EXTENSION
BEEF CATTLE RESEARCH UPDATE
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Effects of Antimicrobial Metaphylaxis on the Health and Growth Performance of Lightweight Beef Steer Calves Originating from Mexico

The United States imported almost 1.3 million feeder cattle from Mexico in 2018[1], with over 50% of the cattle weighing less than 400 lb[2]. Before entry into the United States, cattle of Mexican origin are individually identified, branded, tested for tuberculosis, dipped for ticks, and may be commingled with other Mexican-origin cattle or held at the entry port[3]. These marketing and shipping channels from Mexico introduce stress and opportunities for exposure to bovine respiratory disease (BRD) pathogens before cattle arrival at the feedyard. Shipping fever, or BRD, is the most common morbidity and mortality event among feedlot cattle in the United States.[4] BRD accounts for approximately 75% of morbidity[5] and 50 to 70% of mortality in feedlots.[6] Metaphylaxis is the on-arrival, preventative mass medication of antimicrobial therapy for the control of BRD. Research conducted by Cactus Research and Merck Animal Health evaluated the effects of on-arrival metaphylaxis with tilmicosin (Micotil, Elanco Animal Health) or tildipirosin (Zuprevo, Merck Animal Health) compared with no antimicrobial metaphylaxis on respiratory morbidity and mortality rates of cattle that originated in Mexico.[7]

In this study, 4,086 steers originating from Mexico with an average body weight of 470 lb were randomly assigned to on-arrival metaphylaxis treatments at a commercial feedyard in the Texas panhandle: 1) no antimicrobial, 2) 6 mg of Micotil per lb of body weight (BW)., or 3) 1.8 mg of Zuprevo per lb of BW. Ten pen replications per metaphylaxis treatment were used (30 pens). These steers originating from Mexico were received from border inspection stations in Texas, New Mexico, and Arizona. Within 48 hours of arrival all steers were vaccinated against viral respiratory pathogens (Vista Once, Merck Animal Health) and clostridial diseases (Vision 7, Merck Animal Health) and administered internal antiparasiticide (Cydectin Injectable, Bayer) and external antiparasiticide (Ultra Saber Pour-On, Merck Animal Health). In addition, all steers were implanted with Revalor-IS (Merck Animal Health) at initial processing and received a second implant of Revalor-XS (Merck Animal Health) at approximately 100 days on feed.

The effects of the treatments on morbidity and mortality are shown in Table 1. During the first 60 days on feed, the percentage of steers requiring a first treatment for BRD was different between all treatments ($P < 0.001$), with the Controls (10.98%) being greater than Micotil (4.24%), or Zuprevo (2.06%) and Micotil greater than Zuprevo. The percentage of cattle requiring two BRD treatments was greater for Controls (1.60%) compared with either Micotil (0.59%) or Zuprevo (0.44%) but was not different between Micotil and Zuprevo. Similarly, mortality during the first 60 days on feed differed among treatments ($P = 0.001$) such that mortality was greater for Controls (2.12%) than Micotil (0.51%) or Zuprevo (0.59%). but not different between Micotil and Zuprevo.

Initial BRD treatments across the entire feeding period were similar to those in the first 60 days on feed and differed among treatments ($P < 0.001$) such that steers receiving Zuprevo (3.58%) required fewer first BRD treatments than Controls (12.08%) or Micotil (5.56%), with Micotil being intermediate. Second treatments also differed ($P = 0.04$) such that steers in Zuprevo (0.65%) required fewer second BRD treatments compared with Controls (1.67%), whereas Micotil was intermediate (0.95%). Respiratory mortality across the entire feeding period was reduced in Zuprevo (0.95%) or Micotil (1.09%) compared with Controls (2.19%), whereas mortality from other causes was not different among metaphylaxis treatments (data not shown in table).

These researchers also reported that metaphylaxis treatment did not affect dry matter intake ($P = 0.15$), though intake may have been numerically reduced in Controls (18.50 lb) compared with Zuprevo (19.03 lb) due to reduced BRD morbidity in cattle that received metaphylaxis, as morbid

cattle have been reported to have fewer feeding bouts and reduced feed intake. Intake of the Micotil cattle (18.54 lb) was similar to that of the Controls. No differences (P ≥ 0.21) in average daily gains or feed efficiency (Gain/Feed) were observed among treatments. In addition, no differences in carcass characteristics among treatments were reported.

Table 1. Morbidity and mortality in lightweight steers originating in Mexico and administered no metaphylaxis, Micotil, or Zuprevo on arrival.

	Treatment			
Item	Controls	Micotil	Zuprevo	P-value
Morbidity due to BRD[1] and all-cause mortality during the first 60 days on feed				
BRD treated once, %	10.98[a]	4.24[b]	2.06[c]	<0.001
BRD treated twice, %	1.60[a]	0.59[b]	0.44[b]	0.003
Mortality, %	2.12[a]	0.51[b]	0.59[b]	0.001
Morbidity due to BRD across the entire feeding period				
Days to first treatment	23	48	51	0.111
Treated once, %	12.08[a]	5.56[b]	3.58[c]	<0.001
Treated twice, %	1.67[a]	0.95[ab]	0.65[b]	0.035
All-cause mortality across the entire feeding period				
Dead, %	3.22	1.97	2.26	0.093
Respiratory, %	2.19[a]	0.95[b]	1.09[b]	0.013

[a–c]Means within the same row with unlike superscripts differ, P < 0.05.
[1]BRD = bovine respiratory disease.
Adapted from Word et al., 2021.

These authors concluded that "on-arrival administration of an antimicrobial was an effective method of reducing BRD morbidity and mortality of lightweight steers originating from Mexico in this study. However, BRD first-treatment morbidity was further reduced when metaphylaxis with Zuprevo was used compared with Micotil." They also speculated that live growth performance and carcass characteristics were unaffected by metaphylaxis treatment due to low morbidity in the study population, resulting in minimal detectable performance differences between treatments.

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[2] Peel, D. S., K. H. Mathews, and R. J. Johnson. 2011. Trade, the expanding Mexican beef industry, and feedlot and stocker cattle production in Mexico. USDA Economic Research Service. Available at: https://www.ers.usda.gov/webdocs/outlooks/37416/6818_ldpm20601.pdf?v=3652.1

[3] USDA. 2018. Protocol: Feeder cattle and bison from Mexico. Available at: https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/animal-and-animal-product-import-information/imports/live-animal-imports

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