

## Background Study Objectives Study Design & Methods

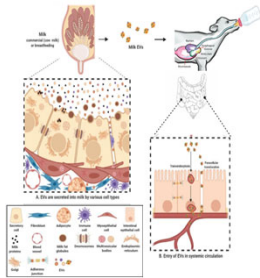


Fig. 1. Overview of microRNAs (miRNAs) potential intestinal absorption by newborn beef-on-dairy calves. Adapted in biorender.com from Sanwlani R., et al., *Proteomes.*, 2020

**Study Objectives**

This study aimed to:

- Characterize inflammatory and metabolism-related microRNAs in bovine colostrum and in milk replacer fed to calves.
- Evaluate the role of circulatory microRNAs in early-life beef-on-dairy calf health.



Calves were individually housed at the Livestock Issues Research Unit (USDA-ARS, Lubbock, TX).  
USDA Agricultural Research Service U.S. DEPARTMENT OF AGRICULTURE

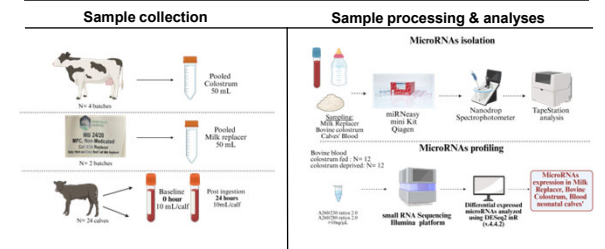
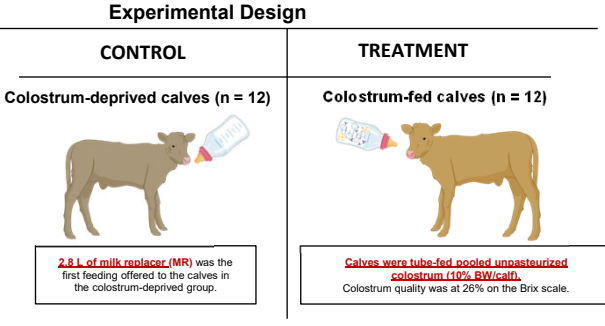


Fig. 4. Experimental design and methodology used in the present calf study. Figures created with BioRender®.

## Results

### Dietary microRNA profiling (colostrum & milk replacer)

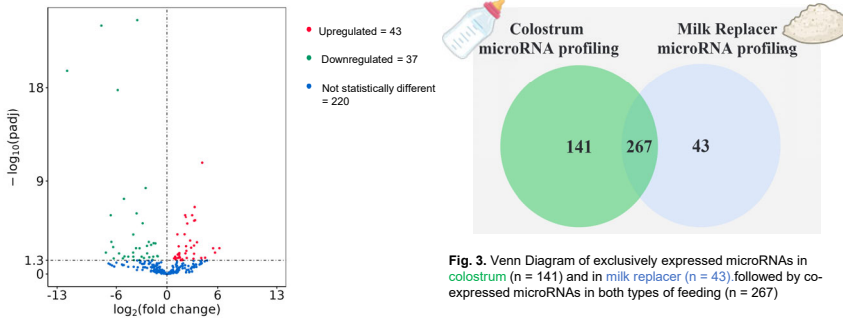


Fig. 3. Venn Diagram of exclusively expressed microRNAs in colostrum (n = 141) and in milk replacer (n = 43), followed by co-expressed microRNAs in both types of feeding (n = 267)

Fig. 2. Volcano Plot of all microRNAs (miRNAs) expressed in bovine colostrum compared to milk replacer including differentially expressed microRNAs ( $P < 0.05$  and  $\log_2$  fold change  $> 1$  or  $< -1$ ). The y-axis is the  $-\log_{10}$  (P-value) while the x-axis is the  $\log_2$  fold change [colostrum-miRNA expression/milk replacer-miRNA expression].

Top microRNAs in bovine colostrum exhibit the following functions:

#### Let-7 family of microRNAs

- ❖ Regulation of cell cycle and proliferation
- ❖ Cell apoptosis
- ❖ Tumor suppressor

Top microRNAs in bovine milk replacer exhibit the following functions:

#### bta-miR-425-3p; bta-miR-2898

- ❖ Antiviral immune response
- ❖ Tissue remodeling

### Circulatory microRNA profiling in Colostrum-fed versus Colostrum-deprived calves

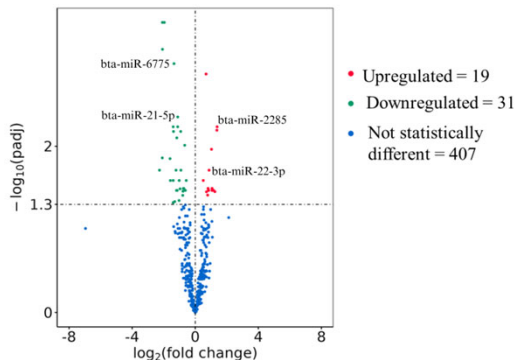
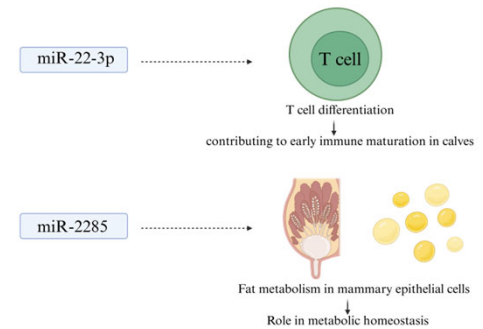


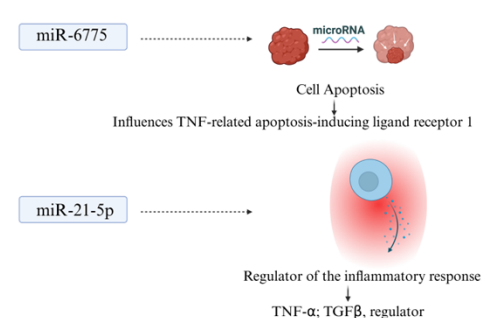
Fig. 5. Volcano Plot of all microRNAs (miRNAs) expressed in the blood of beef-on-dairy calves at 24 hours post-first feeding. This graph represents the microRNA expression in the blood of colostrum-fed compared to colostrum-deprived calves including differentially expressed microRNAs ( $P < 0.05$  and  $\log_2$  fold change  $> 1$  or  $< -1$ ). The y-axis is the  $-\log_{10}$  (P-value) while the x-axis is the  $\log_2$  fold change. Bta = *Bos Taurus*

## Discussion

MicroRNAs miR-22-3p and miR-2285 were upregulated in the blood of colostrum-fed calves compared to colostrum-deprived calves at 24h post-first feeding. The following are the functional roles of these microRNAs:



MicroRNAs miR-6775 and miR-21-5p were downregulated in the blood of colostrum-fed versus colostrum deprived calves at 24h post first feeding. The following are the functional roles of these microRNAs:



## Conclusions Acknowledgments Contact

Colostrum and milk replacer feedings exhibited distinct microRNA profiles with enrichment of different immune-related microRNAs. Overall, both feeding types may modulate the newborn immune responses through different pathways. This study revealed the presence of functional microRNAs in the blood of newborn beef-on-dairy calves prior-to and post first-feeding which were associated with regulation of immune and metabolic pathways. Thus, microRNAs can potentially modulate early-life inflammation and metabolism in calves.

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