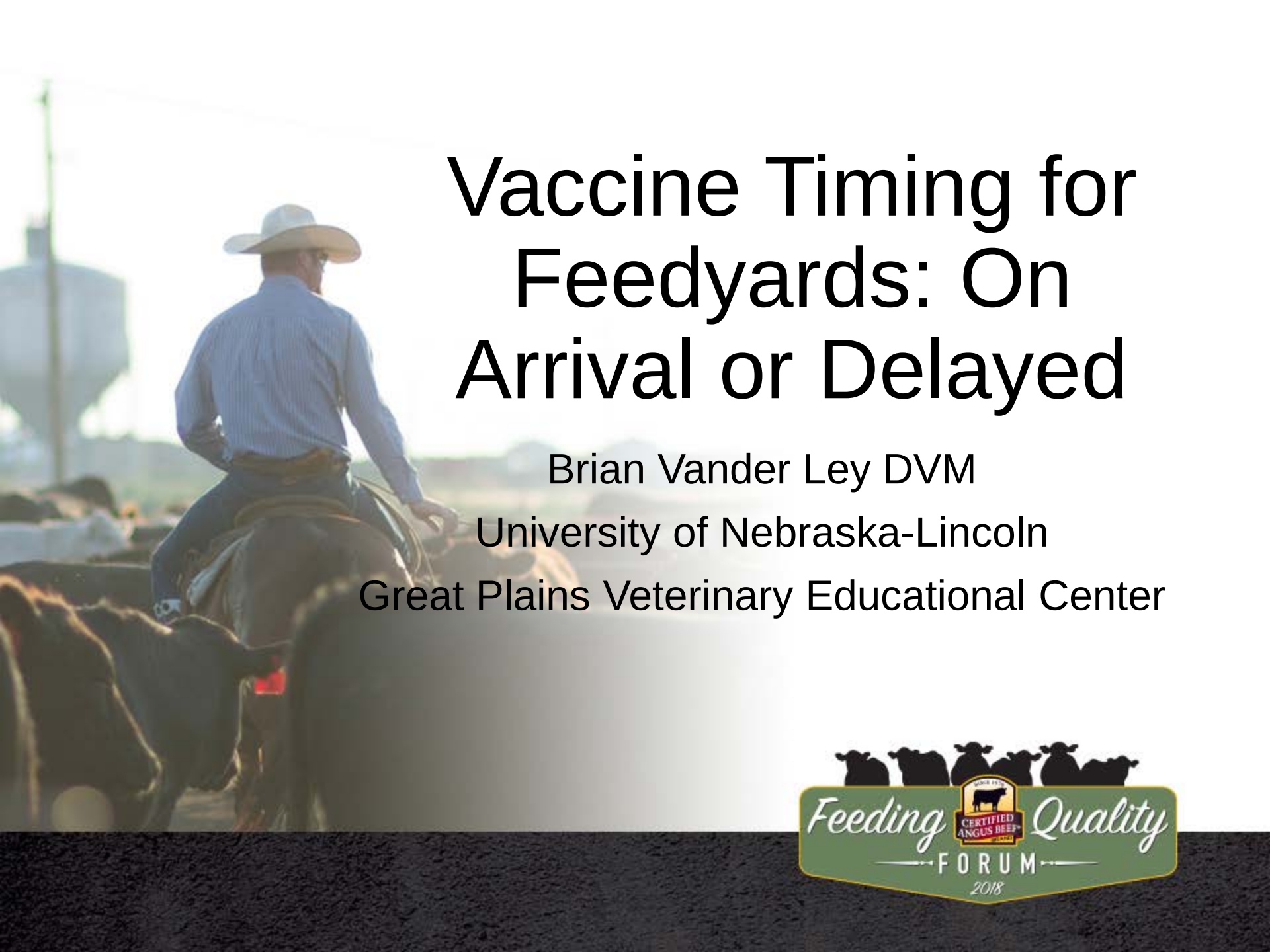


Vaccine Timing for Feedyards: On Arrival or Delayed

Brian Vander Ley DVM

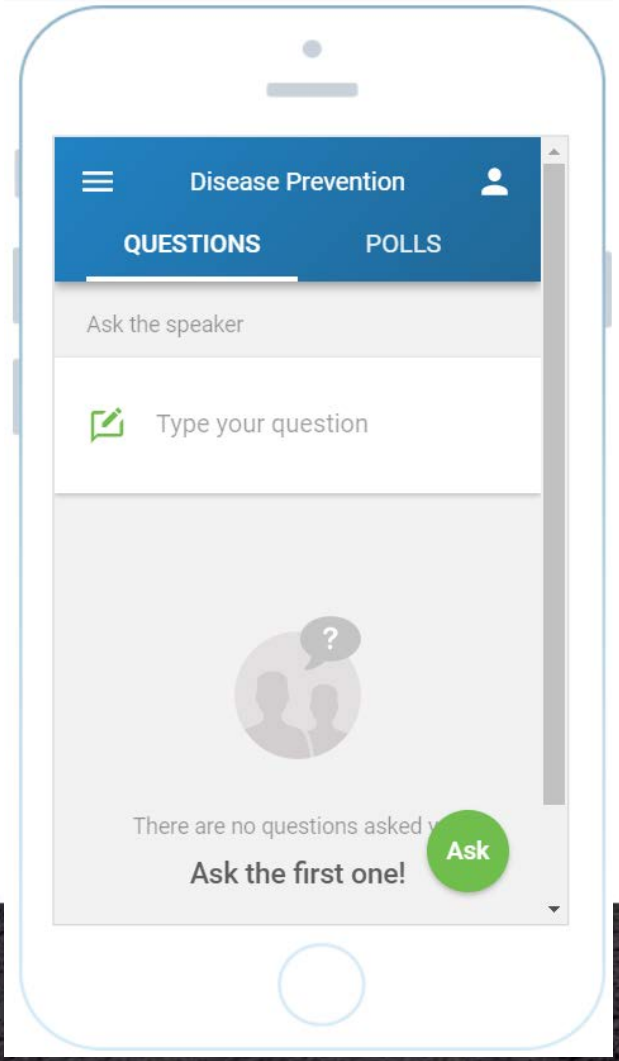
University of Nebraska-Lincoln

Great Plains Veterinary Educational Center

Feeding Quality FORUM 2018

Audience Participation

- Sli.do.com or google “slido”
- Under event code enter “FQF18”
- Ask your questions
- Like other questions to bump them to the top of the list



Vaccination in Feeder Cattle

- Standard practice
  - On-arrival or nearly so
- Questions: Is vaccination safe? Which cattle are safe to vaccinate? When?
- Assumption: Vaccination is at worst the loss of dollars used to purchase the vaccine

Background

- Vaccine labels (Taken straight from a vaccine label)
  - DIRECTIONS: General Directions: Vaccination of healthy cattle is recommended.
- Are newly received calves healthy?
  - Stress
  - Commingling
  - Transport

A Small Trial

A randomized controlled trial to test the effect of on-arrival vaccination and deworming on stocker cattle health and growth performance

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Ray M. Kaplan,[3] DVM, PhD, DEVPC, DACVM; **William B. Epperson**,[1] DVM, MS, DACVPM (Epidemiology);
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Study Design

- 80 Ultra-High Risk Calves
  - 64 bulls, Avg Weight≈450 lbs
  - MS Auction Market
- 2x2 Factorial
- 85 Day Trial
- No Mass Tx

Negative Control **No Vaccine** **No Dewormer** **N=20 (4/pen)**	**Vaccinated** **No Dewormer** **N=20 (4/pen)**
Dewormed No Vaccine N=20 (4/pen)	Vaccinated Dewormed N=20 (4/pen)

