LAMENESS IN SMALL RUMINANTS

WHAT CAN BE LEARNT

DairyCare

GEORGE STILWELL

AWIN

Animal Behaviour and Welfare Research Lab

CIISA, FMV-UL
Assessing welfare

Pain in diseases (e.g. lameness...)

ANIMAL WELFARE INDICATORS

AWIN WORK PACKAGE 1

AWIN WORK PACKAGE 2
- **Animal Pain:**
  - What is animal pain?
  - How is pain produced?
  - How is animal pain assessed?
  - Lameness and claw overgrowth in goats.
  - Attitudes to animal pain.
  - Facial expressions of pain in horses.

Problem-solving approach to pain

1. Treating **nociceptive pain** by addressing the cause.
   - Stabilise fractures
   - Relieve bloat
   - Extract diseased teeth
   - Dissolve uroliths
   - Give antibiotics for bacterial causes of inflammation
   - Correct foot balance to take pressure off site of lameness

2. It can be difficult to determine the cause of **neuropathic pain**.
Quiz 1: Peripheral mechanisms

Drag and drop the answers onto the questions

- Inflammatory mediators
- Afferents
- A beta
- C fibres
- Sensory receptors
- Brain and spinal cord

Which structures convert one type of energy into another?
Where is pain modulated?
Which nerves transmit sensory information?
Which nerves transmit information about pain, hypoxia and gentle touch?
What causes peripheral sensitisation?
Which nerve fibres do not carry information about pain?
Effect of lameness on reproduction

- Treatment with GnRH
  - 15 lame cows did not respond
  - 5 lame cows with very low blood progesterone
  - 11 lame cows did not ovulate
  - Lame cows with less intense oestrus signs

- Lameness...
  - Decreased odds of pregnancy 5.1 times and of calving 3.5 times.

✓ prolonged interval from calving to first service and from first service to conception (Barkema et al., 1994).
✓ extended intervals from calving to first service and to conception (Sprecher et al, 1997)
✓ higher incidence of ovarian cysts, a lower likelihood of pregnancy and lower overall fertility (Melendez et al., 2003)
✓ 3.5 times greater odds of delayed cyclicity (Garbarino et al, 2004)
✓ lame cows take 12 d longer to get pregnant (Alawneh et al., 2011)
• Kidding/lambing interval
  – Non/lame
    • Goats (10.87±1.48 months)
    • Sheep (11.69±1.92 months)
  – Lame
    • Goats (15.2±0.78 months)
    • Sheep (14.59±1.53 months)

Why so few studies...

- Seasonality.
- Male effect.
- Difficult oestrus detection.
- No commercial AI.
- Reproduction tract evaluation → difficult ultrasound and no transrectal palpation.
- Less economic impact.
- Low correlation (?)
Studying lameness in small ruminants
Advantages

• Easier to handle – ↑feasibility + safety
  – Force to walk, stand or rest...
  – Examination.
  – Force flexion/extension of joints.

• Cheaper
  – E.g. lameness induction.

• Number
  – Statistics
  – Replicate studies
Impact...

- Pain and suffering
- Reduce feed intake
- Reduce milk production
- Reduce fertility (?)
- Predisposition to other diseases
  - Pregnancy toxaemia
- Premature culling

MORE STUDIES URGENTLY NEEDED
Our study animals

EXTENSIVE

INTENSIVE
(PERMANENT HOUSING)
Differences and similarities in feet diseases

- **CATTLE**
  - Necrobacillosis
  - Digital Dermatitis
  - Sole Ulcer
  - White line Disease
  - Overgrowth
  - Laminitis

- **SMALL RUMINANTS**
  - Foot rot (more sheep)
  - Scald
  - Digital Dermatitis
  - Horn separation
  - Overgrowth (intensive goat)
  - Deformation
  - Laminitis ??
Studies in small ruminant lameness

- Lameness scoring – NRS vs VAS
  - Websurvey

- Thermographic images
  - Before and after exercise
  - Before and after trimming

- Trimming effect on deformed claws
  - Lameness score before and after trimming.

