Survey of hair cortisol concentrations in Danish cattle
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Introduction
• Cortisol is an important component of the HPA “stress” axis
• Plasma cortisol concentration is unreliable due to sampling stress
• Hair cortisol concentration (measured properly) reflects an integrated value of cortisol that has accumulated over weeks or months

Objectives
• To measure hair cortisol in a cross-section of beef cattle from around Denmark
• To assess the usefulness of hair cortisol as a measure of chronic stress

Materials and Methods
• We approached 232 beef cattle farmers from 9 postcode areas around Denmark
• Of the 35 that responded, 24 farms were visited and hair samples obtained
• Forelock hair was taken and the 2cm closest to the skin was selected for analysis
• Hair was washed, and cortisol was extracted and analysed according to a rigorous protocol
• Data (pg/mg) have been analysed using a series of single factor ANOVAs

Results
• The overall mean hair cortisol concentration was 2.69±0.07 pg/mg
• Hair cortisol concentration:
  • Varied geographically (Figure 1)
  • Was lower in older animals (Figure 2)
  • Varied amongst breeds (Figure 3)
  • Was affected by housing conditions (Figure 4)
  • Varied according to cow comfort (leg cleanliness: Figure 5)
  • Was affected by physiological state (Figure 6)

Conclusions
• The data are complex and final interpretation will require care
• Nevertheless, hair cortisol may be of value in assessing chronic stress
• A number of factors worthy of detailed investigation have been identified

Figure 1. Sample area
Cortisol, pg/mg, mean ± SE (n)

Figure 2. Age
Cortisol, pg/mg, individual values

Figure 3. Breed
Cortisol, pg/mg, median, quartiles and range (n)

Figure 4. Housing
Cortisol, pg/mg, mean ± SE (n)

Figure 5. Comfort
Cortisol, pg/mg, mean ± SE (n)

Figure 6. Status
Cortisol, pg/mg, mean ± SE (n)