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# Adding flaxseed-fed-cow-serum to culture medium advanced *in vitro* bovine embryo development

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## Abstract

Diets enriched in unsaturated fatty acids (linoleic; LA or  $\alpha$ -linolenic acid; ALA) enhanced early embryonic development in Holstein cows compared to a diet enriched in saturated fatty acids (Theriogenology 68:949). Oleic acid (OLA) improves oocyte competence (Biol Reprod 85:62) but its influence on embryo development is not known. An *in vitro* model provides a controlled environment to study nutritional influences on embryogenesis; therefore, our objective was to evaluate the effects of OLA-, LA- or ALA-enriched cow sera on embryo development *in vitro* compared to commercial fetal calf serum (FCS). Blood samples were collected at estrus to harvest serum from non-lactating Holstein cows that had been assigned to diets supplemented with different sources of fatty acids: canola [n=4], 62% OLA; sunflower [n=4], 73% LA; or flax [n=4], 57% ALA. Cows were individually fed hay (9.4 kg) and concentrates (4.1 kg) supplemented with 1 of the 3 rolled oilseeds (8% DM). Cumulus-oocyte-complexes aspirated from abattoir ovaries were matured and fertilized (Day 0) *in vitro* and presumptive zygotes (n=784 in 4 replicates) randomly placed into culture drops with related sera (5%) for 8 d. Embryo development was evaluated on Days 7 and 8, and data were analyzed using the PROC Mixed procedure of SAS. The proportion (%) of embryos reaching the blastocyst stage on Day 7 was significantly higher (P<0.05) in ALA (16) than in OLA (7) and FCS (8) treatments, although it did not differ from LA (13; P<0.20) treatment. Cumulative blastocyst formation on Day 8 (23%) did not differ among treatments, indicating that flaxseed-fed-cow-serum accelerated early embryo growth. This study partially confirms earlier *in vivo* findings and lends support to the hypothesis that pregnancy loss reduction reported in flaxseed-fed dairy cows (J Dairy Sci 89:3066; Theriogenology 66:1316) may be occurring through accelerated early embryo development.

**Keywords:** Bovine, Embryo, Fatty acids