- Assessing pain and resistance
  - Facial expression - foot rot in sheep
  - Genetics

- The use of new technologies.
How is lameness assessed?

- **Objective** - based on the use of equipment that collects kinetic and kinematic data

- **Subjective** (based on the observers’ assessment)
  - Numerical rating scales (NRS)
  - Visual analogue scales (VAS)

- **Which is better?**
Scoring Systems

• Most common = NRS
  – verbal scales with a limited number of response categories.
  – artificial constructs as lameness varies in a continuous trait
  – some information loss
  – reduced sensibility

• Visual analogue scales (VAS)
  – more subjective
  – needs good knowledge of normal behaviour
  – records lameness in a continuous way.
OBJECTIVE

• assess how observers score gait and signs separately without trying an overall lameness assessment.

• gather information for the inclusion of gait and specific posture signs in lameness categories.

• Collect data for the development of a VAS for dairy goats
The survey

• Part of Web 2.0 services.
• Developed in a Wordpress platform.
• 82 videos of walking goats that were previously graded (NRS 0 to 3) by experts.
# Introduction

VAS definition, guidelines, scope...

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## Some Guidelines:

In this survey you will be watching nine videos. You will be able to review each video as many times as desired. The purpose is to score each video according to three descriptors, namely (i) abnormal gait, (ii) nodding of head and (iii) spine curvature, in a Visual Analogue Scale (VAS), as illustrated in the following paragraph.

![Visual Analogue Scale](image)

A Visual Analogue Scale (VAS) is a measurement instrument that tries to measure a characteristic descriptor that is believed to range across a continuum of values. Operationally a VAS is a horizontal line, 10 cm in length, anchored by word descriptors at each end. (D. Gould et al., 2001)

## The descriptors are three different gait and posture signs.

<table>
<thead>
<tr>
<th>ABNORMAL GAIT</th>
<th>NODDING OF HEAD</th>
<th>SPINE CURVATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Look at the way the goat walks.</strong>&lt;br&gt;&lt;br&gt; If the descriptor is not present, the goat will place full weight on all four limbs. If it is present and it is most severe, the goat will be reluctant to move once standing and will not bear weight on affected limbs.</td>
<td><strong>Look at the way the head of the goat moves.</strong>&lt;br&gt;&lt;br&gt; If the descriptor is not present, the head of the goat will remain steady when she walks. If it is present and it is most severe, you will notice an accentuated up and down movement of the head while she walks.</td>
<td><strong>Look at the goat's back.</strong>&lt;br&gt;&lt;br&gt; If the descriptor is not present, you will not notice any or just a slight arched shape in the rump region. <strong>At the goat's back.</strong> If it is present and it is most severe, you will notice an accentuated arch in the rump region at the goat's back.</td>
</tr>
</tbody>
</table>

In the survey, we will ask you to move the marker of the VAS to the point that you feel represents your perception of the presence and severity of occurrence of each descriptor. If you feel you cannot score a descriptor, please select "Not possible to score."
Respondent characterization

• age and gender
• level of education (primary, secondary and higher),
• occupation (farmer or stockperson, animal science, veterinarian, researcher in animal behavior and student),
• country of residence
• experience in scoring goat lameness (inexperienced, little experience, experienced, very experienced).
Each questionnaire was composed of nine videos, selected randomly from the pool of 82 videos. The respondent was asked to move the marker along the continuum and his/her score was automatically measured from zero to the respondent’s mark and stored online. The data was expressed to the nearest 0.5mm. Whenever the participant was unable to score the descriptor, the option “not possible to score” could be selected.
Worldwide recruitment of respondents
Results

