

# Protection from the Elements: A comparative study of hair density, shelter use and heat loss in donkeys, horses and mules

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It is widely believed that donkeys are less adapted to wet, temperate climates than horses, often requiring shelter in addition to natural protection and rugs. However, to date there has been no scientific study assessing the shelter needs of donkeys and current guidelines often consider all horses and donkeys as a homogenous group. Our project provides a comprehensive assessment of the requirements of donkeys for protection from the elements across the four seasons in the British Isles and directly compares these findings to those from horses and mules. Some preliminary results are presented below.

## Hair Density

### Method

**Subjects:** 19 donkeys, 16 horses, 7 mules.

**Method:** 5cm<sup>2</sup> of neck hair is clipped four times a year, dried and weighed. Hair strand thickness is also assessed.

### Results

Hair density was similar across equid groups in September ( $F_{(2,39)} = 2.137, p = .132$ ).

By December there were significant differences in hair density, with horses having the thickest coats and donkeys the thinnest ( $F_{(2,39)} = 23.758, p < .001$ ).

Donkey hair density did not increase from September to December ( $t = .801, df = 18, p = .434$ ) but there was a significant increase in horses ( $t = 7.566, df = 15, p < .001$ ) and in mules ( $t = 7.538, df = 6, p < .001$ ).

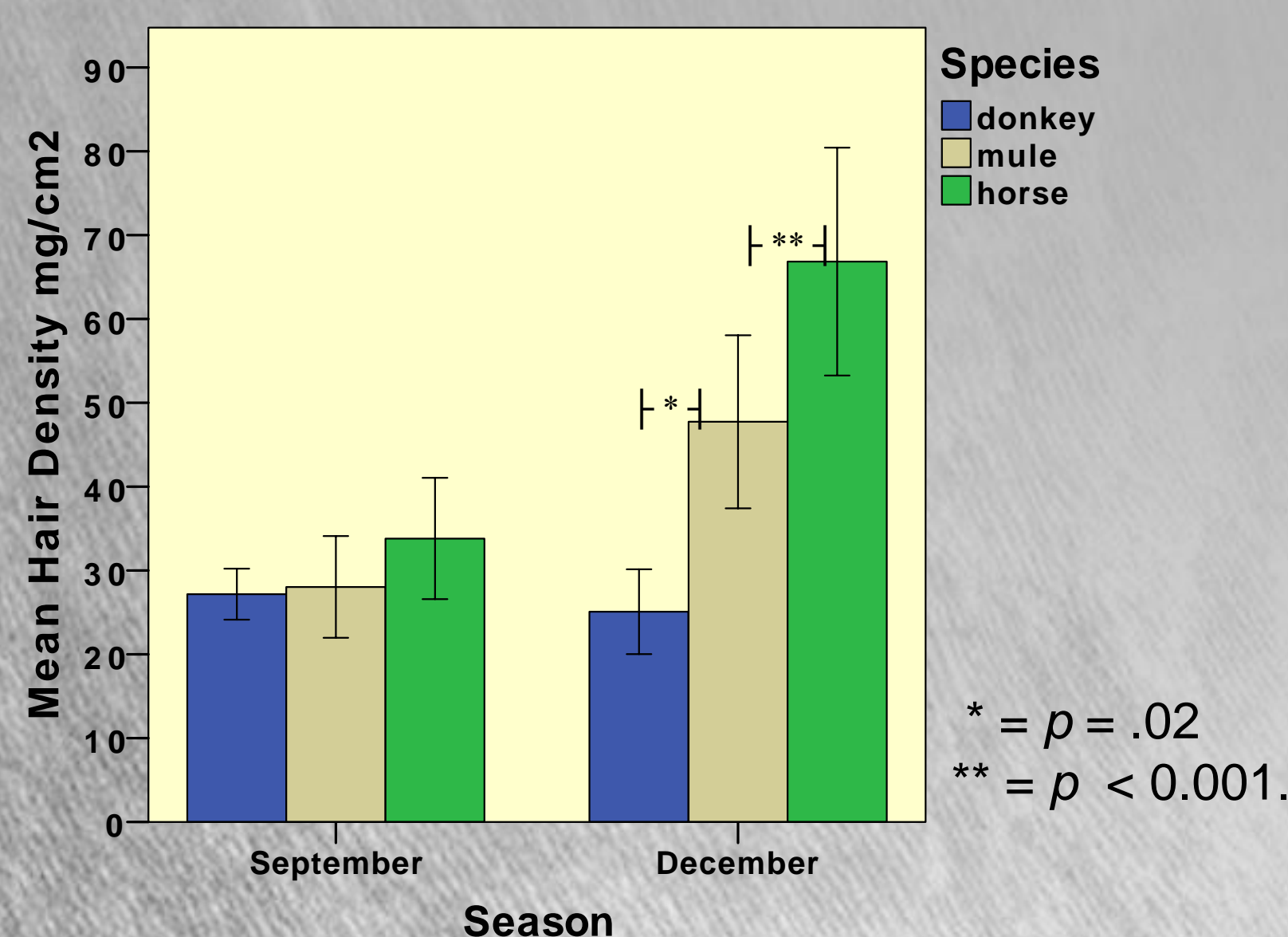


Figure 1. Hair Density of Donkeys, Mules and Horses in September and December, UK.