Impact on BRD Outcomes

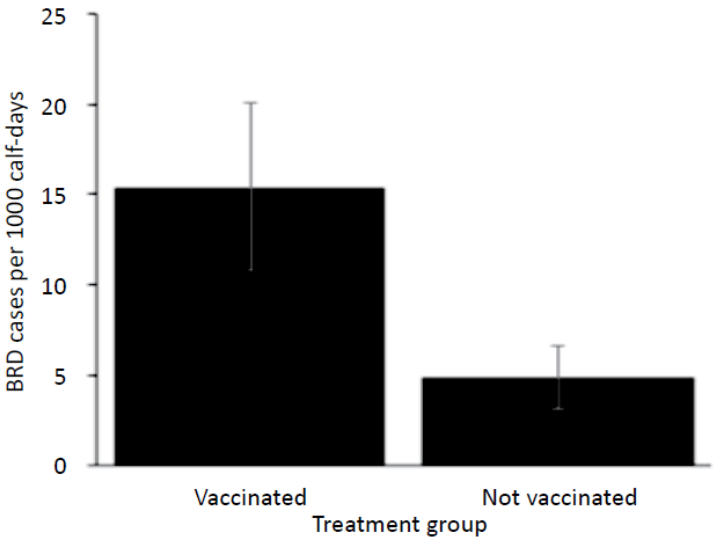


Figure 1. Model-adjusted BRD incidence density for calves vaccinated at arrival (n=40 calves, 10 pens) and calves not vaccinated (n=40 calves, 10 pens) from a Poisson regression model. Calves vaccinated with a modified-live respiratory virus vaccine and a clostridial bacterin-toxoid at d 0 were 3.2 times more likely to be treated for BRD at any point during the 85-day observation period. Error bars represent one standard error.

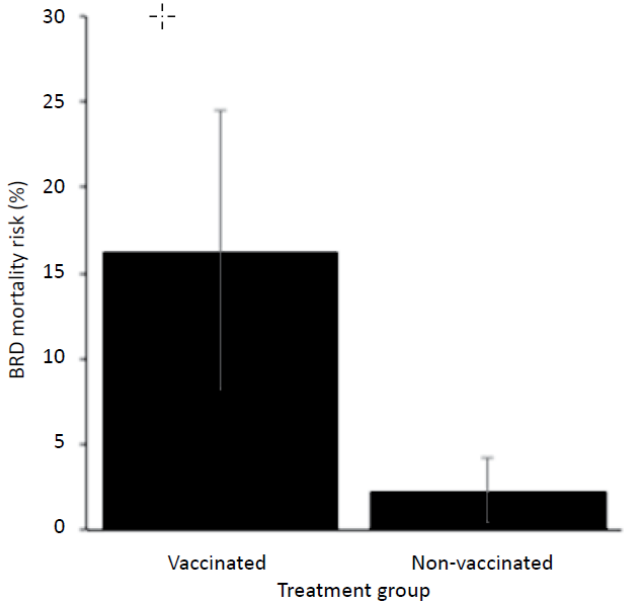
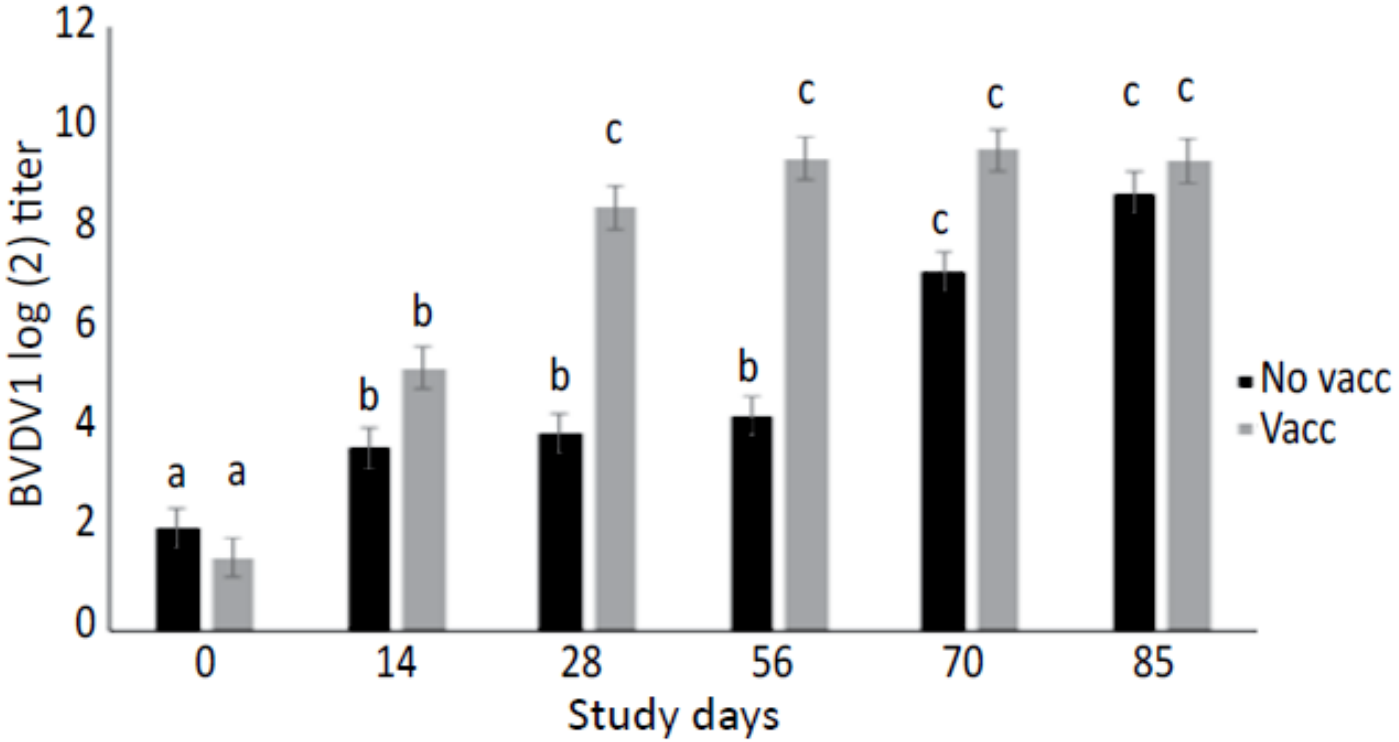


