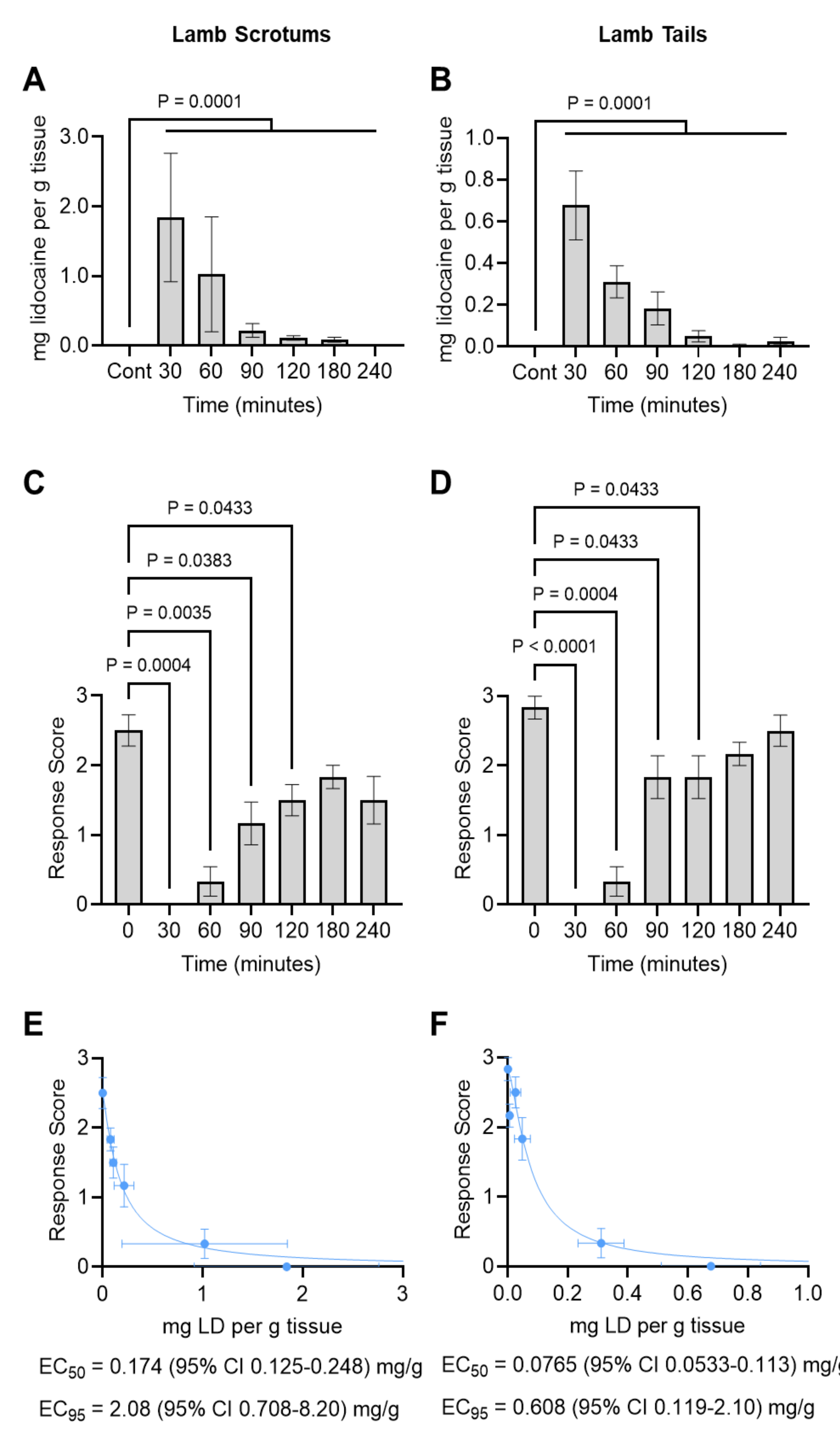
