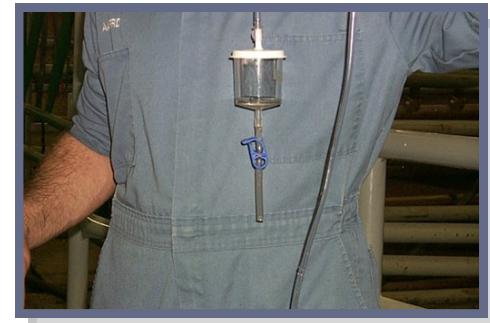


# Unsaturated fatty acids enhance early embryonic development in dairy cows

Feeding unsaturated fatty acids has been shown to improve reproduction in dairy cows by decreasing pregnancy losses and increasing conception rates. However, previous studies did not focus on their effects on embryonic development.

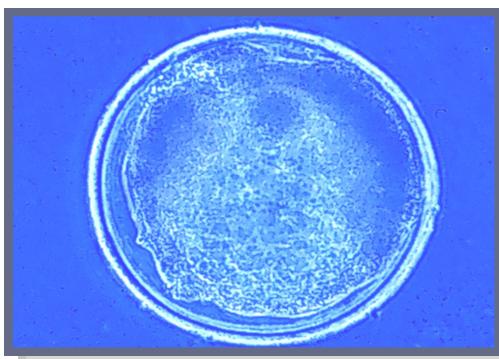
Two major sources of unsaturated fatty acids are flaxseed and sunflower seeds. Flaxseed is rich in alpha-linolenic acid, an omega-3 unsaturated fatty acid. Sunflower seeds are rich in linoleic acid, an omega-6.

Our study examined 24 lactating Holsteins that were divided into three groups: one fed sunflower seeds, one fed flaxseeds, and one fed saturated fatty acids. After following the Ovsynch protocol to synchronize ovulation, the cows were artificially inseminated and given hormones to stimulate their ovaries to release mature eggs. Embryos were then collected and examined to determine their quality, and also the quantity of blastomeres (the cells produced as a result of growth of the embryo) they contained.



*Embryo collection device*

## Unsaturated fatty acids increased the growth of embryos



*Bovine embryo at the blastocyst stage*

The embryos of cows fed flaxseed or sunflower seed had a significantly higher number of blastomeres than those of cows fed saturated fatty acids. There was no difference in growth or quality of embryos between these two diets.

The cows fed flaxseed or sunflower seed also had higher levels of progesterone, a hormone that has been shown to enhance early embryonic development and pregnancy rates in previous studies. However, we could not make the same conclusion from our study, because we did not measure progesterone concentrations during the period of early embryonic development.

## Milk fatty acid profiles reflected dietary fatty acid source

The variations in the fatty acid content of the milk produced by the different dietary treatment groups suggested that considerable quantities of fatty acids were absorbed from the diets. The alpha-linolenic acid content increased by 100% in cows fed flax, but decreased by 15% in cows fed saturated fatty acids and 35% in those fed sunflower seed.

Similarly, linoleic acid increased 61% in cows fed sunflower seeds, but did not change in the other two groups.

### Conclusion

Adding unsaturated fatty acids in sunflower seeds or flax-seed to diets of dairy cows may increase the growth rate of embryos during the early stages of pregnancy.

### Acknowledgements

Support and funding was provided by the Alberta Livestock Industry Development Fund, Alberta Milk, and Alberta Agriculture and Food. Thank you to Bioniche Animal Health, Pfizer Animal Health, and Vetoquinol Canada Inc. for product donations.



Embryos at various stages of development

Thangavelu, G., M. G. Colazo, D. J. Ambrose, M. Oba, E. K. Okine, M.K. Dyck. *Diets enriched in unsaturated fatty acids enhance early embryonic development in lactating Holstein cows.* 2007. *Theriogenology* 68: 949-957.