



Anita Paz & Tainara Michelotti

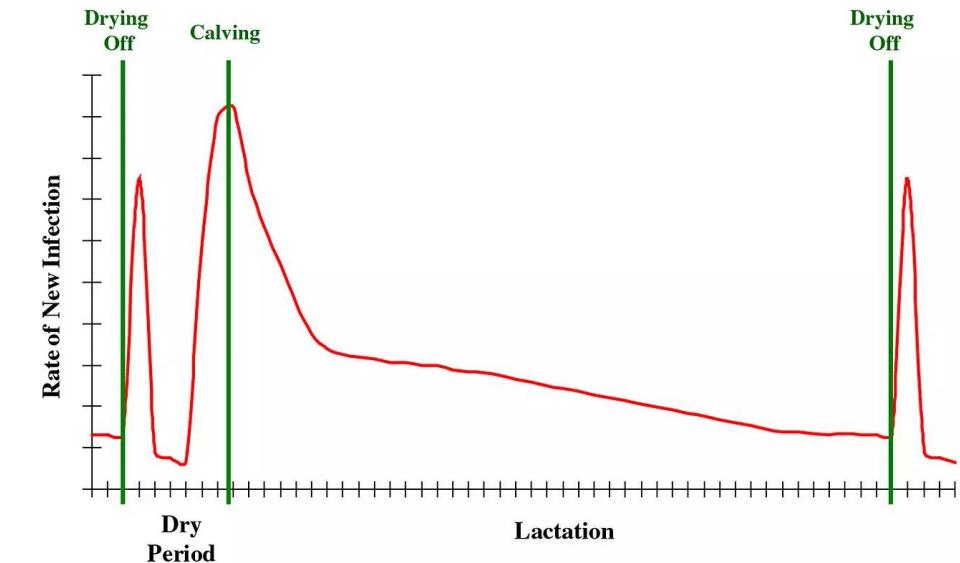
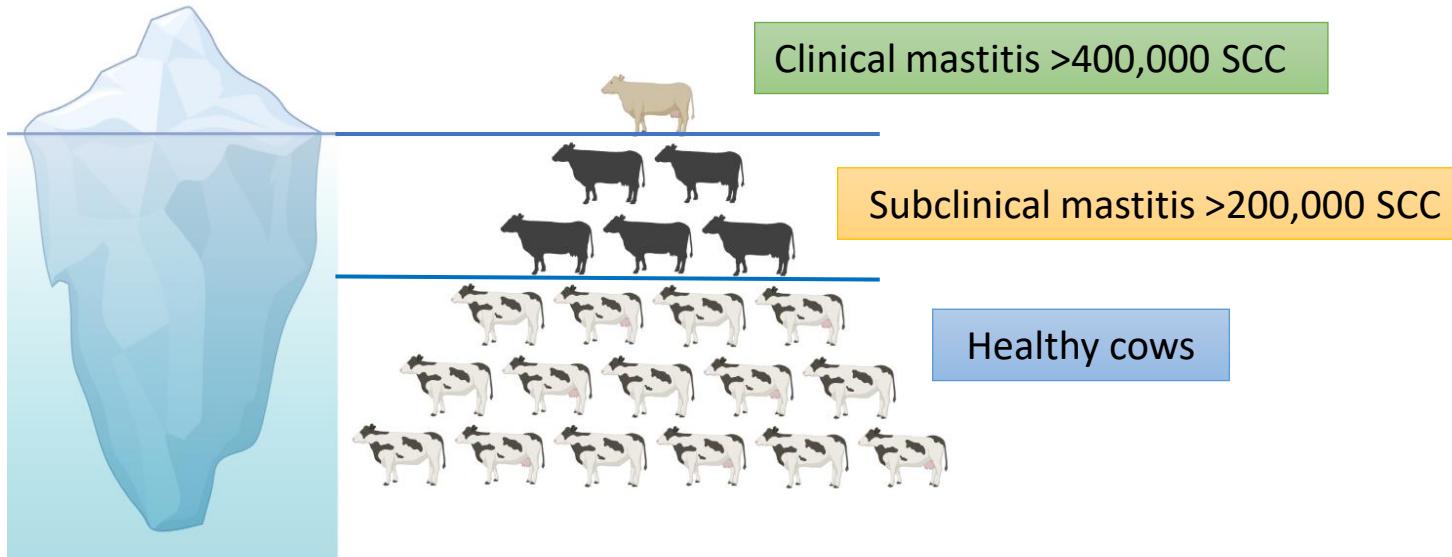
Effects of rumen-protected methionine supplementation during subclinical mastitis challenge on dairy cow inflammation, immune cell mTOR pathway, oxidative status, and lactation performance