- **600** respondents (30 were eliminated).
- **5,130** video observations.
- **Respondents**
  - 367 female and 203 male,
  - Ages ranging from 18 to 75 years (Mean=35.66; SD=11.86).
  - 35 different countries in all five continents
    - With over 10 respondents: Portugal, United Kingdom, United States, Brazil, Canada, Italy, Germany, Austria, Norway, Switzerland, Greece, Spain, New Zealand
    - 22 other countries having less than 10 respondents.
### Datasets

<table>
<thead>
<tr>
<th></th>
<th>All respondents</th>
<th>Very lame vs non-lame</th>
<th>Slightly lame vs non-lame</th>
<th>Only non-lame</th>
<th>All consistent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n=570</td>
<td>n=482</td>
<td>n=227</td>
<td>n=151</td>
<td>n=58</td>
</tr>
<tr>
<td></td>
<td>100%</td>
<td>84.56%</td>
<td>39.82%</td>
<td>26.49%</td>
<td>10.18%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>n</th>
<th>n</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher</td>
<td>547</td>
<td>465</td>
<td>85.01</td>
<td>223</td>
<td>40.77</td>
<td>149</td>
<td>27.24</td>
<td>58</td>
<td>10.60</td>
</tr>
<tr>
<td>Secondary</td>
<td>21</td>
<td>15</td>
<td>71.43</td>
<td>4</td>
<td>19.05</td>
<td>2</td>
<td>9.52</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Primary</td>
<td>2</td>
<td>2</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Occupation</td>
<td>n</td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Veterinarian</td>
<td>270</td>
<td>231</td>
<td>85.56</td>
<td>101</td>
<td>37.41</td>
<td>64</td>
<td>23.70</td>
<td>25</td>
<td>9.26</td>
</tr>
<tr>
<td>Researcher in animal behavior</td>
<td>133</td>
<td>118</td>
<td>88.72</td>
<td>64</td>
<td>48.12</td>
<td>44</td>
<td>33.08</td>
<td>18</td>
<td>13.53</td>
</tr>
<tr>
<td>Animal Science Engineer</td>
<td>50</td>
<td>43</td>
<td>86.00</td>
<td>21</td>
<td>42.00</td>
<td>14</td>
<td>28.00</td>
<td>5</td>
<td>10.00</td>
</tr>
<tr>
<td>Student</td>
<td>89</td>
<td>71</td>
<td>79.78</td>
<td>31</td>
<td>34.83</td>
<td>21</td>
<td>23.60</td>
<td>5</td>
<td>5.62</td>
</tr>
<tr>
<td>Farmer and stockperson</td>
<td>28</td>
<td>19</td>
<td>67.86</td>
<td>10</td>
<td>35.71</td>
<td>8</td>
<td>28.57</td>
<td>5</td>
<td>17.86</td>
</tr>
<tr>
<td>Experience</td>
<td>n</td>
<td>n</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Inexperienced</td>
<td>217</td>
<td>188</td>
<td>86.64</td>
<td>83</td>
<td>38.25</td>
<td>57</td>
<td>26.27</td>
<td>18</td>
<td>8.29</td>
</tr>
<tr>
<td>Little experience</td>
<td>249</td>
<td>206</td>
<td>82.73</td>
<td>103</td>
<td>41.37</td>
<td>62</td>
<td>24.90</td>
<td>25</td>
<td>10.04</td>
</tr>
<tr>
<td>Experienced</td>
<td>85</td>
<td>73</td>
<td>85.88</td>
<td>30</td>
<td>35.29</td>
<td>24</td>
<td>28.24</td>
<td>9</td>
<td>10.59</td>
</tr>
<tr>
<td>Very experienced</td>
<td>19</td>
<td>15</td>
<td>78.95</td>
<td>11</td>
<td>57.89</td>
<td>8</td>
<td>42.11</td>
<td>6</td>
<td>31.58</td>
</tr>
</tbody>
</table>

Cardinal consistency levels were created for the three signs resulting in different datasets for analysis.
Examples of datasets: Plots for gait, nodding and arch (mean and median).

