

The effect of LED flicker on the welfare, health, and production of table egg production pullets reared to 16 weeks

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Light Flicker

- Flicker occurs when there are changes to the voltage and causes quick, repeated changes to the light intensity (Brundrett 1974; Prescott et al. 2003)
- Flicker fusion frequency (FFF) is the boundary between an observer seeing the flicker or seeing a continuous stream of light (Brundrett 1974; Prescott et al. 2003)

Flicker and Hens

- Hens cannot consciously perceive a flicker frequency above 90 Hz (Lisney et al. 2012)
- But hens can unconsciously perceive flicker up to 118-119 Hz (Nuboer et al. 1991; Lisney et al. 2012)
 - This is termed invisible flicker



Previous Research

- Previous research has primarily used fluorescent lights and European starlings
 - Hen and European starling preference tests (Widowski and Duncan 1996; Greenwood et al. 2004)
 - Broiler behaviour (Boshouwers and Nicaise 1992)
 - European starling behaviour (Evans et al. 2012)
 - European starling stress (Maddocks et al. 2001; Greenwood et al. 2004; Evans et al. 2012)
- Results are conflicting



Image: <https://www.allaboutbirds.org>

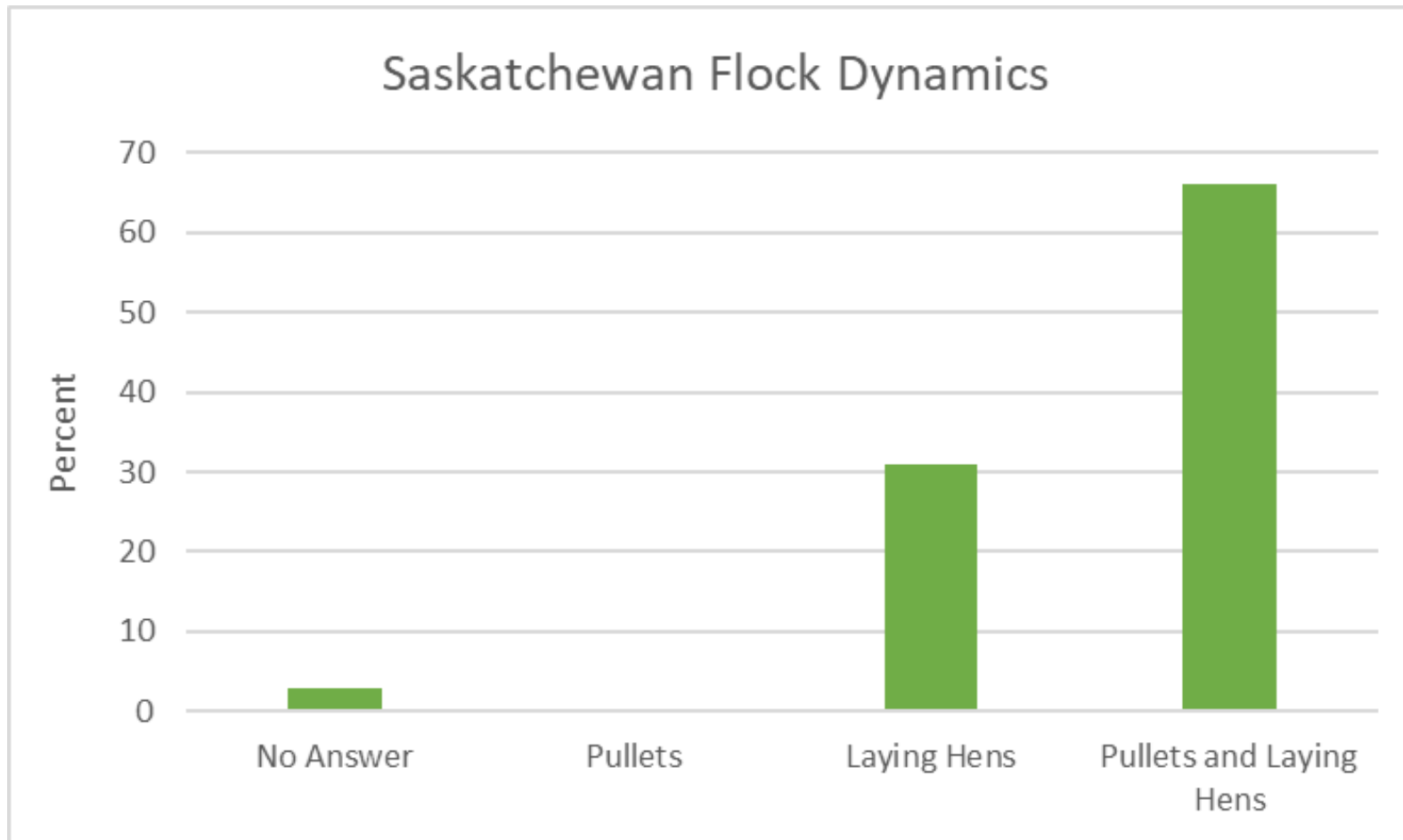
Lighting Survey - Objectives

- Collect information about the lights that are used by Saskatchewan table egg and pullet producers
- Understand how frequently light flicker is observed in barns

Lighting Survey – Materials and Methods

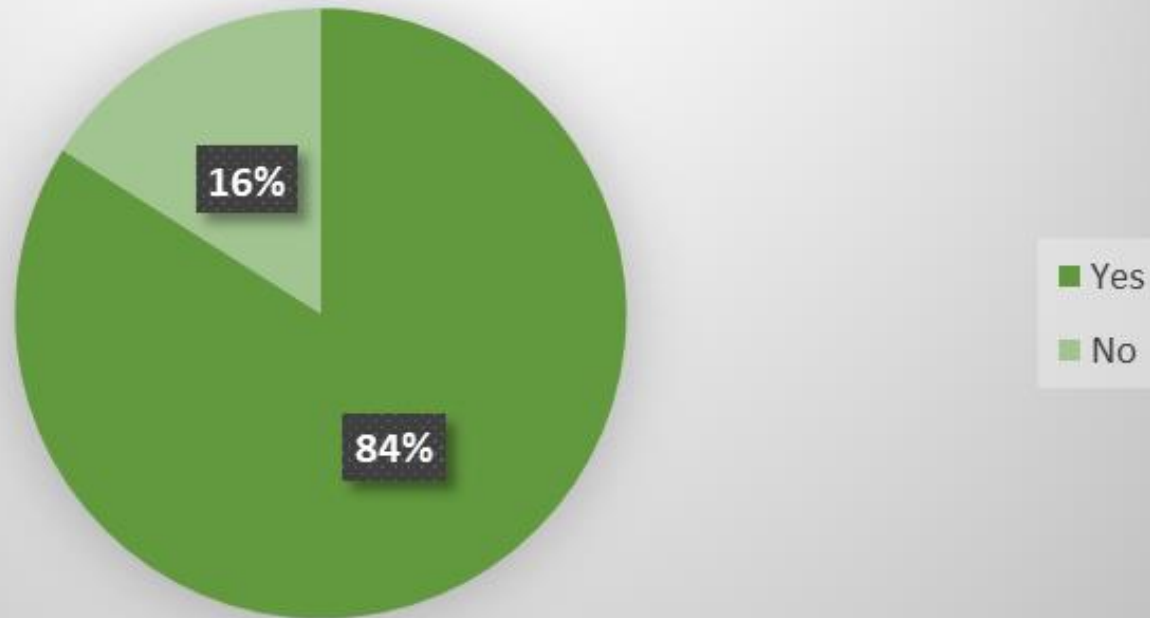
- Survey with 12 questions was distributed at the Saskatchewan Egg Producers Annual General Meeting (2022)
- Survey was given to 55 producers with a completion rate of 58%

