



ANIMAL MOLECULAR
AND CELLULAR BIOLOGY

UF IFAS
UNIVERSITY of FLORIDA



SMALL RUMINANT
PROGRAM

UNIVERSITY OF FLORIDA
BOVINE EMBRYO LAB



Can choline feeding during the breeding period improve pregnancy success of ewes and growth of the resultant lambs?

Masroor Sagheer, Quinn Hoorn, Daniel Carbalho,
Brittany Diehl, and Peter Hansen

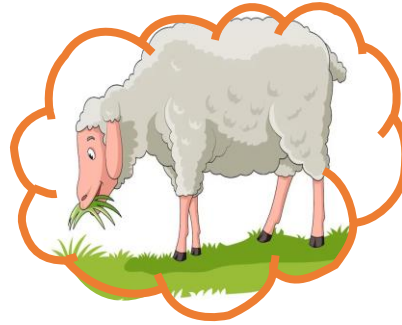
Department of Animal Sciences

University of Florida

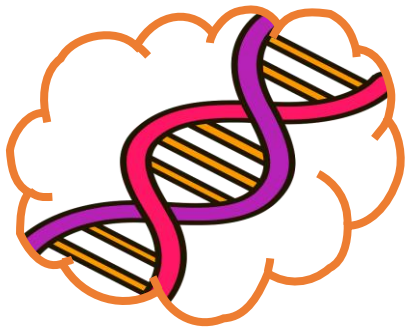
Small Ruminant Short Course
September 20-21, 2024
Gainesville, Florida



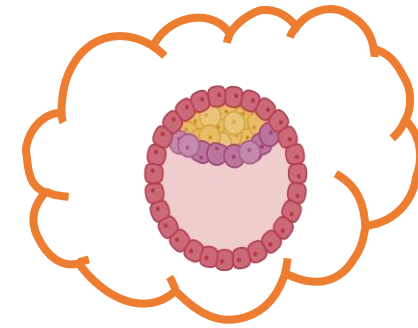
Approaches to enhance animal performance



