

# Reduction in BRD control antimicrobial administration in a multi-site study comparing a conventional BRD control regimen to a targeted individual animal prediction technology among feedlot cattle in a US feedlot.

## INTRODUCTION

Bovine respiratory disease (BRD) is the predominant cause of feedlot morbidity and mortality in the US. Antimicrobial metaphylaxis (i.e. metaphylaxis) is utilized to reduce the negative impact of BRD. Metaphylaxis works!

The BRD prediction technology was designed to estimate individual animal risk of developing BRD at the time of feedlot arrival/processing. Outcomes are used for metaphylaxis decisions.

The BRD prediction technology was designed to capture up to 4 pieces of individual animal information.

- ▶ Cardiac and pulmonary data.
- ▶ Rectal temperature.
- ▶ Body weight.

## OBJECTIVE

The study objective was to determine if cattle health and performance comparing a targeted bovine respiratory disease (BRD) prediction technology (BRD\_PT; Whisper® On-Arrival) was superior to a negative control (no metaphylaxis) yet no different than a positive control (conventional BRD metaphylaxis; 100% application).

## MATERIALS AND METHODS

### 4 study sites

- ▶ TX (2 sites; TX-1, TX-2)
- ▶ OK
- ▶ NE
- Sample population**
- ▶ Beef/beef-cross steers.
- ▶ Procured from typical commerce channels.

### Enrollment criteria

- ▶ Medium/High risk of developing BRD.
- ▶ No clinical signs of severe BRD or non-BRD syndromes upon arrival.

### Day 0 processing activities

- ▶ MLV/Mh-Pm vaccine.
- ▶ Multi-valent clostridial toxoid.
- ▶ Internal/external parasite treatment.
- ▶ Growth promoting implant.
- ▶ Individual ID tag.
- ▶ Individual body weight.
- ▶ ± Tildipirosin (metaphylaxis).

Treatment	Description
Negative Control	Saline
Positive Control	Tildipirosin* (100% administration)
BRD_PT-high	Tildipirosin administered when respective probability threshold was exceeded
BRD_PT-low	

\*Tildipirosin dose: 4 mg/kg (1 mL/100 lbs) subcutaneous injection

- ▶ Calves were penned by treatment group.
- ▶ A 3-day PMI was observed.
- ▶ Cattle were observed daily by pen riders blinded to treatment group.
- ▶ BRD case definition:
  - > CIS ≤ 2 AND rectal temperature ≥ 104 °F (40 °C), OR
  - > CIS = 3 regardless of temperature.

- ▶ Eligible for up to 3 BRD treatment events.
- ▶ Followed to either a short-term (~ 60 days) or long-term (~ 240 days) timepoint.

### STATISTICS

- ▶ Pen was the experimental unit.
- ▶ Alpha ≤ 0.05.
- ▶ Fitted models:
  - > Binomial (pen-level proportion outcomes).
  - > Multinomial (ordinal carcass grades).
  - > Normal (continuous outcomes).
- ▶ Random intercept term to account for design structure.
- ▶ Treatment group included as the fixed effect.

The BRD prediction technology (Whisper® On-Arrival) displayed no statistical differences in health/performance compared to a conventional BRD control program but reduced BRD control antimicrobial use by 10% to 43%.



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## RESULTS

- ▶ BRD control (metaphylaxis) is a proven management practice.
- ▶ The BRD prediction technology (Whisper® On-Arrival) represents an evolution of that practice.
- ▶ Across 4 sites, the BRD prediction technology:
  - > Displayed no statistical differences in health/performance compared to a conventional BRD control program (i.e. 100% antimicrobial administration) across all 4 sites.
  - > Significantly improved health and performance outcomes compared to the negative control (in 3 of 4 sites).
  - > Reduced BRD control antimicrobial use 10% - 43%

TABLE 1. 5,120 steer calves allocated to their respective treatment groups.

Study Site	BW at Arrival (kg)		Pens/Trt Group	Hd/Pen	Study Duration
	Mean	Range			
TX-1	286	173-440	7	70	60 days
TX-2	262	210-435	10	20	Closeout
OK	278	181-429	7	70	Closeout
NE	236	172-328	10	10	60 days

TABLE 2. OK site; short-term health outcomes.

Outcomes	Negative control		Positive control		BRD_PT-high		BRD_PT-low		P-value
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM	
BRD control drug application (%)	0%		100%		87.2%		62.9%		
Days on Feed	60		60		60		60		
In Weight (kg)	277.6	12.7	278.5	12.7	278.1	12.7	277.6	12.7	0.89
BRD morbidity	17.48% <sup>a</sup>	7.50%	8.62% <sup>b</sup>	4.15%	10.33% <sup>b</sup>	4.82%	10.23% <sup>b</sup>	4.86%	<0.01
BRD 2 <sup>nd</sup> treatments	4.88% <sup>a</sup>	2.23%	2.16% <sup>b</sup>	1.09%	2.62% <sup>b</sup>	1.29%	3.96% <sup>b</sup>	1.85%	0.04
BRD 3 <sup>rd</sup> treatments	3.20% <sup>a</sup>	1.15%	1.06% <sup>b</sup>	0.52%	1.24% <sup>b</sup>	0.58%	2.65% <sup>ab</sup>	0.99%	0.04
BRD case-fatality	1.74%	1.22%	0.00%	0.00%	1.39%	0.71	4.11%	2.32%	0.71
BRD mortality	0.61%	0.35%	0.00%	0.00%	0.20%	0.68	0.81%	0.40%	0.68
Overall mortality	0.61%	0.35%	0.00%	0.00%	0.61%	0.98	0.81%	0.40%	0.98

TABLE 3. OK site; closeout health outcomes.