Lighting Survey – Results



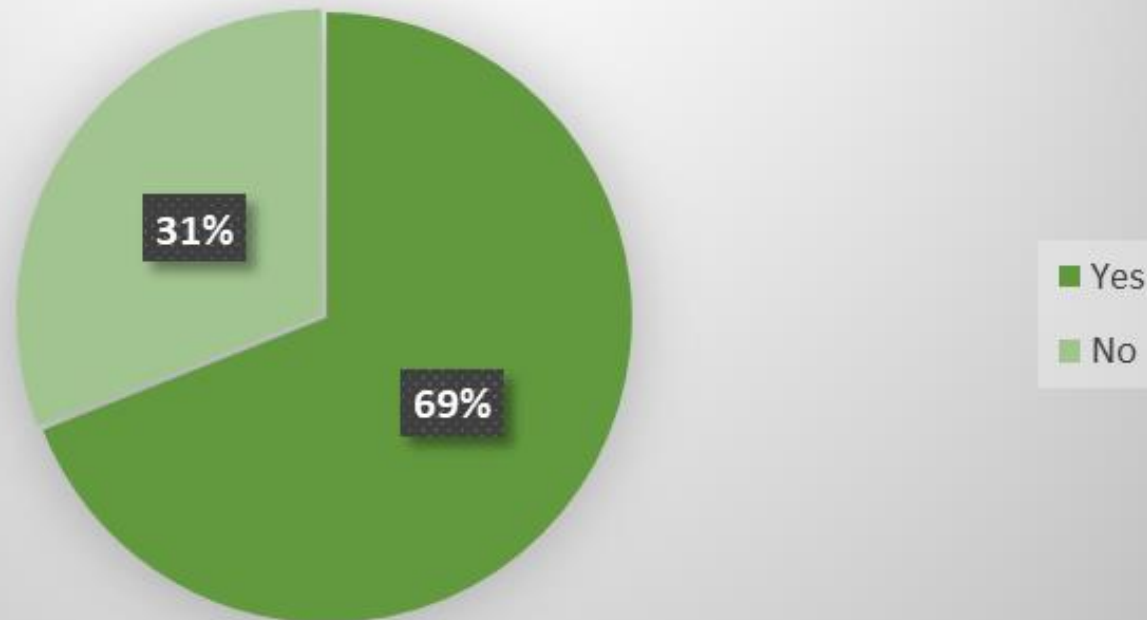
Lighting Survey – Results

Percent of Producers Who Had Heard
of Light Flicker

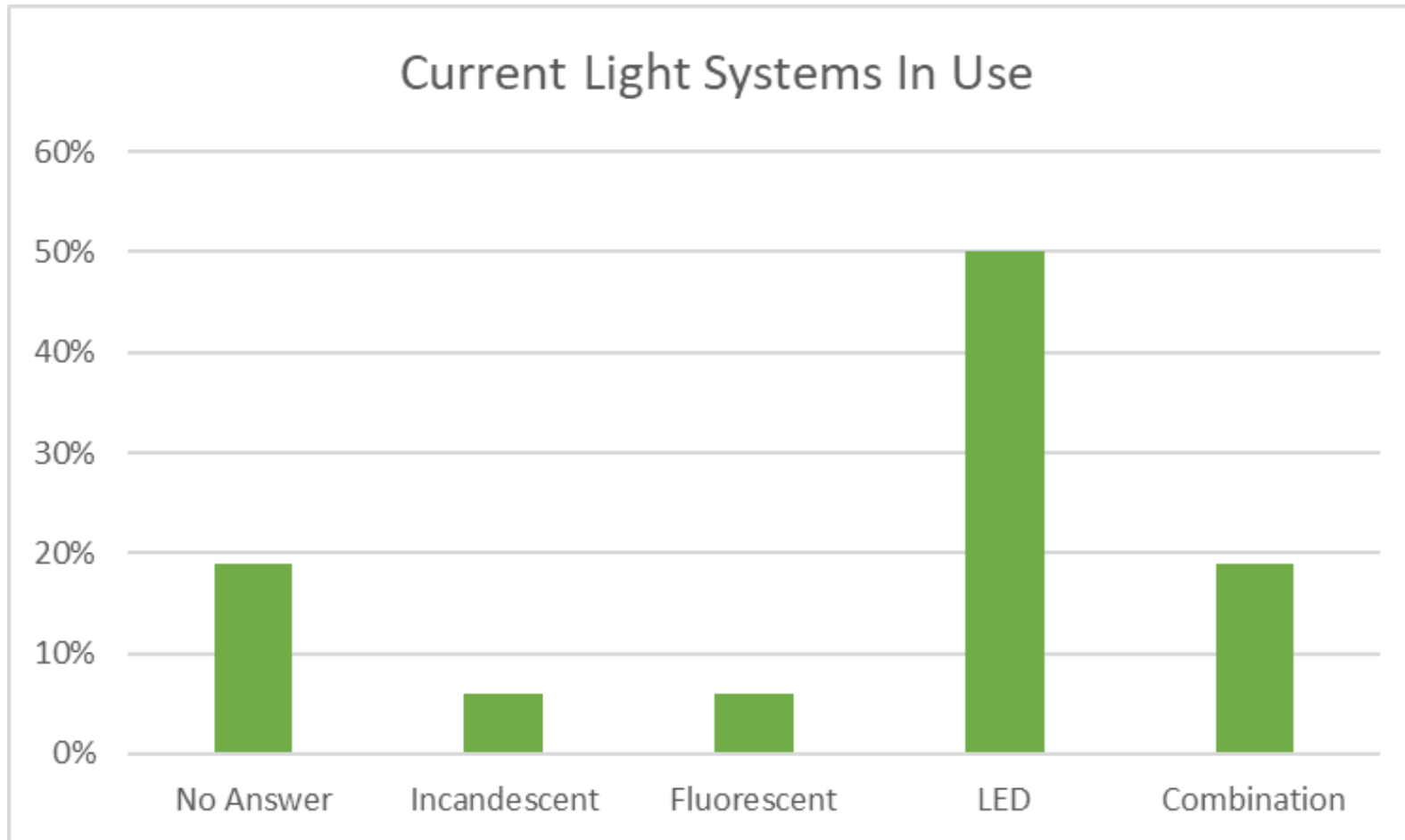


Lighting Survey – Results

Percent of Producers Who Noted
Light Flicker in Their Operation



Lighting Survey – Results



Research Objective

To determine the impact of flickering LED lights on table egg production pullet welfare, health, and production to 16-weeks of age.

Materials and Methods - Treatments

Two trials: May-August 2021 and 2022

Two Lohmann strains:

- LSL-Lite (LW)
- Brown-Lite (LB)

Three flicker frequencies (Hz):