Improved environment
-i.e., management



Improved genetics



Developmental programming

Developmental programming

Undernutrition

Cobalt and sulfur-deficient diet

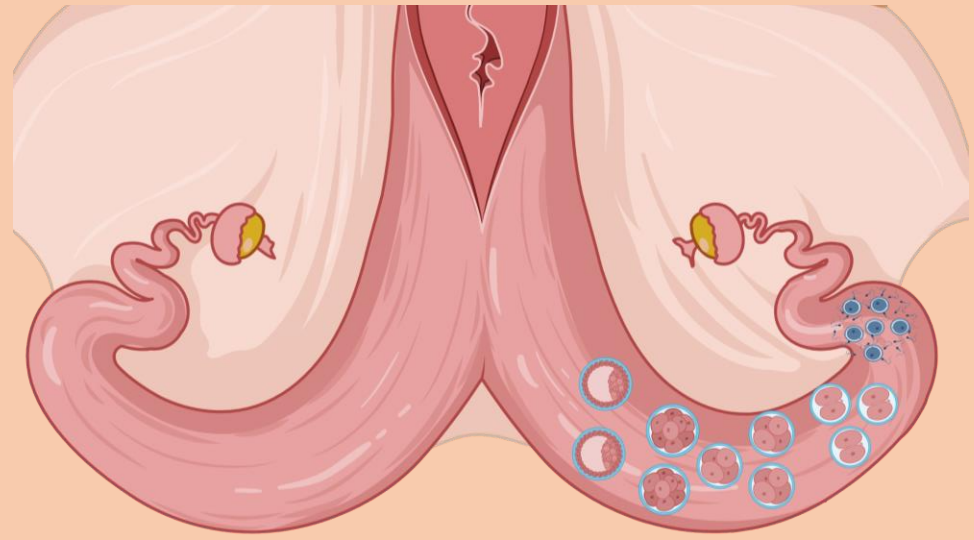
Heat stress

Shearing

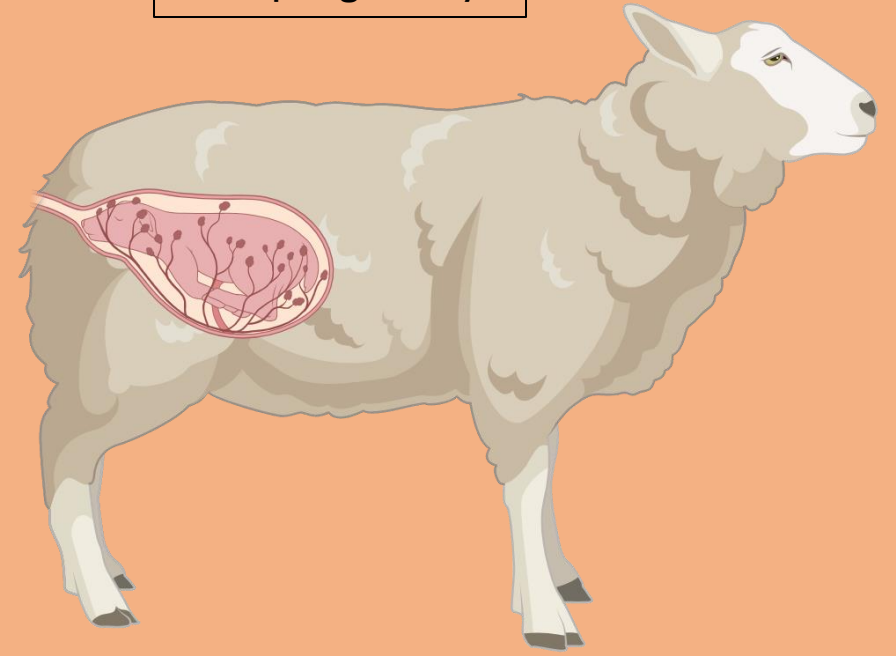