SOUTH DAKOTA
STATE UNIVERSITY

Importance of the topic

- Mastitis: **Most frequent** disease of dairy cows

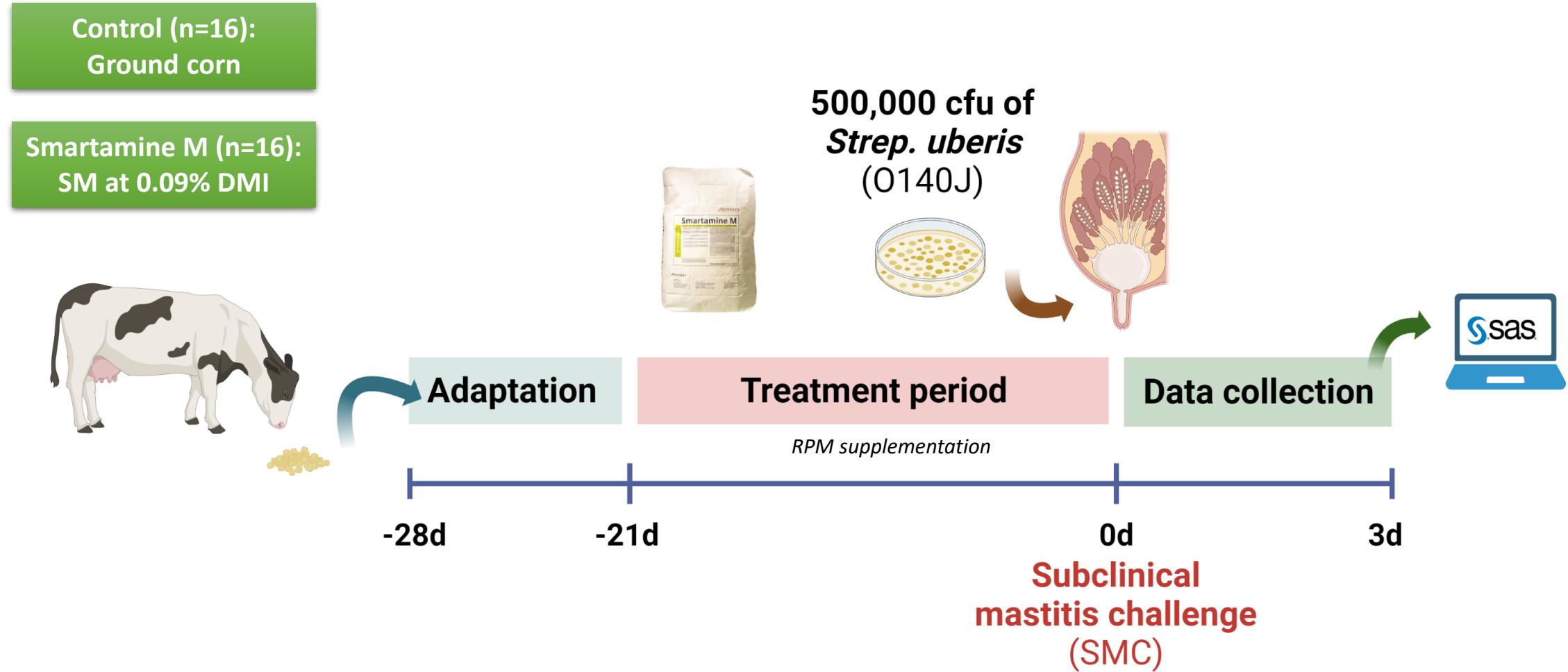


- Rumen-protected methionine (Smartamine M):
- Performance, immune function, oxidative status

Transition period

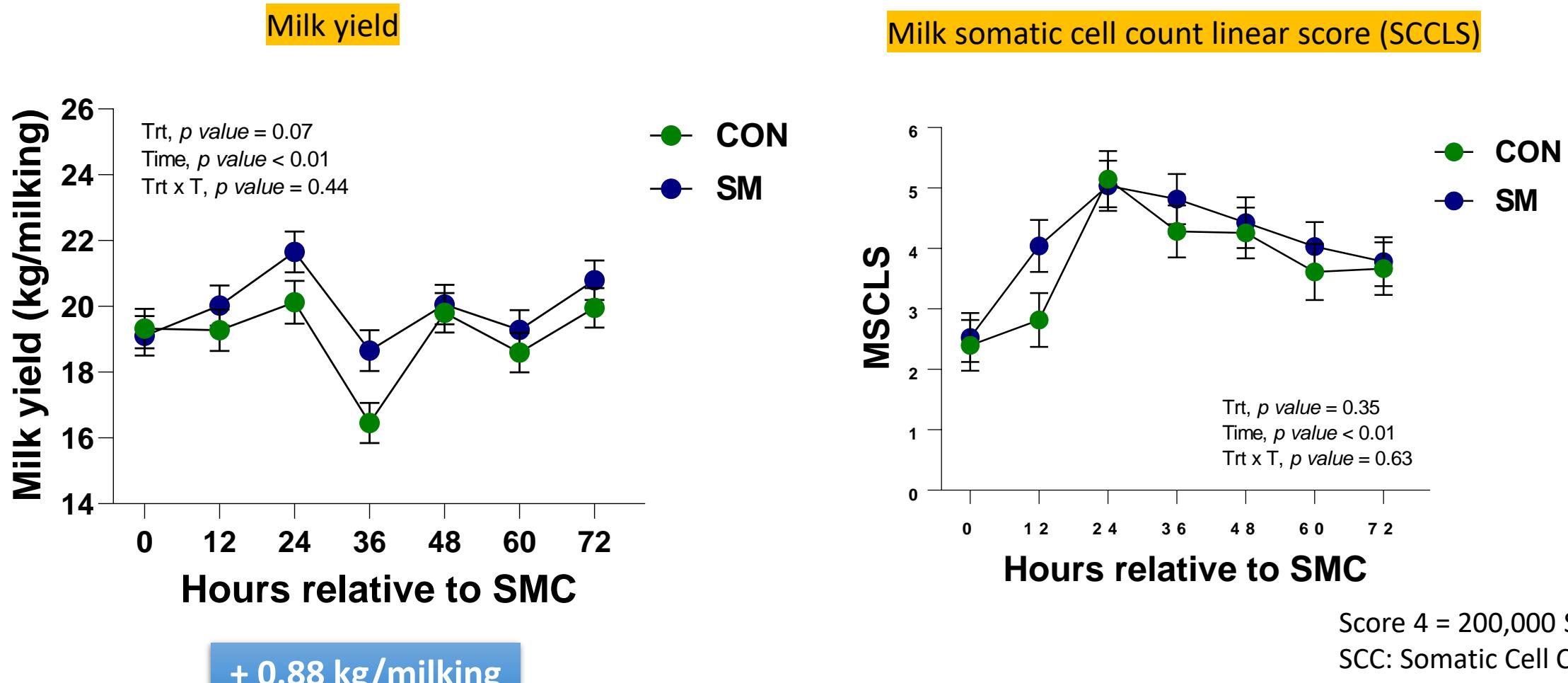
Mid-lactation?