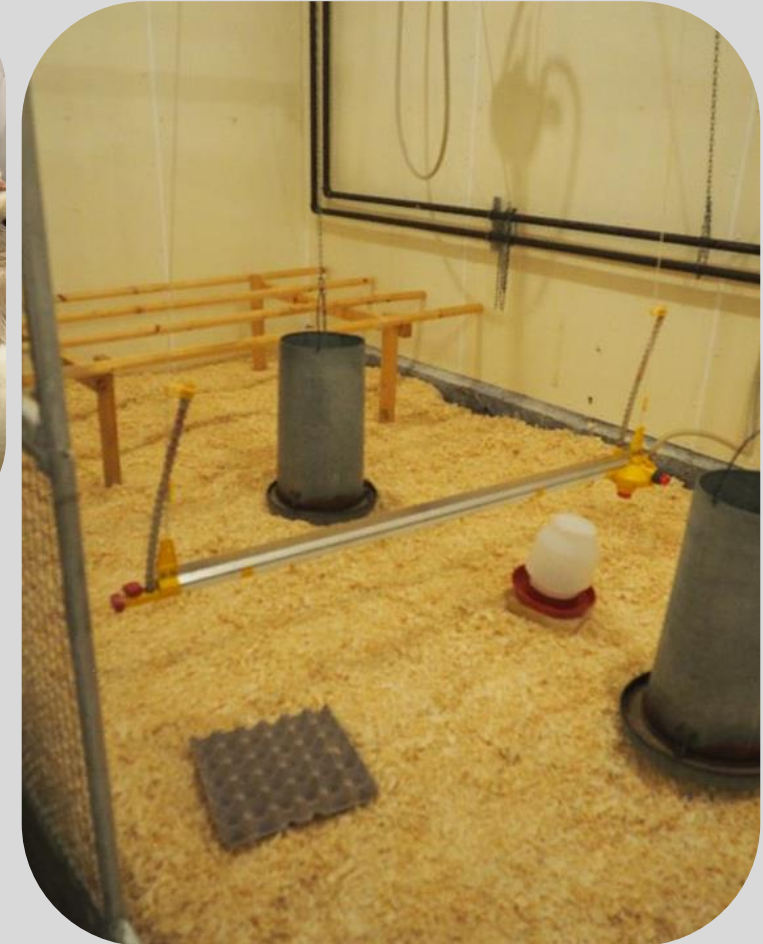
- 30, 90, and 250



Materials and Methods – Animal Husbandry

NFACC 2017; Lohmann Breeders n.d.

- 1,344 LW and 1,344 LB pullets
- 56 birds/pen; stocking density = 6.09 birds/m²
- Pens: 1 perch, 2 tube feeders, 6 nipple drinkers
- Lighting:
 - First week: 22L:2D
 - Week 2-16: 8L:16D
 - 30 lux



Lighting Equipment

- Flicker boxes to control flicker frequency and duty cycle
(Greengage Lighting Ltd., Edinburgh, UK)
- Flicker frequency and light intensity were checked bi-weekly
 - TDS 210 oscilloscope
 - LiFli (light flicker meter)
 - Lighting Passport Spectrometer



Data Collection – Production Parameters

- Body weight
 - 0, 8, and 16 wks
- Uniformity
 - 16 wks
- Feed disappearance – feed weighed throughout trial
- Mortality and culls recorded and necropsied for cause (Prairie Diagnostic Services Inc.)