Cortisol

Over/undernutrition

Early pregnancy

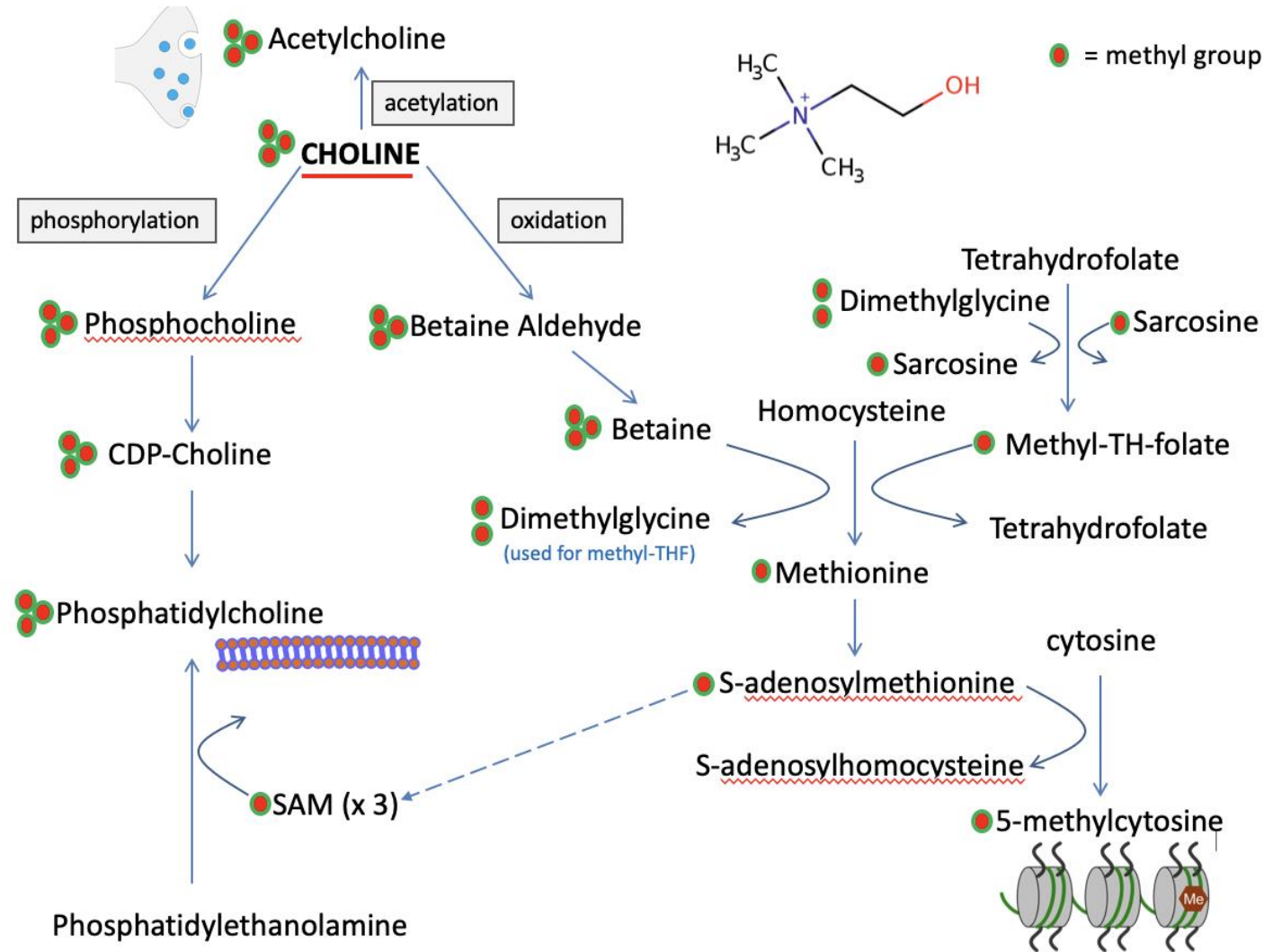


Late pregnancy

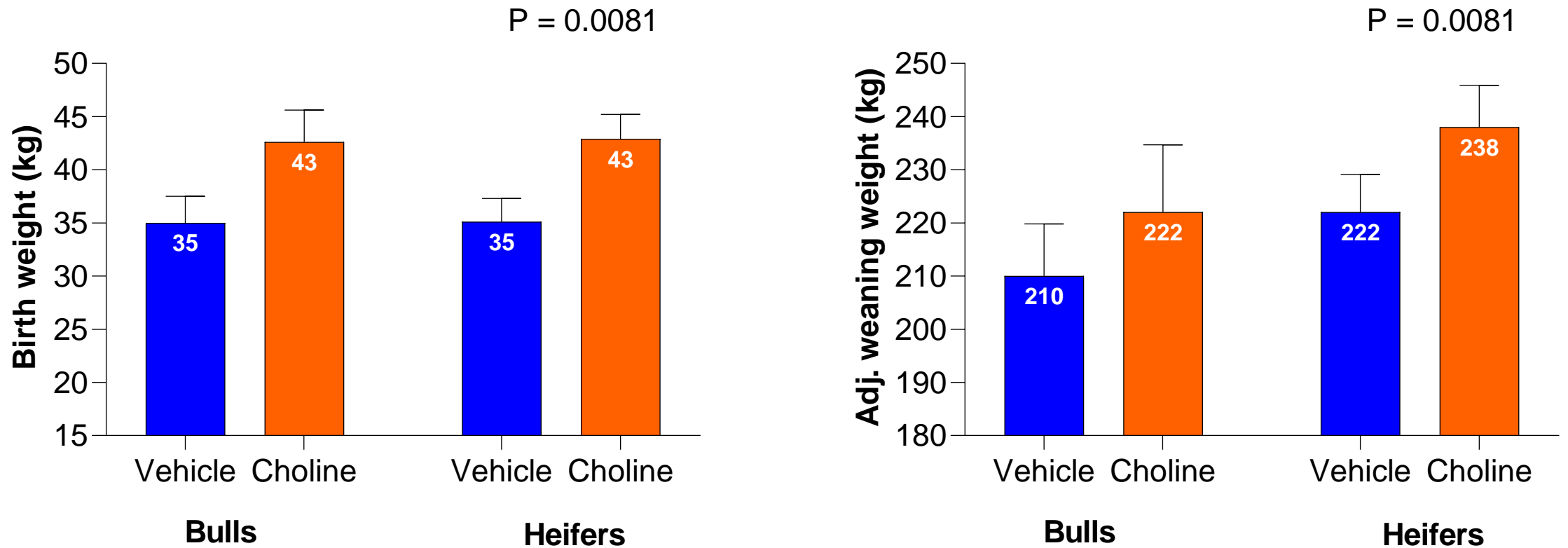


Effects on lambs
Birth weight, growth rate, organ development/function, and hormone concentrations

