UNIVERSITY of GUELPH

ONTARIO AGRICULTURAL COLLEGE

DEPARTMENT OF ANIMAL BIOSCIENCES

PhD. Defence

The Transport and Accumulation of Free and Sulfated Androstenone in the Boar

Christine Bone

Date: November 12th 2021 at 9:00am

The PhD Defence for Christine Bone has been scheduled for November 12th, 2021 at 9:00am. The defence will be held online via Zoom: https://zoom.us/j/95129752561?pwd=VW5jVWZreHJ1UjJ3RjVMbW84TFR6dz09 Meeting ID: 951 2975 2561 Passcode: 111891 One tap mobile +13462487799,,95129752561#,,,,*111891# US (Houston) +14086380968,,95129752561#,,,,*111891# US (San Jose) Dial by your location +1 346 248 7799 US (Houston) +1 408 638 0968 US (San Jose) +1 646 876 9923 US (New York) +1 669 900 6833 US (San Jose) +1 253 215 8782 US (Tacoma) +1 301 715 8592 US (Washington DC) +1 312 626 6799 US (Chicago) Meeting ID: 951 2975 2561 Passcode: 111891 Find your local number: https://zoom.us/u/a3gMMDnQo

The exam committee will consist of:

Examining Chair: Dr. Vern Osborne

Advisor: Dr. Jim Squires

Adv. Committee Member: Dr. Christine Baes

Additional Graduate Member: Dr. Elijah Kiarie

External Examiner: Dr. Galia Zamaratskaia

Abstract:

Boar taint is a meat quality issue caused by the accumulation of androstenone in the adipose tissue of entire male pigs and is prevented with castration, which unfortunately reduces both the profitability and environmental sustainability of pork production and is also a welfare concern. Consequently, the purpose of this study was to characterize the transport of free and sulfated androstenone in the plasma of the boar, as well as the uptake and deconjugation of androstenone sulfate by the adipose tissue to identify novel biological pathways leading to the development of boar taint, which may assist with designing alternatives to castration. Free androstenone bound to albumin in the porcine plasma and the binding capacity, or percentage of androstenone that bound to albumin, was significantly greater ($p = 0.01$) in animals that had low fat androstenone concentrations than in boars with high fat androstenone concentrations. Conversely, androstenone sulfate was not bound by a carrier protein and a positive correlation was identified between the uptake of androstenone sulfate by adipocytes and the expression of the membrane transporter OATP-B ($r = 0.86$, $p = 0.03$), as well as the expression of steroid sulfatase (STS) and the production of free androstenone from androstenone sulfate ($r = 0.76$, $p < 0.001$). Additionally, fat androstenone concentrations were positively correlated with the quantity of free androstenone that was produced from androstenone sulfate by the sulfatase reaction ($r = 0.85$, $p < 0.001$) in early but not late maturing boars. These results suggest that an increased binding capacity of free androstenone may prevent against the development of boar taint. In contrast, androstenone sulfate appears to function as a steroid reservoir that is deconjugated in the adipose tissue to provide a source of free androstenone, which can accumulate and contribute to the development of boar taint in early maturing animals. Based on these results, albumin and STS may be suitable candidate genes for boar taint.