Figure 3. Model-adjusted BRD mortality for calves vaccinated at arrival (n=40 calves, 10 pens) and calves not vaccinated at arrival (n=40 calves, 10 pens) from a logistic regression model. Calves vaccinated with a modified-live respiratory virus vaccine and a clostridial bacterin-toxoid at d 0 had 8.3 times greater odds of death. Error bars represent 1 standard error.

Antibody Responses



Performance Results

- Vaccination=10.3 lbs less (model adjusted for pen, castration status)
- Parasites had a negative impact that was not corrected by deworming

Effects of on-arrival versus delayed modified live virus vaccination on health, performance, and serum infectious bovine rhinotracheitis titers of newly received beef calves[1]

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*University of Arkansas, Division of Agriculture, Department of Animal Science, Fayetteville 72701; and †Boehringer-Ingelheim Vetmedica Inc., St Joseph, MO 64501

ABSTRACT: Stress commonly associated with weaning, marketing, and shipment of feeder cattle can temporarily compromise immune function, thereby reducing the effective response to vaccination intended to control bovine respiratory disease (BRD). Two vaccination timing treatments were used to evaluate the effect of timing of a multivalent modified live virus (MLV) BRD vaccine on health, performance, and infectious bovine rhinotracheitis (IBR) antibody titers of newly received stocker cattle. Crossbred bull and steer calves (n = 528) were weighed (197 ± 2.4 kg) and randomly assigned to MLV vaccination treatment: 1) MLV vaccination upon arrival (AMLV), or 2) delayed (14 d) MLV vaccination (DMLV). All cattle were processed similarly according to routine procedures, with the exception of the initial MLV vaccination timing. Subsequently, BW were recorded on d 14, 28, and 42. Blood samples were collected on d 0, 14, 28, and 42 to determine serum IBR titers, and comparisons were made between treatments on a receiving-day basis and an equivalent postvaccination day basis. Daily BW gains were greater ($P \leq 0.05$) for DMLV calves from d 0 to 14 (1.16 vs. 0.88 ± 0.22 kg/d) and from d 0 to 42 (0.75 vs. 0.65 ± 0.09 kg/d). Days to first treatment, total treatment cost, percentage death loss, and pasture ADG after the 42-d receiving period did not differ ($P \geq 0.15$). Morbidity rates for BRD were high for both AMLV and DMLV (71.5 and 63.5%, respectively) and did not differ ($P = 0.12$). Positive IBR titer seroconversion was greater ($P \leq 0.03$) for DMLV calves on d 42 of the study, and for the 28- and 42-d equivalent postvaccination basis. Delaying vaccination by 14 d may increase ADG during the receiving period compared with AMLV, and seroconversion to IBR was greater in DMLV calves, indicating a possible improvement in acquired immune response when MLV vaccination is delayed.