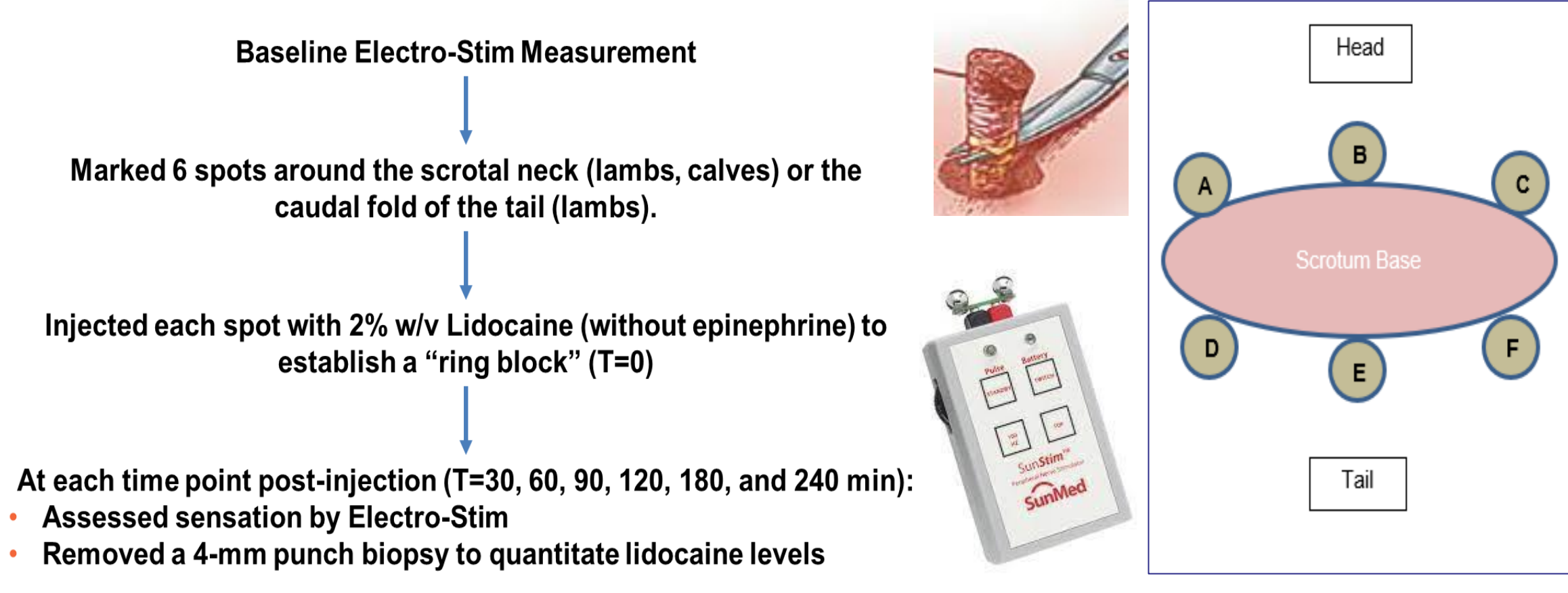


