

RE: Comparison of Plasma vs. Neomycin/Oxytetracycline in Calf Diets

This document reviews the published (n = 1) and unpublished (n = 3) literature that compared plasma vs. NT in calf diets. Surprisingly, there are few data that compare these products directly within the same study, and only one of the studies is published. The data reviewed here used therapeutic levels of neomycin (200-1000 mg/calf/d) and oxytetracycline (100-500 mg/calf/d), thus comparisons to subtherapeutic levels are not available.

The results here suggest that calves fed plasma perform better than calves on nonmedicated treatments. However, plasma performed poorer or similar to control+ NT, but plasma + NT was the treatment that performed the best.

Here are some conclusions we can reach from this data:

- Plasma performed inconsistently in these 4 studies; it appears that the response is pathogen-specific.
- Plasma provides protection against enteric pathogens (study 1 suggests that it is as good as NT).
- There was high death loss in plasma-fed calves due to *Cryptosporidium* infection in Study 2 (unpublished).
- In conditions such as transport stress, adaptation to a new facility (veal pre-starter period), or a systemic or respiratory challenge, plasma supports somewhat better health compared to controls, but NT is by far superior.
- Plasma is an obvious choice for inclusion in nonmedicated milk replacers considering the limitations on length of NT use (upcoming NT change)

Please review the following summaries of each study, and feel free to comment on any of my conclusions.

Comparison of Spray-dried Animal Plasma vs. Neomycin/Terramycin in Calf Diets

Quigley, J.D., and M.D. Drew. 2000. Effects of oral antibiotics or bovine plasma on survival, health and growth in dairy calves challenged with *Escherichia coli*. Food and Agricultural Immunology. 12:311-318.

Animals

- 36 Holstein bull calves
- Approximately 1 d of age
- Purchased from local sale barn

Treatments

- Control, 20:20 all-milk nonmedicated
- 20:20 all-milk w/ **800 mg/lb neomycin and 400 mg/lb oxytetracycline**
- 20:20 w/ **3.3% SDAP** replacing whey protein concentrate

Feeding rate

- 454 g powder/day (1 lb), starter offered from d 7 to 21

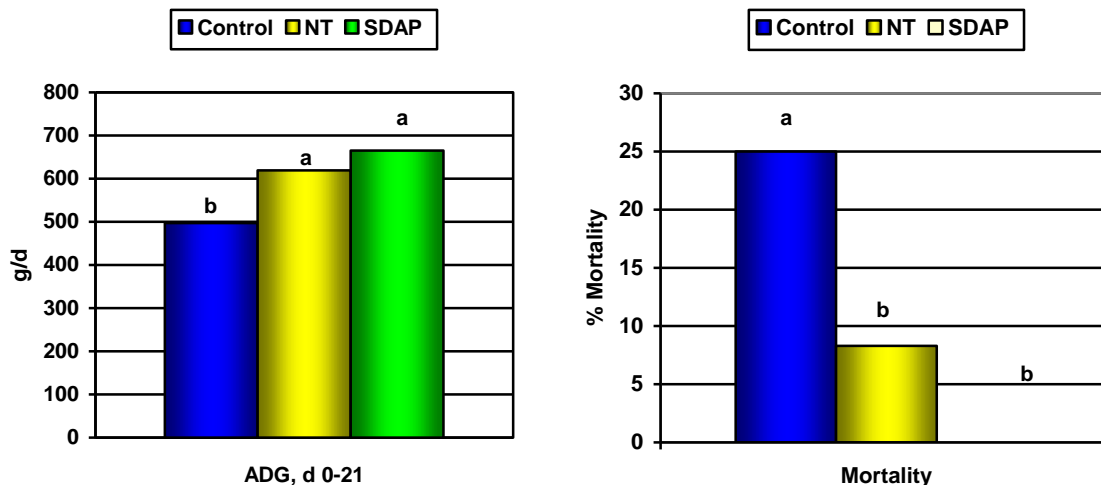
E. coli challenge

- On d 3, all calves orally challenged with 10^8 CFU of E. coli
- No antibiotic or supportive therapy was provided
- Calves euthanized if severe clinical symptoms were presented

Data collection

- Initial body weight, final body weight (d 21), average daily gain, fecal scores

Results



Conclusions

- No difference between NT and SDAP for any measurement
- NT and SDAP increased ADG and decreased mortality compared with the Control

Unpublished Data – Veal starter studies

TRIAL 1 – Porcine plasma in veal starter (unpublished)

