Seasonal variation of cortisol secretion in free-ranging Red Deer

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Introduction

Today, wildlife in the cultivated landscape is often disturbed and stressed by human impacts, which could be responsible for game bite in agriculture and forestry (Gossow et al. 1991).

Glucocorticoids are known as stress hormones mobilizing energy reserves needed to cope with environmental challenges (Salpolsky 1992).

Chronically high glucocorticoid levels in turn detrimentally affect the red deer’s immune system, growth, and reproduction function (Ono et al. 1984, Peristein et al. 1993).

Questions

• To what extent does glucocorticoid-metabolite (GMB) secretion change over the year?
• Which impact does the social rank have on glucocorticoid-metabolite (GMB) secretion, energy costs and food intake?

Methods

We collected fecal samples (n=780) from 21 red deer immediately after we had observed the respective animal defecating. For each fecal sample, we noted individual animal, date and time of sampling. Fecal samples allow for a non-invasive analysis of GBM through an enzyme immunoassay.

16 hinds were equipped with a custom-made radio-telemetry transmitter which measured - heart rate as an index for metabolic rate,
- subcutaneous temperature and
- activity.

With these data the seasonal changes on metabolic rate, thermoregulation and activity could be determined. Furthermore, each hind’s rank was determined by behavioural observations of the group over the period of one year. In addition to natural food available, the deer received pellets ad libitum at a computer controlled feeding station at all times.

Results

• There are significant GMB changes in the annual lifecycle, with the highest values in winter and lowest in summer.
• GMB, energy costs and food intake are dependent on the social rank of the deer in the group.
• GMB, activity, subcutaneous temperature and heart rate show a catabolic metabolism in winter and an anabolic in summer.
• It is important to avoid disturbances during the catabolic metabolism of the animals during winter.

Regarding modern wildlife management, these results should thoroughly be taken into consideration to avoid game bite in agriculture and forestry.