Field Findings of Partial *vs.* Full Litter Access in Aviary Hen Housing

Jofran Oliveira & Hongwei Xin*, Iowa State University
Darrin Eckard & Craig Rowles, Iowa Cage Free, LLP

*Email: hxin@iastate.edu

A presentation at the 2018 EIC Forum

Scottsdale, AZ; April 17-18, 2018

Objectives & Hypotheses

Objectives

1) Assess the effect of daily part-time system door closure
2) Assess the effect of including older hens in young flock

Hypotheses

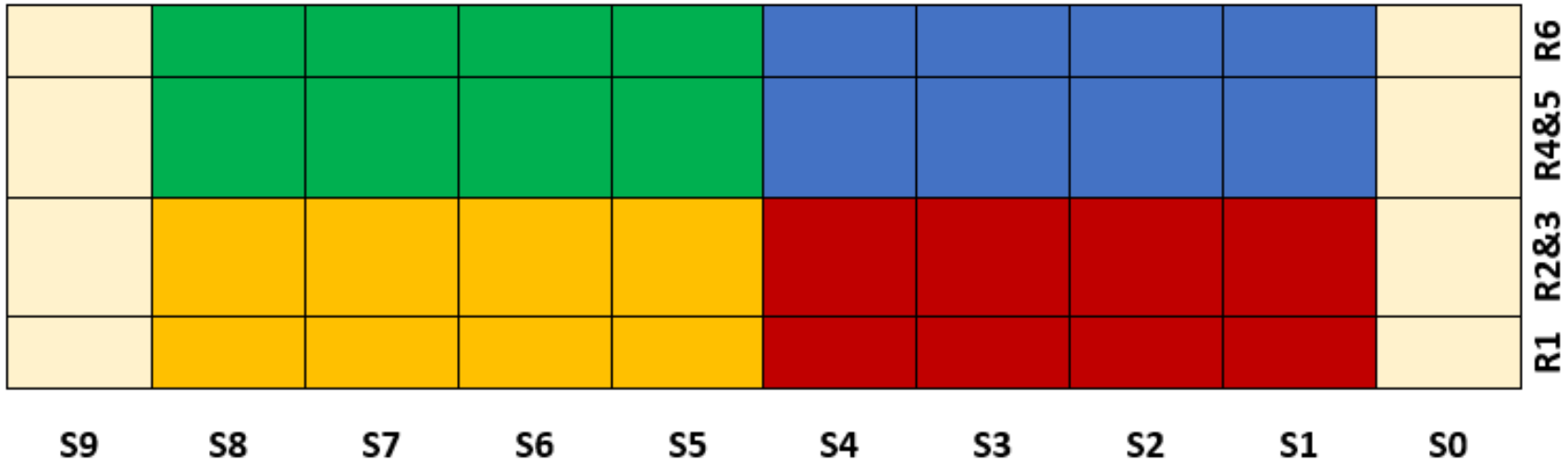
1) Daily part-time door closure (partial litter access, **PLA**) *vs.* constant open door (full litter access, **FLA**) does not compromise hen well-being or performance while conductive to nest-training and floor egg reduction.
2) Introducing older/experienced hens to young flock will “teach” pullets in using nest box, hence reducing floor eggs.

