



Background

- **Male dairy calf** industries experience high levels of mortality impacting calf welfare (estimates from 4 - 8%)¹⁻³
- Many calves arrive with identifiable health abnormalities²
- Group metaphylaxis is common at arrival to address the high risk of morbidity and mortality in the first few weeks
- Concern about **antimicrobial resistance** is promoting judicious antimicrobial stewardship
- **Risk factors** for morbidity and mortality measured at arrival present an opportunity to identify high risk calves
- Antimicrobial use at arrival can be reduced, as compared to conventional **group antimicrobial therapy (GAT)**, by employing **selective antimicrobial therapy (SAT)** targeting high risk calves

Objectives

- Compare morbidity and mortality between groups receiving **GAT** and those receiving **SAT** at arrival
 - Over the first 14 days
 - Over the full 84 day growing period

Materials & Methods

- Study type: Randomized controlled trial
- Intervention: (applied at the level of the room at arrival)
 - Group antimicrobial therapy (GAT) protocol
 - Selective antimicrobial therapy (SAT) protocol
- Outcomes: Morbidity and mortality
- Location: Commercial male dairy calf facility in ON, CA
- Enrollment: January - May 2018
 - Standardized screening of all calves at arrival
 - 19 rooms; 54-56 calves/room; 1032 calves enrolled
 - 10 GAT rooms and 9 SAT rooms
- Study period: Arrival to end of growing period (84 days)
- Analysis: Descriptive statistics and Cox Proportional Hazards Models in STATA 15 (StataCorp LP, College Station, TX)

Results (additional results reported in adjacent column)

- Selection of relevant health parameters at arrival:
 - 50 kg Mean arrival weight [SD: 5.5 kg]
 - 5.7 % Cough Score (> 1 out of 3)
 - 4.7 % Other Abnormality
 - 22 % Dehydration^a
 - 35 % Sunken Flank^a
- ^a Significant difference between SAT and GAT ($P < 0.05$)
- SAT rooms at the time of arrival:
 - ~ 1/2 calves did not require any therapy
 - ~ 2/3 less antibiotic use than GAT rooms

Discussion

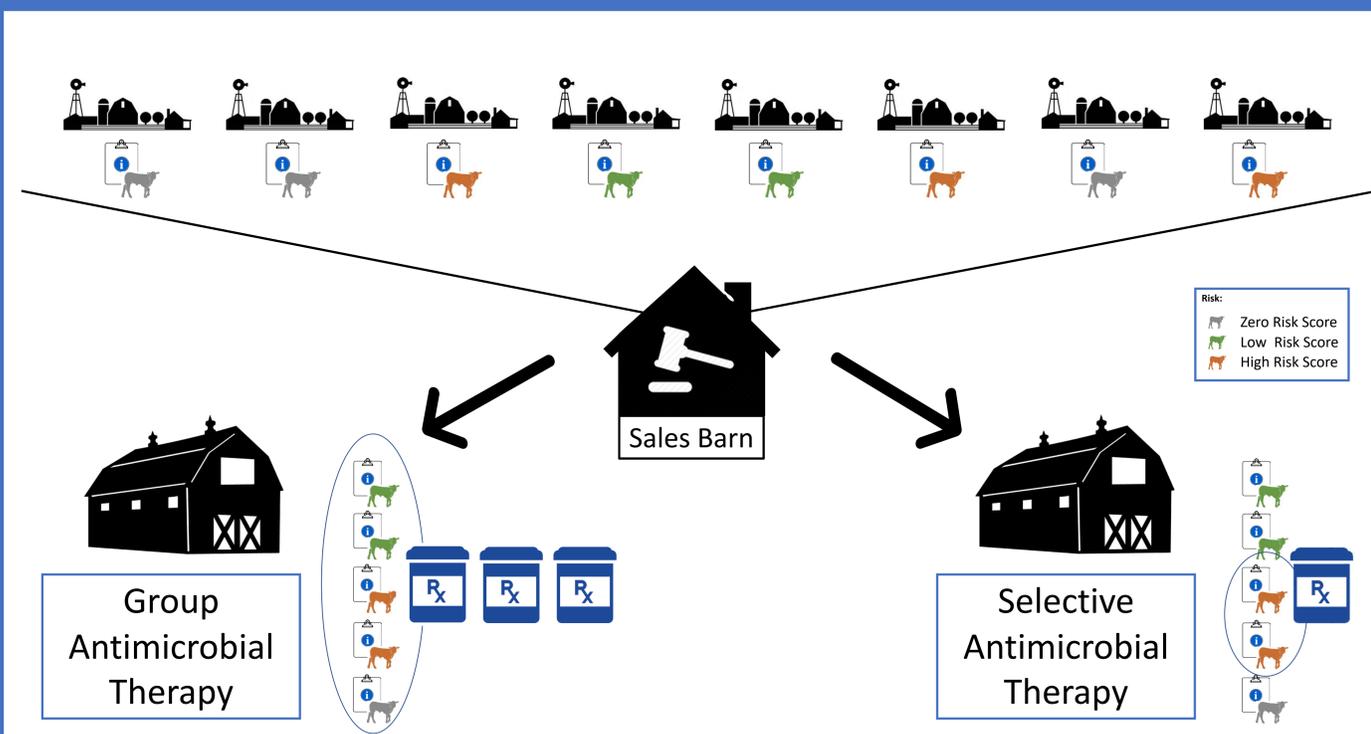
- Although SAT protocol was associated with an increased hazard of mortality over 84 days, the absence of a difference in mortality between calves that received antimicrobials at arrival and those that did not within the SAT rooms suggests this difference is not due to antimicrobial treatment at the time of arrival.
- The shared frailty of the room in which calves were managed had an influence on morbidity and mortality during the 84 day risk period, but not between 0 - 14 days. This likely reflects severe disease outbreaks in some rooms observed later in production.
- The true relationship between SAT and GAT protocols may have been masked by room specific outbreaks.
- If group metaphylaxis at arrival truly reduces the hazard of mortality later in the growing period, future work should focus on determining if the difference is due to treatment of subclinical disease, growth promotion or other mechanisms.
- Future work will compare the effects of SAT and GAT protocol groups on average daily gain and methods to refine calf risk assessment protocols.