Choline – an essential nutrient that can program development



Choline chloride treatment increased birth weight and weaning weight of calves



Estrada-Cortés E, Ortiz W, Rabaglino MB, Block J, Rae O, Jannaman EA, Xiao Y, Hansen PJ. Choline acts during preimplantation development of the bovine embryo to program postnatal growth and alter muscle DNA methylation. FASEB J. 2021;35:e21926.

Study Question

Can choline feeding during the breeding period program development to change postnatal phenotype of the lambs?

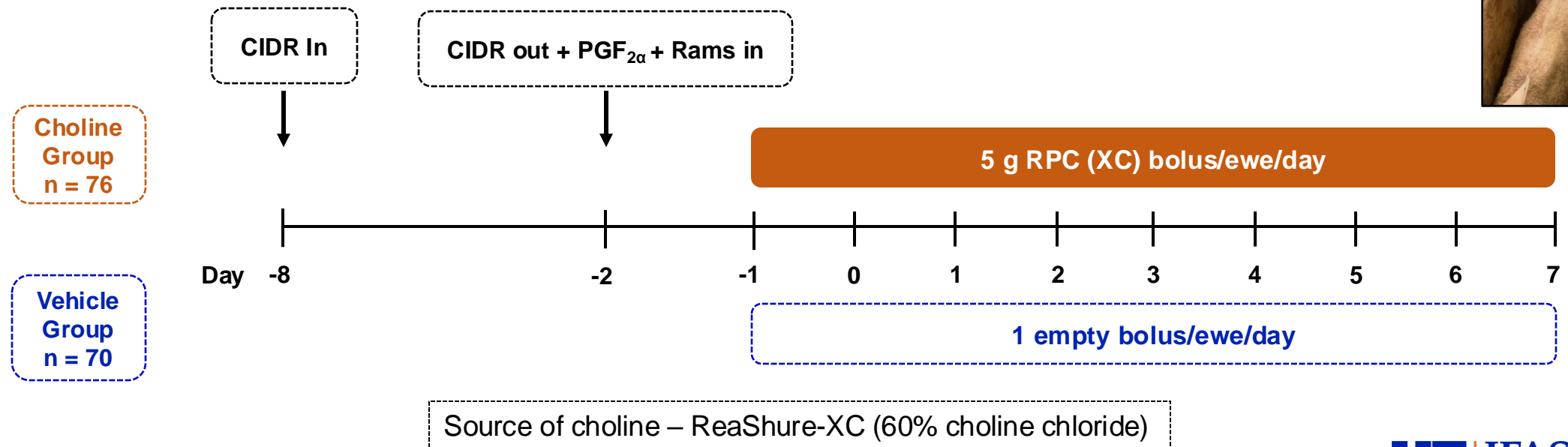
Hypothesis

Feeding 5 grams/day of rumen-protected choline (RPC) during the breeding period will improve the postnatal phenotype in lambs