Experiment timeline



Results and Discussion

Milk yield and SCCLS

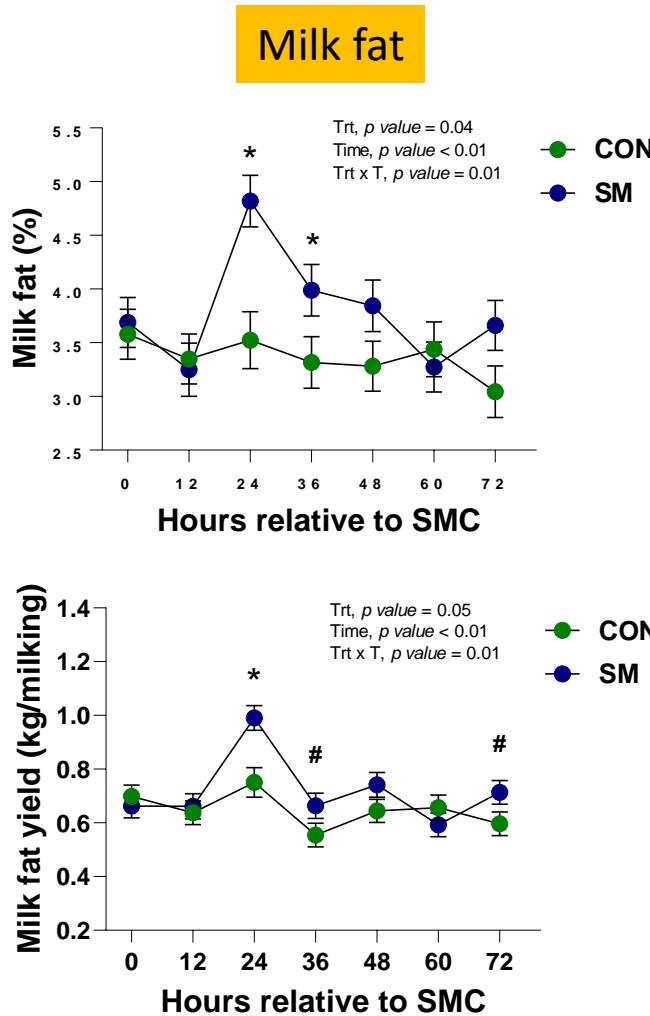


Score 4 = 200,000 SCC
SCC: Somatic Cell Count

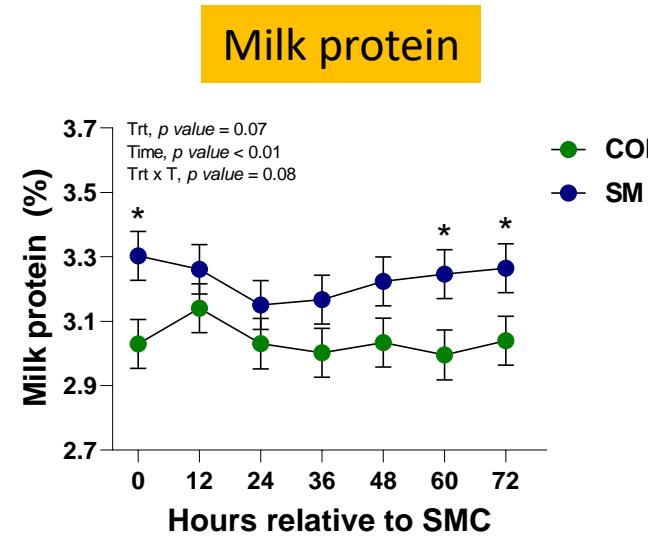
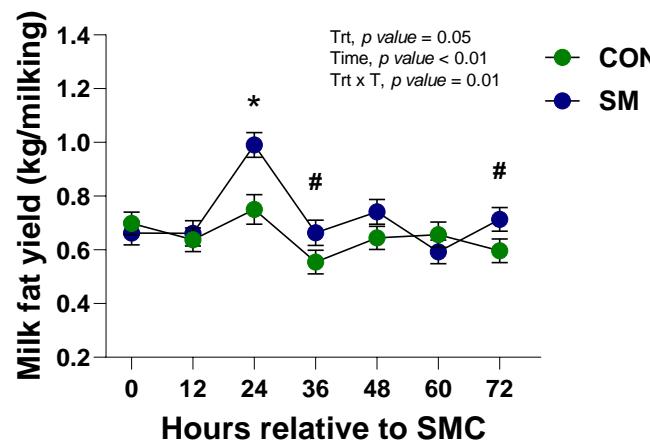
Results and Discussion