Key words: cattle, performance, stress, timing, vaccination

J. Anim. Sci. 2008. 86:999–1005
doi:10.2527/jas.2007-0593

Study Design

- 528 Steers and Bulls
  - Highly Commingled
  - “High Risk Calves”
  - 36 pens of 10-19 head/pen
- Two treatments
  - Arrival Vaccination (Day after arrival)
  - Delayed Vaccination (Day 14 after arrival)
- Targeted metaphylaxis (Tilmicosin if temp>104°F)

Results

Table 1. Effect of bovine respiratory disease vaccination timing on performance of newly received cattle

Item	AMLV[1]	DMLV[1]	SE[2]	*P*-value
BW,[3] kg				
d 0	197.7	195.9	2.42	0.33
d 14	208.6	212.7	3.03	0.007
d 28	217.4	219.9	2.93	0.16
d 42	224.4	228.1	4.08	0.07
ADG,[3] kg				
d 0 to 14	0.88	1.16	0.22	0.007
d 14 to 28	0.61	0.53	0.15	0.45
d 28 to 42	0.45	0.56	0.10	0.12
d 0 to 42	0.65	0.75	0.09	0.05
Pasture ADG,[4] kg	0.89	0.84	0.08	0.15

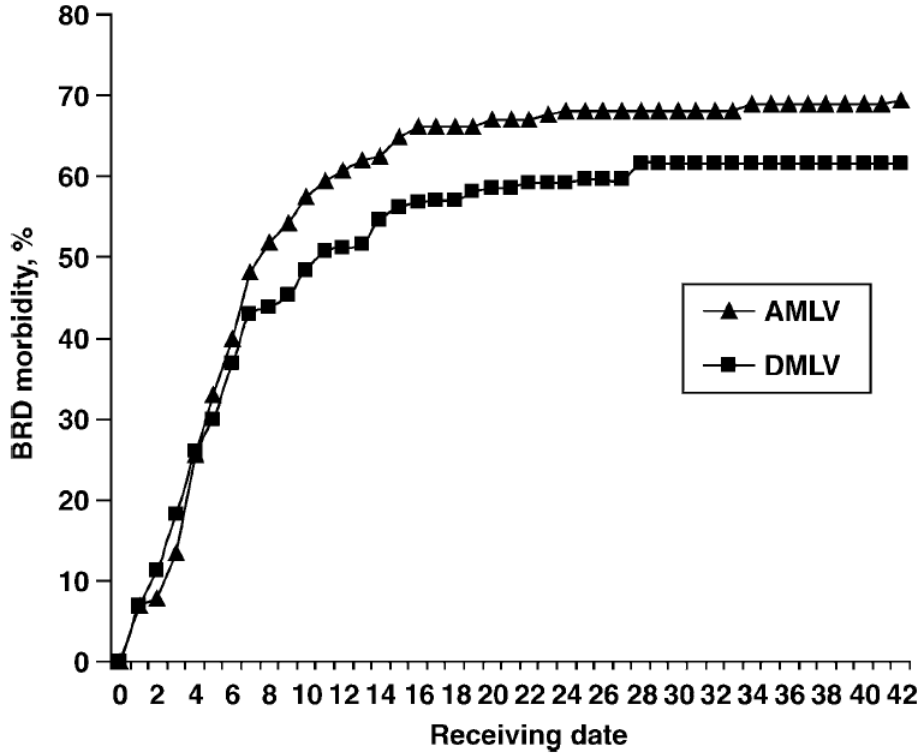

Figure 1. Cumulative percentage of calves receiving arrival modified live virus vaccination (AMLV) or delayed modified live virus vaccination (DMLV) for bovine respiratory disease (BRD), by treatment and receiving date (P = 0.21, SE = 0.10), excluding cattle receiving on-arrival metaphylaxis with tilmicosin phosphate at 1.5 mL/45 kg of BW.

