

# The Use of Alginate Hydrogel Beads During Swine Transportation

## Introduction

- Transport involves multiple stressors, that disrupt homeostasis, leading to non-ambulatory (NA), non-ambulatory non-injured (NANI), non-ambulatory injured (NAI), or in some cases dead-on-arrival (DOA) pigs
- Currently, U.S. producers' market over 100 million pigs annually
  - In 2019 129.9M pigs were slaughtered (USDA,2020).
  - Of those pigs marketed, 645,000 die during transportation each year
  - Based on live market prices, this equates to \$90 M in losses

## What are Alginate Hydrogel Beads?

Cross-linked three-dimensional network structures

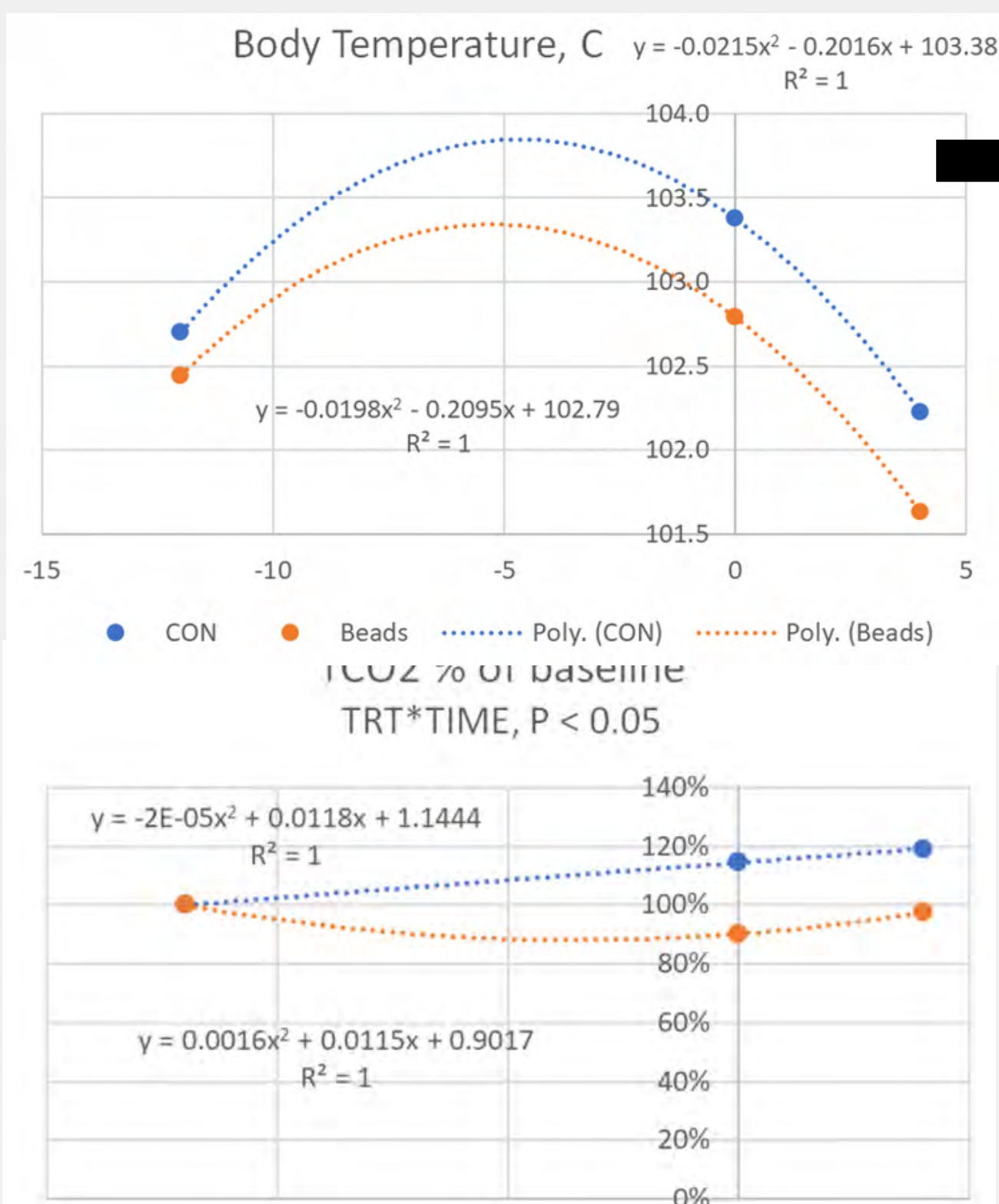
- hydrophilic polymers
- absorb/retain significant amounts of water within the polymeric chains
- Soft and rubbery consistency
- Expand about 100 times in the stomach and small intestine in the presence of water and gastrointestinal fluids
- A small amount of these hydrogels can possibly maintain hydration and satiety



## Emerald Julianna Salinas Dr. Arlene Garcia TTU-SVM

## Objective

The objective of this study was to determine if electrolytes and a glucose source in alginate hydrogel beads (AHBs) could mitigate the negative effects of transportation, using measures of behavior, performance, and physiology that lead to NA, NANI and DOA pigs.



## Methods and Materials

A maternal neonatal pheromone was added to the AHB to encourage consumption. Sixty market pigs including barrows and gilts were allocated to two treatment groups, either AHB (n= 30) or control (CON) without AHB (n= 30). Pigs were acclimated to the AHB 72-h prior to transport and fasted 12-h before being loaded on a straight trailer and transported for a total of 4-h. Pig body weights and blood samples (via jugular venipuncture) were collected before and after transport. Active and inactive postures and drinking behaviors were recorded using Go Pro Cameras during transport and 24-h post-transport using a DVR in one min scan sample. The study was a complete randomized design with pen as the experimental unit.

## Results

### Behavior

- During transport AHB pigs displayed more lying than CON pigs (P < 0.05)
- After transport AHB pigs sat more (P < 0.05) and tended (P > 0.05) to move more than CON pigs
- CON pigs engaged in more drinking than AHB pigs after transport (P < 0.05)

### Performance

- No statistical difference between CON and AHB pigs (P > 0.05)

### Physiology

- Body temperature was increased in CON pigs compared to TRT bead pigs.
  - Con pigs expressed a higher levels of CO<sub>2</sub> in the blood compared to TRT bead pigs.
- Increased CO<sub>2</sub> is caused by hypoventilation, where not enough oxygen enters the lungs.

## Conclusion

The use of AHBs during pig transport had some positive effects on pig physiology and behavior during and after transportation. AHBs are a potential strategy that may be applied by industry in the near future. They could enhance animal welfare by minimizing stress levels and stress-related responses. Research improvements are being made to determine relationships between AHB dosage, meat quality, and food safety. In addition, effects of transportation length, stocking density, transit time, and environmental changes are being investigated.

**In addition future research in this lab is focusing on a formula to reduce bead leaking.**