Milk composition - Milk fat and protein

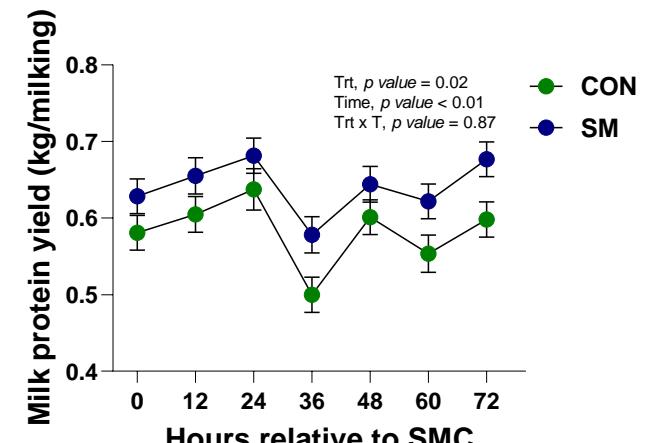
 0.43% milk fat



 70 g milk fat/milking



 0.19% milk protein

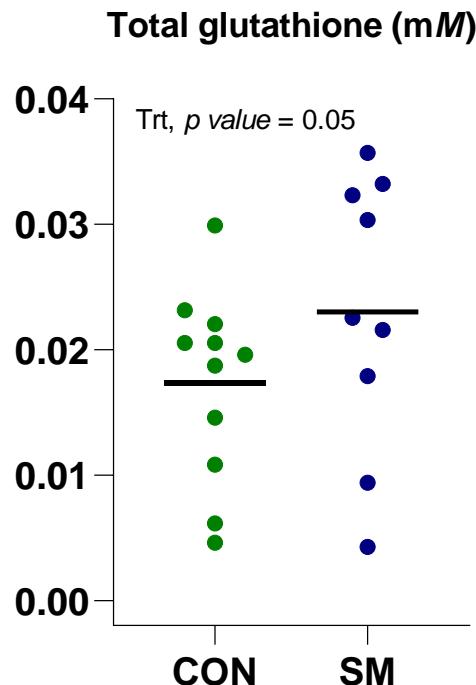


 60 g milk protein/milking