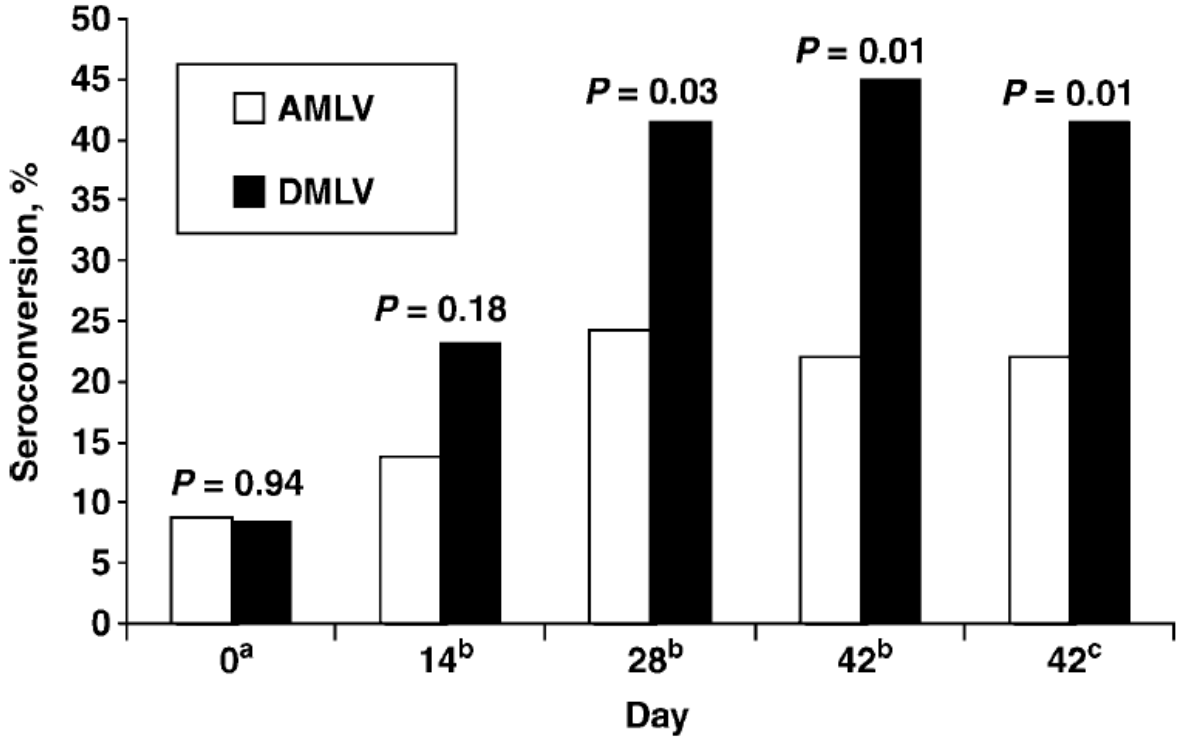

Figure 2. Percentage of infectious bovine rhinotracheitis seroconversion for calves receiving arrival modified live virus vaccination (AMLV) or delayed modified live virus vaccination (DMLV) [a]on arrival (d 0), [b]on equivalent days past the initial vaccination, and [c]at the end of the receiving period (d 42).

Another, Bigger Study

Effects of delayed respiratory viral vaccine and/or inclusion of an immunostimulant on feedlot health, performance, and carcass merits of auction-market derived feeder heifers

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Study Design

- 5,179 heifer calves
- 60 pens
- OK and TX origin
- Treatments
  - Arrival Vaccination, No Immunostimulant
  - Delayed Vaccination, No Immunostimulant
  - Arrival Vaccination, Immunostimulant
  - Delayed Vaccination, Immunostimulant
- Metaphylaxis
- Followed to Finish

