Diet supplementation alters oocyte lipid content and developmental competence in mares

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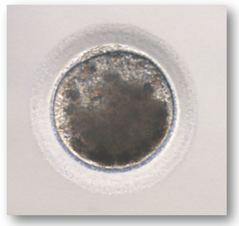
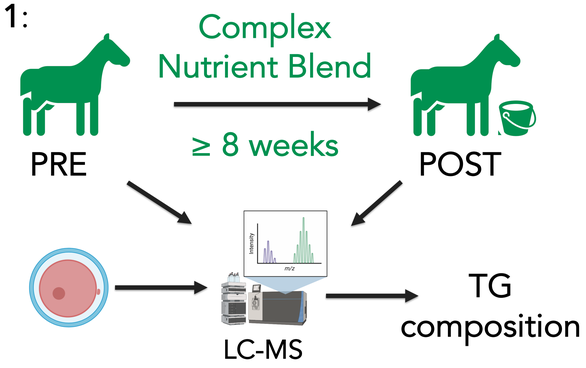
Background



- The equine oocyte is dense in lipids.
- The association between oocyte lipid content and developmental potential remains to be determined, as does the extent that diet can modify oocyte lipids.
- We hypothesized that diet supplementation to older mares can alter:
  1. **Oocyte lipid profile**
  2. **Oocyte developmental potential**

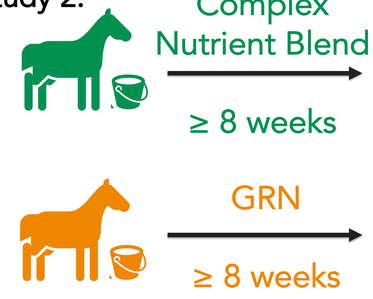
Materials and Methods

Study 1:

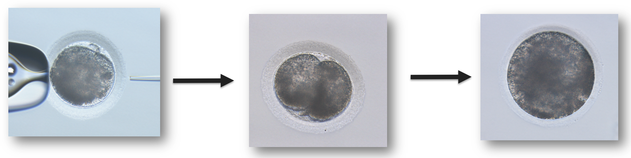


- Oocytes were collected from preovulatory follicles after induction of follicular maturation from mares aged 16-22 years (n=9) before (**PRE**) and after ≥ 8 weeks (**POST**) of supplementation with a **Complex Nutrient Blend** (**CNB**) of commercially available feed additives[a], including minerals, vitamins, L-carnitine, omega-3 fatty acids, pre- and pro-biotics.
- Denuded oocytes were assessed for triglyceride (TG) composition by liquid chromatography–mass spectrometry (LC-MS).

Study 2:

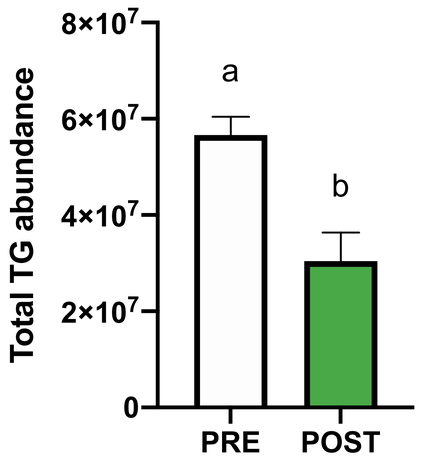


- Oocytes were collected from mares aged 18-24 years (n=5/group) after ≥ 8 weeks of supplementation with **CNB** or with an equicaloric grain control diet (**GRN**, 450g corn, oats and barley, and 60ml of corn oil daily).
- Oocytes were injected with frozen-thawed sperm from a stallion. After ICSI (D0) Cleavage was assessed at D1-2 and blastocyst formation at D7-8.



Results

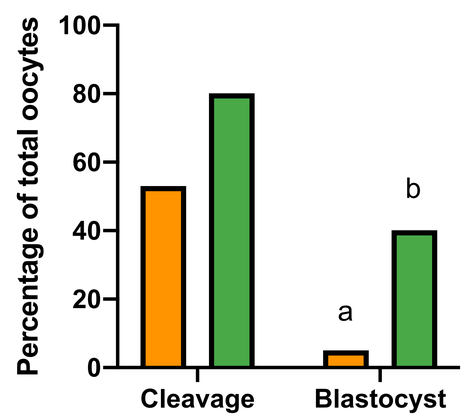
Study 1: Total TG abundance was lower (P=0.005) in oocytes collected after (POST) versus before (PRE) supplementation with CNB.



Of 92 of the analyzed TG species, 68 were less abundant after (POST) than before supplementation (PRE) with CNB, with the most abundant TG species shown in table

Triglyceride	PRE		POST		P value
	Abundance (x10⁶)	Percentage of total TG	Abundance (x10⁶)	Percentage of total TG	
TG(52:2)	5.40±0.42	9.54%	2.71±0.63	8.92%	0.008
TG(52:3)	4.27±0.32	7.54%	2.07±0.49	6.80%	0.004
TG(52:4)	4.06±0.35	7.18%	2.26±0.46	7.43%	0.005
TG(50:2)	3.52±0.32	6.22%	1.66±0.35	5.47%	0.007
TG(54:5)	3.02±0.27	5.33%	2.04±0.44	6.71%	0.05
TG(50:1)	2.85±0.34	5.03%	1.36±0.23	4.48%	0.01
TG(54:3)	2.34±0.26	4.13%	1.11±0.27	3.65%	0.004
TG(52:3)	2.20±0.16	3.88%	1.11±0.20	3.66%	0.001
TG(49:2)	2.02±0.16	3.57%	0.92±0.19	3.02%	0.002
TG(52:5)	1.73±0.12	3.05%	0.98±0.21	3.23%	0.01

Study 2: Cleavage rates were similar (P=0.2); however, more (P=0.03) sperm-injected oocytes developed into blastocysts for CNB (n=15) than GRN (n=19).



Conclusions

- Dietary supplementation of a complex nutrient blend to older mares resulted in reduced abundance of TG in oocytes and improved developmental potential.
- The extent that diet supplementation improves oocyte competence by altering the lipid profile is still to be determined.

Acknowledgements

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[a] Equine GI™ (147 g daily), Potency® (28 g daily), Motility Plus® (23 g daily), Healthy Weight Oil (60 ml daily), Platinum Performance, Inc.