Very lame - non lame

All consistent
CONCLUSIONS

• Good overall differentiation between severely lame goats and non-lame goats.

• Difficulties in the distinction between the true non-lame and the slightly lame goats.

• Characteristics of the respondents in the different datasets of cardinal consistency show that experience is very important for differentiating the different lameness categories.
CONCLUSIONS

• Lameness categories are not evenly spaced.

• Our results question the inclusion of different descriptors in NRS categories for clinical assessment of lameness.

• Further investigation is needed to assess the diagnostic value of each lameness descriptor.

• A new alternative scale for dairy goats is being developed
Very high prevalence in intensive farms (60 to 95%) Hill, 1995; Anzuino et al., 2011; Muri et al., 2013; AWIN, 2014.

How does claw deformation affect the welfare of ruminants?

Does exercise exacerbate pain?

Are lesions and inflammation reversible?

Is trimming a solution?

Some studies ongoing
Does trimming reduce pain and discomfort?

94 dairy goats

Not deformed

Deformed

FLIR I3

Distal interphalangeal joint

Trimming

TEMPERATURE ASSESSMENT REPEATED 15 DAYS AFTER TRIMMING
**Does trimming reduce pain and discomfort?**

<table>
<thead>
<tr>
<th>DAY</th>
<th>Claw type</th>
<th>Temperature distal joint</th>
<th>Sig. (t Test)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>0*</td>
<td>Deformed</td>
<td>23.3</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>Not deformed</td>
<td>20.76</td>
<td>3.92</td>
</tr>
<tr>
<td>15*</td>
<td>Deformed</td>
<td>28.44</td>
<td>2.37</td>
</tr>
<tr>
<td></td>
<td>No deformation</td>
<td>28.72</td>
<td>2.81</td>
</tr>
</tbody>
</table>

*Different environment temperature

When claws are deformed the distal interphalangeal joints show higher temperature (higher blood flow $\rightarrow$ inflammation?).

Trimming leads to a reduction in temperature (inflammation) surrounding these joints.
Are these the only joints affected?

Does exercise (walking) have influence in the degree of inflammation?
Simulating the day to day life of a dairy goat.

Study the effect of exercise before and after trimming

Study the effect of claw deformation and overgrowth on other limb joints
<table>
<thead>
<tr>
<th>Step</th>
<th>Activity</th>
<th>Duration</th>
<th>Repeat</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exercise</td>
<td>20 min</td>
<td>15 days after trimming</td>
</tr>
<tr>
<td>2</td>
<td>Rest</td>
<td>5 min</td>
<td>4 limbs</td>
</tr>
<tr>
<td>3</td>
<td>Exercise</td>
<td>1 min</td>
<td>4 limbs</td>
</tr>
<tr>
<td>4</td>
<td>Clipping</td>
<td></td>
<td>Repeat 15 days after trimming</td>
</tr>
</tbody>
</table>

Claw growth and deformation scoring (0-1-2)
The effect on other joints

- Carpal or tarsal joint
- Proximal Interphalangeal joint
- Distal Interphalangeal joint
### Results

<table>
<thead>
<tr>
<th>Joint</th>
<th>Day</th>
<th>Time</th>
<th>Claw type</th>
<th>0</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distal</td>
<td>0</td>
<td>BE</td>
<td>29.18</td>
<td>27.95</td>
<td>30.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE</td>
<td>27.42(^a)</td>
<td>28.1</td>
<td>29.86(^a)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>BE</td>
<td>28.94</td>
<td>29.12</td>
<td>29.61</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE</td>
<td>28.7</td>
<td>28.64</td>
<td>29.14</td>
<td></td>
</tr>
<tr>
<td>Proximal</td>
<td>0</td>
<td>BE</td>
<td>30.55</td>
<td>28.31</td>
<td>30.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE</td>
<td>29.13</td>
<td>29.05</td>
<td>29.82</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>BE</td>
<td>30.62</td>
<td>30.43</td>
<td>30.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE</td>
<td>29.95</td>
<td>30.47</td>
<td>30.52</td>
<td></td>
</tr>
<tr>
<td>Carpal Tarsal</td>
<td>0</td>
<td>BE</td>
<td>33.53</td>
<td>31.74</td>
<td>33.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE</td>
<td>32.41</td>
<td>32.69</td>
<td>33.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>BE</td>
<td>33.62</td>
<td>34.44</td>
<td>34.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>AE</td>
<td>33.74</td>
<td>34.12</td>
<td>34.35</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) \(p = 0.02\)