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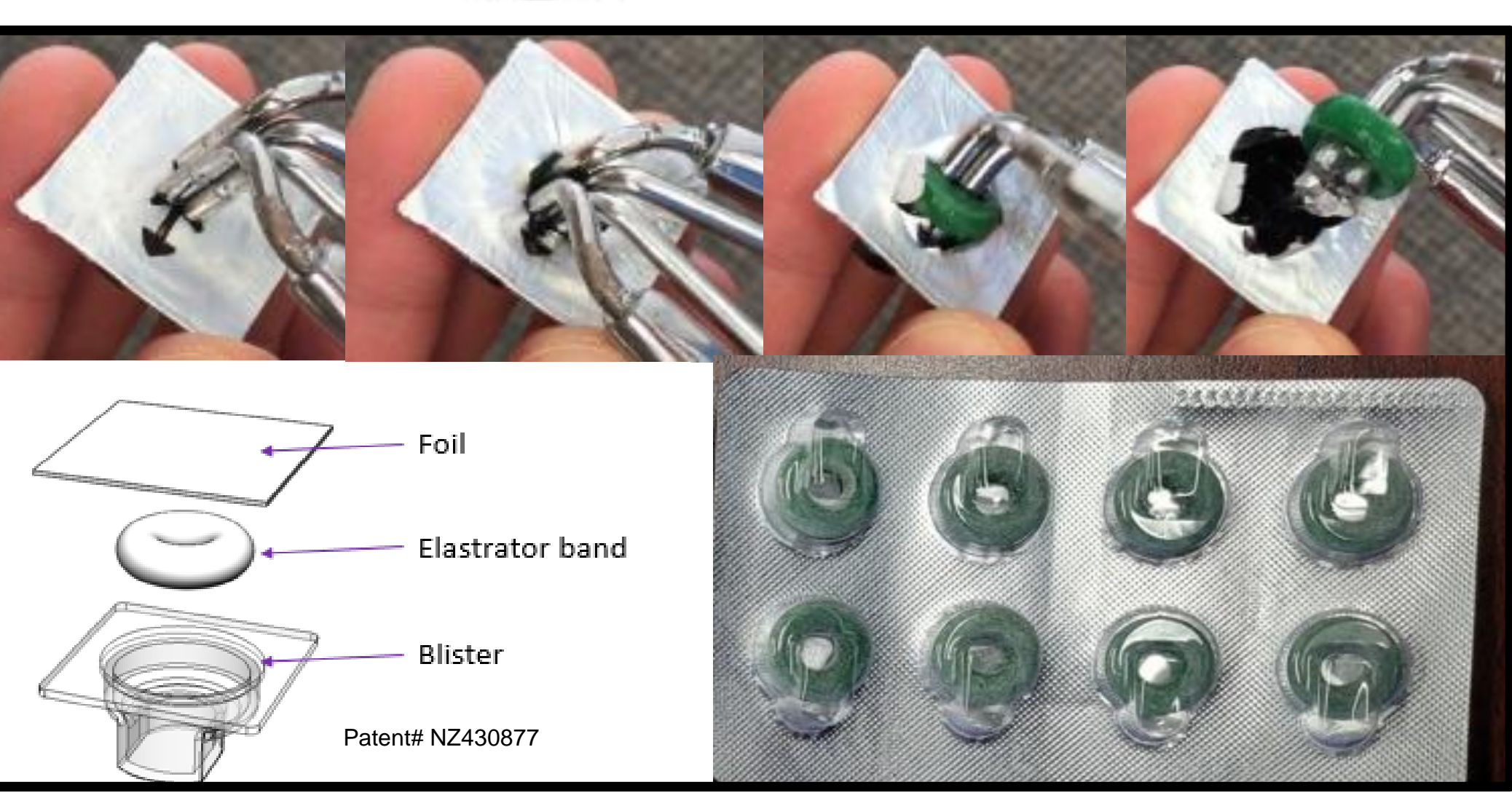
1. Chinook Contract Research Inc.
2. ACER Consulting Ltd.
3. Lakeland College
4. Alberta Lamb Producers
5. Alberta Veterinary Laboratories Ltd/Solvet

