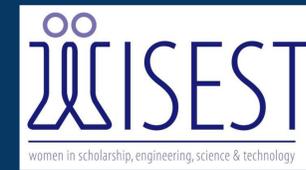


24-Hour Activity Time Budgets of Lohmann Brown and White Laying Hens in Enriched Housing



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Introduction

- Laying hens in Canada are in the process of moving to **enriched housing** rather than conventional cages. Enriched housing allows laying hens to exhibit a wider range of **natural behaviours** compared to conventional housing by providing hens with enrichments such as **perches**.
- In order to **improve hen welfare**, a catalogue of different behaviour types called an **ethogram** can be analyzed. For example, the quality of enrichment types and their effect on laying hen welfare in enriched cages can be determined by whether hens display a **variety of natural behaviours**.
- Activity time budget**: the total time in which a specific behaviour is exhibited as a percentage of the total time of observation (Hansen, 1994).
- Activity time budgets are an indicator of the degree to which natural behaviours are being exhibited by laying hens. They can also be used to look for behavioural differences between different **genetic strains** of hens.

Problem

- Within the scientific literature, no studies have reported a full 24-hour activity time budget for laying hens in enriched cages using **instantaneous scan sampling** on a 5-min sample interval.
- Furthermore, a 24-hour activity time budget has not been constructed for Lohmann White and Lohmann Brown laying hens housed in enriched cages with different **perch shapes**.
- Nor has there been published data on the effect of the **light phases** on the activity time budget of Lohmann Whites and Lohmann Browns.

Purpose

- One objective of this study was to create a **24-hour activity time budget** for Lohmann Brown and Lohmann White laying hen strains reared with 2 perch shapes in enriched housing.
- Another objective of this study was to determine the effect of **light phases** on laying hen behaviour.
- The results of this study will help identify **furnishing features** to use when designing enriched housing for laying hens as well as which **strain** of laying hen is best suited to being housed in enriched environments.

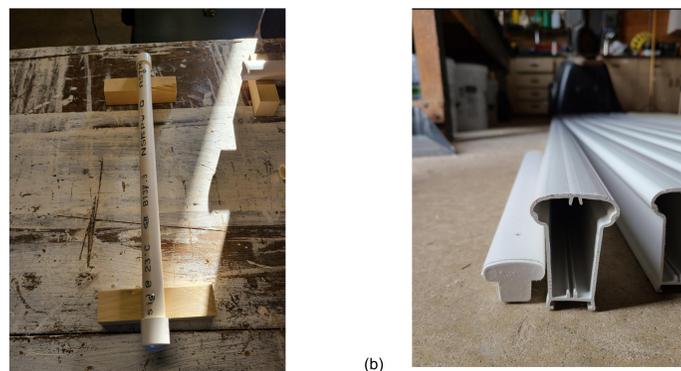


Figure 1: examples of round (a) and ovoidal (b) perches. Depaoli et al. (unpublished data)

Methods/Materials

- A total of 41 laying hens at 25 weeks of age were studied using a **2x2 factorial design** in which laying hen strain (Lohmann White and Lohmann Brown) was compared to 2 perch shapes (ovoidal and round) for **effect on behaviour**.
- Cage was used as the experimental unit with 1 cage per strain by perch shape treatment as a preliminary study. An average of 10 birds resided in each cage.
- The study was conducted at the University of Alberta Poultry Unit on South Campus.
- Cabela's No-Glow Gen 3 20MP Trail Camera Combos recorded images per cage using instantaneous scan sampling on a **5-min sampling interval over 24 hours**.
- Images were coded using the **ethogram** noted in Table 1.
- Data were recorded as the number of birds in each cage performing each behaviour at each sample point.

Methods (Cont'd)

Table 1: Ethogram of the behaviour categories studied in this experiment

Behaviour categories*	Description
Feeding	Eating food from one of the feed troughs. Head is bent over the food trough. (Birds at the trough are assumed to be feeding even if head is out of frame if posture is congruent with other feeding birds.) If head is not in trough and posture is not down, coded as standing.
Drinking	Bird is by the water dispenser and the beak is touching or near the dispenser.
On perch	Bird's feet are not on the ground, the bottom of the bird can be seen. (Assumed to be on perch if the centre of gravity of the bird lines up with the perch, even if the whole bird is not visible.) (In the case stated above: perching or standing is determined based on the position of the bird in question in relation to other birds on the perch at that time.)
Standing	Feet are both on the ground with the legs extended. (standing is assumed if the bird is not exhibiting any of the above behaviours.)

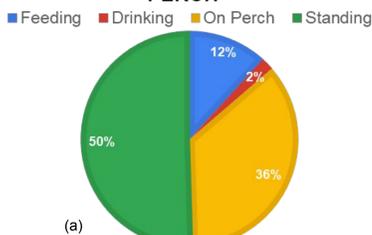
*All behaviours are mutually exclusive
 *If a bird is on a perch and the beak is next to the water dispenser, it will be coded as on perch.

Behaviour on Perch*	Description
Standing on perch	Bird is standing on a perch with feet and legs visible and the keel bone not touching the perch.
Perching on perch	Bird is resting on a perch and its feet and legs are tucked underneath its body. Keel bone is touching the perch.

