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# Evaluation of differing interventions (including pork plasma) at the onset of neonatal calf diarrhea.

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## Introduction

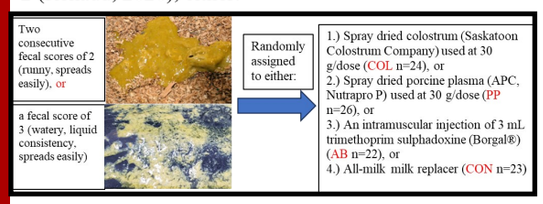
Spray dried colostrum has shown merit during enteric disease challenge (Berge, et. al.). Spray dried pork plasma is shown to reduces disease symptoms when calves are challenged with *E coli* (Nollet, et. al). No studies have compared both of these functional protein sources to a common antibiotic regiment to treat diarrhea in young calves.

## Objective

The objective of this study was to investigate strategies to treat diarrhea.

## Material and Methods

Male calves (n=160) sourced from farms and auctions (BW=51.7 ±4.3 kg) were randomly assigned to receive one of 4 treatment regiments commencing at the on-set of a fecal score of 3 or two consecutive fecal scores of 2 (Renaud, 2020), either:




Images: courtesy of Veal Farmers of Ontario

⇒ The respective functional protein source was formulated into the 26:20 calf milk replacer (CMR) at the expense of milk protein.

⇒ Respective treatment was administered as a substitute for 1 L of milk replacer for 10 consecutive feedings (5 days) after enrollment in the study.

⇒ If a calf refused his liter of test diet it was tubed, however, if a calf refused his additional feeding of the standard CMR it was recorded as a feed refusal.

⇒ All milk replacer (including test diets) were administered at 130 g solids/L.

CMR was fed 2x/d in a step-up, step-down fashion (37.8 kg over 56 d) starting at 5 L/d for the first 2 weeks. Texturized starter (20% CP, 4% straw) was offered ad lib. Calves were housed individually in a mechanically ventilated grain-fed veal facility in Ontario.

Measures:

⇒ Serum total protein at arrival (refractometer)

⇒ Medical treatments, mortality, milk refusals

⇒ Individual body weight weekly

⇒ Individual fecal score 2x/d (Renaud, 2020)

⇒ Individual respiratory score 2x/d (Love, 2014)

Statistical analysis:

⇒ Conducted in Stata 17 (StataCorp, TX)

⇒ Cox proportion hazard model used to measure mortality and morbidity

⇒ Linear regression model to evaluate ADG

⇒ Generalized linear model to evaluate fecal and respiratory scores

## Results & Conclusion

Of the 160 calves placed, 59.4% experienced sufficient diarrhea symptoms to enter the study. No differences were found between treatment groups with regard to source ($P$=0.51), crossbred calves (n=20; $P$=0.90, the balance were Holstein), serum total protein ($P$=0.60), or incidence of failed transfer of passive immunity (33% of all calves; $P$=0.65). Using a log-rank test of survivor function there was no differences in mortality ($P$=0.73).

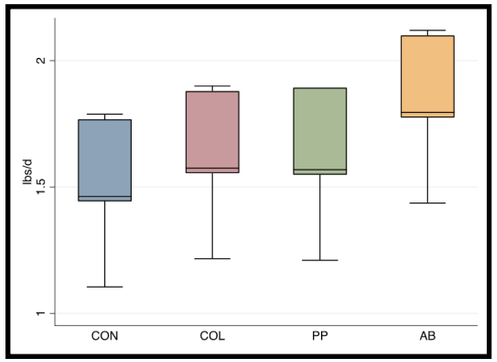
## Conclusions:

- No statistical differences in treatment for diarrhea and respiratory disease, mortality, or resolution of diarrhea
- Calves in the antimicrobial group had a greater ADG over the 56 d experimental period. However, no differences were noted in ADG over the first 28 d.
- At d 56, calves in the antimicrobial group weighed more than the control calves, whereas the colostrum and porcine plasma groups tended to weigh more at 56 d
- Approximate cash outlay (US$): 300 g Saskatoon Colostrum Powder $22.40, 300 g APC Nutrapro P plasma $1.65; 15 ml Borgal® trimethoprim sulphadoxine $1.12. Additional protein value 159 and 234 g from colostrum and plasma respectively. Colostrum also provides 63 g of fat.

## Possible follow-up studies:

- Supplement functional protein prior to diarrhea event
- Increase functional protein dose

**Figure 1.** Predicted median, 25th and 75th percentile and range of average daily gain over the 56 d experimental period as determined using a linear regression model




| | COL | PP | AB | CON |
|---|---|---|---|---|
| Number (n) of calves enrolled | 24 | 26 | 22 | 23 |
| Enrollment (diarrhea onset) growth day | 4.2 | 3.9 | 4.3 | 4.3 |
| Mortality (n) | 5 | 3 | 5 | 4 |
| Arrival Serum Total Protein (g/dL) | 5.29 | 5.48 | 5.25 | 5.27 |
| Trimethroprim sulfa (% 1st scour treat) | 75.9% | 57.7% | 100% | 60.9% |
| Of diarrhea treated, % 2nd treat | 0.0% | 0.0% | 0.0% | 0.0% |
| % treated for respiratory disease | 54.2% | 46.2% | 59.1% | 73.9% |
| Of Respiratory treated, % 2nd treat. | 76.9% | 83.3% | 83.3% | 64.7% |
| Of Respiratory treated 2x, % 3rd treat | 50.0% | 60.0% | 66.7% | 54.6% |
| Body weight (BW) at enrollment (kg) | 52.2 | 51.5 | 52.3 | 51.8 |
| 56-d post enrollment BW (kg) | $94.6^{x}$ | $94.4^{x}$ | $97.7^{a}$ | $91.9^{y,b}$ |
| 28-d ADG post enrollment (kg) | 0.57 ±0.28 | 0.58 ±0.20 | 0.59 ±0.23 | 0.59 ±0.19 |
| 56-d ADG post enrollment (kg) | $0.77^{a}$ ±0.20 | $0.77^{a}$ ±0.19 | $0.82^{b}$ ±0.18 | $0.72^{a}$ ±0.16 |
| $^{a,b}$Means within a row different superscripts differ ($P \leq 0.05$) | | | | |
| $^{x,y}$Means within a row different superscripts differ ($P \leq 0.10$) | | | | |

Treatment groups in study (130 g/L). Calves were enrolled at barn placement and treatment administered at on-set of diarrhea (2 days fecal score 2 or 1 day fecal score 3):
COL: CMR formulated to 26% CP & 20% fat with spray dried colostrum (Saskatoon Colostrum Company) included at 23% of formula (30 g/fdg)
PP: CMR formulated to 26% CP & 20% fat with spray dried porcine plasma (APC, Nutrapro P) included at 23% of the formula (30g/fdg)
AB: CMR formulated to 26% CP & 20% fat with no functional proteins + intramuscular injection of trimethroprim sulphadoxine (Borgal®) at a dose of 3 mL/45 kg 1x/d for 5 consecutive days
CON: CMR same as AB treatment group but no injectable antibiotic administered

**References**:

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Love WJ, Lehenbauer TW, Kass PH, Van Eenennaam AL, and Aly SS. 2014. Development of a novel clinical scoring system for on-farm diagnosis of bovine respiratory disease in pre-weaned dairy calves. PeerJ 2:e238. https://doi.org/10.7717/peerj.238.

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