Overview of Transport Losses
ELANCO Animal Health

Areas to Discuss

- Definitions
- Why are transport losses important?
- Fatigued pigs
  - Incidence
  - Symptoms
  - Metabolic characteristics
  - Recovery?
  - Pre-disposing factors
- What can you do to reduce transport losses?

Terminology

- Deads on arrival (DOA): Pigs that die during transport
- Non-ambulatory pig: A pig unable to rise and move or keep up with contemporaries
  - Downers, subjects, slows, fatigued, injured
- Transport losses: Deads on arrival and non-ambulatory pigs at the plant

Classifying non-ambulatory pigs

- Fatigued Non-ambulatory, non-injured (Stress related)
- Injured Non-ambulatory, injured (Structure/injury related)

Overview of Transport Losses

- Not a new issue to the industry (stress gene)
- Losses can occur at any stage of the marketing process
- Transport losses represent many growing concerns:
  - Animal Welfare
  - Legal
  - Economic

Potential Legal Issue

- Downed Animal Protection Act
  - (H.R. 2519 & S. 1298)
  - Allows the Secretary of Agriculture to enforce regulations for handling and disposition of non-ambulatory livestock
  - Prevents movement of non-ambulatory livestock while these animals are conscious
  - Requires non-ambulatory livestock be humanely euthanized
  - Prohibits non-ambulatory livestock from entering the food chain

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### Incidence of Non-ambulatory Pigs?

- National statistics are not available
- Field studies suggest ~0.2% to 1.0%
- Ratio of fatigued to injured = ~2:1
- Total transport losses = ~0.5 to 1.3%

### Economic Impact of Transport Losses

- Economic losses associated with:
  - **Producer**
    - Loss of value on DOAs
    - Severe discount on non-ambulatory pigs at the plant
    - Pig/carcass disposal fees
    - Carcass trim loss and bruising
  - **Packing Plant**
    - Increased labor costs for handling non-ambulatory pigs
    - Pork quality defects (DFD, PSE)
    - Negative public perception

### Symptoms and Metabolic Characteristics of Fatigued Pigs

### Fatigued Pig Symptoms

- Normal Pig
  - Stress
- Open-Mouth Breathing
- Skin Discoloration
- Refuse to move
- Stress
- Abnormal Vocalization
- Muscle Tremors
- Collapse = Fatigued
- Death

### Muscle Energy Metabolism

- GLYCOGEN
- LACTIC ACID
- HEAT
- ENERGY
Metabolic Changes in Fatigued Pigs

- Fatigued pigs are in a metabolic state of acidosis
  - High blood lactic acid
    • >20 mmol/L
  - Low blood pH
    • 6.9-7.2
  - High body temperature?


Handling

- Benjamin et al., 2001
  - Compared aggressive vs. gentle handling in pigs
    - Aggressive: pigs moved rapidly with hot shots
    - Gentle: pigs moved at their own pace with plastic cane
    - 54 pigs per treatment
  - Lactic acid, mmol/L
    |               | Fatigued, % |
    |----------------|-------------|
    | Gentle         | 4.0<sup>a</sup> | 0.0<sup>b</sup> |
    | Aggressive     | 25.2<sup>b</sup> | 20.4<sup>b</sup> |

Handling Intensity

- Gonyou (2004) compared moving pigs through a handling course with 3 different handling intensities:
  - Gentle handling with livestock paddles
    • Pigs were moved at their own pace
  - Aggressive handling with livestock paddles
    • Pigs were encouraged to move rapidly
  - Aggressive handling with hot shots
    • Pigs were encouraged to move rapidly

(Gonyou, 2004)
Group Size

- Lewis & McGlone, 2007
  - Compared moving pigs through a handling course in groups of 1 to 10 pigs
  - Key findings:
    - Positive linear relationship between group size and:
      - Heart rate
      - Subjective handling score (more difficult to handle)
      - Time to complete the handling course
    - Conclude that the optimal group size is 5-6 pigs

Handling Summary

- Stress responses are minimized when pigs are:
  - Moved with livestock paddles
  - Moved at their pace
  - Moved in small groups
    - Note: optimal group size is dependent upon aisle width

It isn’t just handling!