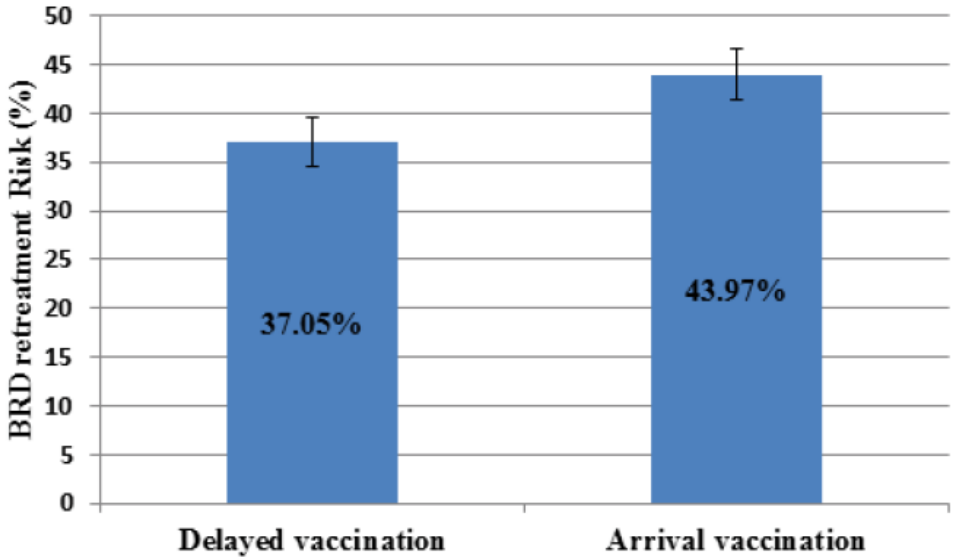
Close Out Results

Table 3. Health performance of feedlot heifers at close-out for the effects of vaccination timing and immunostimulant inclusion (model-adjusted means, (SEM)).

	Experimental group*						
Item	**DP†**	**AP**	**DPZ‡**	**APZ**	***P*-value P§**	***P*-value Z‖**	***P*-value P x Z¶**
BRD 1 treatment, %	26.03 (2.09)	25.50 (2.07)	25.18 (2.05)	25.16 (2.05)	0.82	0.63	0.83
BRD 2 treatments, %	9.64 (1.21)	11.05 (1.33)	8.93 (1.15)	11.01 (1.32)	0.04	0.63	0.66
BRD 3 treatments, %	5.53 (0.79)	5.79 (0.82)	4.35 (0.68)	5.50 (0.79)	0.24	0.22	0.42
BRD re-treatment risk,# %	37.95 (3.09)	43.59 (3.20)	36.17 (3.09)	44.35 (3.22)	0.01	0.84	0.64
BRD case fatality, %	13.44 (1.90)	16.08 (2.08)	10.28 (1.71)	13.11 (1.90)	0.14	0.10	0.85
BRD mortality, %	3.61 (0.64)	4.36 (0.73)	2.65 (0.53)	3.36 (0.61)	0.15	0.06	0.88
Overall mortality, %	5.35 (0.80)	5.88 (0.86)	3.79 (0.64)	5.02 (0.77)	0.13	0.04	0.45
BRD outs (deads + removals), %	4.17 (0.78)	4.98 (0.89)	3.47 (0.68)	4.21 (0.79)	0.16	0.18	0.95
Total outs (deads + removals), %	6.34 (0.96)	6.88 (0.10)	5.26 (0.84)	6.16 (0.94)	0.27	0.17	0.73

BRD Treatment Differences

Figure 2. Model-adjusted means (and standard errors of the means) for BRD retreatment risk at close-out, demonstrating the statistically significant reductions due to delaying MLV vaccine* administration (*P*=0.01).