Effect of feeding RPC

on pregnancy rate, pregnancy loss, and postnatal phenotype

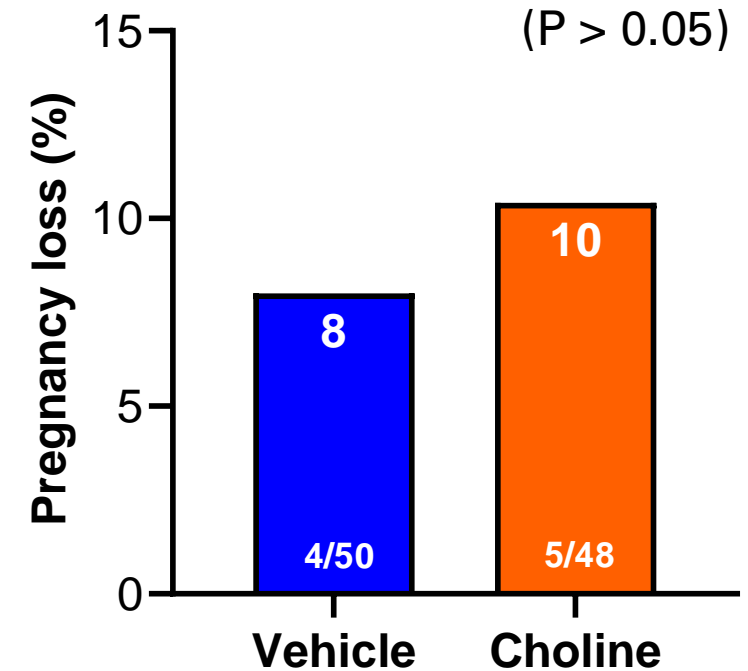
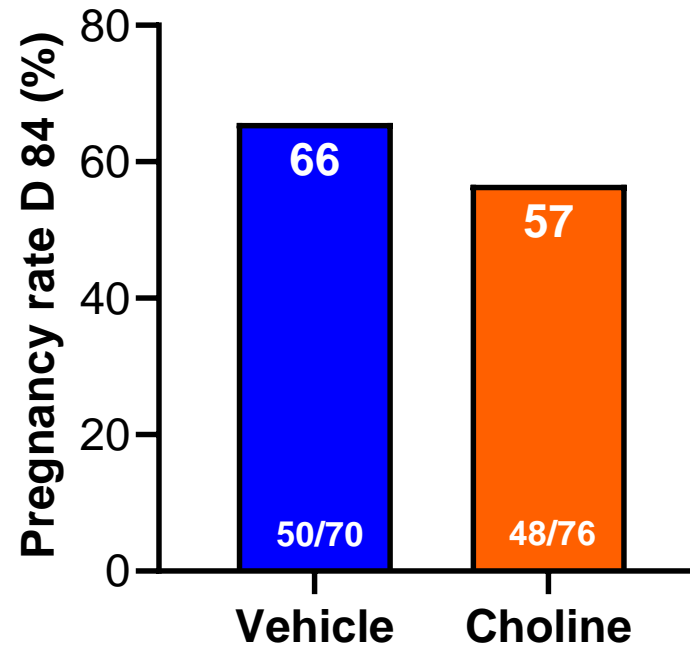
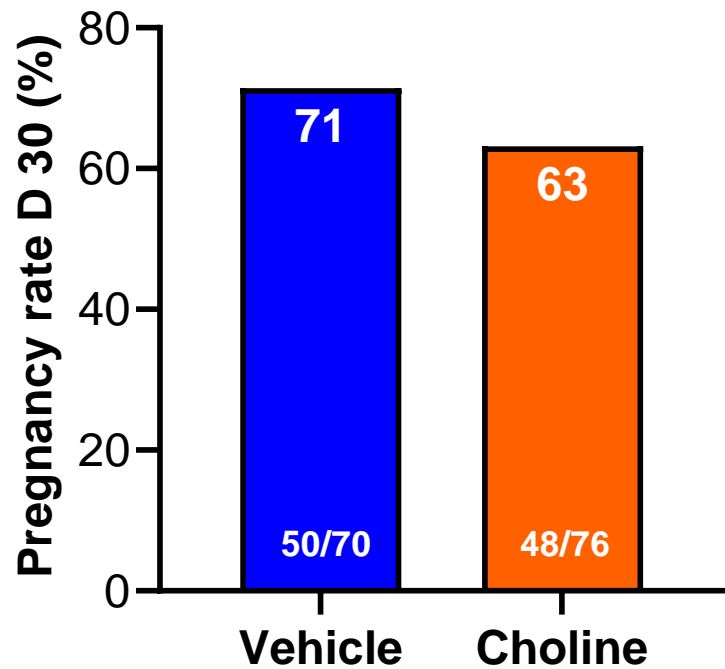
- ✓ Adult multiparous ewes (n = 146)
- ✓ SPU Gainesville
- ✓ Blocked by breed and age
 - ✓ Katahdin, FI Nat, Texel, cross
- ✓ Synchronized for natural breeding with rams
- ✓ Individual bolus feeding (5 g of 60% choline chloride in a gelatin capsule vs empty gelatin capsule)



