Flooring materials for fed cattle

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Outline
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• Previous Work
• Trial Objectives & Overview
  • Individual Trials
• Pre-Mortem Methods
• Production and Joint Results
• Field Trial
• Discussion and Conclusion
• Post-Mortem Methods
• Carcass and Dissection Results
• Discussion and Conclusion
Previous Work

• In dairy cows...
  • Greater incidence of hock lesions, swollen joints (Rushen et al., 2007; Westerwrath et al., 2007)
  • Lying behavior changes (Ruis-Heutinck et al., 2000; Absmanner et al., 2009; Cozzi et al., 2013)

• In beef animals...
  • Evidence of swollen joints on concrete surfaces (Platz et al., 2007; Platz et al., 2009)
  • No production differences (Lowe et al., 2001)
  • Rubber mats are preferred over bare concrete slats (Tucker et al., 2006; Vokey et al., 2001; Fregonesi et al., 2004)
  • Claw health remains inconclusive (Vokey et al., 2001; Boyle et al., 2007; Fjeldaas et al., 2011)
EasyFix Trials Objectives

• To examine production measure responses
• Explore relationship between flooring and joint inflammation
  • Periarticular vs intra-joint capsule inflammation
  • Identify/quantify inflammation marker at the systemic level
• To observe and record behavioral differences
EF Trials Overview

Incoming Steers
Two day sampling

Monthly sample dates

At finishing weight, two day sampling

Front limbs examined at WVDL

Slaughtered at JBS Green Bay

Weight, Carpal Circumference, Blood Sample*, Data Logger Attachment
EasyFix (EF) Trials Overview

• EF1 – 31 Beef Crossbred Steers
  • 15 animals
  • Oct 2012 – Feb 2013

• EF2 – 32 Angus Steers
  • 16 animals
  • March 2013 – July 2013

• EF3 – 36 Holsteins Steers
  • 16 animals (4 replacements)
  • Oct 2013 – Nov 2013
  • Feb 2014 – March 2014
Housing
• Constant illumination
• Controlled humidity
• Temperature held at 18 degrees C
Joint Measurements
• Carpal circumferences were taken ~4 wk
• Measured largest section of joint
Behavioral Collection

• Data Loggers (HOBO, Pendant G, Onset)
  • Position in space (xyz axes), degrees of tilt

• Measured:
  • total lying time
  • total standing time
  • average lying bout duration
  • average standing bout duration
  • number of lying bouts

• At least three days of data collection per logger attachment period (Ledgerwood et al., 2009)

• Attached medial plane of left metatarsal

http://www.onsetcomp.com/products/data-loggers/ua-004-64
Statistical Analysis

• Continuous and discrete were analyzed using the MIXED procedure of SAS (SAS Inc, Cary, NC)
  • Pen as experimental unit
  • Pen means tested for differences between treatments, day on trial, and treatment by day interactions, where applicable
  • If discrete, % basis of animals per pen
  • Differences consider significant if $P < 0.05$
Production, Joint, and Behavior

Conclusions

• No treatment differences in DMI, ADG, G:F
  • Larger sample size, uniform animals

• Carpal circumference is larger on concrete than on rubber over time
  • 100 d
  • Growth rate, rate of gain, breed differences

• Treatment differences in number of lying bouts
  • Potential significance in cattle willingness to change positions
EF Trials
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Weight, Carpal Circumference,
Blood Sample, Data Logger
Attachment

Front limbs
examined at
WVDL

Slaughtered
at JBS Green
Bay
Right Carpus - Skin

38 - Concrete

14 - Rubber
Right Carpus – Sub Cutis

38 - Concrete  
14 - Rubber
Right Carpus – Exposed Joint

38 – Concrete  
14 – Rubber
Right Hoof – Dorsal

38 – Concrete 14 - Rubber
Skin surface

Subcutis
WVDL Analysis

• Metacarpal evaluation yielded no findings of inflammation or bruising from either treatment or trial

• Synovial fluid and synovium were tested for *M. bovis* by rtPCR
  • Samples pooled by pen
  • All negative
Data Summary

• Overall trial differences of weight gain do not differ between treatments

• Joint circumference is greater on concrete after 100 d of exposure

• Number of lying bouts is less on CONC

• Greater incidences of soft tissue damage on CONC

• Toe overgrowth on RUBBER
Conclusions

• First month in confinement requires an ‘adjustment’ period
• Joints are swelling on concrete, but effect requires time to develop
  • Left vs right carpus
• Behavior is affected by flooring, with animals becoming increasingly resist to postural changes as time progresses
  • ‘Energetic Cost’ of joint inflammation?
• Inflammation is localized, not systemic – inflammatory marker?
• Toe and heel length are longer on rubber, may affect dairy heifers
Thanks for listening! Any questions?