecal count was done to make sure the data would be as clean as possible and to assign individual animals to a specific treatment group with each group having a total egg count as equal as possible.

The treatments used were control, Safe-Guard, Ivomec Pour On, Ivomec Injectable, and a combination of Safe-Guard with Ivomec Pour On. Each treatment group consisted of 26 head of heifers which were weighed on treatment day to insure proper application rates based on label recommendations.

On the day of treatment a fecal sample was collected from each heifer to serve as the pre-treatment base data. Fourteen days after treatment a fecal sample was pulled from each heifer to provide post treatment data which was used to make various comparisons.

Following treatment, those treated with Safe-Guard alone had egg counts decrease 96.50% as a group average. Those treated with Safe-Guard in combination with Ivomec had egg counts drop a group average of 99.98%. By comparison, those treated with Ivomec injectable alone had an average of

63.28% fewer eggs. Those treated with Ivomec pour-on alone had 42.84% fewer eggs as the group average. The control group had egg counts decrease 41.56% as a group average.

Table: 2008 Heifer Parasite Control Study

# animals treated	Average/hd Eggs per 3 grams on day of treatment	Treatment given	Average/hd Eggs per 3 grams 14 days after treatment	# head with decreased egg count	#head with increased egg count
26	128.4	Safe-Guard	4.5	26	0
26	155.4	Combination	.04	26	0
26	120.7	Ivomec Injectable	44.3	22	4
26	129.2	Ivomec Pour-on	73.8	22	4
26	138.5	Control	81	14	12

“In my opinion, it doesn’t look like there’s much doubt that Safe-Guard does a good job of reducing egg counts...It shows that Safe-Guard does a tremendous job.” – Rodney Wallbrown, West Virginia University Extension Service Agent, Mason County.

It is important for veterinarians and cattle producers to determine whether the dewormers they rely on are working. A Fecal Egg Count Reduction Test (FECRT) is a valuable tool to test for anthelmintic resistance. It’s quick and effective. Pull samples from 20 random animals, no matter the herd size. Test before deworming and then test again 14 days later. If average egg worm counts for the group decline by 90 percent or more, your dewormer is working and your cattle are performing.

“Our cattle producers probably need to be worried about resistance...they need to be rotating chemistries. They need to do more checking and they need to do more parasite control; just because you pour something on them doesn’t mean they’re in good shape.” – Rodney Wallbrown, West Virginia University Extension Service Agent, Mason County

Footnotes:

1. Economic analysis of pharmaceutical technologies in modern beef production, John D. Lawrence and Maro. A. Ibarburu, Iowa State University, 2007.
2. Comparison of pharmacokinetic profiles of doramectin and ivermectin pour-on formulations in cattle, V. Gaynard, et al, 1998.

SOURCES:

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