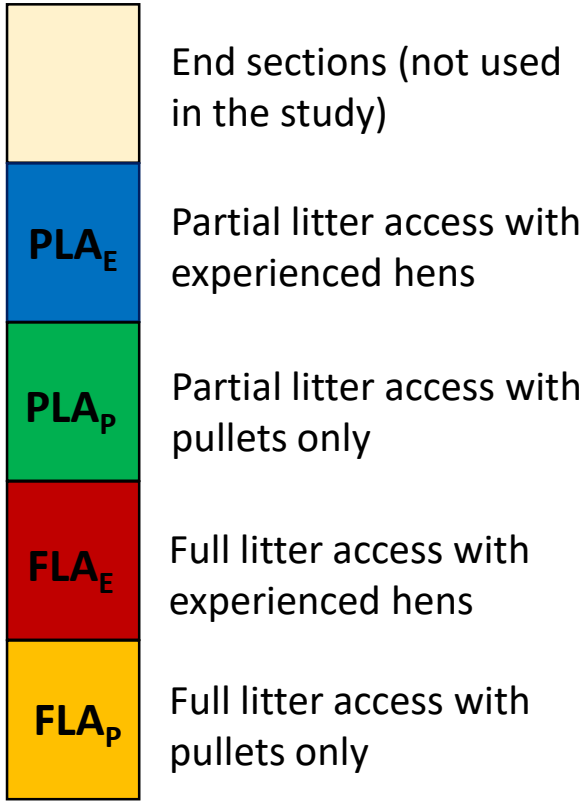
Methodology: *Experiment Design/Layout*

- **2 x 2 factorial = 4 treatments**

  (FLA *vs.* PLA) x (pullets only *vs.* pullets + older hens)

- **8 replicates per treatment**



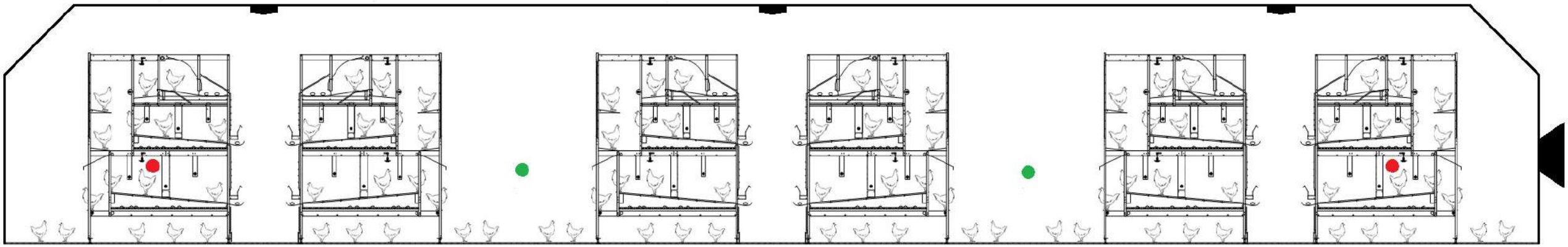


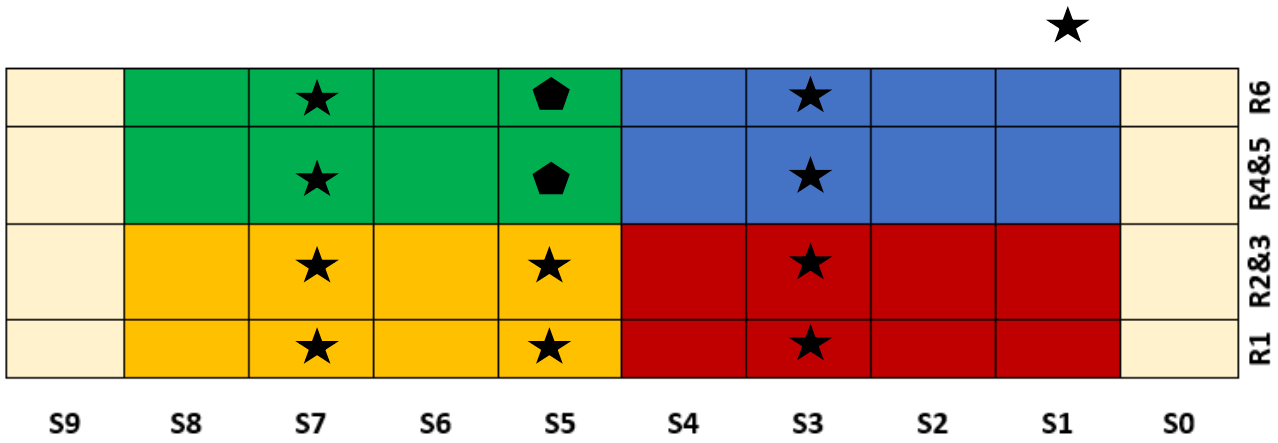
- R = Row, S = Section

Methodology: *Birds & Housing Conditions*

- Breed: Dekalb white, pullets raised in an aviary CF house
- Total initial hens housed: 51,405; 41,136 used in the study
- No. of hens per section: 857 (narrow) or 1,714 (wide)
- Lights-on at 05:00h, lights-off at 21:00h
- PLA: doors open at 10:50 h, closed after dark
- 1.5% 49-wk-old hens (on the same farm) introduced
- Study period: 11/27/16 to 01/24/18 (17 – 76 WoA)