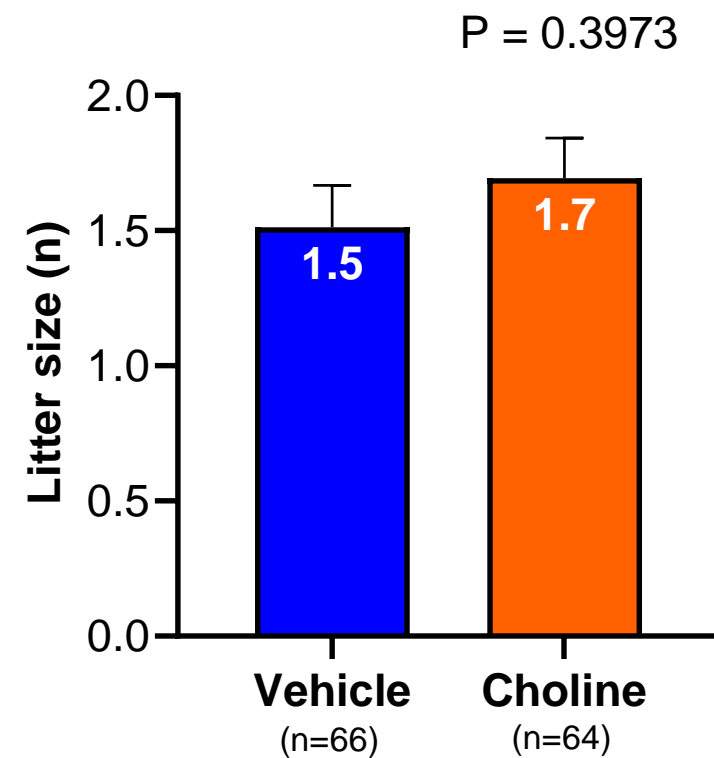
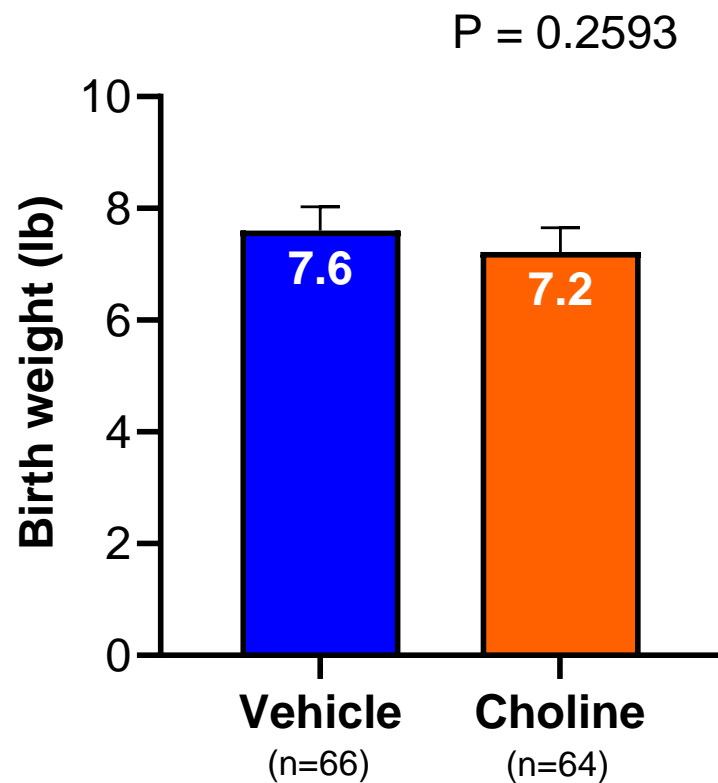
Endpoints

- Pregnancy rate – Days 30 & 84
- Pregnancy-associated glycoproteins – Days 30 & 84
- Birthweight
- Litter size and sex ratio
- Weaning weight
- *Longissimus thoracis* (ribeye) muscle area
- Fat thickness