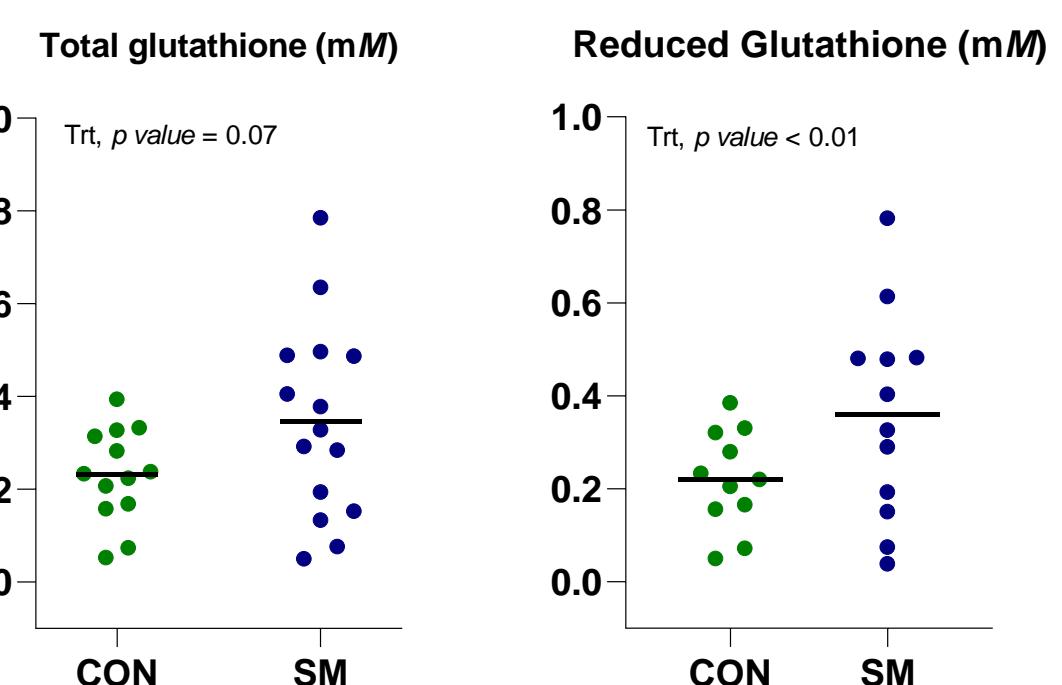
Results and Discussion

Liver glutathione

-10 d relative to SMC



+24 h relative to SMC

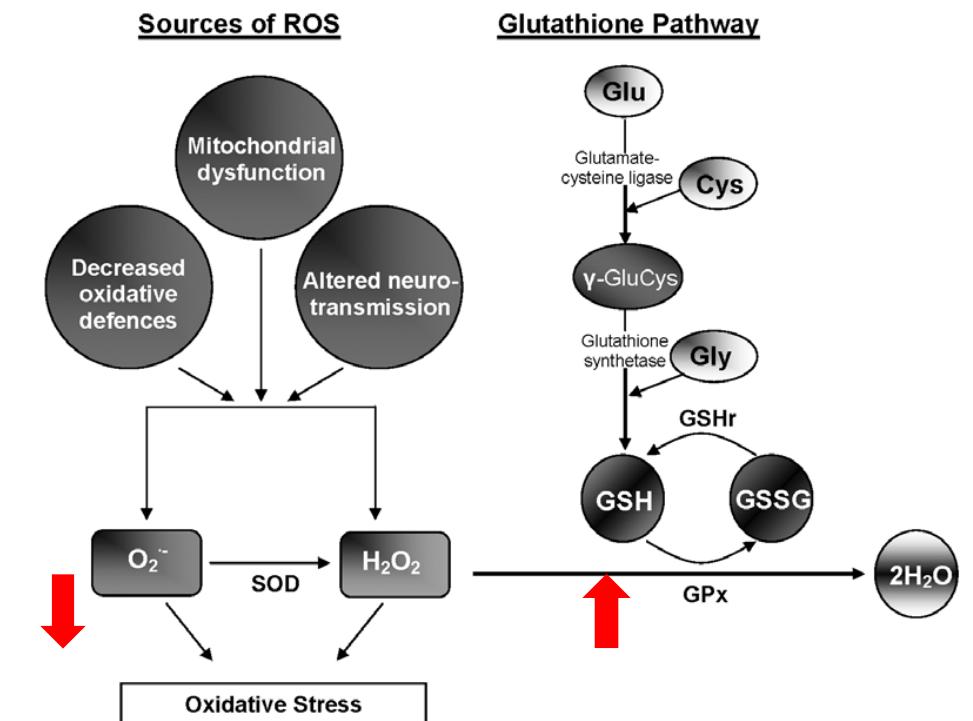
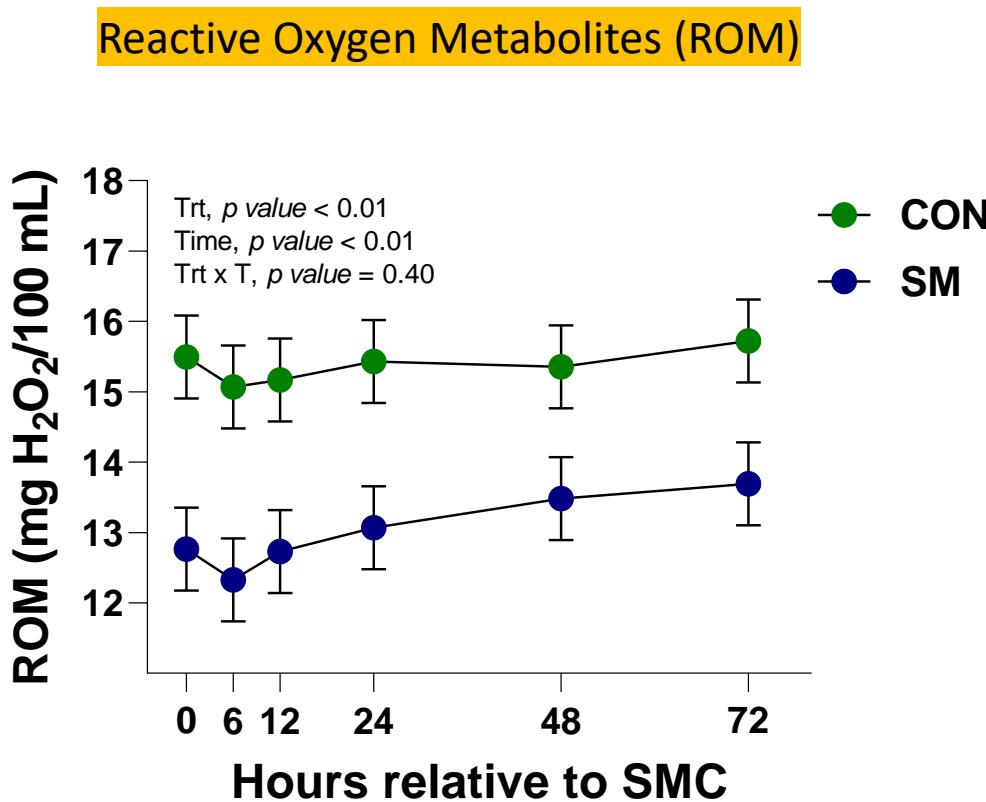


