Guidelines for selecting good feet and structure

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Introduction

- Lameness is a very important economic problem in all sectors of cattle industry

- According to a study by USDA* (NAHMS)
  - Direct effects of lameness account for **15%** of culling in US dairy herds

Based on these data, it has been estimated that the indirect effects of lameness on production and reproduction could account for an additional 49.1% of culling in US herds

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*National Animal Health Monitoring System. Part 1. *Reference of Dairy Management Practices*. Publication No. 200.696, Ft. Collins, Colo: USDA-APHIS, Veterinary Services , 1996.

Lameness in Feedlot Cattle

- Records on 1,843,652 animals in 5 large western feedlots
  - Lameness - 16% of health problems (5% of deaths)
  - Lame cattle accounted for 70% of all sales of non-performing cattle
    - Price of salvaged cattle was only 53% of original purchase price
    - On average, salvaged cattle left 85 days after arrival; and on average, weighed only 10 pounds more than their in-weight

Griffin D, Perino L, Hudson, D: 1987. Feedlot lameness. Lincoln, NE, University of Nebraska Cooperative Extension Service.
Stokka, GL, Lechtenberg, K, Edwards, T, et al. 2001. Lameness in Feedlot Cattle. Veterinary Clinics of North America, Food Animal Practice, 17(1):189-207.

Lameness in Cow/Calf Operations

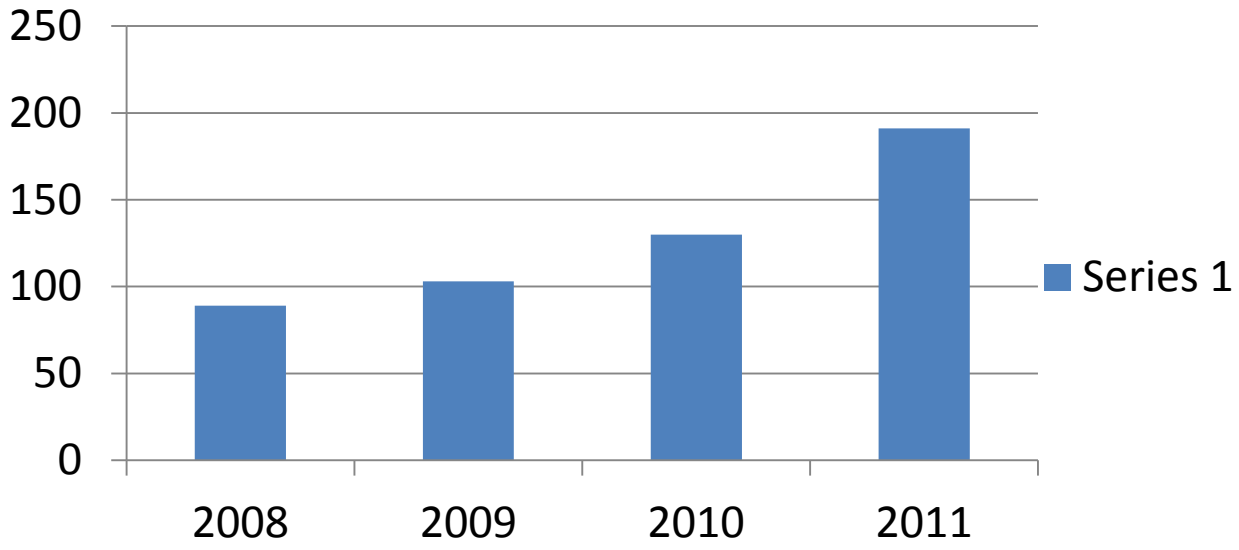
- Economic impact because of:
  - Value of individual breeding animals
  - Reproductive loss
    - Extended intervals from calving to first service/conception
    - More services per pregnancy
    - 8.4 times more likely to be culled
    - May take a mature bull up to 2 months to regain normal fertility after a lameness event
      - » Do breeding soundness following lameness

Lameness in Cow/Calf Operations

- Economic impact because of:
- Lameness treatment/labor cost
  - Lesion dependent $150 - $800
  - Surgical costs septic joint - $1200 – 2000

Lameness incidence

- Medical records UTCVM
  - 1600 cases presented from East Tennessee
    - Black Angus predominant breed



Awareness of the problem:
Quotes from Ranchers.net's "Bull Session"

- Lets just say time spent kicking straw away and walking some bulls out might be time well spent…….
- Are you guys telling me that some Angus have got bad feet……
- Unfortunately it is more than some – but deep straw at bull sales seems to correct the defect.