Methodology: *Environmental monitoring*





★ Temperature & RH sensor
⬟ Temperature, RH & CO2 sensor
● Sensors placed in the litter area
● Sensors placed inside the system

Methodology: *Measurements*

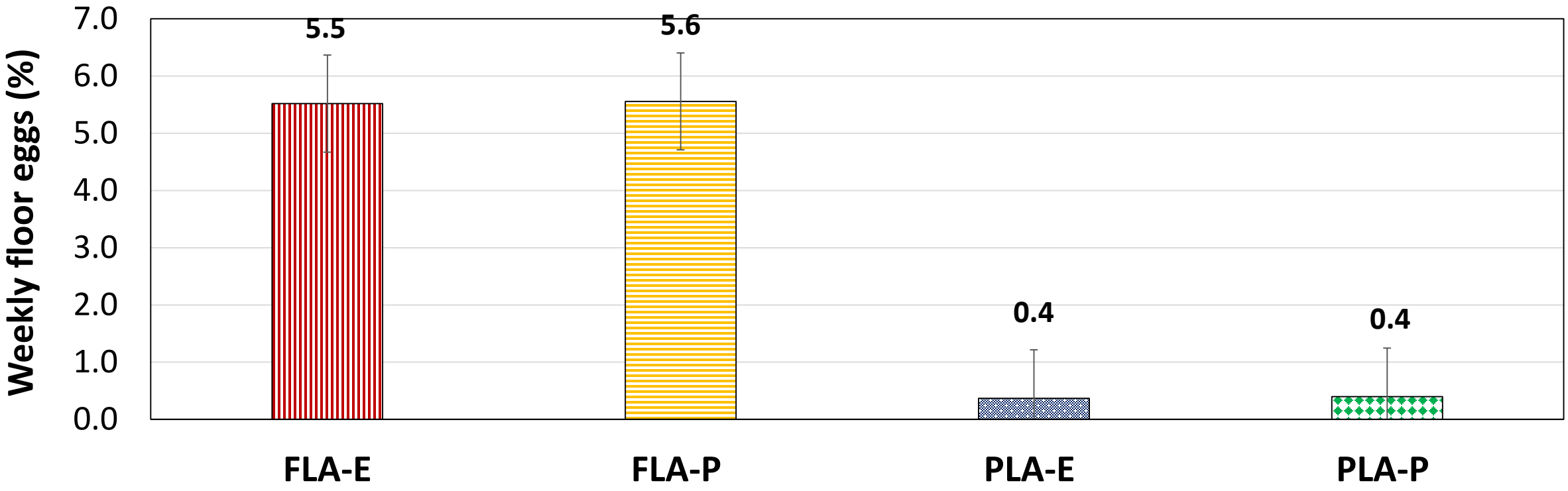
- **Environment**
  - ✓ air temperature, RH, NH_3, CO_2
- **Litter quality and quantity**
  - ✓ Amount on floor, moisture content, caking, bacteria level
- **Production**
  - ✓ Body weight and uniformity
  - ✓ Birds remaining outside the system at night
  - ✓ Floor eggs
  - ✓ Mortality

