

Supplementing Bovacillus™ to high-risk cattle during a 90-d grazing period

R. F. Cooke, F. N. T Cooke, S. J. Mackey, K. M. Harvey, B. B. Karisch, B. I. Cappellozza

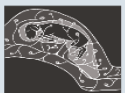
Texas A&M University - Department of Animal Science

Mississippi State University - Department of Animal and Dairy Sciences

Novonesis, Horsholm 2970, Denmark



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Introduction



Cow-calf systems
Calves weaned at 7 mo of age



Pasture (40%) - Stocker



Feedyards (60%) – Receiving/Growing yards



Finishing/Fattening (12 to 16 mo of age)
95% finishing in feedlots





Introduction



- Stocker cattle are exposed to a plethora of stressors:
 - Weaning
 - Transport
 - Novel diets and environments
 - Commingling
- Immunosuppression and increased risk of BRD
- Nutritional interventions are investigated to promote performance and immunity



CATTLE ADAPTED TO TROPICAL &
SUBTROPICAL ENVIRONMENTS

Bacillus-based probiotic



- ***Bacillus*-based probiotics enhance:**
- Rumen function
 - Proliferation of microbes
 - Synthesis of digestive enzymes
 - Dietary DM and NDF digestibility
- Immunocompetence
 - Inhibits pathogen growth
 - Stimulates biofilm and mucin
 - Improve intestinal barrier function



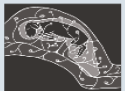
Hypothesis: the addition of a *Bacillus*-based probiotic will improve immunity and productivity of high-risk stocker cattle.

Objective: compare performance, physiological, and health responses of high-risk stocker cattle supplemented with or without the *Bacillus*-based probiotic ingredient during a 90d grazing period.

Materials and Methods



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Years 1 & 2

- The experiment was completed in two replicates:
 - Year 1: Sept 15, 2022 – Dec 15, 2022
 - Year 2: Sept 14, 2023 – Dec 14, 2023
- Experiment conducted at H. H. Leveck Animal Research Center Beef Unit in Starkville, MS
- 240 angus-influenced, auction yard purchased steers (120 steers/year)
 - Originating from MS, AL, LA





Initial Processing

- **d -1:** cattle were transported 150 km to research facility, immediately weighed and maintained as a single group
- **d 0:** Initial processing
 - Respiratory (Vista Once SQ)
 - *Clostridium* (Covexin 8)
 - Anthelmintic (Safeguard)
 - Tissue sample collected for BVD PI
 - Vaccinations were boosted on d 14





Study Pastures

- Initial BW (236 ± 1 kg) was used to allocate steers to 1 of 12 pastures (4-ha pastures; 10 steers/pasture; 24 total pastures)
- Pastures were stockpiled with native forage, primarily dallisgrass and bermudagrass
 - Pastures were supplemented with bermudagrass hay when forage availability became limited around d 52 both years
- A commercial mineral + vitamin mix (without ionophores) was provided for the duration of the experiment





Treatments



- Pastures were randomly assigned to receive 1 of 2 treatments:
 - **BOV**; *Bacillus*-based ingredient Bovacillus[®] provided at 2g/steer/day
 - **CON**; no additive
- All pastures were supplemented daily with dried distillers' grain at 1% of BW average
 - Treatment was incorporated into 4.54 kg of DDG taken from the total daily offer to be top-dressed
 - Cattle received treatments from d 0 - d 90



Sample Collection

- Full BW recorded on d 0, 14, 28, 56, 90
 - Shrunk BW (16-hour food and water withdrawal) recorded on d 91 for ADG calculations
- Blood samples were collected immediately after BW assessment

Day 0

Day 14

Day 28

Day 56

Day 90

Day 91





CATTLE ADAPTED TO TROPICAL & SUBTROPICAL ENVIRONMENTS

Bovine Respiratory Disease

- Cattle were monitored daily for BRD symptoms
 - Treatment decisions were made utilizing the DART score system (Zoetis)
 - Cattle were checked by trained individuals on horseback





