

Evaluation of Infrared Thermography (IRT) and Micro-Behavioural Biometrics for Estrus Detection in Naturally Cycling Dairy Cows

H.J. Perez Marquez^{1*}, D.J. Ambrose², A. Schaefer¹, C. Bench¹

¹Department of Agriculture, Food, and Nutrition Science, University of Alberta T6G 2P5. ²Alberta Agriculture and Forestry, Email address: perezmar@ualberta.ca

Low estrus detection rate contribute to reduced fertility and longevity in dairy cows. Canadian dairy herds have an estrus detection rate of less than 40% which can be even lower (35%) in tie-stall barns. For the last decade, the dairy industry has been moving towards automated estrus detection platforms in order to achieve higher estrus detection rates (>40%) without increased labor input. Infrared thermography (IRT) has proven to be a non-invasive technology which is able to predict ovulation by measuring heat radiated from the vulva area during estrus. Adding complementary non-invasive biometric information (eg. thermal patterns and micro-behaviour dynamics) to IRT algorithms may increase accuracy and specificity. The objective of this study is to evaluate combined infrared thermography and micro-behavioural biometrics for estrus detection in naturally cycling dairy cows. Twenty one first lactating cows will be ultrasound scanned (Ultrasound ALOKA SSD-500 ALOKA Co., LTD, Japan) every other day beginning at 43 days in milk (DIM) to determine ovulation. Once a cow has ovulated (D0), ultrasound scans will be initiated every other day from D7 to 14 and daily scans from D14 until confirmation of a subsequent ovulation and appearance of a new corpus luteum. Automated IRT and micro-behavior biometrics will be captured on the caudal-dorsal side of each cow using an automated infrared camera FLIR A310 real-time non-radiometric: at 320 X 240 pixels 30 Hz (FLIR Systems Ltd Burlington, ON, Canada) and using Vacca2 software (Animal Inframetrics Inc. Lacombe AB, Canada) from D14 until ovulation in order to obtain temperature readings per second using vulva and tail areas of the cow. IRT and behaviour biometric will take place during and after milking in order to compare physiological and micro-behavior frequency changes between non-estrus and estrus stages.