In-vivo bovine model to examine the long-lasting effects of acute DEHP exposure on ovarian function

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Background
• Di(2-ethylhexyl) phthalate (DEHP) is a commonly used plasticizer that is widely dispersed throughout agricultural environments. Thus, domestic animals are at potentially constant risk of exposure.
• DEHP and its metabolites have been shown to have adverse effects on ovarian function in laboratory animals. However, their effects on domestic animals are less known.

Objective
• To examine the effect of DEHP on ovarian function: follicular, and corpus luteum (CL) dynamics and steroidogenesis, in lactating cows.

Experimental design
• Holstein cows were synchronized and tube-fed with DEHP (100 mg/kg per day; n=4) or water (n=5) for 3 days.
• Urine and plasma samples were collected before (day 0), during (days 2, 4) and after (days 11, 19, 24) treatment.
• Samples were pooled and analyzed to determine DEHP metabolite concentrations (data not shown).
• Cows were resynchronized and monitored by ultrasonography scanner (Aloka SSD-900, 7.5 MHz).
• Follicular fluids of the preovulatory follicles were aspirated with an ultrasonic scanner connected to a vaginal sector transducer (PieMedical, 7.5 MHz).
• Follicular fluid estradiol concentration was determined by RIA kit (DSL-4800, Diagnostic Systems Laboratories Inc., Webster, TX, USA).
• Statistical variance was tested by one-way ANOVA. The level of significance was set to \( P < 0.05 \).

Results
• DEHP impairs developmental dynamics of (A) first-wave (DF1) and second-wave (DF2) dominant follicles and (B) the CL.

• DEHP tends to increase the formation of ovarian pathologies (i.e. cysts, persistent follicles).

Summary
• The findings demonstrate the potential risk associated with exposure to DEHP via feeding.
• DEHP impaired developmental dynamics of the dominant and preovulatory follicles, as well as the CL.
• Such alterations might explain, in part, formation of ovarian pathologies and reduced fertility in dairy cows.