## Shelter Use

### Method

**Subjects:** 120 donkeys and 68 horses with access to outdoors and man-made and natural shelter.

**Method:** Subjects' behaviour and shelter use will be recorded twice per week for 1 year. Weather conditions including temperature, precipitation, wind speed and lux are recorded. Data from September-April are presented here.

### Results

**Precipitation:** Species, precipitation level and species x precipitation are significant predictors of shelter use (binomial logistic regression model:  $\chi^2(3) = 1950.6, p < 0.001$ ; classification: 74%).

Donkeys spent more time indoors than horses ( $Z^2(1) = 158.5, p < 0.001, OR = 6.76$ ).

In addition, donkeys are relatively more affected by the rain (seek shelter more) than horses ( $Z^2(1) = 10.9, p = 0.001, OR = 1.37$ ).

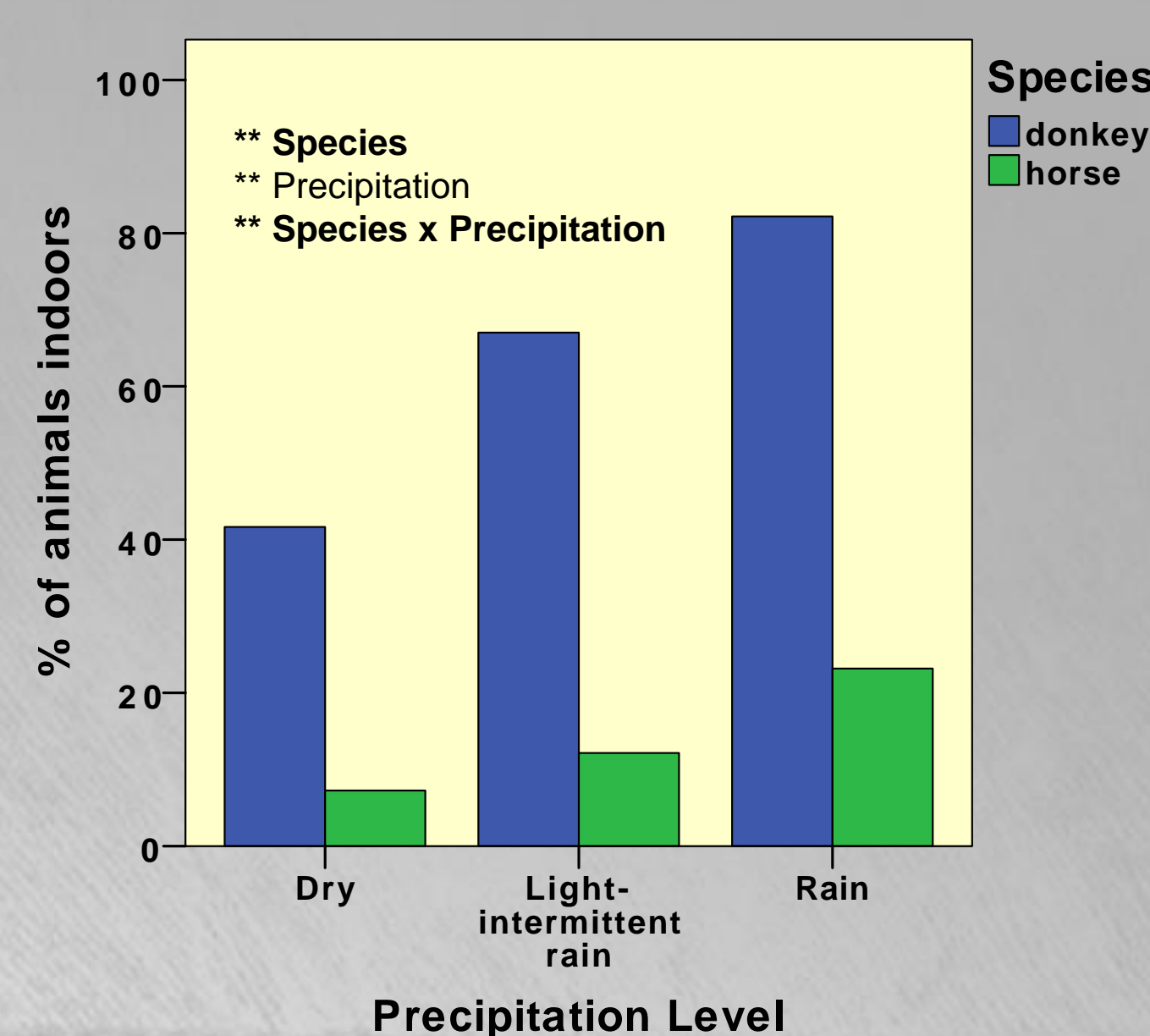


Figure 2. Percentage of animals seeking shelter at different precipitation levels. \*\* =  $p \leq 0.001$ .

