

# Pig Stunning

## CO<sub>2</sub>

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Premium Standard Farms



# Back to the Future

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- Widely used in Europe and Canada
- Once used in U.S. by Hormel (1952) and Oscar Mayer
  - Above ground systems/tunnels
  - Last removed in very early 90's
- Denmark all CO<sub>2</sub> – 1987 (Gade, 1994)
- Irreversible stun approved 1994
- U.S. resurgence late 90's-Export
- PSF, Cargill, Smithfield, Swift, Farmland

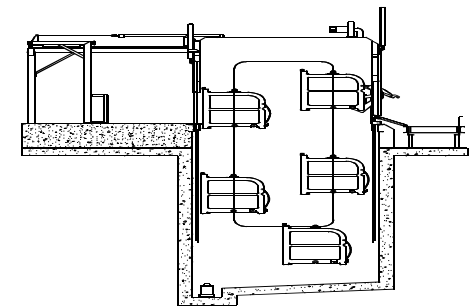
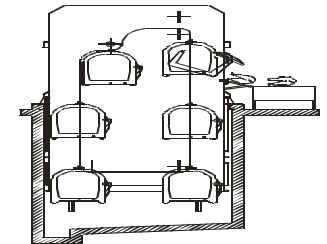
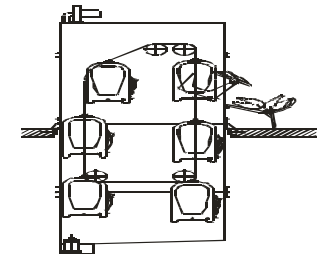
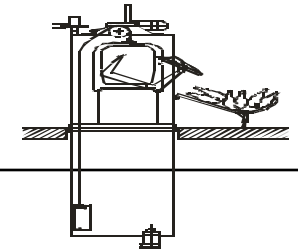
# CO<sub>2</sub> Types of Stunning Plants

Type	Model	Number of gondels	Animals per gondol
Dip lift	Light	1	1 / 2
Dip lift	Jumbo	1	2 / 4
Dip lift	Jumbo special	1	2 / 5

Type	Model	Number of gondels	Animals per gondol
Combi	22-88	2-8	1 / 2

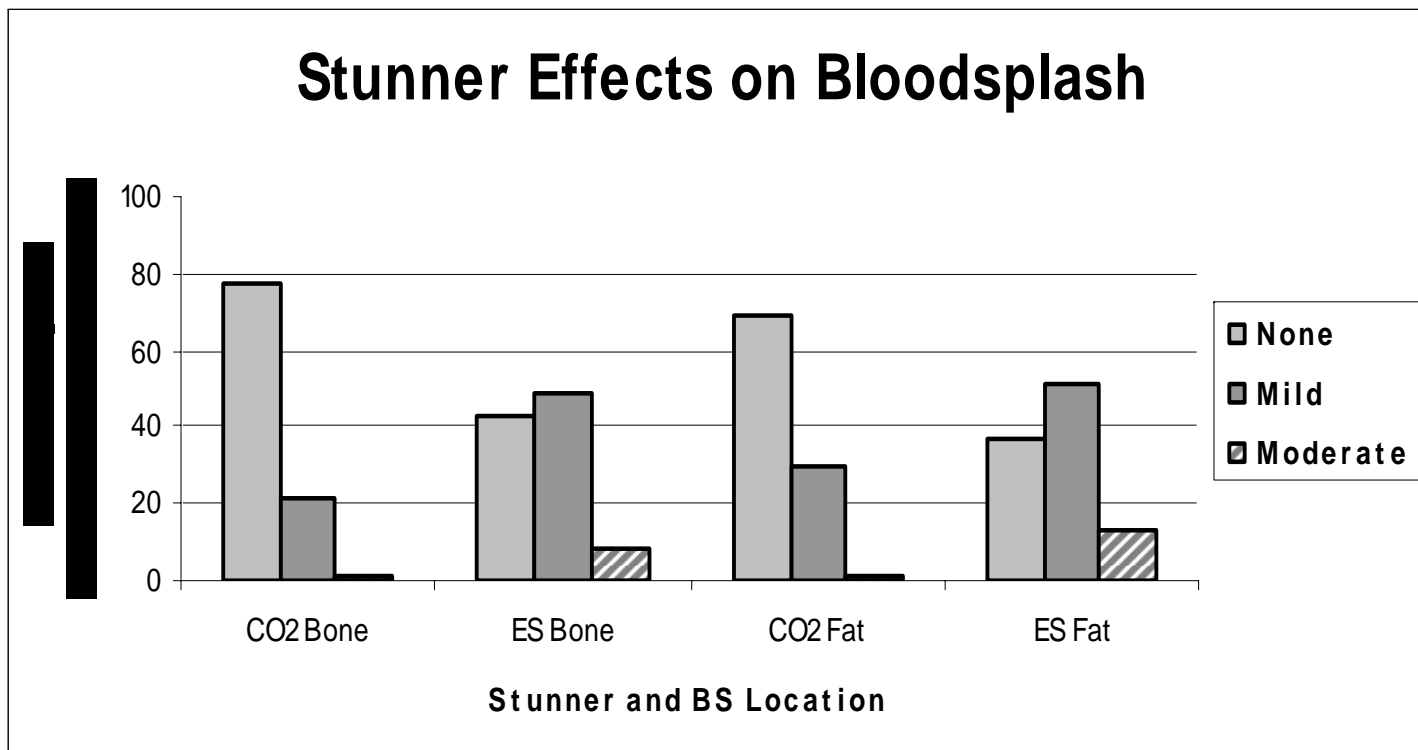
Type	Model	Number of gondels	Animals per gondol
Jumbo	3-8	3-8	2 / 4