Overall ↑ liver glutathione

Anti-oxidant capacity

Results and Discussion

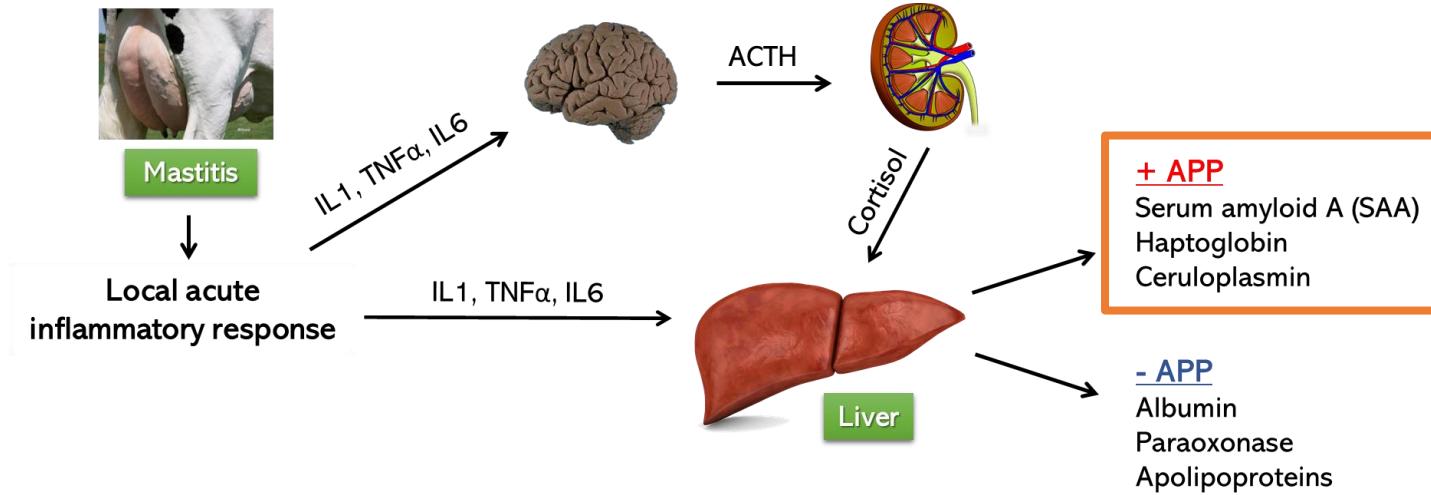
Oxidative stress biomarkers



↓ ROM = Better oxidative status

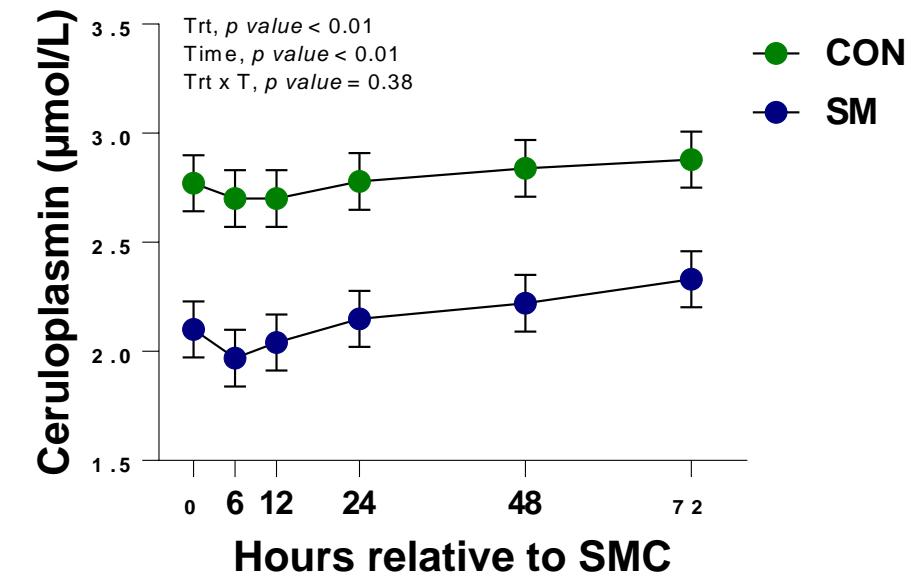
Blood

0 - 72 h relative to SMC



Results and Discussion

Blood biomarkers

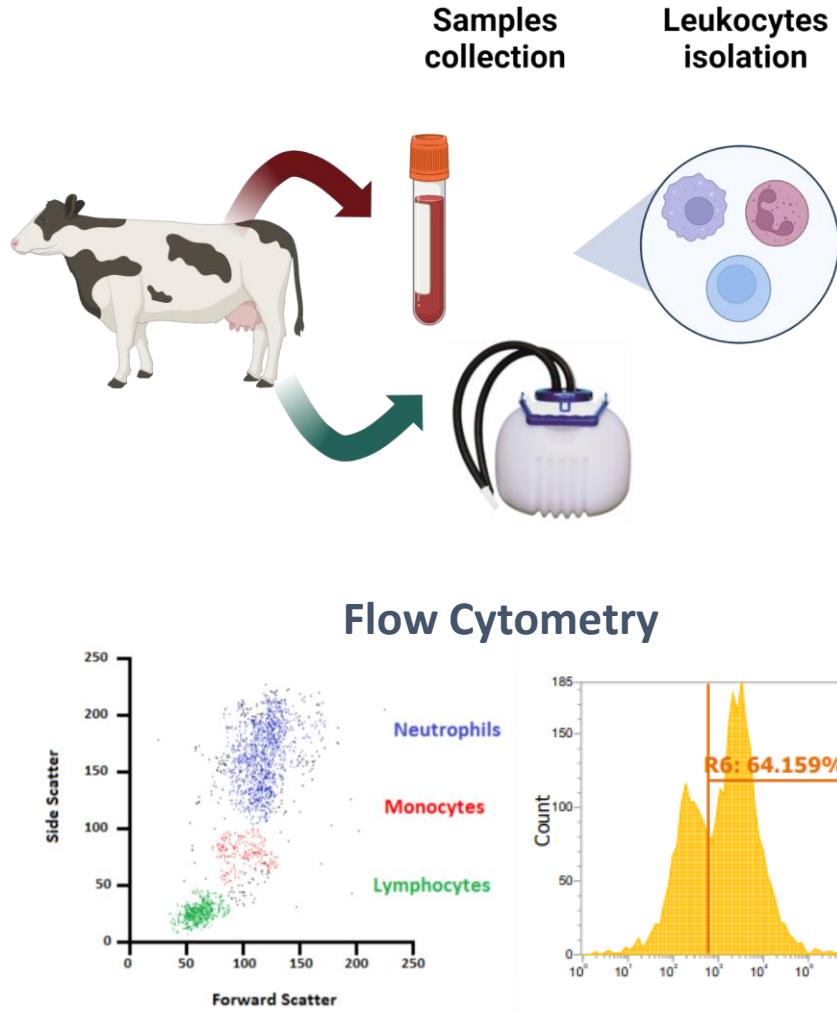


Ceruloplasmin =
Lower systemic inflammatory
status

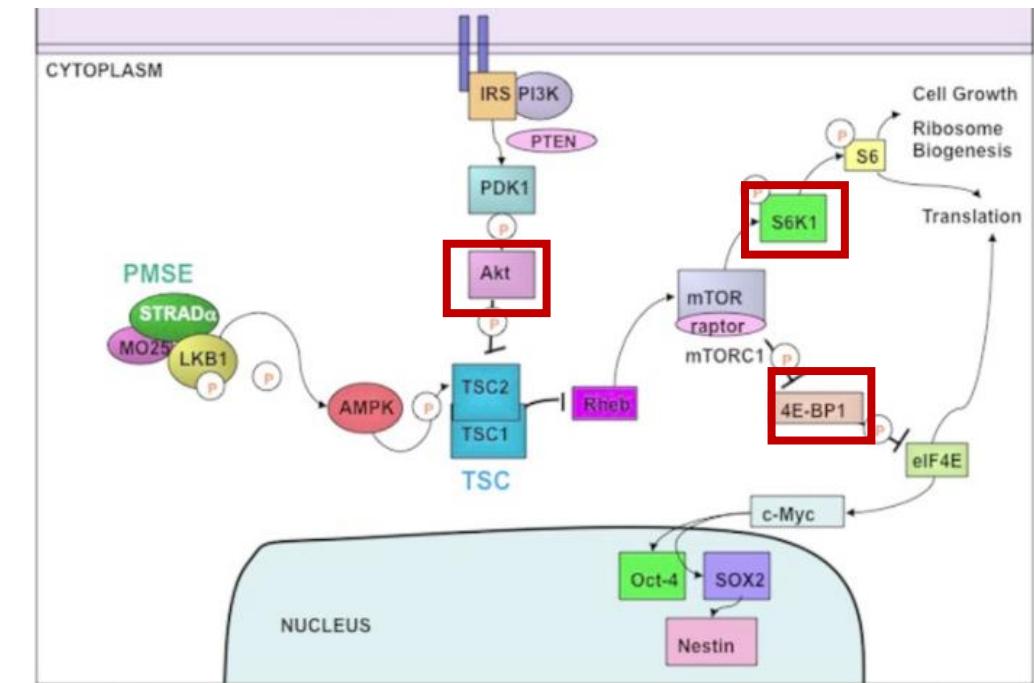
APP = Acute phase protein

