Effect of Liver Flukes on Productivity of Beef Steers From Pasture Through Feedlot When Treated with IVOMEC® Plus (ivermectin/clorsulon)

Duane Maye, DVM

Based on: Marley SE, Corwin RM, Hutcheson DP: Effect of Fasciola hepatica on productivity of beef steers from pasture through feedlot. Agri-Practice 17: 18-23, 1996.

Introduction

Economic Significance of Liver Flukes

Infection of cattle with *Fasciola hepatica*, the common liver fluke of cattle and sheep, causes important economic losses to producers. Liver flukes, once thought to be a problem only in the Southeast and Pacific Northwest, are an increasing problem as the habitat of the intermediate host, the lymnaeid snail, increases with each new dam and irrigation project. Contrary to common belief, the economic losses from liver flukes are not mainly due to damage caused by migration of immature fluke and liver condemnations at processing. Rather, productivity losses are primarily due to reduced average daily gain, lower feed conversion, reduced milk production and lower weaning weights.

Improving Productivity in Feedlot Cattle

Several feedlot studies have demonstrated that treatment of fluke-infected cattle with an effective flukicide produces a positive cost-benefit result and improved productivity.

It is clear that losses are possible in cattle infected with fluke, but prior to this study, there were no conclusive studies relating the impact of liver fluke burdens and the age of infection. Results from European studies referred to in the paper indicated that flukes less than eight weeks old have little or no effect on productivity on grazing stocker cattle. The greatest amount of damage occurs, both economically and physiologically, once liver flukes enter the bile duct at approximately eight weeks post infection and mature into adults. Additional studies in the United States have demonstrated increased productivity in feedlot cattle with flukicide treatment of infected cattle. The rate of gain may be reduced by 8% to 28% in feeder steers with 40 to 140 liver flukes. This trial demonstrated the benefit of treating cattle with IVOMEC® Plus (ivermectin/clorsulon) on arrival at the feedlot even in the face of low levels of infection and ten week old liver flukes.

The Bottom Line
There were no significant differences in performance data between the fluke infected and non-infected groups during the grazing phase, demonstrating that there are little measurable performance losses associated with liver flukes less than 10 weeks old and subclinical infections of liver fluke in grazing cattle.

During the feedlot portion of this trial, steers treated with IVOMEC Plus exhibited:

- Significantly ($P<0.05$) better total adjusted weight gain advantage of 28.5 lb, equal to an adjusted ADG advantage of 0.23 lb per head per day.

- Significantly ($P<0.05$) lower GGT (gamma-glutamyl transpeptidase - an indicator of liver function) values Day 29 post treatment through the end of the trial.

- Significantly ($P<0.05$) lower average number of liver flukes collected at slaughter (13.8), while cattle treated with only IVOMEC® (ivermectin) 1% Injection had a higher average number of flukes (27.8). The difference in the average number of flukes recovered from cattle treated with IVOMEC Plus and those treated with IVOMEC 1% Injection was 101%.

- Since the age of the liver flukes was known to be 10.5 weeks old, treatment occurred before all the flukes were mature - a situation similar to actual field conditions where the age of the flukes are unknown at the time of treatment.

- Even with flukes remaining, the removal of part of the infection permitted improvements in the performance of the cattle treated with IVOMEC Plus.

The Field Trial
Marley et al conducted a two-part study with 142 crossbred beef steers to determine the effect of *Fasciola hepatica* on productivity. The trial consisted of a grazing phase and a feedlot phase. During the grazing phase induced subclinical liver fluke infection were used to determine the influence of immature liver flukes (up to 10 weeks post-infection) on productivity of animals on pasture. On entry to the feedlot, the objectives shifted to evaluating the effect of treating steers with IVOMEC Plus, which contains ivermectin and clorsulon, versus treatment with IVOMEC 1% Injection alone, on feedlot performance.

Grazing Phase
The grazing phase of this study was conducted at the Forage Systems Research Center (FSRC) at the University of Missouri on 12 paddocks of 10 acres each. The paddocks were of similar soil type and topography, and had the same water source. The forage content was orchardgrass, bluegrass and low endophyte-infected fescue. At the time of purchase, all steers were
vaccinated for infectious bovine rhinotracheitis, bovine viral diarrhea, bovine respiratory syncytial virus, parainfluenza strain three (PI-3), *Haemophilus somnus*, and seven strains of *Clostridium* spp. Steers were also implanted with a growth promotant implant (36 mg zeranol). Prior to the start of the trial, steers were allowed to graze the paddocks for 14 days to contaminate the area with parasite eggs. To remove all internal and external parasites before the start of the trial, the entire group of 120 steers were treated with IVOMEC Pour-On at 1 ml per 22 lb of body weight. The steers in the fluke-infested paddocks were infected with 500 metacercaria of *F. hepatica* per animal in a gelatin capsule delivered orally via balling gun to produce a subclinical liver fluke infection. The steers were then weighed, ranked by descending order of weight and assigned to 6 paddocks of fluke infected animals and 6 paddocks of non-fluke infected paddocks containing 10 animals each. Steers were grazed for 69 days and weighed on Days 0, 13, 27, 42, 54 and 68. Parameters measured were weight gain (ADG), packed cell volume (PCV) gamma-glutamyl transpeptidase (GGT) and fecal egg counts for both nematode larvae and bile duct liver flukes.

