Pre-Weaning Growth and Health Outcomes in Purebred and Crossbred Dairy Heifer Calves

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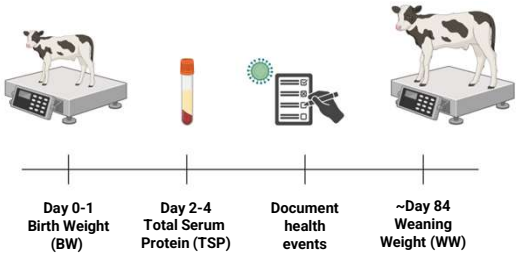
INTRODUCTION

- Dairy heifer calf pre-weaning growth is essential for future productivity in the herd, as growth impacts first lactation performance [1]
- The total cost to raise a dairy heifer calf during the pre-weaning period ranges between $90-$440 [2]
- Pneumonia and scours negatively impact growth, future herd productivity, and are two of the leading causes of mortality in pre-weaned dairy calves [3, 4]
- Identifying illness-susceptible calves is critical.
- Breed differences in health and growth pose challenges for optimal management [5]
- The **objective** of this study was to evaluate pre-weaning growth and health metrics across dairy breeds managed under identical conditions on a single farm.

MATERIALS AND METHODS

Holstein (H) n = 175 | Jersey (J) n = 26 | Dairy Cross (HJX) n = 63

Dairy heifer calves (n = 264) were enrolled at birth in the study, located on a single farm in the Texas Panhandle. The study took place between Aug-Dec 2025.



- Frequency of health events measured:
  - Dehydration (DEHYD)
  - Scours
  - Pneumonia (PNEU)

Statistical analysis for all variables in SAS 9.4:
- Shapiro-Wilk test for normality
- Correlation with PROC CORR
- Health events and WW by breed with PROC GLM
  - Covariates: dam lactation number and BW

RESULTS

Table 1. Summary Statistics. Mean, standard error, minimum, and maximum values for variables measured in the studied heifer calf population.

Variable	Mean ± SE	Min	Max
Birth Weight (kg)	34.72 ± 0.35	14.4	54.5
Weaning Weight (kg)	78.09 ± 0.11	45.4	111.1
Total Serum Protein (g/dL)	9.43 ± 0.10	5	13
Pneumonia (freq)	0.55 ± 0.08	0	6
Scours (freq)	1.62 ± 0.12	0	9
Dehydration (freq)	0.30 ± 0.04	0	4

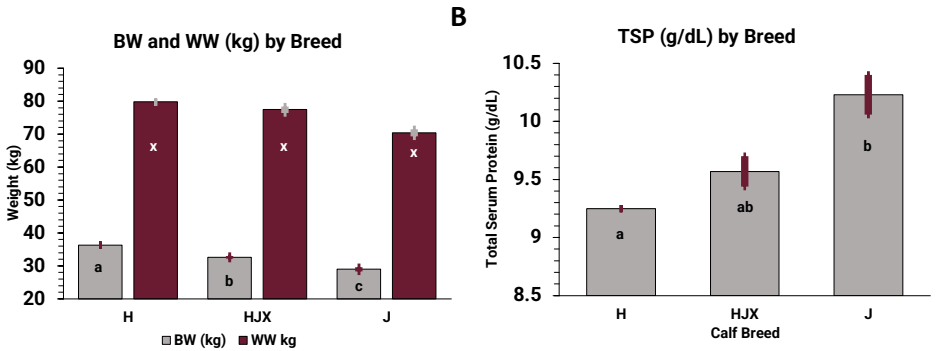


Figure 1. BW, WW and TSP by breed. A) BW was significantly different by breed (*P <0.001*) with differences denoted by letter. WW was not significant by breed. B) TSP was significantly different by breed (*P = 0.003*) with differences denoted by letter.

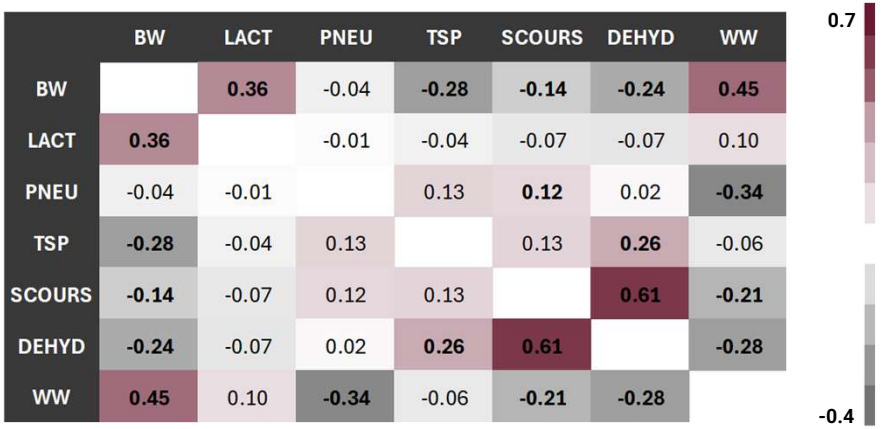


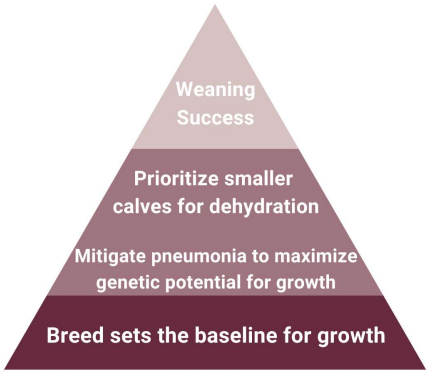
Figure 2. Heat map of r^2 from Pearson's correlation. Significant correlations (*P <0.05*) are denoted in bold.

DISCUSSION

- **Growth:**
  - Birth weight was influenced not only by breed but also by dam's lactation number, suggesting that maternal maturity contributes to early growth potential independent of breed.
  - Although weaning weight was not significant by breed, a positive correlation between birth weight and weaning weight establishes birth weight as a likely predictor of growth potential.

- **Health:**
  - Positive correlation between scours and dehydration indicates that scours is likely a key driver of dehydration.
  - Negative correlation between birth weight and dehydration suggests smaller calves are more susceptible to severe fluid loss.
  - Negative correlation between birth weight and total serum protein, paired with positive correlation between total serum protein and dehydration, likely reflects the breed-specific vulnerability for dehydration found in the smaller Jersey calves.
  - Negative correlation between pneumonia and weaning weight suggests that respiratory illness is a growth inhibitor, regardless of breed.

IMPLICATIONS



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