

# Standardizing Infrared Thermography (IRT) and Micro-Behavioural Biometrics for Estrus Detection in Dairy Cows

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Average estrus detection rates in Canadian Dairy herds are under 40%. Further, an estimated, 75% of Canadian dairy herds operate in tie-stall barns where estrus detection rates could be even lower than 35%. Infrared thermography (IRT) uses heat radiated from the body's surface to monitor temperature and other physiological changes in animals. Complementary biometric algorithms (eg. coat patterns and movement dynamics) may increase accuracy and specificity. The objective of this study is to standardize infrared thermography and micro-behavioural biometrics for estrus detection in dairy cows. 18 cycling cows at 45 days in milk divided in 6 groups and 18 pregnant cows divided in 6 groups (Control) will be scanned using (Ultrasound ALOKA SSD-500 ALOKA Co., LTD, Japan) to ensure cows are cycling and to confirm pregnancy. Open cows will be synchronized with an injection of GnRH at d-1(100µg of Ferteline IAF BioChem International Inc.) and CIDR insertion for 7-d (Pfizer Animal Health, Pfizer Canada Inc.). On d-6, an injection of prostaglandin PGF2α (500 µg Estrumate Merck Intervet Corp. Kirkland, QC, Canada) will be given followed by removal of the CIDR on d-7 with second injection of 500 µg of PGF2α. Pregnant cows (Control) will receive a sham injection and CIDR on the same schedule and frequency as open cows on the synchronization protocol. Cows will be monitoring before, during, and after milking to establish micro-behaviour frequencies, temperature and physiological changes in order to capture estrus using an infrared camera (FLIR A310) at a resolution of MPEG-4 video over Ethernet to show live images on a PC with 640x480 overlay up to 30 Hz. Thermograms of the eye, muzzle, cheeks, neck, front feet, round, heart girth, vulva surround, tail head, and withers view FLIR T450s Real-time Radiometric: at 320 X 240 pixels 30 Hz (FLIR Systems Ltd Burlington, ON. Canada) behaviour biometrics via visual cameras (Swann 8-ch 960H DVR, will be used to validate data acquired compare to the automated FLIR A310 Infrared System.