EXTENSION
BEEF CATTLE RESEARCH UPDATE
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July 2023

Evaluation of Tylosin Phosphate Supplementation over Strategic Durations on the Incidence and Severity of Liver Abscesses in Feedlot Cattle

Tylosin phosphate (Tylan, Elanco Animal Health) is an antibiotic that is commonly fed to feedlot cattle to decrease the incidence of liver abscesses. The average incidence of liver abscesses ranges from 12 to 30%[1, 2] but can be as high as 90%.[3] Liver abscesses in feedlot cattle are a cause of decreased performance and reduced carcass value. Loss in carcass value is due to not only to the abscessed liver being condemned, but also due to trim loss associated with the condemned liver. According to the 2016 National Beef Quality Audit Report,[4] liver abscesses were the leading cause of offal condemnation (30.8% of livers condemned at slaughter). Brown and Lawrence (2010) estimated that liver abscesses (used 18.1% incidence rate) cost the United States' cattle feeding industry $15.9 million annually in liver condemnation, trim losses, and reduced carcass weights and quality grades.[2]

Since 1973 the most effective tool available for feedlot operators to control the incidence and severity of liver abscesses has been supplementation with tylosin phosphate. Due to regulatory changes pertaining to the use of in-feed antibiotics in cattle production, there is growing interest in alternatives to antibiotics for liver abscess control. However, none of the alternatives that have been studied were able to demonstrate similar efficacy as tylosin phosphate. For this reason, recent research was conducted to determine the effectiveness of tylosin phosphate supplementation over strategic durations on the incidence and severity of liver abscesses in feedlot cattle.[5]

In this research, two experiments were conducted in commercial feedyards. In both experiments, in applicable treatments, tylosin phosphate was formulated and supplied 90 mg/head/day of Tylan 100 Premix (Elanco Animal Health). In Experiment 1, a total of 3,360 steers (initial weight = 831 lb) were used in a randomized complete block design with 6 treatments conducted at a commercial feedyard in the Texas panhandle from January to September. The steers were blocked by arrival date and assigned randomly to 1 of 8 pens per block so that mean weight was similar across pens. A total of 48 pens were used containing 70 steers per pen for a total of 8 replications per treatment. Treatments included no tylosin phosphate (NT) or tylosin phosphate provided the first 26% (FIRST-26, day 0 to 42), 50% (FIRST-50, day 0 to 84), or 75% (FIRST-75, day 0 to 122) or the last 50% (LAST-50, day 80 to 163) of the 163-day feeding period or continuously for 163 days (CONT).

In Experiment 2, a total of 3,625 heifers (initial weight = 589 lb) were used in a randomized complete block design with 6 treatments conducted at a commercial feedyard in Oklahoma from February to November. The heifers were blocked by arrival date and source and assigned randomly to 1 of 6 pens per block so that mean weight was similar across pens. A total of 48 pens were used containing 71 to 80 heifers per pen for a total of 8 replications per treatment. Treatments included no tylosin phosphate (NT) or tylosin phosphate provided the first 17% (FIRST-17, day 0 to 36), 50% (FIRST-50, day 0 to 108), or 74% (FIRST-74, day 0 to 161) or the last 83% (LAST-83, day 36 to 217) of the 217-day feeding period or continuously for 217 days (CONT).

In both experiments liver abscesses were visually assessed and scored according to a modified scoring system based on the Elanco Animal Health Liver Check Service. This system is defined as follows: [A− = 1 or 2 small abscesses ≤2.54 cm in diameter, A = 2 to 4 small active abscesses ≤2.54 cm in diameter, A+ = multiple small abscesses or 1 or more large active abscesses >2.54 cm in diameter, A+ Adhesion = liver adhered to gastrointestinal tract, A+ Open = open liver abscess, and A+ Open/Adhesion = liver adhered to the gastrointestinal tract and an open liver abscess].

Supplementation with tylosin phosphate did not affect intake or growth performance in Experiment 1 ($P \geq 0.27$) or Experiment 2 ($P \geq 0.14$) regardless of duration. Similarly, there were no differences detected in carcass characteristics either experiment (Exp. 1, $P \geq 0.34$ and Exp. 2, $P \geq 0.32$) or health outcomes (Exp. 1, $P \geq 0.27$ and Exp. 2, $P \geq 0.37$).