### Determination of EC50 & EC95 of Injectable Lidocaine in Lamb Scrotums & Tails

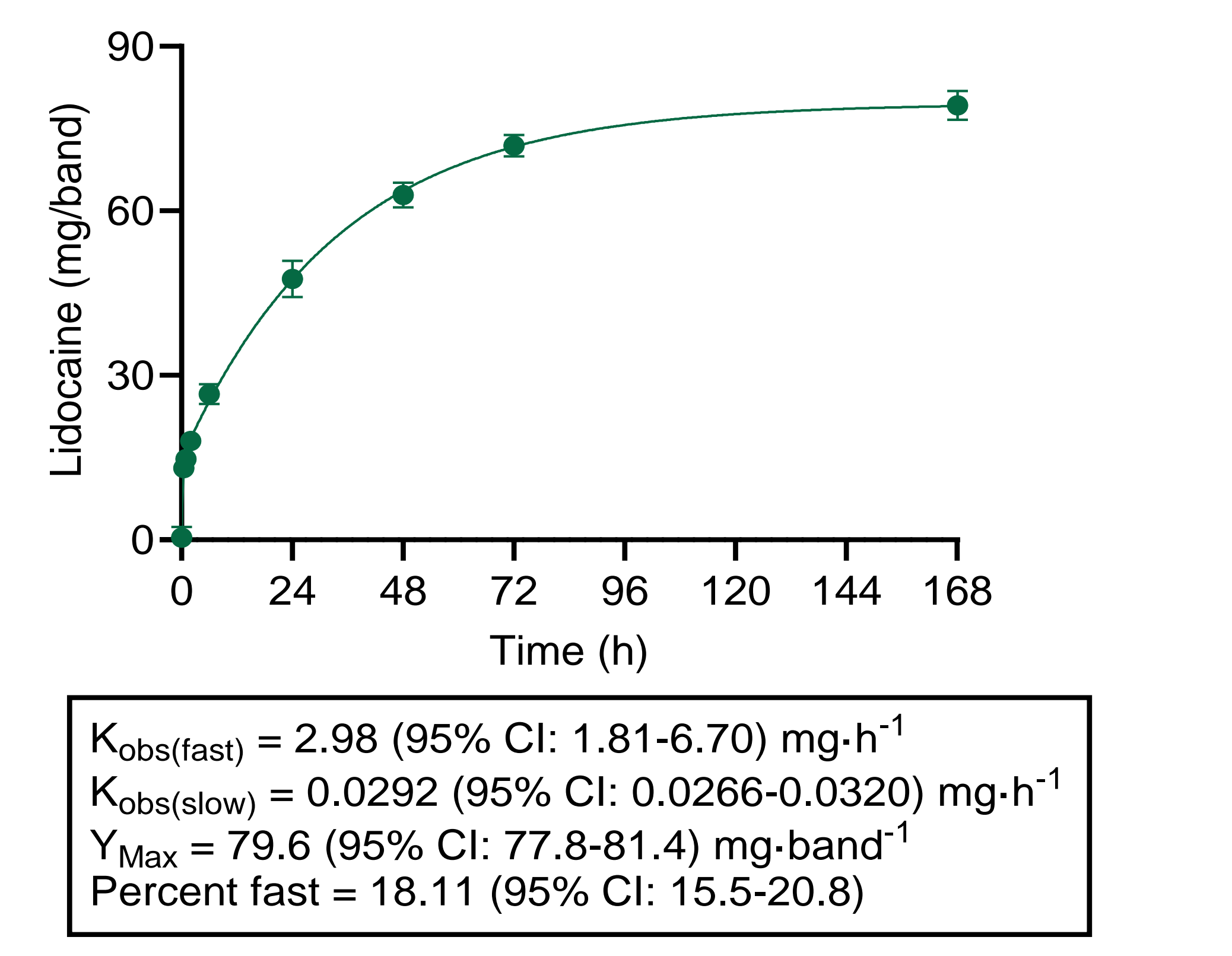


**RESULTS:** Tissue lidocaine concentration for Lamb Scrotums (A) or Lamb Tails (B) at the indicated times after lidocaine injection (T = 0). (C-D) Electrocutaneous Stimulation Response Scores for Lamb Scrotums (C) or Lamb Tails (D) at the indicated times after lidocaine injection (T = 0). P-values were determined for each time-point relative to the T = 0 control sample using a repeated measures one-way ANOVA and corrected for multiple comparisons using Dunnett's test. Bars represent the mean ± SEM for 6 animals. (E-F) Stimulation response scores from panels C-D were plotted (on the y-axis) versus tissue lidocaine concentrations from A-B (on the x-axis) and non-linear regression was used to calculate the EC<sub>50</sub> and EC<sub>95</sub> values for Lamb Scrotal (E) or Lamb Tail (F) tissues.