- Handling is critical **BUT!**
- There are many potential stressors that a pig experiences during transportation
- The fatigued pig is a MULTIFACTORIAL PHENOMENON

Porcine Stress Syndrome (Stress Gene)

- PSS is associated with deaths during routine handling and transportation
- PSS pigs have similar symptoms to fatigued pigs:
  - Tail and muscle tremors
  - Open-mouth breathing
  - Skin discoloration
  - Increased body temperature
  - Extreme acidosis
  - Collapse
  - Death

Genetics

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Impact of PSS on Transport Losses

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<tr>
<th>Study</th>
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<th>Carrier</th>
<th>Positive</th>
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  - Only 10% of the pigs in Canada carried the stress gene, but the stress gene was responsible for 53% of transport deaths

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Transport Floor Space

- Transport floor space is a potential cause of transport losses that can easily be changed by varying the number of pigs loaded onto the trailer.

- National Institute for Animal Agriculture currently recommends 4.26 to 4.79 ft²/pig for market weight pigs (250 to 300 lbs).

Transport Factors: Floor Space

- Utilized 42 loads in spring and fall to determine the effects of transport floor space on losses at the plant.

- Transport losses, %

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<td>188</td>
<td>ab</td>
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<td>c</td>
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<td>179</td>
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Environmental Conditions

Seasonal Variation in U.S.

- Seasonal variation in U.S. (Based on 1.3 million pigs; Rademacher & Davies, 2005)
**What can you do to minimize losses?**

- **Management**
  - Promptly treat sick pigs
  - Correctly identify market weight pigs

- **Facility design**
  - Use aisle widths of 32” or greater
  - Minimize distance pigs are moved
  - Minimize the number of 90° turns
  - Use loading chutes with ramp angles of 10° or less
  - Replace broken cleats on loading chutes
  - Replace light bulbs regularly

**Minimize Stress During Loading**

- Move 4-6 pigs at a time using a normal walking pace
- Minimize the use of “hot shots”
- Load pigs farthest from truck on middle or bottom deck
- Load difficult pigs only if walking normally
- Ask yourself “Does this pig really have to go today?”
- If pig needs to be loaded, try to load in last compartment on trailer at a reduced capacity

**Preparing Pigs for Transport**

- Walk pens daily
- Routinely move pigs prior to loading
- Pre-sort pigs prior to loading (if feasible)
- Remove feed prior to loading (if feasible)
- Shower pigs prior to transport in the summer

**Overall Summary**

- Transport losses represent growing animal welfare, legal, and economic concerns to the U.S. swine industry
- ~1% of all pigs transported die or become non-ambulatory
- Transport losses can occur at any stage of the marketing process and are multi-factorial
- It is well established that transport losses are increased by:
  - Aggressive handling
  - Porcine stress syndrome (stress gene)
  - Crowding pigs during transport
  - Extreme weather conditions

- Transport losses can be reduced at the farm by:
  - Promptly treating sick pigs
  - Correctly identifying market weight pigs
  - Improving facility designs
  - Minimizing stress during loading
  - Preparing the pig for transport
Overview of ELANCO Animal Handling Resources

ELANCO Animal Handling Team
- Food Chain Team
  - Mark Klassen
  - Tim Heiller
  - Abby Anderson
- Technical Consultants
  - Dr. Matt Ritter
  - Dr. Scott Carr
  - Dr. Paul Matzat

ELANCO Handling Resources Available
- Load site assessments (over 100 completed)
- Animal handling training programs
  - TQA training (over 1000 trained)
  - Load-out crew training (over 1000 trained)
  - Site assessment training
- Pig handling and transportation research
  - Studies have been conducted on over 400,000 pigs

Load Site Assessments
- Free service provided by ELANCO
- Assessments conducted by Mark Klassen of ELANCO
- Evaluate:
  - Pre-loading preparation
  - Handling tools and vocalization
  - Loading crew – loading procedures
  - Truck driver – loading procedures
- Recommendations for changes that:
  - Cost nothing
  - Cost a little
  - Open your wallet!

Load Site Assessment Forms

Questions? Comments?