# MEAT QUALITY OF PIGS TRANSPORTED TO SLAUGHTER USING TWO NOVEL TRAILER DESIGNS VERSUS A STANDARD POT-BELLY TRAILER UNDER CANADIAN CONDITIONS

K. Moak[1*], S. Conte[2], R. Bergeron[1], B.M. Bohrer[1], G. A. Ferreira[3], J. G. Vero[3], G. Aboagye[4], S. Khalife[1], A. Thompson[1], A. M. Bridi[3], N. Devillers[2], L. Faucitano[2]

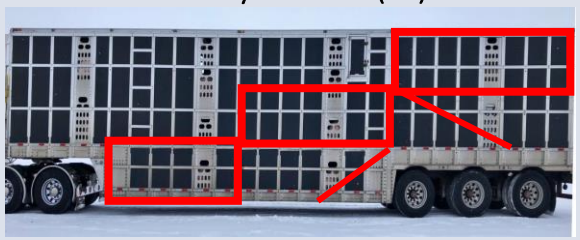
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## Background & Objectives

- Transportation is one of the most stressful events a pig experiences and results in direct financial loss.
- The pot-belly (PB) trailer has been reported to increase animal losses and meat quality defects [1;2;3] due to the presence of steep internal ramps and inadequate ventilation, especially when the vehicle is stationary [4;5].
- The flat-decked trailers models featuring hydraulic decks (no ramps) improve handling ease resulting in a lower proportion of dead-on-arrivals and decreased physiological stress response compared to PB trailers [6].
- More animal losses are both reported in summer and winter [7]. In summer transports, the use of trailer designs featuring fan-assisted ventilation and water misting may resolve this issue by providing a better internal ambient conditions and improving the thermal comfort of pigs [8].
- The objective of this study was to evaluate and compare two novel trailer designs against the current standard North American pot-belly (PB) trailer on meat quality of pigs during short transport under Canadian summer and winter conditions.

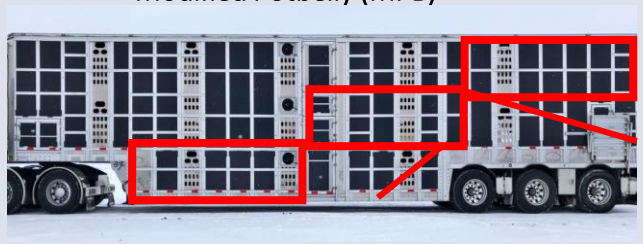
## Methods

Potbelly Standard (PB)



- Standard internal ramps
- Punch hole ventilation

Modified Potbelly (MPB)



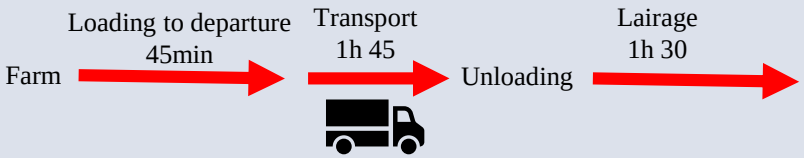
- Modified hydraulic ramp
- Fan-assisted ventilation
- Water drinkers

Pezzaioli (PEZZ)



- 2 full hydraulic flat decks
- Fan-assisted ventilation
- Water misters
- Water drinkers
- Adjustable roof

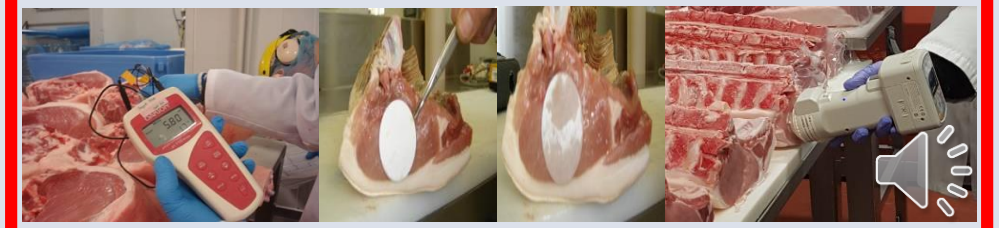
A total of 36 loads of pigs (3 trailers, 2 seasons, 6 replicates per trailer design per season) were transported from 9 similar commercial farms to a commercial slaughter plant located in Southern Ontario over both summer 2019 (July-August) and winter 2020 (January-February).




