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Student Abstracts

The effect of dietary saturated and unsaturated fatty acid on fatty acid composition of serum, adipose and liver lipid fractions, and serum vitamin content in pre-ruminant calves

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Dietary saturated fatty acid (SFA) and unsaturated fatty acid (UFA) can alter fatty acid (FA) profiles in various tissues, serum as well as circulating lipid soluble vitamins. The objective of this study was to examine the effect of dietary SFA and UFA on adipose, liver and serum FA profiles, and its relation with vitamins content in pre-ruminant calves. Twelve Holstein male calves were assigned to two treatments, 6 calves each, in a completely randomized design. Starting 3 d of age, calves on SFA received of 120 mL palm oil/d, and calves on UFA received 80 mL flax seed oil plus 40 mL conjugated linoleic acid (CLA). After 50 d, all animals were euthanized and samples were obtained. Adipose, liver and serum lipids were processed by gas-chromatography following lipid extraction, fractionation and methylation for FA profile. Serum α -tocopherol, retinol, and β -carotene contents were analyzed by high-performance liquid chromatography (HPLC). Data were analyzed using the Proc TTEST of SAS with significance declared at $P \leq 0.05$. The result showed the UFA had significantly greater α -linolenic acid (α -LA; C18:3 n3; $P < 0.01$) compared to SFA calves in all three [non-esterified fatty acid (NEFA), neutral lipid (NL) and phospholipids (PL)] fractions of liver, adipose and serum. In addition, UFA calves had a decreased γ -linolenic acid (C18:3 n6; $P < 0.05$) compared to SFA calves in all three fractions of liver as well as NL and PL fractions of serum. Furthermore, supplementation of UFA with α -LA caused a greater eicosapentaenoic acid ($P < 0.05$) in all three lipid fractions of serum, as well as NL and PL fractions of adipose tissue. The lipid soluble vitamins content in serum however was significantly reduced by dietary UFA ($P < 0.01$). This may indicate that UFA supplementation elevated the substrate of polyunsaturated fatty acid biosynthesis, but possibly degraded the lipid soluble vitamins to protect these FA from oxidation.

Keywords: Fatty acid composition, lipid soluble vitamins, calves

The effect of aspirin on prostaglandin F_{2α} secretion in lactating dairy cows during the luteal phase of the estrous cycle

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Approximately, 70-80% of embryonic loss in dairy cattle occurs between day 8 and 16 following artificial insemination (AI). Early embryonic loss may be due to untimely secretion of prostaglandin F_{2α} (PGF_{2α}) before maternal recognition on days 14-16 after fertilization. The objective of this study was to examine the effect of aspirin, a non-steroid anti-inflammatory drug (NSAID), on PGF_{2α} secretion in lactating dairy cows by characterizing blood plasma prostaglandin metabolites (PGFM) and progesterone (P₄) concentrations during the luteal phase of the estrous cycle. Twenty-three lactating Holstein cows were synchronized to ovulation, which was confirmed by ultrasonography (day 1). On day 14, after detection of corpora lutea, cows were randomly assigned to receive aspirin (total of 140 g; n=11) or no aspirin (control; n=12) and a blood sample was obtained from each cow. Aspirin was given orally on day 14 (2×) and day 15 (1×), 12 hours apart. On day 15, six hours after the last dose of aspirin, hourly blood samples were taken for 6 consecutive hours for PGFM concentrations analysis. Daily blood samples were also collected (day 15 to 23) to examine P₄ concentrations. To examine the retreatment effect, analysis of repeated measures were utilized. The model included treatment, the repeated factor time, and treatment × time interaction, cow within treatment was considered the random effect. On day 14, mean P₄ concentrations were > 1 ng/mL for all cows and similar between groups. Before treatment, there was no difference in mean PGFM concentrations between the groups (203 vs 224 ng/mL; SE ± 39 for aspirin and control, respectively). There was an effect of treatment and treatment × time on mean PGFM (P < 0.05). Mean PGFM concentrations decreased (P < 0.05) 30 hours after initiation of treatment and remained low for 5 hours after last treatment for the aspirin group, whereas the control PGFM concentrations remained unchanged. Overall, mean PGFM concentrations were 106 and 190 ng/mL (SE ± 33) for aspirin and control groups. Blood P₄ concentrations post-treatment were similar between the two groups (3.6 vs. 3.2 ng/mL; SE ± 0.6), but declined from day 15 to 23 (P < 0.01) for both groups. Although P₄ concentrations did not differ between groups, days to luteolysis (P₄ < 1 ng/mL for two consecutive days) tended (P = 0.09) to be longer for the aspirin compared to the control group (20.6 vs. 19.25 ± 0.5 days). This study indicates that oral administration of aspirin may suppress PGF_{2α} during day 14 to 15 after estrus and may delay luteal tissue regression although no effects on P₄ were observed.

Keywords: dairy cow, non-steroidal anti-inflammatory drug, prostaglandin F_{2α}