## Heat Loss

### Method

**Subjects:** 80 donkeys, 80 horses, 80 mules.

**Method:** Ambient air temperature will be categorised as: cold (below 0°C), cool (0°C -10°C), warm (10°C - 20°C) and hot (above 20°C). Within each temperature category, thermographic images of 20 donkeys, horses and mules (10 dry, 10 wet) will be taken and heat loss calculated.

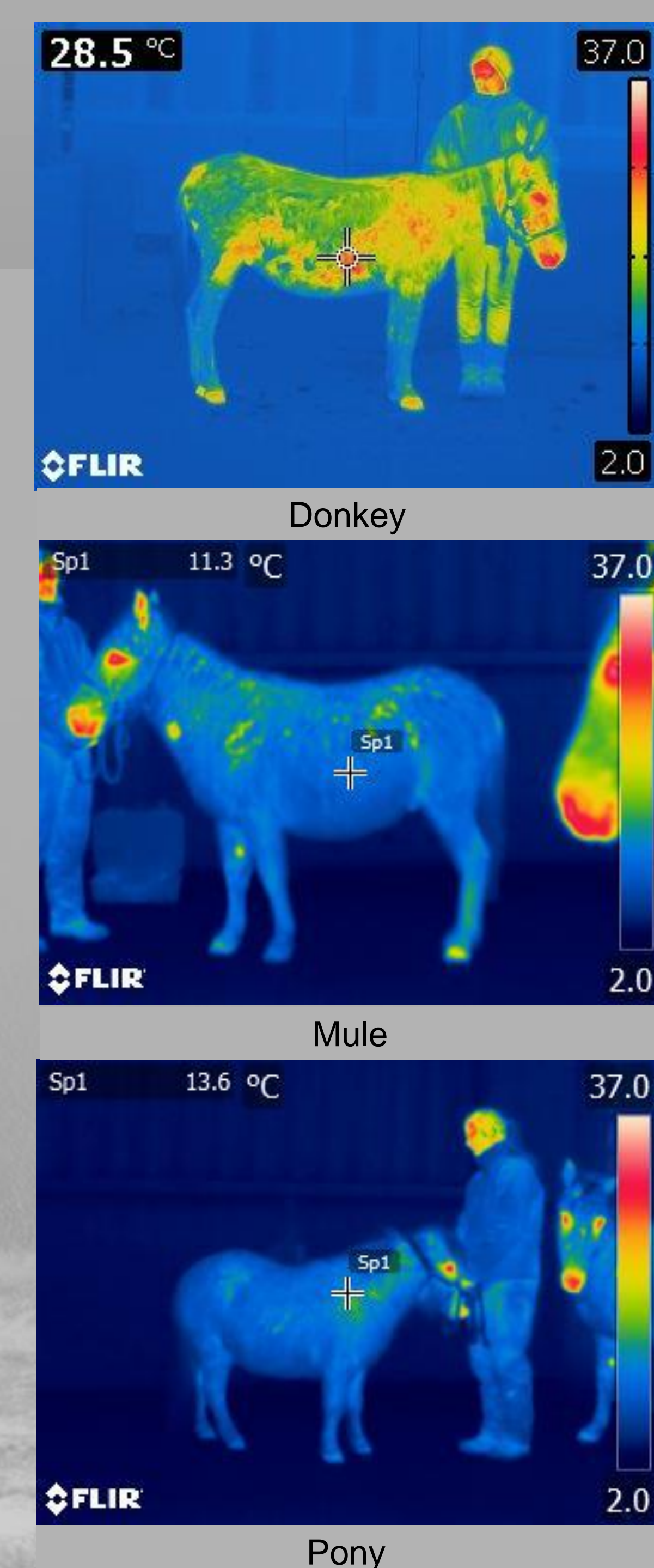


Figure 3. Thermographic images of equid subjects, used to calculate heat loss across different weather conditions (taken with Flir E60bx camera, 60Hz, 320x240 pixels)

This project is ongoing. Preliminary results suggest that donkeys may require additional protection from the elements in the UK when compared to horses.