Results and Discussion

mTOR pathway



Environmental cues Immune signals Nutrients



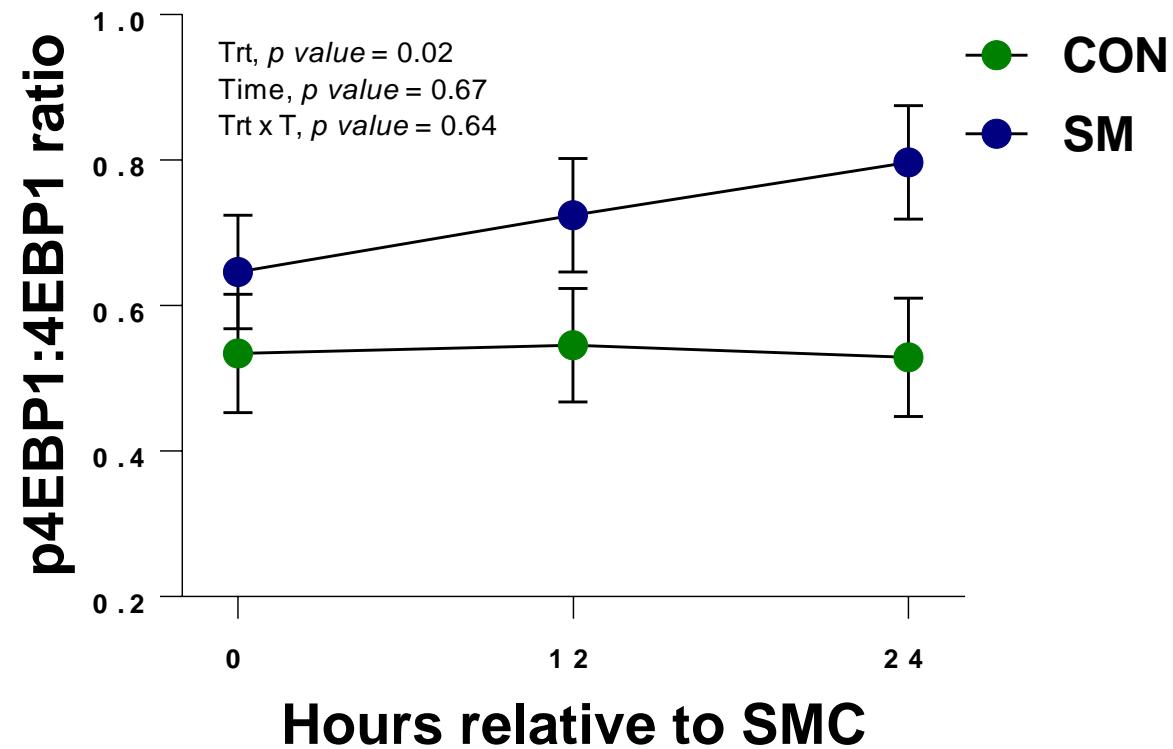
Blood

0 - 24 h relative to SMC

Results and Discussion

mTOR pathway

p4EBP1:4EBP1 in neutrophils



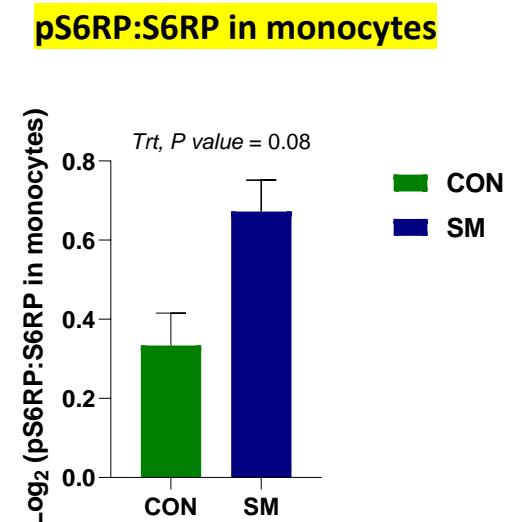
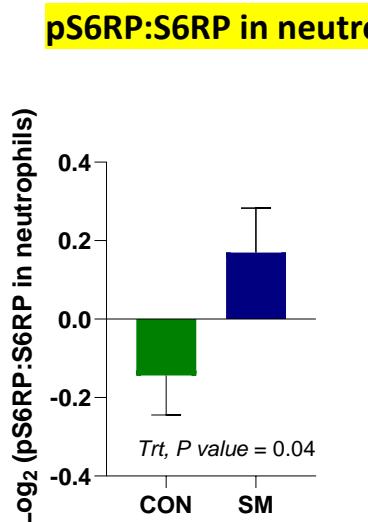
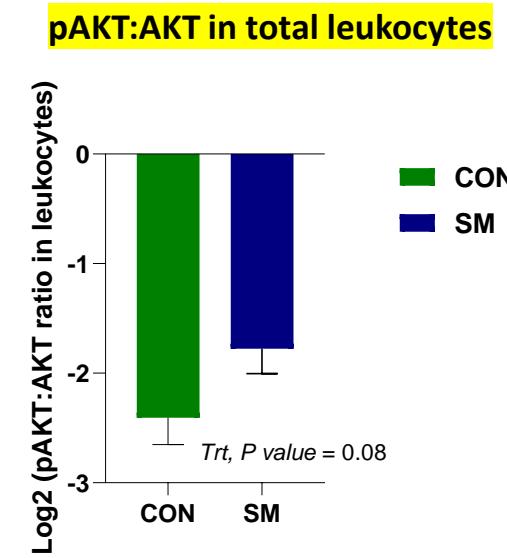
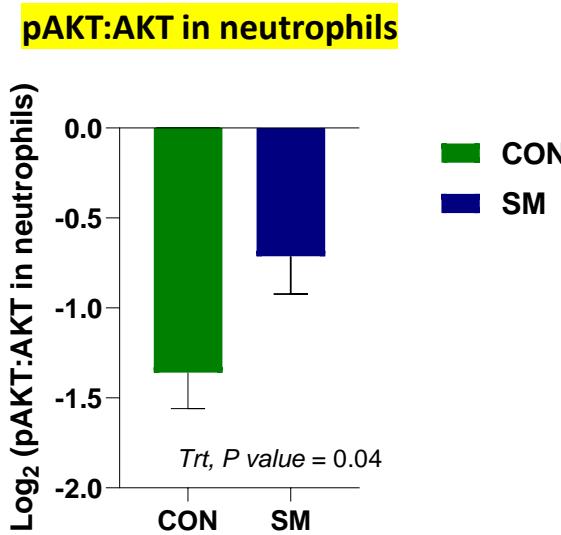
4EBP1 = Eukaryotic Translation Initiation Factor 4E Binding Protein 1

Mammary gland

24 h relative to SMC

Results and Discussion

mTOR pathway



AKT = Protein kinase B

S6RP = S6 Ribosomal Protein

Phosphorylation of mTOR proteins

Increased protein synthesis
Immune cell activation?
Cytokine production?
Resolution of inflammation

Further analysis

Summary

- Smartamine M supplementation during subclinical mastitis challenge
- Benefits dairy cow:

- ✓ Inflammatory status
- ✓ Immune cell mTOR pathway
- ✓ Oxidative status
- ✓ Lactation performance