Results – RPC feeding did not affect pregnancy rate and pregnancy loss

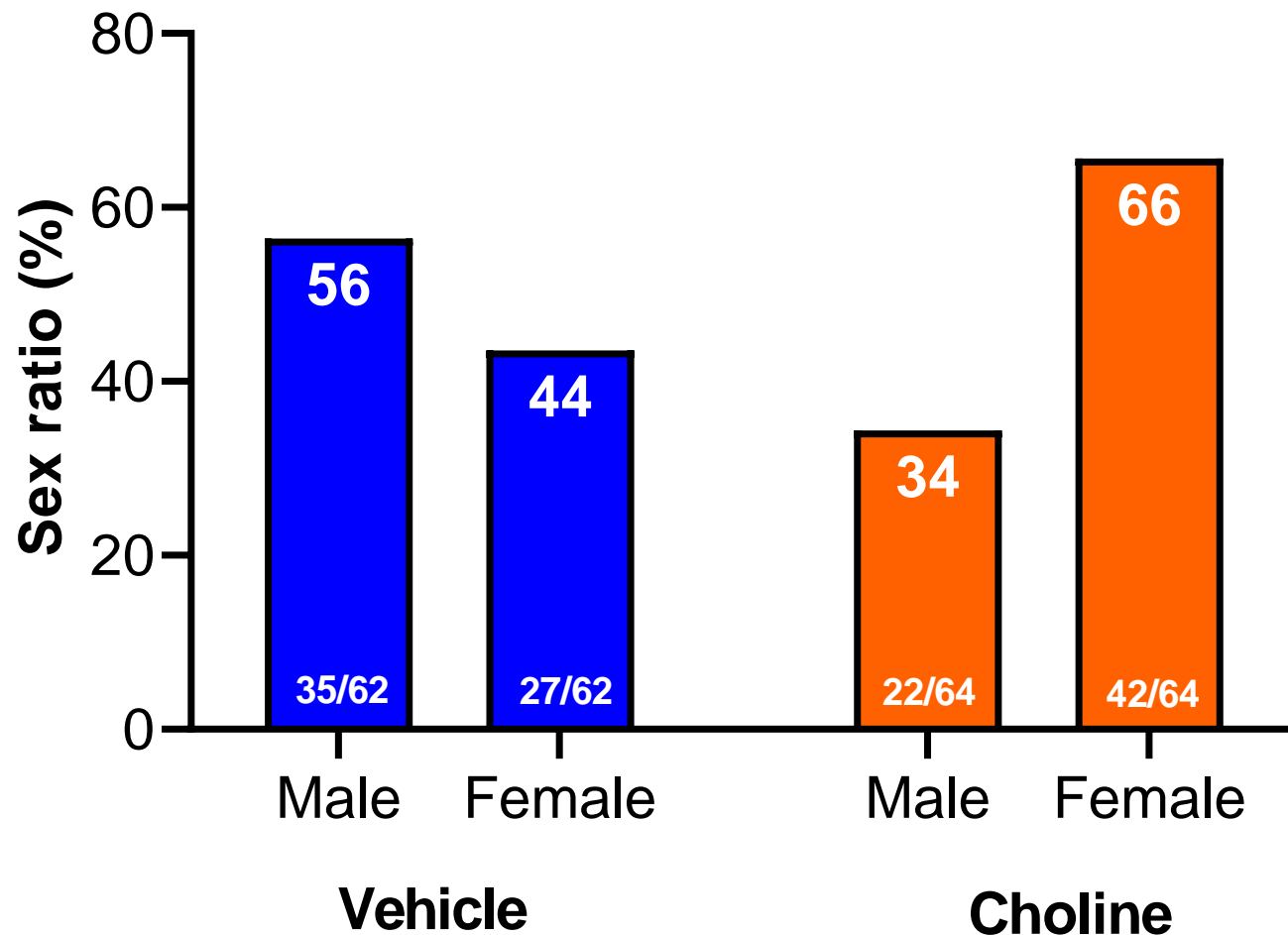


Results – RPC feeding did not affect birth weight and litter size

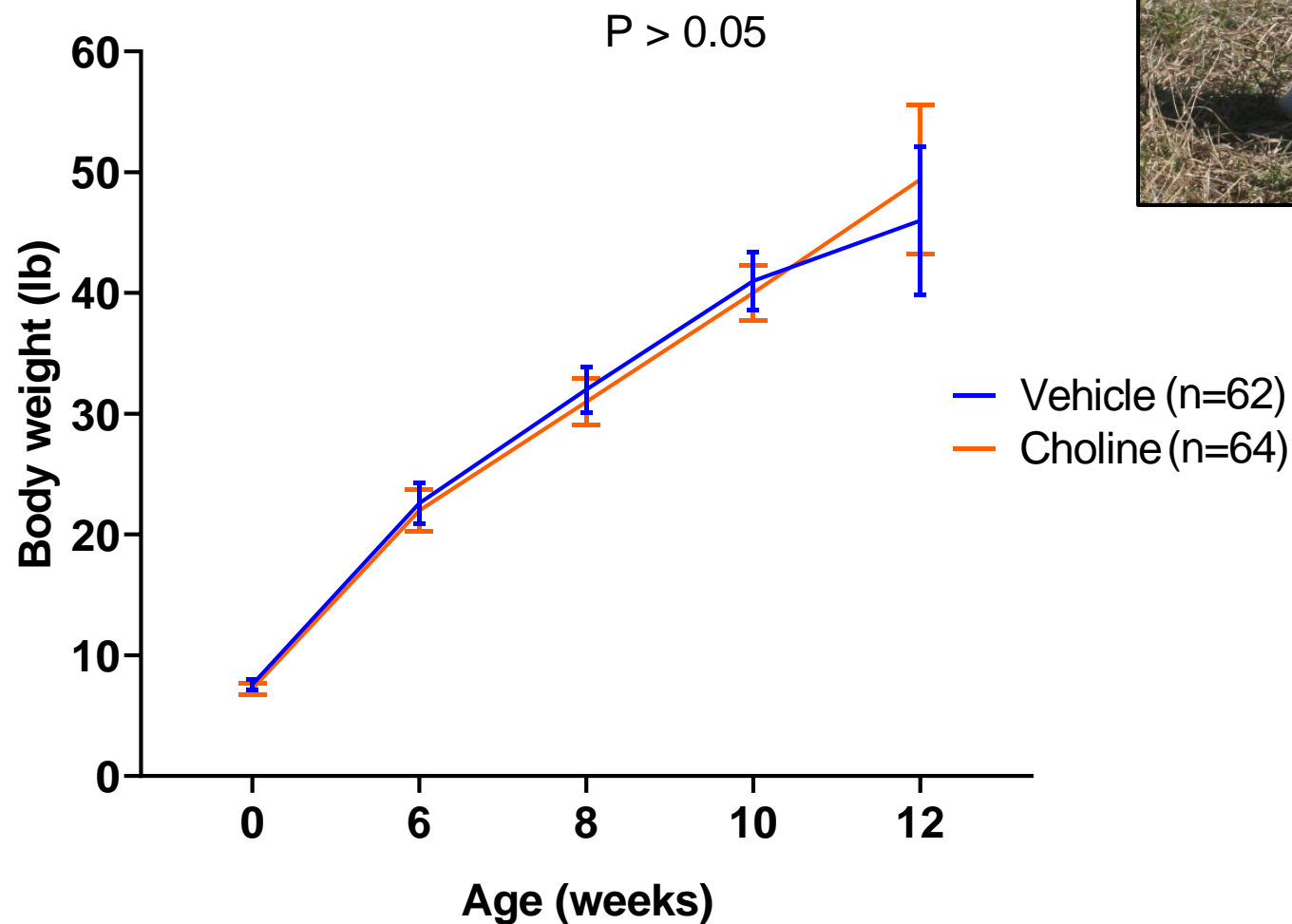


Results – RPC feeding altered the sex ratio in lambs

P = 0.0072



Results – RPC feeding did not affect body weight from birth until weaning



Conclusions

- ✓ RPC feeding during the breeding period did not affect pregnancy rate, pregnancy loss, birth weight, litter size, and body weight from birth until weaning
- ✓ RPC feeding altered the sex ratio at birth

Future plans

- ✓ Repeat the findings with another location and breed (Dorper)
- ✓ Maternal placental function
- ✓ Carcass ultrasound

Acknowledgements

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