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Project title:

Category: Research project

Type of project: Essay

Full project: Sheep's behaviour and activity regarding hormonal changes in Summer



Sheep (*Ovis aries*) is the main livestock animal in Iceland and in Faroe Islands. Modern sheep are the direct descendants of those ones that Vikings had brought back in 9th-10th century. Icelandic race is a quite calm one and they enjoy eating wild grass. They sometimes become aggressive to each other while some of them show stress.

It would interest me to research their behavior and feedback responses along with their physiological – hormonal changes as it concerns seasons of the year. Winter is much colder with very low temperatures and with a short period of daylight (only 4-5 hours). Is their behavior different in summer compared to winter? Is their reproduction affected? Is their milk production larger in summer? Is their appetite and/or sleep altered between Winter and Summer? What about their biomass (per individual and/or per group)?

My hypothesis is that sheep are more calm, more productive, eat more and are growing heavier in August (summer) compared to December (winter). I could achieve my research through meetings in farms, taking interviews by farmers, ecologists and/or organizing conversations with zoologists. I will pose questions like the above listed focusing on the differences between summer and winter days. I'm going to take relevant videos and pictures of the farm establishments and the animals themselves. In parallel, we could take some hormonal measurements, with blood samples, during each day and compare them to possible measurements that have been done by specialist scientists and researchers during last winter (i.e: 11 - 20 December, 2016).

More specifically:

In order to explore the physiological mechanisms that lay behind their behavior we need to measure certain hormones' levels. Hormone measurements should include:

- growth hormone (GH) and thyroid hormones (T3 and T4) which are hormones related to cell growth and division. These cause an increase in open diaphysis in sheep's bones and along with the skeletal muscle growth and fat distribution in the adipose tissue.
- testosterone and estrogens which are the main reproduction hormones of male and female sheeps.
- Catecholamines (Adrenaline and Nor-adrenaline) found in the adrenal medulla, the neurons and in the brain. They are organic compounds and important class hormones which are involved in several biochemical and physiological processes of animal organisms: heart rate, blood pressure and other autonomous neural system functions.
- Melatonin which regulates sleep and wakefulness and is involved in the synchronization of the circadian rhythms including blood pressure regulation, seasonal reproduction (melatonin may reduce the desire for mating) etc.
- Prolactin is a protein which acts as an important regulator of the immune system.



We are going to measure the above referred levels in the research lab during each day in a descent subjects' population (N) of certain five (5) male and five (5) female sheeps by taking blood samples in the morning 8am, at noon - 2am and in the evening – 8am. Further on, we could compare these hormone levels to the winter's ones hopefully taken by specialist researchers. We know that there is a restriction of different or even no animals that have been measured during winter. Still, this research has the value of recording 2017 summer's levels for a possible future

extension of the research with a perspective of recording next winter hormone values (2017-18).

It would be a good idea to film sheeps one or more days with low temperatures and sunny days, and then we could observe their general mood, their behavior towards the other sheeps of a certain population. This action can be captured with my mobile (Xiaomi RedmiNote3) phone camera which has excellent resolution of 13MP.

As a next step, we are going to take interviews from ecologists and zoologists about everything related to Icelandic sheep. In parallel, we could organize conversations with specialist biologists and with 1-2 farmers in their establishments in order to pose certain questions like:

- What problems are they faced with sheeps during winter or summer?
- Are sheeps get ill cause of a climatic event?
- Are they become aggressive? Affected by which environmental stimuli and when?
- Is their mating, appetite and milk production affected by seasonal changes?

Getting back home, I intend to present my work in an essay that I'm going to write including:

- Introduction and hypothesis
- Methods (measurements, devices)
- Results (hormone levels per day and time, related graphs, pictures and notes on the behavior and activity)
- Discussion and conclusions.

I'm also intending of presenting my work in an open event in my school and I will definitely share it in the internet: [Directorate of Secondary Education of Karditsa](#) and [Directorate of Education of Thessaly websites](#) along with [my school's website](#), [slack platform of my teacher](#), and of course in related social media (facebook, twitter). The whole experience will be published in the local Press of [Thessaly](#), Greece!