BE – before exercise; AE – after exercise
CONCLUSIONS

• Distal interphalangeal joint is the most affected especially after being subjected to exercise.

• Measuring differences in animals at rest may give wrong results.

Another study showed that in severely deformed claws (score 2) distal joint temperature will remain higher even after trimming.
Thermography - surface temperature of the feet

Healthy foot

Foot with footrot
area of the lesion shows a higher temperature than in non lesioned feet

Temperatures are always higher on all sites measured

FEET WITH LESIONS

35.4°C

FEET WITHOUT LESIONS

32.3°C

Infected feet

p = 0.002
Pain assessment in lameness - facial expression

(University of Cambridge)

Foot-rot in sheep
Pain assessment

Shiavenato et al., 2008

Langford et al., 2010

Stotocinal et al., 2011

Dalla Costa et al., 2014
Methods

Diseased – footrot (D. nodosus) | Healthy

37 Antibiotics only | 36 Antibiotics & NSAID | 38 Matched control

111 sheep
7 farms, different breeds

DATA COLLECTION

Day 1 and day 90

- Lameness & Lesions
- Behaviour
- Facial expressions
- Blood
- Faeces
- Temperature
- Wool
Facial expression

<table>
<thead>
<tr>
<th>Day of diagnosis</th>
<th>Fully recovered</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
</tbody>
</table>
Scoring facial expressions of pain

- There are five areas of the face which you need to become accustomed to when scoring pain in sheep:
  1. Orbital area
  2. Cheek area
  3. Ears
  4. Lip and jaw profile
  5. Nostrils and philtrum
Orbital tightening

<table>
<thead>
<tr>
<th>Not present</th>
<th>Partially present</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- Not present: 0
- Partially present: 1
- Present: 2

![Images of sheep heads showing varying degrees of orbital tightening](image URLs)
Cheek (masseter muscle) tightening

<table>
<thead>
<tr>
<th></th>
<th>Not present</th>
<th>Partially present</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- **Not present**: 0
- **Partially present**: 1
- **Present**: 2
<table>
<thead>
<tr>
<th>Abnormal ear position – front view</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Not present</strong></td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

- **Not present (0)**: Ear position is not visible or present.
- **Partially present (1)**: Ear is partially visible or present.
- **Present (2)**: Ear is fully visible and present.

![Images of sheep representing different ear position categories](image)
Abnormal ear position – profile view

<table>
<thead>
<tr>
<th>Not present</th>
<th>Partially present</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

- Not present (0): Ear position is normal.
- Partially present (1): Ear position is slightly abnormal.
- Present (2): Ear position is severely abnormal.
### Abnormal lip and jaw profile

<table>
<thead>
<tr>
<th></th>
<th>Not present</th>
<th>Partially present</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

![Sheep profiles](image)

- **Not present (0):** No visible abnormalities.
- **Partially present (1):** Minor deviations from normal profile.
- **Present (2):** Clear abnormalities in lip and jaw profile.
# Abnormal nostril and philtrum shape

<table>
<thead>
<tr>
<th>Not present</th>
<th>Partially present</th>
<th>Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

![Images of sheep faces illustrating the categories of nostril and philtrum shape](image-url)
Day 1 vs. day 90