- 324 sentinel barrows total
- 3 sentinel barrows/test compartment/trailer (9 per trailer; 27 per replicate)
- 3 test compartments (bottom front, middle deck, or top rear compartment; highlighted in red) per trailer design
- Average compartment density 0.52m$^2$/pig in summer and 0.46m$^2$/pig in winter
- Loading order and driver randomized in each replicate
- Pigs moved in groups by push gates, stunned with $CO_2$ then exsanguinated

### Measurements (24 h *post-mortem*)

- pHu measurements in the *longissimus muscle* (LM), *semimembranosus* (SM), and *adductor* (AD) muscles
- Drip loss (filter paper wetness test) measured in the LM
- Colour measured in the LM and SM muscles



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## Results

**Table 1. Meat quality characterisitics of the LM and SM and AD muscles of pigs transported in either the PB, MPB, or PEZZ trailers under summer and winter conditions [a,b]**

**Summer**

| | PB | | | MPB | | | PEZZ | | | | P-value | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | BF | MD | TR | BF | MD | TR | BF | MD | TR | SEM | Trailer | Compartment | Trailer*Compartment |
| LM | | | | | | | | | | | | | |
| pHu | 5.52 | 5.48 | 5.55 | 5.48 | 5.49 | 5.47 | 5.49 | 5.48 | 5.48 | 0.04 | 0.13 | 0.62 | 0.35 |
| Drip loss % | 1.59 | 1.95 | 1.60 | 1.36 | 1.60 | 1.65 | 1.39 | 2.13 | 1.72 | 0.24 | 0.41 | 0.03 | 0.61 |
| SM muscle | | | | | | | | | | | | | |
| pHu | 5.58 | 5.52 | 5.66 | 5.57 | 5.62 | 5.56 | 5.59 | 5.53 | 5.59 | 0.04 | 0.74 | 0.21 | 0.02 |
| AD muscle | | | | | | | | | | | | | |
| pHu | 5.67 | 5.58 | 5.78 | 5.60 | 5.67 | 5.67 | 5.66 | 5.61 | 5.63 | 0.04 | 0.36 | 0.10 | 0.04 |

**Winter**

| | PB | | | MPB | | | PEZZ | | | | P-value | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Treatment | BF | MD | TR | BF | MD | TR | BF | MD | TR | SEM | Trailer | Compartment | Trailer*Compartment |
| LM | | | | | | | | | | | | | |
| pHu | 5.37 | 5.42 | 5.38 | 5.39 | 5.39 | 5.38 | 5.45 | 5.43 | 5.41 | 0.03 | 0.06 | 0.47 | 0.49 |
| Drip loss % | 1.30 | 1.24 | 1.25 | 1.10 | 0.98 | 0.98 | 1.21 | 1.11 | 1.21 | 0.19 | 0.16 | 0.76 | 1.00 |
| SM muscle | | | | | | | | | | | | | |
| pHu | 5.50 | 5.51 | 5.54 | 5.53 | 5.46 | 5.49 | 5.46 | 5.47 | 5.49 | 0.03 | 0.05 | 0.34 | 0.23 |
| AD muscle | | | | | | | | | | | | | |
| pHu | 5.58 | 5.64 | 5.72 | 5.69 | 5.59 | 5.58 | 5.57 | 5.62 | 5.63 | 0.05 | 0.32 | 0.50 | 0.01 |

[a] PB = Pot-belly; MPB = Modified Pot-belly; PEZZ = Pezzaioli

[b] BF = Bottom Front; MM = Middle Deck; TR = Top Rear

### Key Points

- LM pHu value tended to be lower in pigs transported in the MPB compared to those transported in the PEZZ during winter (5.38 vs 5.42, SEM=0.03; *P* = 0.06)
- LM drip loss value were very dry (<1.5%) in pigs shipped in the bottom front compartment compared to the middle compartment during summer, regardless of trailer type (1.45 vs 1.89, SEM=0.24; *P* = 0.04)
- The pHu value of the SM and AD muscles were lower in pigs transported in the middle deck compartment compared to those transported in the top rear compartment of the PB trailer during summer (5.52 vs 5.60, SEM = 0.04; *P* = 0.02 and 5.61 vs 5.75, SEM = 0.04; *P* = 0.04, respectively).
- A lower pHu value was found in the AD muscle of pigs transported in the PB bottom front compartment compared to the top rear compartment during winter (5.58 vs 5.72, SEM = 0.05; *P* = 0.01).

## Discussion & Conclusion

- The results of this study indicate the negative effect of compartment location within each trailer type on meat quality variation
- Low deck height, decreasing airflow and handling ease in the bottom compartment, is shared between all trailer types and may explain the drier pork found in this compartment
- Both summer and winter seasons affected meat quality variation suggesting a need to improve climatic control for trailer compartments
- **Take home message:** Specific trailer compartments need to be redesigned to improve meat quality of market-hogs during short summer and winter transports.

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