**Feedlot Phase**
The 60 fluke-infected steers were transported to the Agricultural Research and Extension Center, Texas A&M University, at Bushland, Texas. On arrival, the steers were weighed, vaccinated (7-way clostridial bacterin), implanted with two growth promotant implants (200 mg progesterone + 20 mg estradiol benzoate and 140 mg trenbolone acetate), ranked in descending order of body weight and blocked into sets of two. Treatments were randomly assigned: one group received IVOMEC Plus and the other group received only IVOMEC 1% Injection. The groups were fed for 124 days and had access to the same feed and water. Steers were weighed and bled, and fecal samples examined every 28 days, except during the final interval, which occurred 9 days later. Feed data were recorded daily for each animal. Parameters compared were feed consumption, feed efficiency, ADG, PCV, GGT, serum albumin, and fecal examination for liver fluke ova. At slaughter, livers were taken to the College of Veterinary Medicine at Oklahoma State University where flukes were collected and counted.

**Results**

**Grazing Phase**
Mean GGT values were significantly (*P*<0.01) elevated in fluke-infected animals by Day 54 of the grazing period. No significant differences (*P*>0.05) were apparent in performance during the grazing portion of the study (Table 1).

**Feedlot Phase**
Mean GGT values were significantly (*P*<0.01) lower in cattle treated with IVOMEC Plus from 29 days post treatment through the end of the feedlot period. Cattle treated with IVOMEC Plus had a significant (*P*<0.05) advantage for total weight gain and ADG (Table 2). At slaughter, there was
a significant reduction ($P<0.01$) in the number of live flukes recovered from animals treated with IVOMEC Plus.

### Table 1. Mean Performance Data - Grazing Phase (lb)

<table>
<thead>
<tr>
<th>Animal Group</th>
<th>Starting Weight</th>
<th>Ending Weight</th>
<th>Weight Gain</th>
<th>ADG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-infected</td>
<td>627.0</td>
<td>681.3</td>
<td>54.3</td>
<td>0.81</td>
</tr>
<tr>
<td>Fluke-infected</td>
<td>626.2</td>
<td>678.7</td>
<td>52.5</td>
<td>0.78</td>
</tr>
</tbody>
</table>

ADG = Average Daily Gain

### Table 2. Mean Performance Data - Feedlot Phase (1)

<table>
<thead>
<tr>
<th>Performance Parameter (lb)</th>
<th>IVOMEC Plus</th>
<th>IVOMEC 1% Injection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting Weight</td>
<td>659.3(a)</td>
<td>657.5(a)</td>
</tr>
<tr>
<td>Ending Weight</td>
<td>1129.1(a)</td>
<td>1103.0(a)</td>
</tr>
<tr>
<td>Adjusted Ending Weight</td>
<td>1112.6(a)</td>
<td>1082.3(a)</td>
</tr>
<tr>
<td>Total Gain</td>
<td>469.8(a)</td>
<td>445.5(b)</td>
</tr>
<tr>
<td>Adjusted Total Gain</td>
<td>453.3(a)</td>
<td>424.8(b)</td>
</tr>
<tr>
<td>Weight Gain Difference</td>
<td>24.3</td>
<td>NA</td>
</tr>
<tr>
<td>Adj. Weight Gain Difference</td>
<td>28.5</td>
<td>NA</td>
</tr>
<tr>
<td>Average Daily Gain</td>
<td>3.66(a)</td>
<td>3.43(b)</td>
</tr>
<tr>
<td>ADG Difference</td>
<td>0.20</td>
<td>NA</td>
</tr>
<tr>
<td>Adj. ADG Difference</td>
<td>0.23</td>
<td>NA</td>
</tr>
</tbody>
</table>

(1) Values in rows with different letters are significantly different ($P<0.05$)
(2) Weights adjusted to carcass dressing percentage (60%)
Summary
This trial indicated that liver flukes less than 10 weeks of age cause little measurable performance losses in pastured cattle. However, it should be noted that GGT values were elevated at the end of the grazing phase.

It is common knowledge that most flukicides are most effective against mature flukes (older than 8 to 10 weeks). Treatment in this study occurred when the liver flukes were 10.5 weeks old. The steers treated with IVOMEC Plus, a combination of ivermectin and clorsulon, demonstrated higher weight gain and thus increased average daily gain when compared to those treated with IVOMEC 1% Injection alone. This trial demonstrated that treatment with IVOMEC Plus to control parasites at entry into the feedlot significantly improved overall weight gain.