Outcomes	Negative control		Positive control		BRD_PT-high		BRD_PT-low		P-value
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM	
BRD control drug application (%)	0%		100%		87.2%		62.9%		
Days on Feed	240		240		240		240		
BRD morbidity	21.96% <sup>a</sup>	6.27%	11.54% <sup>b</sup>	3.82%	13.24% <sup>b</sup>	4.27%	13.35% <sup>b</sup>	4.30%	<0.01
BRD 2 <sup>nd</sup> treatments	6.41%	2.21%	3.48%	1.33%	3.50%	1.34%	5.01%	1.80%	0.06
BRD 3 <sup>rd</sup> treatments	4.21% <sup>a</sup>	1.31%	1.82% <sup>b</sup>	0.72%	1.64% <sup>b</sup>	0.67%	3.28% <sup>b</sup>	1.09%	0.04
BRD case-fatality	3.23%	1.59%	1.45%	1.44%	1.28%	1.27%	6.33%	2.74%	0.33
BRD mortality	1.21%	0.51%	0.20%	0.20%	0.40%	0.29%	1.20%	0.51%	0.20
Overall mortality	1.82%	0.60%	1.01%	0.45%	1.22%	0.49%	1.82%	0.60%	0.63

TABLE 4. OK site; closeout performance outcomes.

Outcomes	Negative control		Positive control		BRD_PT-high		BRD_PT-low		P-value
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM	
BRD control drug application (%)	0%		100%		87.2%		62.9%		
Days on Feed	240		240		240		240		
In Weight (kg)	277.6	12.7	278.5	12.7	278.1	12.7	277.6	12.7	0.51
Average Final Weight (pen; kg)	630	8	640	8	639	8	641	18	0.13
ADG (deads-out; kg/d)	1.5	0.1	1.5	0.1	1.5	0.1	1.5	0.1	0.17
ADG (deads-in; kg/d)	1.36 <sup>a</sup>	0.05	1.45 <sup>b</sup>	0.05	1.46 <sup>b</sup>	0.05	1.43 <sup>ab</sup>	0.05	0.05
Mean Daily DMI (kg)	8.3	0.2	8.3	0.2	8.6	0.2	8.4	0.2	0.06
G:F (deads-out; kg/d)	0.18	0.002	0.18	0.002	0.18	0.002	0.18	0.002	0.18
G:F (deads-in; kg/d)	0.16	0.003	0.17	0.003	0.17	0.003	0.17	0.003	0.16

TABLE 5. OK site; carcass outcomes.

Outcomes	Negative control		Positive control		BRD_PT-high		BRD_PT-low		P-value	
	Mean	SEM	Mean	SEM	Mean	SEM	Mean	SEM		
BRD control drug application (%)	0%		100%		87.2%		62.9%			
Hot carcass weight, kg	376 <sup>a</sup>	4.0	380.9 <sup>b</sup>	4.0	385.5 <sup>b</sup>	4.0	380.0 <sup>a</sup>	4.0	0.03	
Yield, %	65.15	0.42	65.00	0.42	65.44	0.42	64.25	0.42	0.14	
Ribeye Area	14.76	0.20	14.81	0.20	14.96	0.20	14.61	0.20	0.08	
Marbling	515	10.26	502	10.26	502	10.26	503	10.26	0.31	
Backfat	0.66	0.01	0.67	0.01	0.67	0.01	0.68	0.01	0.76	
Calculated Yield Grade	3.20	0.08	3.25	0.08	3.21	0.08	3.31	0.08	0.50	
	% of treatment group (count)								0.38	
Yield Grade	1	8.48% (39)		9.19% (44)		15.19% (72)		7.28% (34)		N=1880
	2	34.35% (158)		30.48% (146)		30.80% (146)		32.55% (152)		
	3	36.96% (170)		38.83% (186)		35.23% (167)		36.83% (172)		
	4	17.83% (82)		18.79% (90)		15.82% (75)		19.49% (91)		
	5	2.39% (11)		2.71% (13)		2.95% (14)		3.85% (18)		
	% of treatment group (count)								0.44	
Quality Grade	Prime	6.09% (28)		4.59% (22)		16.70% (79)		4.50% (21)		N=1879
	Choice	82.61% (380)		84.55% (405)		74.63% (353)		86.94% (406)		
	Select	10.65% (49)		10.86% (52)		8.46% (40)		8.57% (40)		
	Other	0.65% (3)		0.00% (0)		0.21% (1)		0.00% (0)		

Nickell et al. Transl. Anim. Sci. 2021.5:1-13.