

THE INFLUENCE OF A DIET ENRICHED IN ∇ -LINOLENIC ACID ON OVARIAN FOLLICLES AND PREGNANCY RATES IN DAIRY CATTLE: PRELIMINARY FINDINGS

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Certain dietary fatty acids play an important role in reproductive function. As shown with a diet high in eicosapentaenoic (20:5n-3) and docosahexaenoic (22:6n-3) acids by Coelho et al. (Theriogenology, 47:143), ∇ -linolenic acid (C18:3n-3) could also reduce endometrial PGF₂ ∇ secretion and potentially increase embryo survival. The objectives were to determine if a diet enriched in ∇ -linolenic acid would enhance ovarian follicular growth, plasma progesterone concentrations, embryo survival, and pregnancy rate in lactating dairy cattle. Holstein cows (n=88) were assigned to diets supplemented with either rolled flaxseed (55% of lipid content is ∇ -linolenic acid) or rolled sunflowerseed (<1% of lipid content is ∇ -linolenic acid) to provide approximately 750 g oil/cow/day. Diets began 4 wk before breeding when cows were 55 $\pm$ 22 d (mean $\pm$ sd) postpartum. Barley silage/barley grain-based rations were formulated to meet or exceed NRC 2001 requirements. Diets were similar in metabolizable protein and net energy of lactation. Based upon a mean dry matter intake of 24.2 kg/d, cows consumed 410 g linolenic acid vs. ~ 5 g linolenic acid. Ovulation was synchronized with a Presynch/Ovsynch protocol and cows were bred by timed-insemination. Blood samples were collected from all cows 21 and 24 d after AI and cows with elevated (>1 ng/mL) progesterone at both times were presumed pregnant at 24 d. Pregnancy diagnosis was conducted 32 d after AI by ultrasound. Pregnant cows received no further oilseed supplementation. Nonpregnant cows were immediately placed on another Ovsynch regimen, rebred 42 d after the first AI, and oilseed supplementation continued to pregnancy diagnosis (32 d after second AI). In a subset of 16 cows (n=8 per diet) ovarian structures were monitored by transrectal ultrasonography and serum progesterone was measured on alternate days from Days 0 to 20 and 0 to 18, respectively.

Presumptive pregnancy (24 d) and confirmed pregnancy (32 d) rates to the first AI were higher in cows fed flax than in those fed sunflower (87.9 vs. 65.7% and 53.3 vs. 32.5%, respectively; P<0.05), with cumulative 32 d pregnancy rates (combined for both inseminations) of 66.7 vs. 51.1% (P<0.15). In the subset of 16 cows with more intensive monitoring, the preovulatory follicle (prior to the first AI) was larger in cows fed flax compared to those fed sunflower (16.9 vs. 14.1 mm; P<0.05). However, there was no significant effect of diet on numbers of ovarian follicles or CL diameter. Mean serum progesterone concentrations were not different between diets.

These preliminary findings suggest that inclusion of rolled flax in the diets of postpartum dairy cows may improve fertility, possibly through enhanced embryo survival. Further investigations are ongoing to elucidate the underlying mechanisms.

Key words: dairy cattle, pregnancy, flaxseed, linolenic acid, PGF₂ ∇