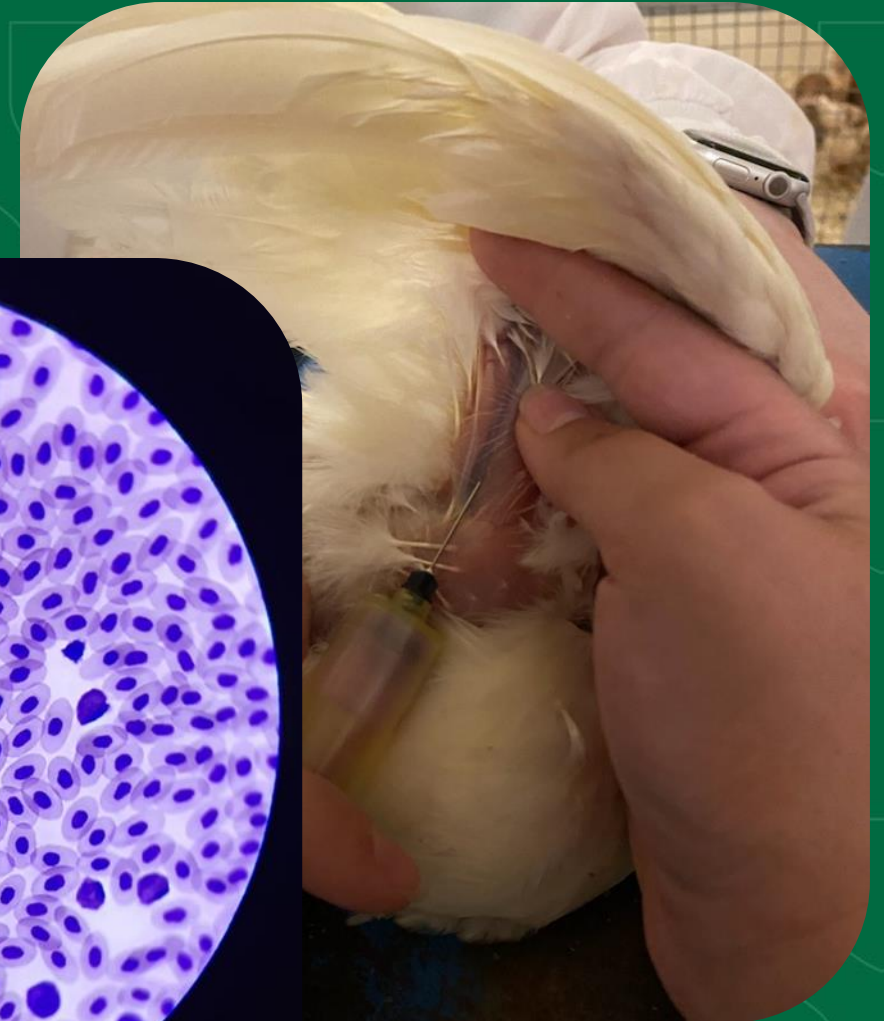
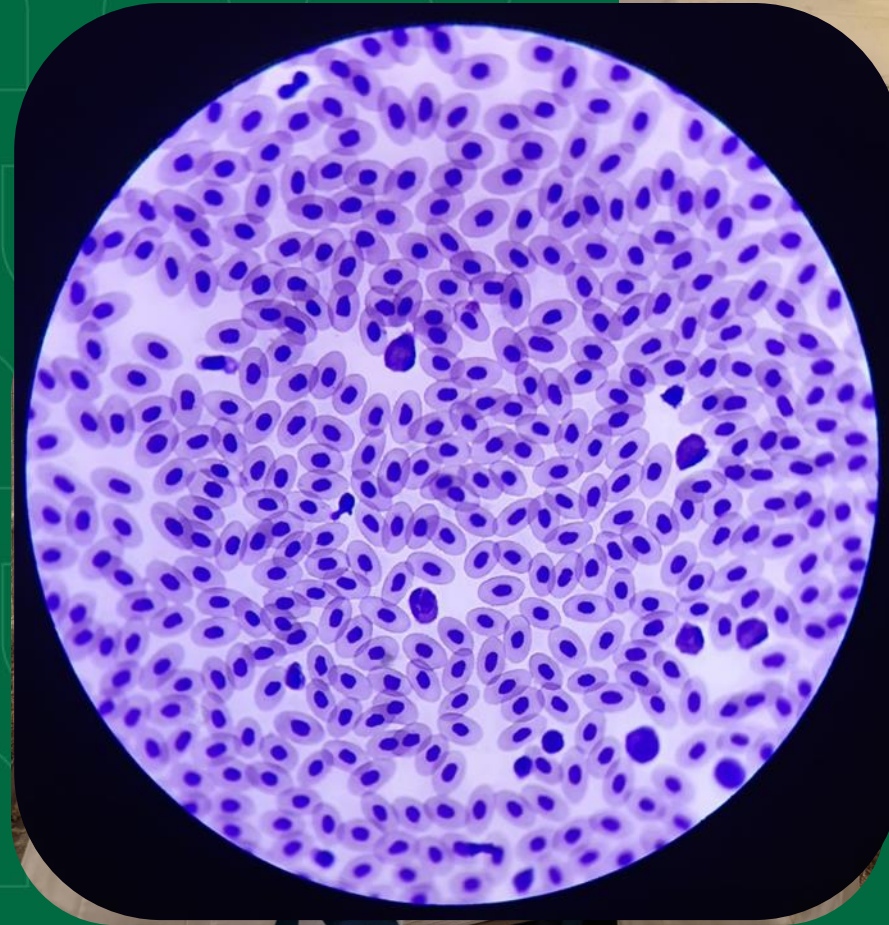
Data Collection - Behaviour

- Behaviour videos (Chew et al. 2021)
 - 4, 8, 12, and 16 wk
 - Active, resting, comfort, nutritive, exploratory, and aggressive behaviours
- Plumage scores (Davami et al. 1987; Sarica et al. 2008)
 - 16 wks
- Comb scores (Ali and Cheng 1985)
 - 16 wks



Data Collection - Stress

- Serum corticosterone (Siegel 1971)
 - 7 wks
- Heterophil to lymphocyte ratio (Gross and Siegel 1983)
 - 7 and 15 wks



Data Collection - Fear

- Novel object test (Forkman et al. 2007)
 - 7 and 15 wks
- Tonic immobility (Jones and Faure 1981)
 - 8 and 16 wks
- Response to observer (Schwean-Lardner et al. 2012)
 - 1, 4, 8, 12, and 16 wks



Results

Results are currently being analyzed



Thank you to the Funders





Thank you!

**Any questions or
comments?**

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