Guidelines for selecting good feet

- Make sure you can see/pay attention to the feet
  - Standing & walking hard surface
    - May show subtle lameness
    - Walk strong, easy, flat back
  - Not recently trimmed
  - Look more critically at young animals

Methods to judge for good feet

- Visual scoring based on conformation
- Objective scoring system expressed in precise units
  - Breed selection based on claw measurements that are suitable to increase longevity of offspring
    - Toe angle
    - Claw size/volume
    - Leg angle side view
- Combination of both

Conformation

- **Claw size (heritable)**
- Look at claw size in relation to body size
- Should provide large and stable bearing surface
  - Ability to act as shock absorber dependent on size.
  - Larger size better able to dissipate weight bearing forces
    - Reduce lameness risk.

Claw size

- Top and bottom claw width good prediction for claw size
  - Should not narrow down from the width across the coronary band to the toe
- Toe length correlates with width

1600 pound Angus bull: Front claw top width 2.75” Bottom width 2.5” Toe length 2.75”
Rear claw top width 2.75” Bottom width 2.75”Toe length 2.75”

Conformation

- **Front claws**
  - Claw size equal; 54% total claw volume
  - Balanced weight bearing between claws

Conformation

- Rear claws.
  - Outer claw consistently larger and wider than inside claw
  - Naturally bears more weight relative to inside claw
    - overgrowth resulting in > concussion - lameness
    - 90% lameness in outer claw rear leg

Conformation

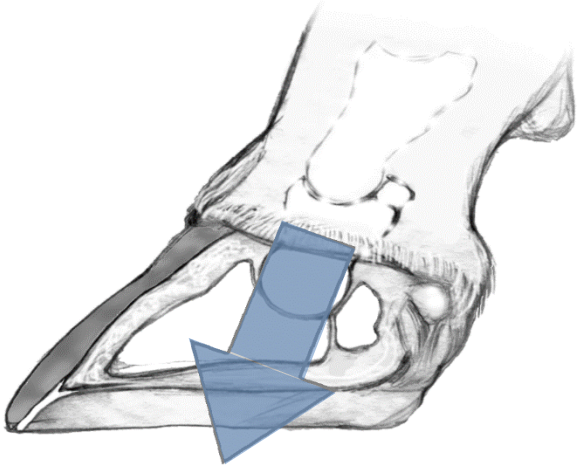
- Toe angle & heel height (genetic)
  - Steep toe angle
  - Good heel height

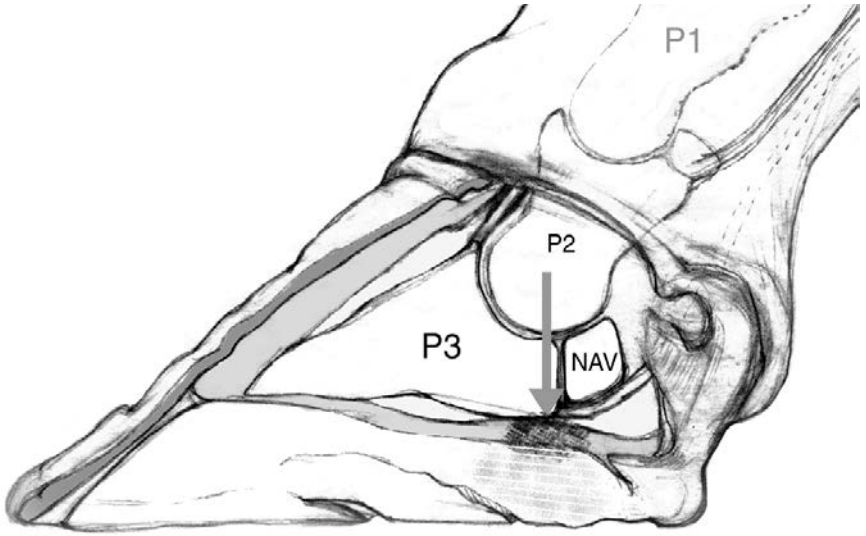
Conformation

- Toe angle
  - Genetic correlation between sole lesions and toe angle
  - Toe angles (50 – 60^0) positively correlated with increased survival
    - Bulls siring steeper foot angle have daughters that live longer
  - Toe angle more correlated with longevity than leg traits