Statistics Overview



Quantitative data was analyzed using MIXED procedure in SAS



Binary data was analyzed using GLIMMIX procedure in SAS



Day 0 was used as covariate



Experimental unit is the pen



Significance was determined to be $P \leq 0.05$

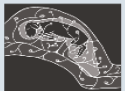


Tendency was determined to be $0.10 \geq P > 0.05$

Results and Discussion



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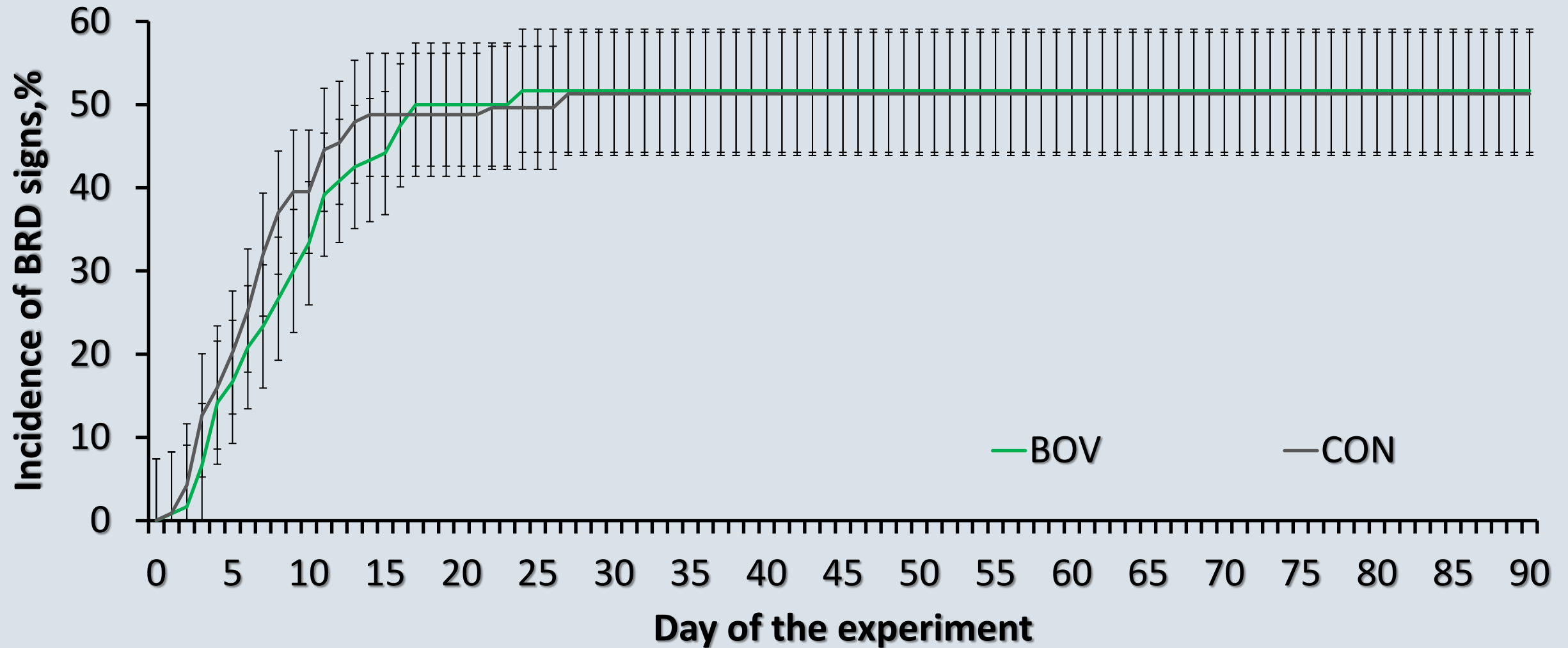
Performance Parameters

Item	BOV	CON	SEM	P-value
Individual steer responses				
Body weight, kg				
Initial	236.4	236.7	1.5	0.89
Final	300.7	301.9	2.4	0.73
Average daily gain, kg/d	0.703	0.712	0.025	0.80
Growth rate, kg/d	0.757	0.762	0.022	0.87
Pasture-based responses				
Initial liveweight, kg/pasture	2,364	2,366	6	0.77
Final liveweight, kg/pasture	3,007	2,869	46	0.04
Liveweight gain, kg/pasture	643	502	45	0.04



BRD Incidence

$P \geq 0.33$





Health responses

Item	BOV	CON	SEM	<i>P-Value</i>
All steers, %				
Incidence of BRD, %	51.7	51.3	7.7	0.97
Mortality	0.00	2.52	1.01	0.08
Removals	0.00	2.52	1.01	0.08
Removals + mortality	0.00	5.04	1.41	0.01
Steers diagnosed with BRD, %				
Recovered after 1 treatment	87.1	78.7	4.7	0.22
Recovered after 2 treatments	12.9	18.0	4.6	0.43
Recovered after 3 treatments	0.0	3.28	1.60	0.15
Mortality	0.0	4.92	1.95	0.07
Removals	0.0	1.64	1.14	0.31
Removals + mortality	0.0	6.45	2.34	0.05



