

Circadian and anticipatory feed behavior in domestic sheep (*Ovis aries*)

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Kellogg Honors College Capstone Project

Problem / Question

How will the timing and amount of activity of sheep (based on their circadian rhythm) adjust to the new feeding times when the feed times are changed?

Hypothesis

Based on their anticipatory food behaviors, their activity will increase at different times corresponding to the new feeding times. However, it is suspected that their activity will also remain higher at the normal feeding times as well, whether the feeding times are the same or not.

Project Overview

- A group of nine intact rams that were isolated in a lambing barn next to the main bard and the fields were used to collect the data; the rest of the flock were kept in and did not interact with the rams
- The average age of the rams was 1.94 years.
- The species represented were Katahdin goat (ear tag: #R12), Dorper goat (ear tag: #B32), a Hampshire sheep (ear tag: #16065), five Dorsets sheep (ear tags: #D534, D714, D705, D727, D730) and a Hampshire and Suffolk cross ram (ear tag: #2040).

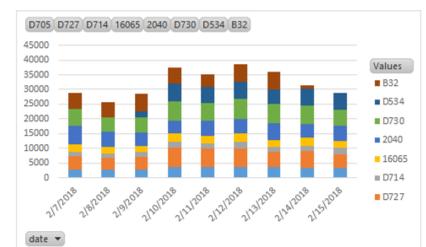
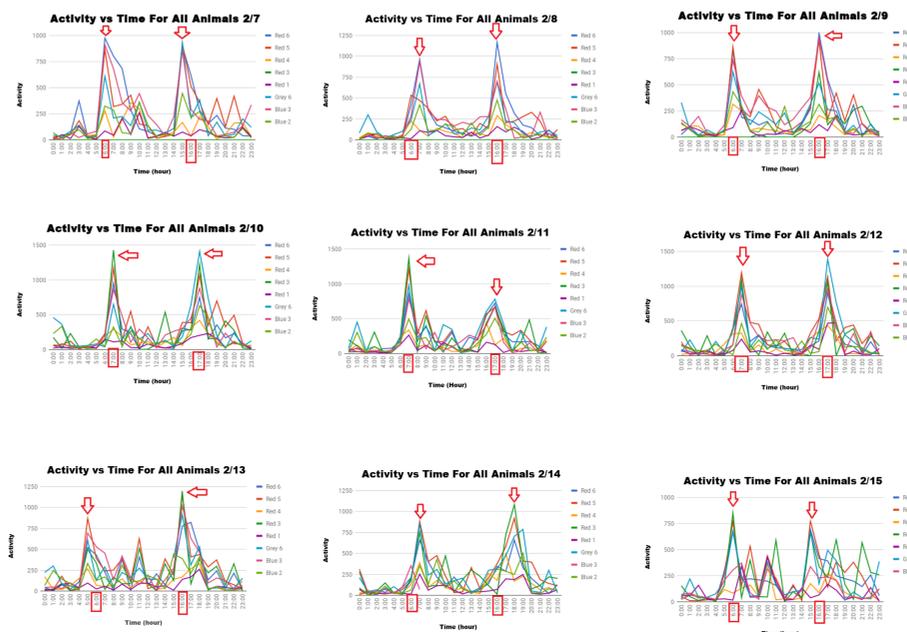
Procedure

- To measure the activity of each ram, commercial accelerometers (Fitbark©) were used to quantify the activity levels of each ram
- On 2/6/2018, each ram was fitted with a collar made of red canvas cloth, for strength and visibility, and yellow caution tape, for additional visibility. Duct tape was used to secure the knots and hold the Fitbarks© in place
- 2/7/2018: the data was collected for three days of the rams' normal activity levels with unchanged feeding times (6:00AM and 4:00PM)
- 2/10/2018 through 2/12/2018: the feeding times were adjusted to 7:00AM and 5:00PM
- 2/13/2018 through 2/15/2018: the feeding times were adjusted back to the normal times of 6:00AM and 4:00PM
- The amount and type of feed stayed consistent throughout the experiment
- For each day of the experiment, the accelerometers had to be synced through the Fitbark© application on a mobile device when feeding the rams

Works Cited

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Results



This graph illustrates the amount of activity each animal experienced per day

The graphs compare hourly activity of each animal during the normal feeding schedule and irregular feeding schedule

Conclusion

- The study may not have been long enough for the animals to learn that the feed times were significantly different, based on their circadian rhythms. However, it seemed the rams did exhibit food anticipatory activity, though it did not adjust based off different feed times.
- The activity on days where the feed time was changed was more sustained, starting 15-30 minutes before their normal feed time of 6AM and 4PM and continued until they were fed at 7AM and 5PM.
- During the days when the feeding times were changed, the average activity and total activity for the day was higher than during the days with regular feeding schedule possibly due the FAA or stress induced by the absence of food
- Additional research is needed with longer periods of changed feeding schedule to verify the data

Discussion

- The activity levels spike before and during the AM and PM feedings.
- In both cases, the increase in activity happened 15-30 minutes before the food distribution which means that the animals experienced food anticipatory activity (FAA).
- The average hourly activity was higher during the days with changed schedule than during the days with regular feeding schedule. This might have happened because the animals engaged in FAA for 2 hours instead of 1 and also because the increased length of food anticipation might have made the animals more nervous which lead to pacing.
- Daily activity was higher during the trial days vs. the first three regular feeding schedule days. Stress from absence of food during regular hours that could also be interpreted as FAA are the possible explanations for that.
- Some data shows that hourly activity was higher after the scheduled feeding times during the last 3 days of the experiment (after 6AM and after 4 PM) which was not anticipated