Conformation/ shape

- Toe angle
  - Correlation between toe angle and toe length and heel height
  - Shallow angle – longer toe – low heels
    - Shifts weight bearing towards the heel
    - Associated with more sole ulcers





Conformation

- Straight walls and toe

Conformation

- Angle of outside wall
  - Should be perpendicular with bearing surface
  - Inward curvature of the outside wall and rotation at the toe - screw claw

Screw Claw conformation

- Outside wall displaces sole weight bearing

Causes of screw claw

- Multifactorial problem
    - Heritable
        - Autosomal recessive

Heritable Screw claw.

Abnormal angle between the bones in the foot causing curvature of the outside wall and rotation of the toe

Heritable Screw claw

- Diagnosis
  - Family history
  - Young age
  - Outer claw of rear leg
  - Typical signs
    - Toe rotation
    - Curvature of outside wall
  - Absence of laminitis

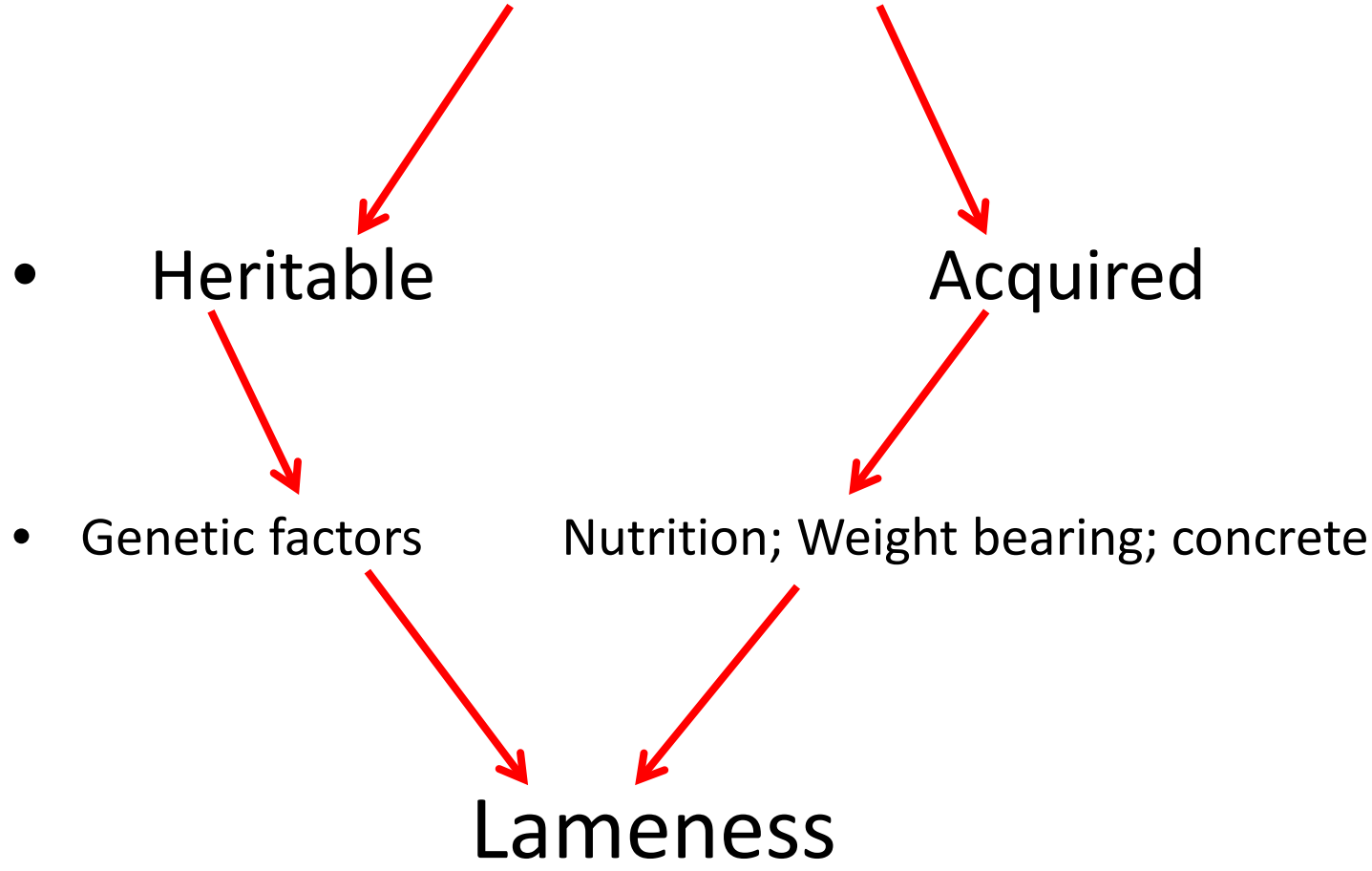
Acquired screw claw

- Multifactorial problem
  - Weight bearing
  - Laminitis
    - High grain
  - Management
    - Confinement
    - Concrete

Acquired screw claw

- What is generally regarded as heritable screw claw is highly correlated with laminitis

Screw claw


Heritable
Acquired
Genetic factors
Nutrition; Weight bearing; concrete
Lameness

Laminitis.

Damage of the horn producing tissues causes horizontal and vertical cracks and grooves

Methods to judge for good feet

- Visual scoring
  - Australian BeefClass Structural Assessment
    - Used for genetic analysis of structural traits, to predict the structure of an animal's progeny
    - Front feet claw set, hind feet claw set, front feet angle, rear feet angle, rear leg side view, rear leg hind view.