The effects of feeding tylosin phosphate for varying durations during the feeding period on liver abscesses in Experiment 1 and 2 are shown in Tables 1 and 2, respectively. In Experiment 1, the total percentages of liver abscesses were lowest for the FIRST-75 and continuous treatments and greatest for steers in the no tylosin or LAST-50 treatments, with FIRST-26 and FIRST-50 intermediate ($P < 0.01$). For liver scores, total A+ were least for steers in the FIRST-75, which were similar to the FIRST-26, FIRST-50, and continuous treatments ($P = 0.03$). Steers fed no tylosin had the greatest A+ liver abscess incidence and were similar to steers in the FIRST-26 and LAST-50 treatments.

Table 1. The effects feeding tylosin phosphate (TP) for varying durations during the feeding period on liver abscesses (Experiment 1)

	Treatment[1]						
Item	NT	FIRST-26	FIRST-50	FIRST-75	LAST-50	CONT	P-value
Abscessed, %	15.76[a]	13.18[ab]	13.00[ab]	10.38[b]	17.23[a]	10.32[b]	<0.01
Liver score[2]							
A-, %	2.08	2.77	3.33	2.76	1.63	1.10	0.09
A, %	5.16[ab]	4.74[ab]	4.58[ab]	3.15[b]	7.98[a]	4.24[b]	0.03
Total A+, %	8.53[a]	5.67[abc]	4.76[bc]	4.47[c]	7.62[ab]	4.98[c]	0.03

Adapted from Linneen et al., 2023.

[a–c]Means within a row with different superscript letters differ ($P < 0.05$).

[1]NT = no TP; TP provided for the first 26% (FIRST-26), first 50% (FIRST-50), first 75% (FIRST-75), or last 50% (LAST-50) of the feeding period; CONT = TP continuously fed for the 163-day feeding period.

[2]A− = 1 or 2 small abscesses ≤2.54 cm in diameter, A = 2 to 4 small active abscesses ≤2.54 cm in diameter, A+ = multiple small abscesses or 1 or more large active abscesses >2.54 cm in diameter.

In Experiment. 2, heifers in the LAST-83 and continuous treatments exhibited the lowest ($P < 0.01$) total liver abscess percentage compared with no tylan, FIRST-17, FIRST-50, and FIRST-74 treatments. Heifers in the LAST-83 and continuous treatments had the least ($P = 0.04$) total A+ liver abscesses compared with the greatest incidence for heifers in NT and FIRST-17 treatments.

Table 2. The effects feeding tylosin phosphate (TP) for varying durations during the feeding period on liver abscesses (Experiment 2)

	Treatment[1]						
Item	NT	FIRST-17	FIRST-50	FIRST-74	LAST-83	CONT	P-value
Abscessed, %	29.63[a]	31.58[a]	27.10[a]	26.76[a]	19.66[b]	19.05[b]	<0.01
Liver score[2]							
A-, %	4.54	5.52	6.41	5.47	2.83	1.13	0.08
A, %	5.82	5.07	3.16	3.28	3.19	3.14	0.10
Total A+, %	19.27[a]	20.99[a]	17.54[ab]	18.02[ab]	13.65[b]	12.91[b]	0.04

Adapted from Linneen et al., 2023.

[a,b]Means within a row with different superscript letters differ ($P < 0.05$).

[1]NT = no TP; TP provided for the first 17% (FIRST-17), first 50% (FIRST-50), first 74% (FIRST-74), or last 83% (LAST-83) of the feeding period; CONT = TP continuously fed for the 217-day feeding period.

[2]A− = 1 or 2 small abscesses ≤2.54 cm in diameter, A = 2 to 4 small active abscesses ≤2.54 cm in diameter, A+ = multiple small abscesses or 1 or more large active abscesses >2.54 cm in diameter.

In these experiments, feeding tylosin continuously during the feeding period reduced total live abscess incidence by 35% on average compared with cattle not fed tylosin. This is less than the range of liver abscess reduction from 44 to 76% reported by research spanning multiple decades 1975, 2009, 2019, and 2021).[6, 7, 8, 9] Supplementing tylosin continuously during the feeding period reduced A+ liver abscesses by 42 and 33% in Experiments 1 and 2, respectively. In these two

experiments, limiting tylosin supplementation to only the receiving period was ineffective for the reduction of liver abscesses compared with the negative control.

These researchers concluded that results from these studies indicated supplementation of tylosin can be reduced to 75 to 85% of the feeding period while still being effective in reducing the incidence and severity of liver abscesses, but the ideal timing within the feeding period to remove tylosin remains unclear. In these studies, feeding tylosin did not affect cattle growth performance, health, or carcass characteristics.

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