- CONCLUSIONS:**
- Injectable Lidocaine onset of anesthesia within 30 minutes
  - Injectable Lidocaine effect lasts 120 minutes
  - EC50 in lamb scrotum is 0.17 mg/g tissue
  - EC50 in lamb tails is 0.077 mg/g tissue



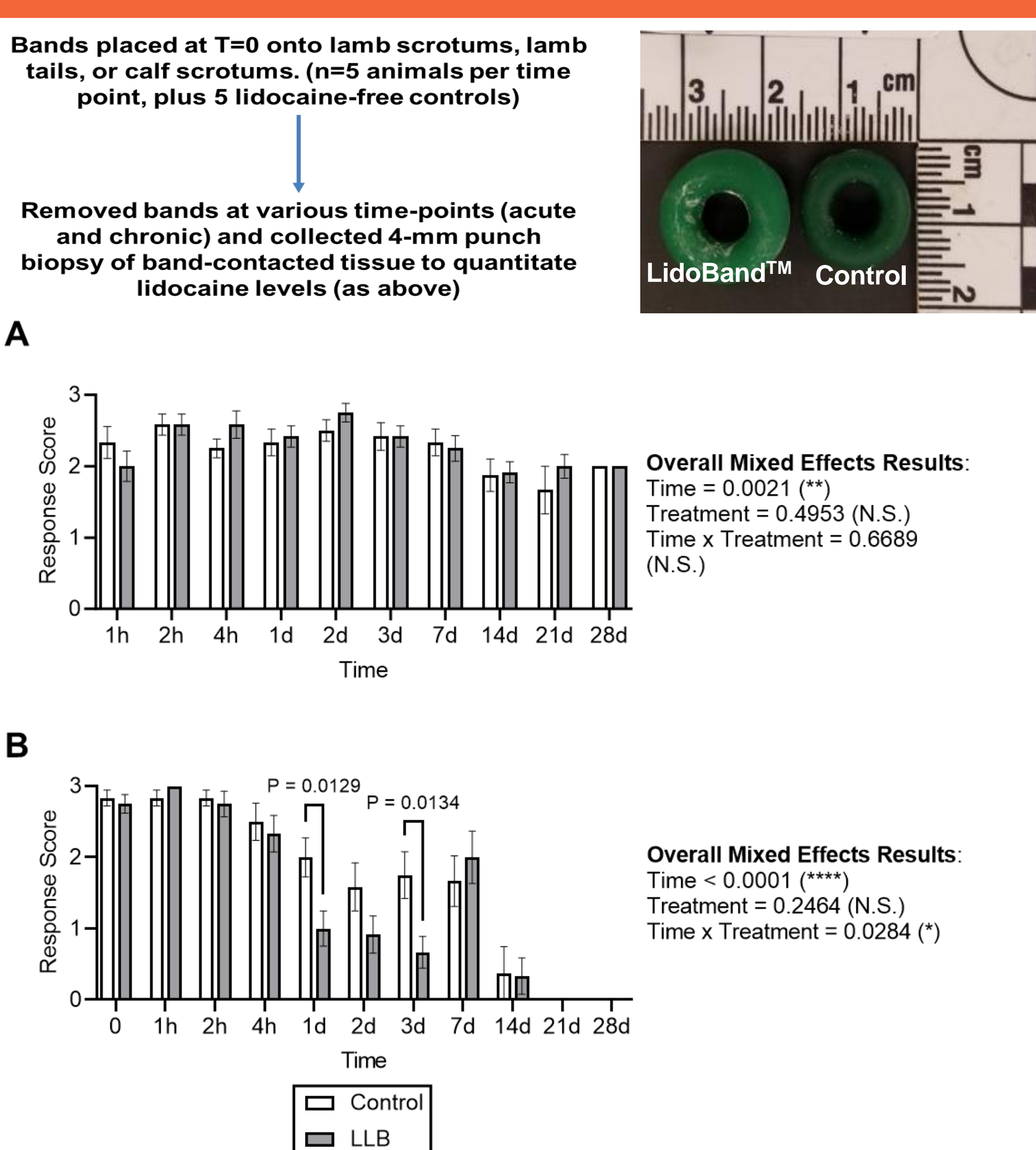
### In vitro Release Kinetics & Device Design



Lidobands were designed to deliver lidocaine rapidly (to address acute discomfort) and for a prolonged duration (to address chronic discomfort).

