

ANIMAL WELFARE

Title: Towards an improved method of piglet castration to reduce pain: the use of one incision in combination with the use of a Vapocoolant and Metacam™ (C-17-037)

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Scientific Abstract: Castration is a stressful and painful procedure that can negatively impact the welfare of pigs. Castration is performed to avoid boar taint in the meat of sexually mature male pigs and to reduce aggression. The objectives of this study were to: 1) evaluate the effect of two incisions compared to one incision and the use of a topical vapocoolant (VAPO; ethyl chloride; a topical anesthetic) applied before castration, on measures of performance, behavior and physiology and 2) evaluate the effect of the best method found in objective 1 and the use of Metacam® (an injectable non-steroidal anti-inflammatory drug; NSAID) before castration on measures of performance, behavior and physiology.

The first phase consisted of six treatment groups (N = 27 pigs per treatment) and included: nothing [NO]; sham castrated [SH]; one incision castration [C1]; one incision castration plus VAPO [C1+VAPOAPO]; two incision castration [C2]; two incision castration plus VAPO [C2+VAPO]. Body weights were taken at baseline (TO), at 24, 48, and 72 h, and 7 and 14 d (at weaning) after castration. Behavior measures were collected every 10 min for 1 min for an entire hour and then using 10 min scan samples for 24 h after castration. Blood samples were collected to assess physiological measures at baseline (TO), 15 min (T15), 30 min (T30), 180 min (T180) and 24 h after castration. Vocalizations were measured using STREMOD software from the start to the end of castration. Wound scores were collected daily during 10 d for phase 1 and 14 d for phase 2. In phase 1, performance measures were significantly different among treatment groups for weaning weight (P = 0.0222). C1 pigs C1+VAPOAPO pigs were significantly heavier than the other castrated treatment groups (8.44 ± 0.30 kg and 8.32 ± 0.30 kg, respectively), but not different than NO and SH pigs. Differences in behavior were not significant among treatment groups in phase 1 nor phase 2. Vocalizations were significantly higher for C1 and C1+VAPOAPO pigs (464.20 ± 51.0 db and 333.21 ± 51.0 db, respectively; P = 0.0015). Several physiological measures (hematology and blood chemistry) were significantly different among treatment groups. Hematological measures mainly identified iron deficiencies and were not clearly due to the effects of castration. These included, mean corpuscle volume (MCV; P = 0.0002), mean corpuscle hemoglobin (MCH; P = 0.0053), mean corpuscle hemoglobin concentration (MCHC; P = 0.0065), and red cell distribution width (RDW; P = 0.0001). Several blood chemistry measures were significant among treatment groups, such as total protein (TP; P = 0.0001.), blood urea nitrogen (BUN; P = 0.0413), and glucose (GLU; P = 0.0233). Treatment differences in cortisol concentrations or wound scores were not observed.

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Phase 2 consisted of three treatment groups (N = 40 pigs per treatment) and included: nothing [NO]; one incision castration [C1]; one incision castration plus Metacam® administered 15 min before castration [C1M]. The same measures were collected as in Phase 1. Performance measures did not differ among treatment groups. The behavioral data did not show differences among treatment groups in the first hour post-castration nor during the 24 h post-castration period. Vocalization data did not differ among treatment groups. Blood measures were not significantly different among treatment groups, except for red blood cells (RBC; $P = 0.0304$). Cortisol values were different among treatment groups ($P < 0.05$). C1 and C1M cortisol concentrations were greater than the NO treatment group at 15 min post-castration (74.48 ± 9.50 ng/ml, 63.65 ± 8.57 ng/ml and 33.99 ± 9.89 ng/ml, respectively). After 15 min C1M cortisol concentrations were not different than the NO group, while C1 peaked at 30 min and then decreased over time. Wound scores, specifically bruising in the scrotal area was significantly different among treatment groups Metacam® ($P < 0.001$). On post-castration day (PCD) 1, bruising at or around the site of castration was higher in the C1M group compared to C1 (1.00 ± 0.11 and 0.029 ± 0.10 , respectively). On PCD 2, C1 has higher bruising compared to C1M (0.78 ± 0.10 and 0.33 ± 0.09). On PCD 3 the C1M pigs had higher bruising than C1 pigs (2.67 ± 0.15 and 0.0 ± 0.13). It was speculated that the appearance of delayed bruising on C1M pigs may have been caused by Metacam®.

In conclusion, the data collected gives sufficient insight on the benefits of one incision castration compared to 2-incision castration. However, the data does not support the idea that Metacam® meaningfully reduced the acute pain of castration, as it is evident that pigs still experience stress associated with castration at 15 min post-castration with or without the use of Metacam®. Further research could potentially identify the correct timing for administration and thus, Metacam® could mitigate the pain associated with one incision castration.