References

1. Bähler, C., A. Steiner, A. Luginbühl, A. Ewy, H. Posthaus, D. Strabel, T. Kaufmann, and G. Regula. 2012. Risk factors for death and unwanted early slaughter in Swiss veal calves kept at a specific animal welfare standard. *Research in Veterinary Science* 92:162-168. doi:10.1016/j.rvsc.2010.10.009.
2. Renaud, D.L., T.F. Duffield, S.J. LeBlanc, S. Ferguson, D.B. Haley, and D.F. Kelton. 2018a. Risk factors associated with mortality at a milk-fed veal calf facility: A prospective cohort study. *J. Dairy Sci.* doi:10.3168/jds.2017-13581.
3. Winder, C.B., D.F. Kelton, and T.F. Duffield. 2016. Mortality risk factors for calves entering a multi-location white veal farm in Ontario, Canada. *J. Dairy Sci.* 99:10174-10181. doi:10.3168/jds.2016-11345.

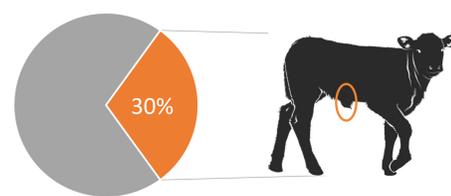
2/3 reduction in antimicrobial use at arrival

No difference in 14 day morbidity and mortality *



14 Days Post Arrival

- **Intervention:** No statistical difference in the time to morbidity or mortality between rooms receiving the SAT protocol and GAT protocol
- **Mortality:** Calves arriving with abnormal navels (umbilical pain, heat, swelling or discharge) have a 3.6 times greater hazard of dying than calves with normal navels ($P = 0.01$)
- **Morbidity:** Calves from rooms that are not filled within 1-3 days have a 1.7 times greater hazard of morbidity ($P = 0.04$)



Full 84 Day Growing Period

- **Intervention:** Calves receiving the SAT protocol have a 2.7 times greater hazard of dying than those receiving the GAT protocol ($P = 0.005$). No difference in mortality between calves receiving antibiotics and those that did not receive antibiotic within the SAT protocol group was observed. The shared hazard of room was significant for morbidity and mortality ($P = 0.001$).