**RESULTS:** A dissolution experiment using USP<711> was used to quantitate *in vitro* release of lidocaine over a 1-week time course. Lidocaine release was initially rapid ( $K_{obs} = 2.98$  mg/hour) for the first 30.4 hours of the time course, slowing to 0.0292 mg/hour for the remainder.

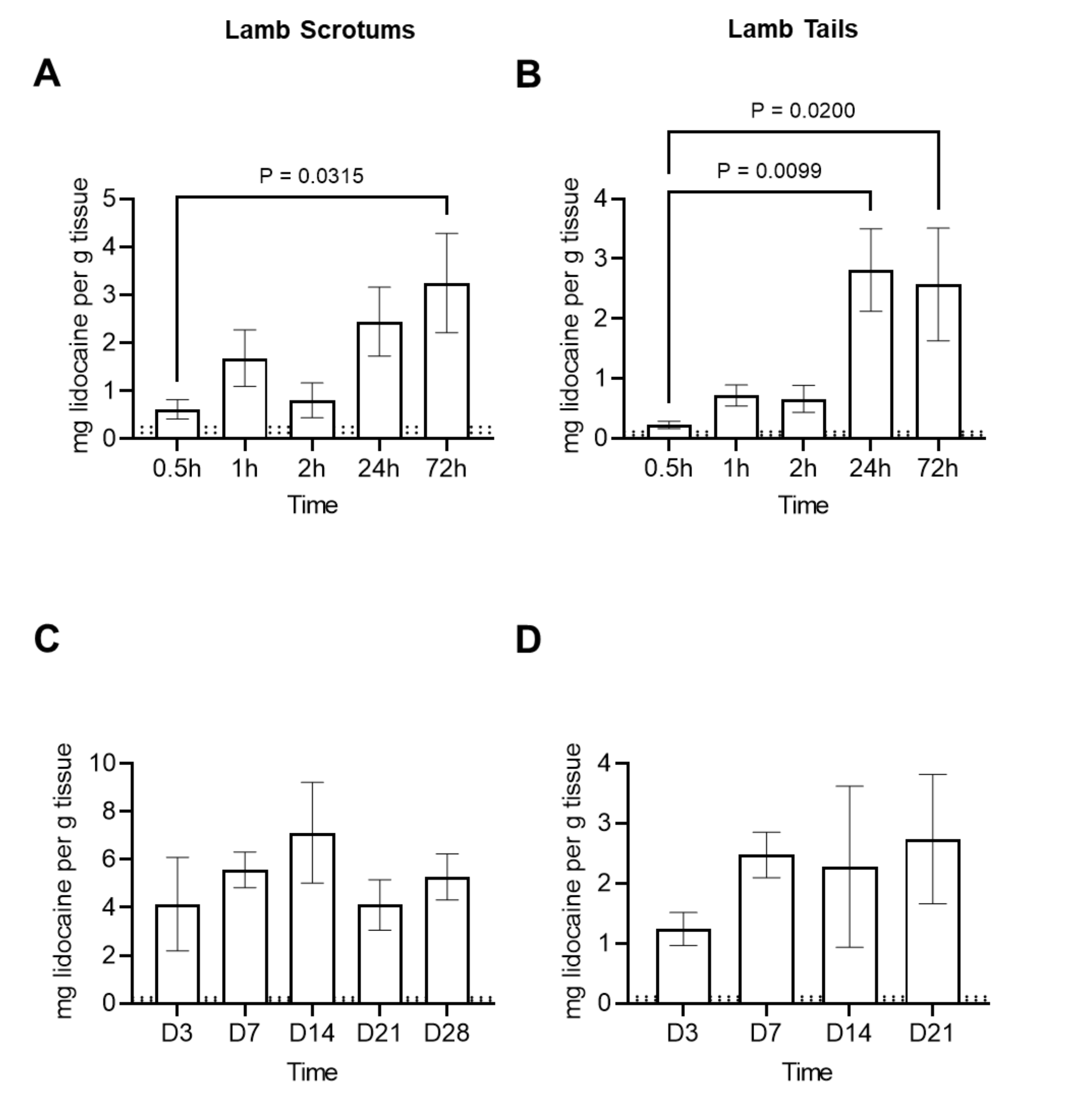
### Comparison of sensation of LidoBands™ versus control bands in Lamb Tails over time