Score 1
Splayed toes

Score 5
Straight wall

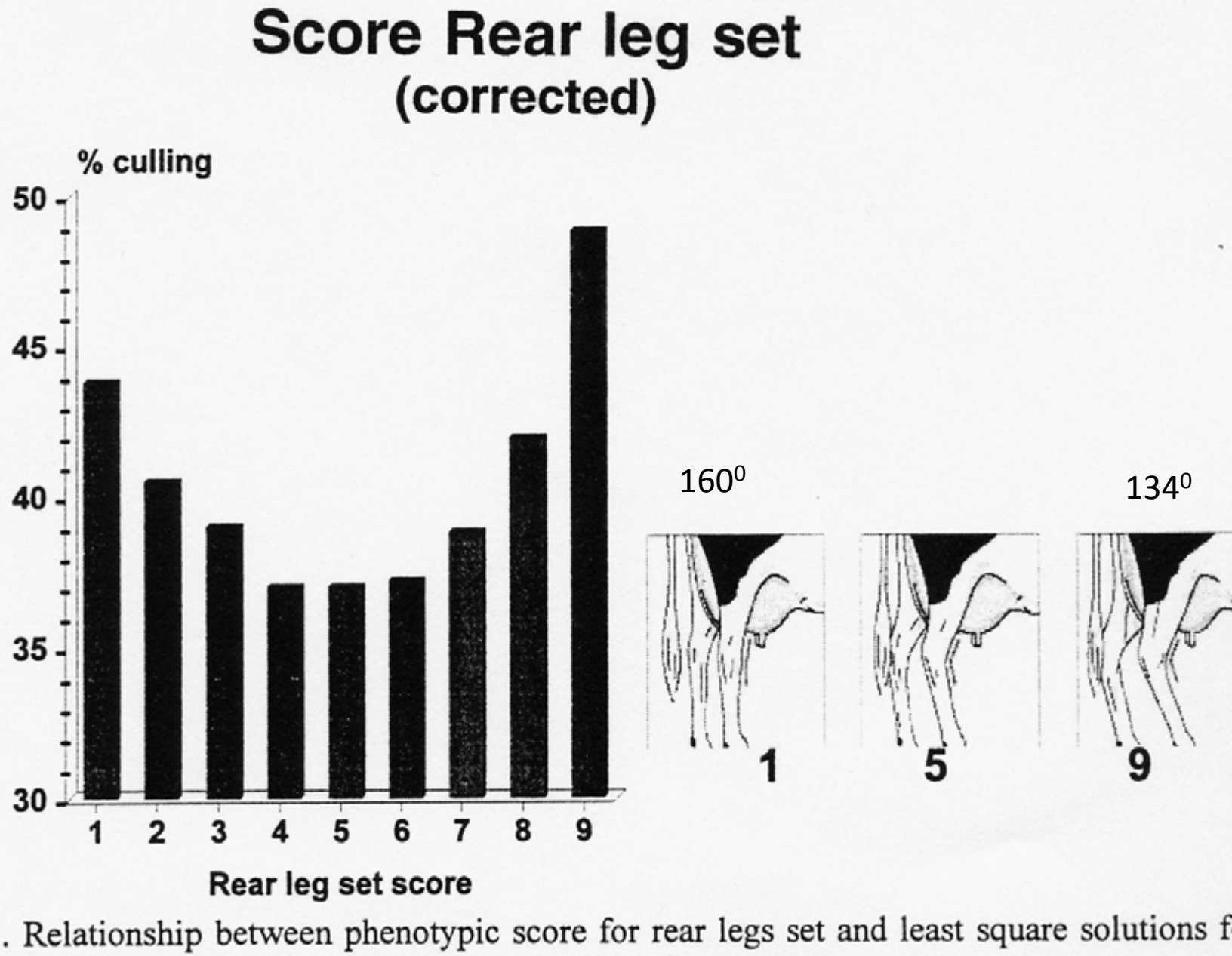
Score 9
Toe rotation/curve

Methods to judge for good feet

- A score of 5: Ideal 
- Score 4 and 6: Includes most animals and would be acceptable in any breeding program
- Score 3 and 7: Acceptable in most commercial breeding programs. Seed stock producers should be wary.
- Score 2 and 8: Should be looked at closely before purchasing
- Score 1 and 9: Considered culls.

Conformation

- Upper leg traits (McDaniel; Distl)
  - Heritability high enough to achieve genetic response
- Hocks
  - Hock angle viewed from side
    - Post hocks
    - Function poorly in absorbing mechanical stresses of weight bearing – predispose to degenerative joint disease (arthritis)
    - Hock angle should be slightly straight but less than 175^0



Graph 1. Relationship between phenotypic score for rear legs set and least square solutions f
culling rate before starting the 3rd lactation in Dutch Black&White cows.

Lameness in Cow/Calf Operations

- NCBA National Market Cow and Bull Quality Audit on Slaughtered Cattle[1]
  - 7.37% of cattle had at least 1 arthritic joint
  - 3.97% of cattle had 2 arthritic joints

[1]National Cattlemen's Beef Association: Executive summary of the 1999 national market cow and bull audit. NCBA:1-15, 1999.
[2]Brown, CC, et al., Prevalence of papillomatous digital dermatitis among culled adult cattle in the southeastern United States. Am J Vet Res, 61:928-930.

Normal claw conformation

- Wide bearing surface
- Toe angle 50 – 60^0
- Toe length short 3”
- Straight wall at the toe
- No rotation at the toe
- Straight side wall
- Good heel height 1.5 inches
- Absence of obvious grooves on wall
- Narrow interdigital space

Legs and feet scoring system

- Claw quality scoring based on visual as well as claw measurements
  - Toe length 3”
  - Claw angle 50 -60 ^{0}
  - Claw size Wide top & bottom
  - Side wall angle - straight
- Overall score for feet and legs
  - Rear legs set side view
  - Locomotion
  - Stride
  - Bones and joints

General considerations regarding lameness

- Lame animals bring very little money
- Immediate attention required. Claw lesions can deteriorate quickly and critical structures such as tendons and joints can become involved
- Most problems DO NOT respond to antibiotics except foot rot in which case you should have improvement within 3 days