Type	Model	Number of gondels	Animals per gondol
Back-loader	4-6	4-6	5 / 3





# Impact on Bloodsplash





# Implementation of Backloaders and Automated Handling Systems

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- ❑ 2000 and beyond
- ❑ Capacity increases
- ❑ Customers and USDA focus on insensibility and prodding
- ❑ Group handling
- ❑ Wide entrance
- ❑ Longer stunning times (2-3 minutes)
- ❑ Irreversible stun
  
- ❑ Cost \$0.5-6 million USD





# Backloaders & Group Handling

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- ❑ Significant improvement in initial pH
- ❑ Dramatic improvement in ham color
- ❑ Reduction in seasonal stress impact on meat quality
- ❑ Complete elimination of electric prods
- ❑ Insensibility a non-issue



# Installations and Options

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- Requires a pit 21' deep
- Footprint for handling systems
- Joysticks
- Manning
- Flooring & Texture
  - Runs
  - Final push pen
- Automated Gates (timing, height, width)
- Lighting/shadows-not completely turn-key
- Captive vs. loose shackles



# Areas to Monitor

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- Stun to Stick-Must be < 2 min., preferably <1 min.
  - Gray casings
  - Recovery
- Cycle Time
- Gas Levels
  - Esp. in cold weather
  - Calibrate monitors
  - Monitor location
- CO<sub>2</sub> levels for people



# Audit Criteria

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- ❑ Gas concentration
- ❑ Number of pigs/gondola
- ❑ Vocalization at gondola entry
- ❑ Proper use of gates
- ❑ Sticking
- ❑ Insensibility



# Advantages of CO<sub>2</sub> Stunning

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- No broken backs/bones
- Minimize bloodsplash
- Higher initial pH
  - Better color
  - Reduced drip loss
  - Less PSE
- Welfare advantages if group handled
- Safer for shacklers and stickers



# Disadvantages of CO<sub>2</sub> Stunning

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- ❑ Orienting carcasses on the shackle table
- ❑ Tattooing post mortem
- ❑ Potential for blood retention in organs/viscera
- ❑ Capital cost