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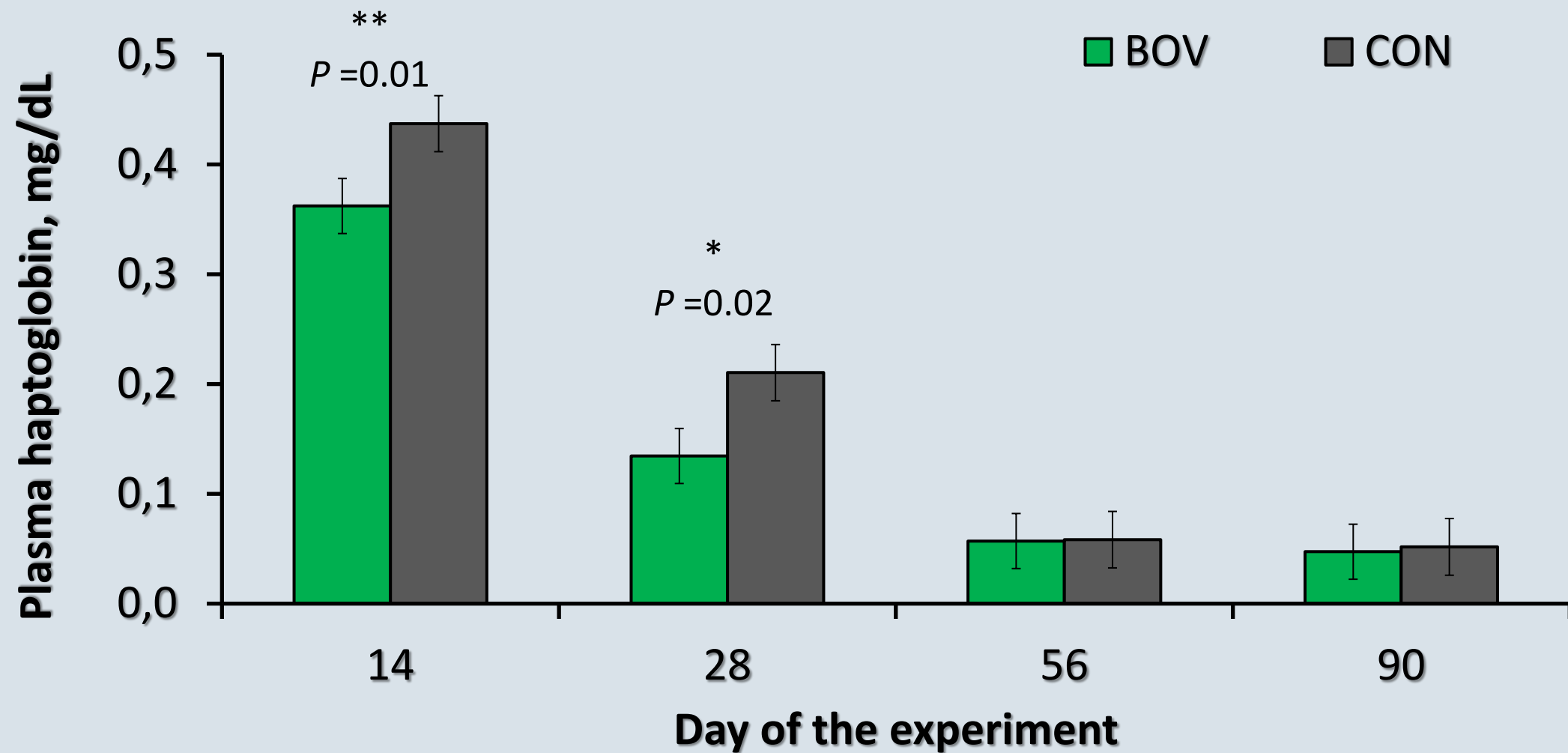


Physiological responses

Item	BOV	CON	SEM	P-value
Plasma metabolites and hormones				
Glucose, mg/dL	78.3	78.6	0.9	0.83
BHBA, mg/dL	2.05	2.04	0.03	0.85
NEFA, mEq/L	0.343	0.342	0.011	0.94
Cortisol, ng/mL	22.3	19.5	2.8	0.49
IGF-I, ng/mL	112	110	3.2	0.74
Plasma antibodies against respiratory viruses				
BVDV, S/P ratio	1.36	1.49	0.10	0.36
BHV, S/P ratio	3.31	3.25	0.20	0.85
PI3, S/P ratio	0.674	0.654	0.054	0.79



Plasma Haptoglobin Concentrations





Conclusion

- Supplementing BOV did not improve ADG, final BW, nor incidence of BRD
- BOV steers had less haptoglobin on d 14 and 28
 - Reduced stress or pathogen induced inflammation
- All BOV steers completed the trial opposed to 5% CON did **not** complete
 - Pasture-based liveweight production increased 28% for BOV
- Collectively, this *bacillus*-based probiotic proves as a dietary alternative to improve health conditions and overall productivity of high-risk stocker steers



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Thank you!

Reinaldo Cooke
reinaldocooke@tamu.edu



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