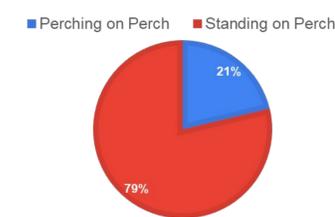
*Mutually exclusive

Results

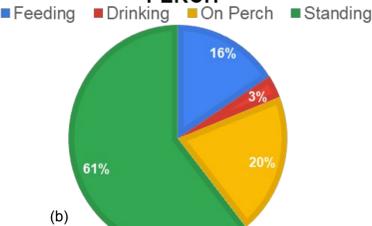
WHITE LOHMANNN WITH OVOIDAL PERCH



WHITE LOHMANNN PERCHING VS. STANDING ON OVOIDAL PERCH



WHITE LOHMANNN WITH ROUND PERCH



WHITE LOHMANNN PERCHING VS. STANDING ON ROUND PERCH

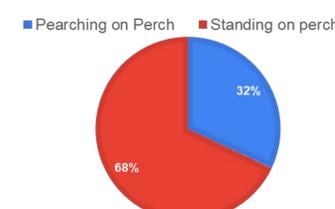
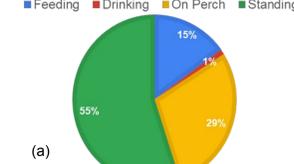


Figure 2: 24-hour activity time budget of White Lohmann laying hens with 2 different perch shapes. White Lohmanns spent more time on the ovoidal perch compared to the round perch. When on perch, they preferred to stand regardless of perch type. White Lohmanns with the round perch spent more time standing compared to those with an ovoidal perch and more time perching on perch than those with an ovoidal perch.

Results (Cont'd)

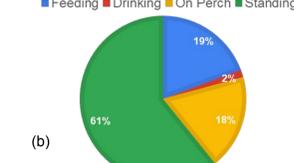
BROWN LOHMANNN WITH OVOIDAL PERCH



BROWN LOHMANNN PERCHING VS. STANDING ON OVOIDAL PERCH



BROWN LOHMANNN WITH ROUND PERCH



BROWN LOHMANNN PERCHING VS. STANDING ON ROUND PERCH

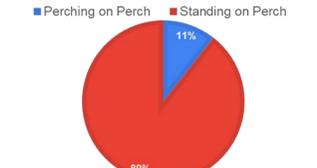


Figure 3: 24-hour activity time budget of Brown Lohmann laying hens with 2 different perch shapes. Within Brown Lohmanns, more time was spent on the ovoidal perch compared to the round perch. When on perch, hens divided their time the same on both the ovoidal and round perch. Brown hens with round perches drank 2x more than brown hens with ovoidal perches.

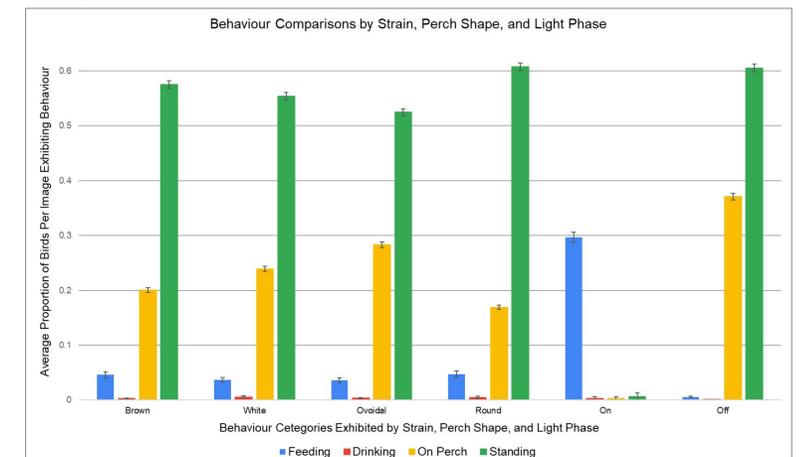


Figure 4: Average proportion of behaviours exhibited over 24 hours by strain (Feeding p<0.001; Drinking p<0.001; On Perch p<0.0001; Standing p<0.05), perch shape (Feeding p<0.0001; Drinking p<0.05; On Perch p<0.0001; Standing p<0.0001), and light phase (Feeding p<0.0001; Drinking p<0.0001; On Perch p<0.0001; Standing p<0.0001). Standing behaviour was exhibited at the highest proportion in both strain and perch shape. On average, brown hens stood more than white hens while white hens perched more than brown hens. When lights were on, feeding behaviour was exhibited most whereas perching and standing were of the majority when lights were off.

Conclusion and Discussion

- Overall, **ovoidal perches** were utilized more regardless of strain. It is speculated that this is because ovoidal perches allowed for **increased comfort** and **better balance**. More research will be required to verify these results.
- Although both strains displayed perching behaviour, White Lohmann hens with an ovoidal perch displayed this behaviour to a greater degree. Preliminarily, these data would suggest that **White Lohmann hens** housed in enriched cages with **ovoidal perches** will display more perching behaviour therefore **improving their welfare**. Further research is required to verify these results.
- The greater proportion of perching behaviour in White Lohmann hens is speculated to be caused by their **smaller size**. A greater number of smaller birds can fit on a perch, allowing more to exhibit perching behaviour.
- Creating a **24-hour activity time budget** allowed the effects of light phases to be observed. Approximately 30% of hens were at the feeder when lights were on compared to 0.57% when lights were off, preliminarily indicating that hen feeding behaviour is **photosensitive**.

Literature Cited

I. Hansen (1994) Behavioural expression of laying hens in aviaries and cages: Frequencies, time budgets and facility utilisation, British Poultry Science. <https://doi.org/10.1080/00071669408417715>

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