Animals

- 102 Holstein bull calves

Treatments

- Control – all-milk nonmedicated
- Control + NT – 1 g/d neomycin + 500 mg/d oxytetracycline (NT fed for first 14 days)
- Plasma – porcine plasma replaced skim milk, approx. 20% of protein (plasma fed through 43 days)
- Plasma + NT

Results

Item	Control	Control + NT	Plasma	Plasma + NT
Initial weight, lbs	100.4	97.6	97.6	97.4
Day 43 weight, lbs	162.6	164.4	161.2	162.0
Gain (lbs), d 0-7	-2.27 ^b	0.52 ^a	-0.88 ^{ab}	1.40 ^a
Gain (lbs), d 0-14	3.00 ^b	4.68 ^{ab}	4.19 ^{ab}	6.24 ^a
Gain (lbs), d 0-43	52.4 ^b	66.6 ^a	61.2 ^a	61.8 ^a
Mortality, per trt	4/26	0/25	1/26	1/25

Conclusions

- Plasma nonmed performed better than control nonmed and equal to control + NT, but plasma + NT supported superior performance for the first 14 days

TRIAL 2 – Bovine plasma in veal starter (unpublished)

Animals

- 102 Holstein bull calves
- 92 of them were transported from NY/PA to Wisconsin
- 10 purchased locally

Treatments

- Control
- Control + NT – 500 mg/d neomycin + 250 mg/d oxytetracycline (NT fed for first 14 days)
- Plasma – bovine plasma replaced casein, approx. 30% of protein (plasma was about 8% of formula)
- Plasma + NT

Results – 92 transported calves

Item	Control	Control + NT	Plasma	Plasma + NT
Gain (lbs), d 3-24	11.3	10.8	10.2	8.2
Gain (lbs), d 3-48	60.5	60.1	56.1	50.9
Medical trt, d/calf, < d 10	2.58 ^a	1.50 ^{ab}	2.05 ^{ab}	0.87 ^b
Medical trt, d/calf, d 10-24	2.67 ^a	0.89 ^b	1.50 ^{ab}	1.05 ^b
Death loss, <d 10	3	4	7	1
Death loss, d 10-24	4	1	2	1

Conclusions

- An outbreak of *Cryptosporidium* contributed to high death loss during d 3-10, and calves experienced respiratory disease from d 10-24. In terms of mortality, NT was numerically better than plasma.

Unpublished Data – APC Research Report (internal use only, not for distribution)

Animals

- 120 sale barn calves
- Severely heat-stressed during transport

Treatments

- Control – all-milk MR (20:20)
- Control + NT – all-milk MR w/ 400 g/ton neomycin and 200 g/ton oxytetracycline
- Plasma – 4% SDAP

Other information:

- 62% of calves had failure of passive transfer (may be lower than actual due to dehydration)
- Antibiotic therapy for scours was prohibited
- High mortality (50, 25, and 50% for Control, Control + NT, and Plasma, respectively)
- Necropsies revealed that several calves died of *Salmonella dublin* (resistant to NT) or *Pasturella multocida* (sensitive to NT) pneumonia – outbreak during wk 4 of the study

Results

Item	Control	Control + NT	Plasma
Mortality, %	50	25	50
Mortality age ¹ , d (avg. ± SEM)	39 ± 13.4	8.6 ± 20.3	15.7 ± 12.6
BW ² , kg			
d 0	46.4	47.1	46.9
d 28	50.8	53.0	51.0
d 56	69.9	74.9	77.1
ADG ² , kg			
d 0-28	147	218	145
d 29-56	771	812	918
d 0-56	418	496	539
ADG:DMI, g/kg			
d 0-56	303	305	355
Fecal scores ²	1.94	1.86	1.85
Scours ² , % of days	22.1	16.6	18.1
Treated ⁴ , %	11.5	6.4	7.0

¹Plasma vs. NT contrast; *P* = 0.12

²Growth data includes only calves that survived the entire 56-d study

³Control vs. Control + NT and Plasma contrast; *P* = 0.12

⁴Control vs. Control + NT and Plasma contrast; *P* = 0.006

Conclusions

- Systemic *Salmonella dublin* infection and respiratory infection contributed to high death loss
- Control and plasma calves had similar death loss, both of which tended to be higher than NT calves
- Mortality age in control calves tended to be higher than NT and plasma calves
- In calves that survived for 56 d, calves fed plasma had similar health and fecal scores compared with calves fed NT
- Growth performance was similar among all treatments
- Difficult to interpret results because of several confounding factors involved (heat stress, multiple pathogen challenges)