- Day 1
  - Score: 3
  - P<0.001

- Day 90
  - Score: 0
Lameness vs Total pain score
Sensitivity and specificity

- Area under curve = 0.949
Day 1 vs day 90

Five observers: scored 30 sheep (20 footrot (10+10), 10 controls)
Facial Expression Thermography
Genetic markers for foot rot resistance
(SRUC – Edinburgh)

• Genetic associated with resistance to infection

• Molecular basis to resistance to footrot
Identifying key genomic regions using SNP

• Making the link between phenotype and genomic ‘pattern’

• Identifying animals with the ‘desirable’ set of SNPs

• Creating a ‘SNP key’ for footrot (‘Gene’ test)

• Incorporation into breeding programme

Mucha¹, Bunger¹, Conington (2015) Analysis of SNP variation for footrot in Texel sheep
Submitted: Genetics, Selection, Evolution
The WelGoat App

The WelGoat App teaches users to recognize, assess and manage lameness and claw overgrowth in dairy goats.
**ARCHED BACK**

The lameness sign showed in the video is:

- [ ] Present
- [ ] Absent
Gait

Non lame goat

Severely lame goat

This video is property of http://www.animal-welfare-indicators.net/site/

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SELF ASSESSMENT - LAMENESS

Video A

Video B

Lameness
SCORING - CLAW OVERGROWTH

INTRO CLAW TRAINING
The claw showed in the picture is:

- [ ] Non Overgrown Claw
- [ ] Moderately Overgrown Claw
- [ ] Severely Overgrown Claw
# Recommendations

<table>
<thead>
<tr>
<th>Lameness</th>
<th>Overgrowth</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>If the user only classifies the lameness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not lame</td>
<td>Not classified</td>
<td>Goat should be monitored at least every 3 months.</td>
</tr>
<tr>
<td>Moderately lame</td>
<td>More than two healthy claws</td>
<td>Goat needs to be monitored at least every 3 month. Claws should have been trimmed by that time.</td>
</tr>
<tr>
<td>Severeely lame</td>
<td>Two or more claws with moderate overgrowth</td>
<td>This animal needs claw trimming within the next month.</td>
</tr>
<tr>
<td></td>
<td>Two or more claws with severe overgrowth</td>
<td>The claws need to be trimmed right away</td>
</tr>
<tr>
<td>If the user classified both (lameness and claw overgrowth)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not lame</td>
<td>More than two healthy claws</td>
<td>This animal needs your attention within the next month</td>
</tr>
<tr>
<td></td>
<td>Two or more claws with moderate overgrowth</td>
<td>This animal needs your attention within the next month</td>
</tr>
<tr>
<td></td>
<td>Two or more claws with severe overgrowth</td>
<td>The claws need to be trimmed right away. Verify the lameness score in 15 days</td>
</tr>
<tr>
<td>Moderately lame</td>
<td>More than two healthy claws</td>
<td>You should look for other possible causes for the lameness, besides claw overgrowth. Contact your veterinary.</td>
</tr>
<tr>
<td></td>
<td>Two or more claws with moderate overgrowth</td>
<td>The claws need to be trimmed right away. Verify the lameness score in 7 days. If no improvement is seen, contact your veterinary.</td>
</tr>
<tr>
<td>Severeely lame</td>
<td>More than two healthy claws</td>
<td>The claws need to be trimmed right away. Verify the lameness score in 7 days. If no improvement is seen, contact your veterinary.</td>
</tr>
</tbody>
</table>
An interface allows for individual data collection that can be sent to your e-mail for posterior analysis.
SCORING HISTORY

LAMENESS

It was scored on:
10/02/2014 at 13:12 PM

CLAW OVERGROWTH

SET A DATE

Set a date so we can remember you to do the scoring again.

/ /
(mm/dd/yyyy)

*Donec a nibh vel tellus vulputate egestas sit amet et est. Quisque non risus suscipit, egestas sapien.
Future use of new technologies

- Automatic image capture and scoring
ACKNOWLEDGEMENTS

- Ana Vieira
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Thank you