

Hoof Injuries and Gait Characteristics in Dairy Cattle

The Problem

Hoof injuries are common in dairy cattle, but little is known about their effects on cow gait. Our aim was to use techniques developed for studying human motion to measure gait characteristics of healthy cows and those with different hoof injuries.

The Research



- Cows, fitted with reflective markers on their legs, were video taped walking along level concrete
- Gait analysis software was used to determine the vertical and horizontal displacements of each hoof
- Stride length, stride height, stride duration, speed, stance times (hoof on ground) and swing times were calculated
- Cows' hooves were examined at trimming for sole lesions and digital dermatitis



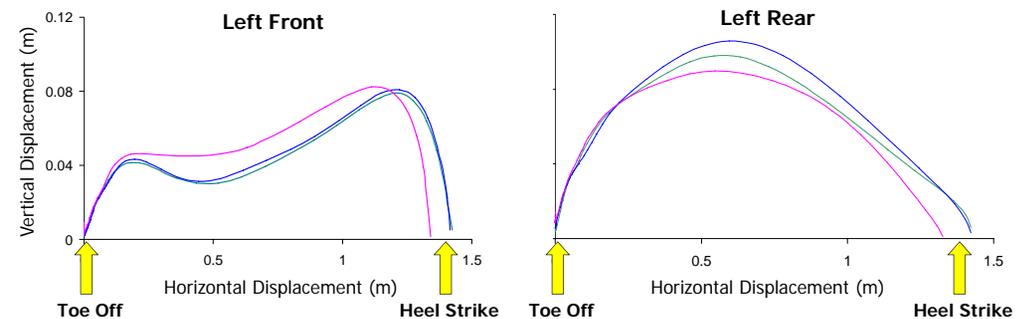
Results

On average (\pm s.e.) cows with sole lesions walked more slowly, had shorter strides and longer stance times than healthy cows. Cows with digital dermatitis had shorter swing times than healthy cows.

| Stride Variable | Healthy (n=17) | Sole Lesions (n=20) | Digital Dermatitis (n=9) |
|---------------------|----------------|---------------------|--------------------------|
| Stride length (m) | 1.39 (0.11) | 1.36 (0.10) | 1.42 (0.15) |
| Stride duration (s) | 1.26 (0.04) | 1.36 (0.03) | 1.26 (0.05) |
| Stride height (m) | 0.96 (0.02) | 0.94 (0.02) | 0.91 (0.03) |
| Swing (s) | 0.57 (0.01) | 0.56 (0.01) | 0.53 (0.01) |
| Stance (s) | 0.69 (0.03) | 0.80 (0.03) | 0.73 (0.04) |
| Speed (m/s) | 1.12 (0.02) | 1.03 (0.02) | 1.15 (0.03) |

(Shaded text indicates significant difference $p < 0.05$)

Gait patterns of front and rear hooves differ due to anatomical differences. Cows with severe sole lesions (n=4) and digital dermatitis (n=4) have different hoof motion patterns than those with healthy hooves (n=17).



Conclusions

Gait analysis provides a promising method for detecting cows with gait abnormalities and hoof injuries