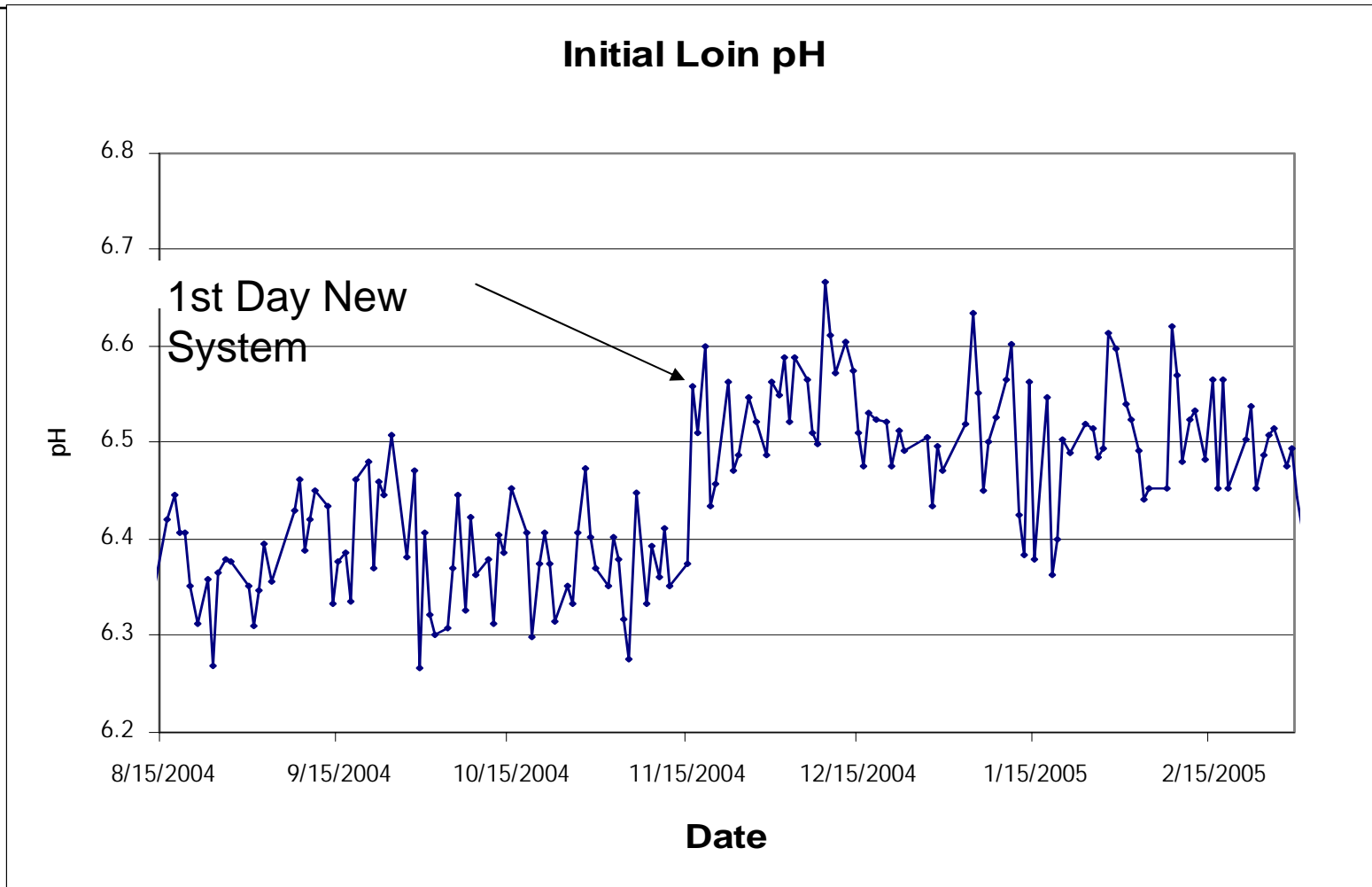


# Welfare Considerations

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- Has been an ongoing concern about stress and discomfort during the excitation/induction phase of stunning.
  - Critical to immerse rapidly in high concentration, but trade- off as high levels are aversive.
  - Less comfortable, but for shorter period.
- Total time from first exposure to initial stun 10-12 seconds
  - Sensitivity is lost and motion is not stress related.
  - Human anesthesia too
- Breed/genotype considerations
  
- No Perfect System
- Low stress of automated handling offsets a very brief period of excitation.

# Impact on Initial pH





# Alternative Gases (Klont, et.al.)

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- Argon
- Nitrogen
- Krypton
- Zenon
- With O<sub>2</sub> and CO<sub>2</sub> combinations



# Stunning – Only One Component

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- Chilling-Blast/Rapid
- Stun to Chill
- Resting
- Feed Withdrawal
- Genetics
- Health