**RESULTS:** Electrocutaneous Stimulation Response Scores Over Time for Lamb Tails Treated with Control Bands or Lidobands (LLBs). (A) As an overall positive control for sensory response, electrocutaneous response scores were taken above the band. The response scores at the band are presented in panel (B). For panel (B), the lowest rheostat level giving the highest baseline score for each individual animal at T=0 was used for all subsequent time points. Bars represent the mean ± SEM of 12 Control-treated or 12 LLB-treated animals. Data were analyzed with a repeated measures mixed-effects model. P-values for individual time points were not corrected for multiple comparisons (i.e., Fisher's LSD test was used).

**Abstract:** Chinook Contract Research Inc. (CCR) has developed a novel anesthetic delivering elastration ligation band. The LidoBand™ (US Patent # 11,596,510) can be used with all current elastrator tools. It has been designed to deliver a clinically relevant therapeutic dose of anesthetic for the duration of its application(s). CCR has partnered with Alberta Veterinary Laboratories/Solvet (AVL/Solvet) to manufacture the device in Alberta. In 2022, RDAR supported a research project (2022N090R) directed by Alberta Lamb Producers to adapt this novel made-in-Alberta welfare technology for use in Alberta's lamb industry for welfare friendly tail docking and castration applications. This poster presents some of the results from four different trials: 1) investigation of *in vitro* release of lidocaine from LidoBands; 2) pharmacokinetics (PK) and pharmacodynamics (PD) of injectable lidocaine in scrotal and tail tissue; 3) pharmacokinetics and pharmacodynamics of *in vivo* delivery of lidocaine with LidoBands placed on the tail and scrotum of lambs; and 4) a "proof-of-concept" study comparing the sensation of control- versus LidoBand™-banded tail tissue over time.

### PK and PD of in vivo delivery of lidocaine with LidoBands™ in Lamb Scrotums & Tails



**CONCLUSIONS:** This study defined the effective concentrations of injectable lidocaine yielding 50% or 95% reductions in local sensation (EC<sub>50</sub> and EC<sub>95</sub>, respectively). The use of injectable lidocaine provides effective short-term anesthesia for 120 to 180 min following the injection; however, additional strategies are needed to manage long-term pain. The use of a LidoBand™ could provide an alternative where tissue lidocaine concentrations meet or exceed the EC<sub>95</sub> for at least 21-28 days and, based on electrostimulation data, provides local anesthesia for at least 3 days when compared to a control band. Further field and laboratory studies into LidoBand™ efficacy are ongoing, including a comparison of the use of an injectable local anesthetic to the LidoBands™.

**Acknowledgments:** The authors wish to thank their industry partner, Alberta Lamb Producers, for their support in participation in this work. We also wish to thank our funders, Results Driven Agriculture Research and the Canadian Agricultural Partnership, a five-year federal, provincial, territorial initiative. We also wish to thank Alberta Agriculture and Irrigation for continued access to facilities and equipment to support CCR's field and laboratory work for this project as well as Lakeland College for the support of research staff and students during the field study component of this work. These studies, when animals were used, were conducted in compliance with the animal care guidelines established by the Canadian Council of Animal Care and were approved by the Chinook Contract Research IACUC (A8217-03).

For more information on this project please scan the QR Code