Interpreting the Results

- Impact of Study Design on Outcomes
- Impact of Risk Classification on Outcomes

What's Going On

- Stress-Physiologic, Nutritional, Social
- Commingling-new susceptible hosts + pathogen exchange
- Co-Infections

The Forces At Play

Published December 5, 2014

Effects of commingling beef calves from different sources and weaning protocols during a forty-two-day receiving period on performance and bovine respiratory disease[1,2]

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Study Design

- 509 Steers
  - MS Market-N=260
  - MO Ranch-N=249
- 2x3+1 Factorial
  - Weaning Management (Abrupt, Wean45, WeanVac45)
  - Commingled or not
  - Auction market calves served as control

Impact of Commingling

Table 5. Effects of calf origin/commingling on morbidity, mortality, and health costs[1]

Item	RANCH	MARKET	COMM	SEM[2]	*P* > *F*
Morbidity, %	11.1[a]	41.9[b]	22.6[c]	5.6	<0.001
Treated once, %	7.4[a]	31.9[b]	15.9[a]	4.2	<0.001
Treated twice, %	1.9	4.0	6.1	2.4	0.32
Treated thrice, %	1.8[a]	6.0[b]	0.6[a]	1.6	0.04

Impact of Weaning/Vaccination

Table 6. Effects of weaning management on morbidity, mortality, and health costs[1]

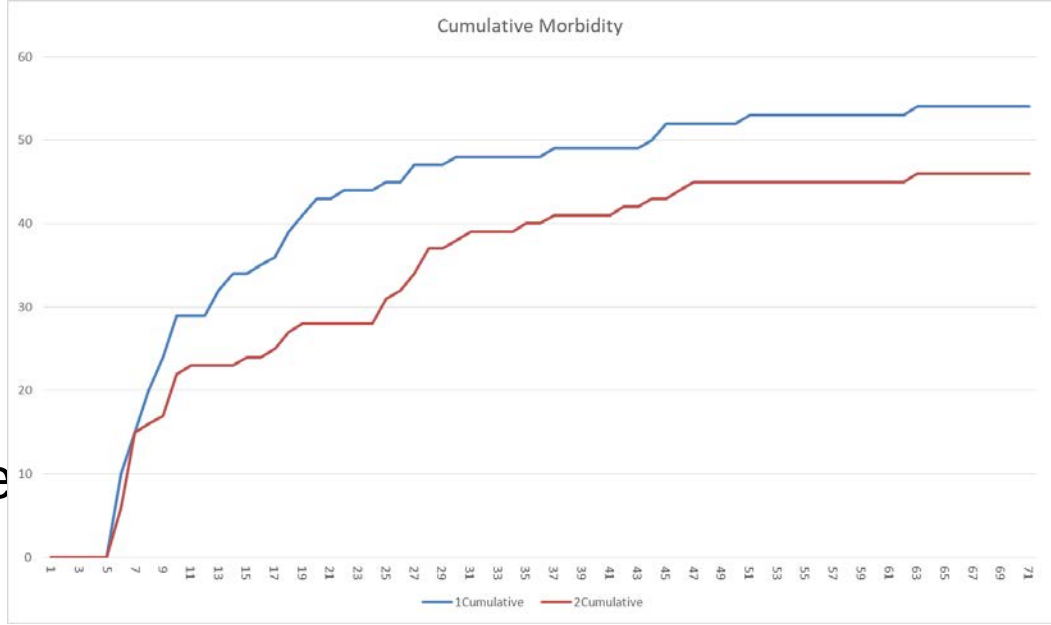
		RANCH				
Item	MARKET	WEAN	WEAN45	WEANVAC45	SEM[2]	$P > F$
Morbidity, %	41.9[a]	35.1[a]	5.9[b]	9.5[b]	4.2	<0.001
Treated once, %	31.9[a]	22.2[a]	5.0[b]	7.7[b]	3.8	<0.001
Treated twice, %	4.0[ab]	9.2[a]	0.9[b]	1.8[b]	2.2	0.05
Treated thrice, %	6.0[a]	3.7[ab]	0.0[b]	0.0[b]	1.5	0.02

The Vaccine Value Proposition

- Benefits of Vaccination
  - Induce herd immunity
  - Eliminate “pockets of naivety”
- Costs of Vaccination
  - Serves as a coinfection when given to sick animals
  - Fails to provide benefits when given during times of increased stress

The Decision to Delay

- How does my system work now?
  - Epidemiologic curves
- How does this fit my system?
  - Processing timing
  - Risk of incoming cattle
- What might be the unintended consequences?



Questions, Comments

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