Methodology: *Measurements (cont'd)*

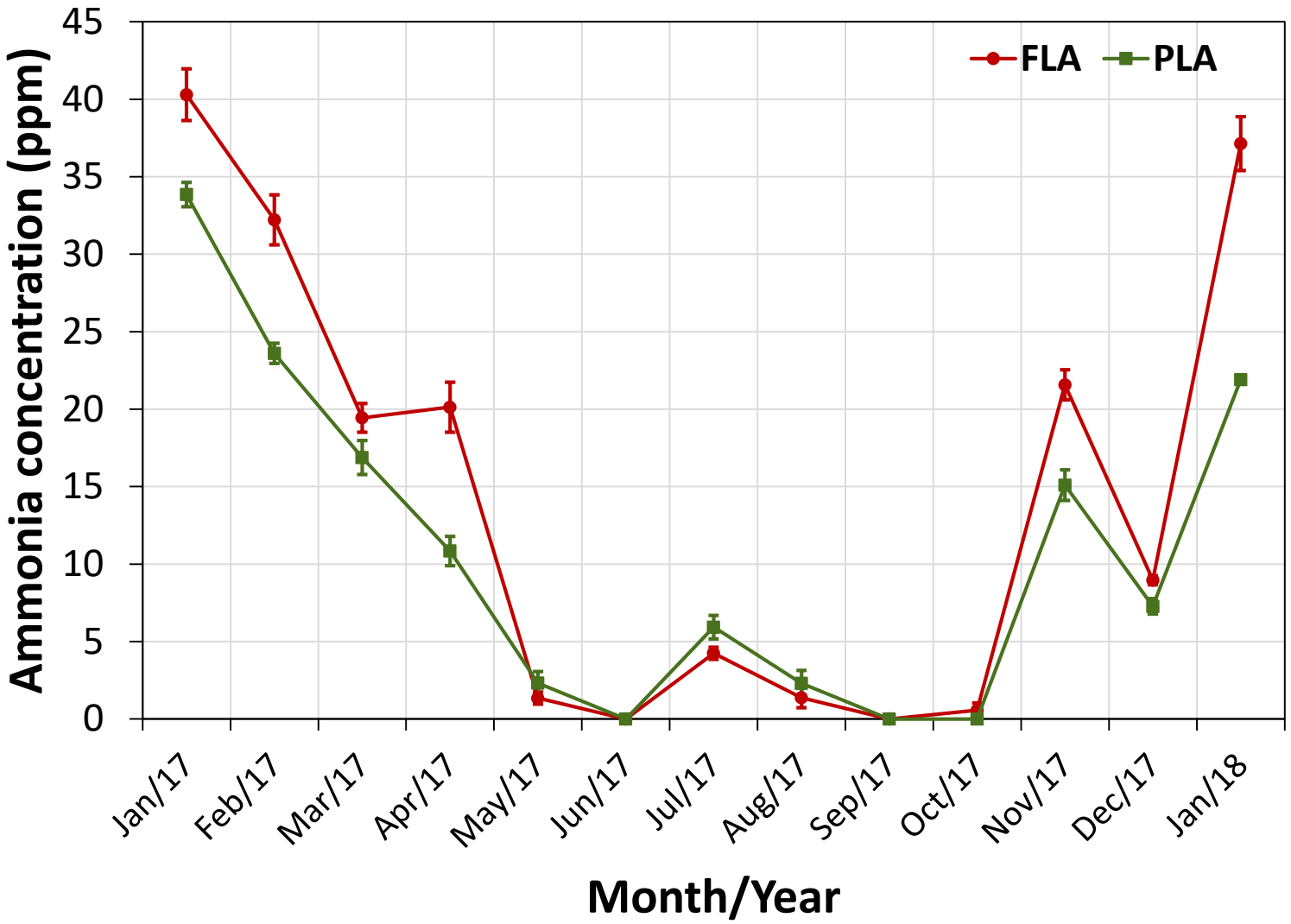
Hen Welfare
Overall Plumage Score (0-14)
Cleanliness (0-3)
Keel deformation (0 or 2)
Comb pecking (0-2)
Comb abnormality (Yes - 1, No - 0)
Foot pad dermatitis (0 or 2)
Claw length (Long-1, Short-0)
Skin lesions (0-2)
Beak trimming (0-2)
Toe damage (Yes-1, No-0)

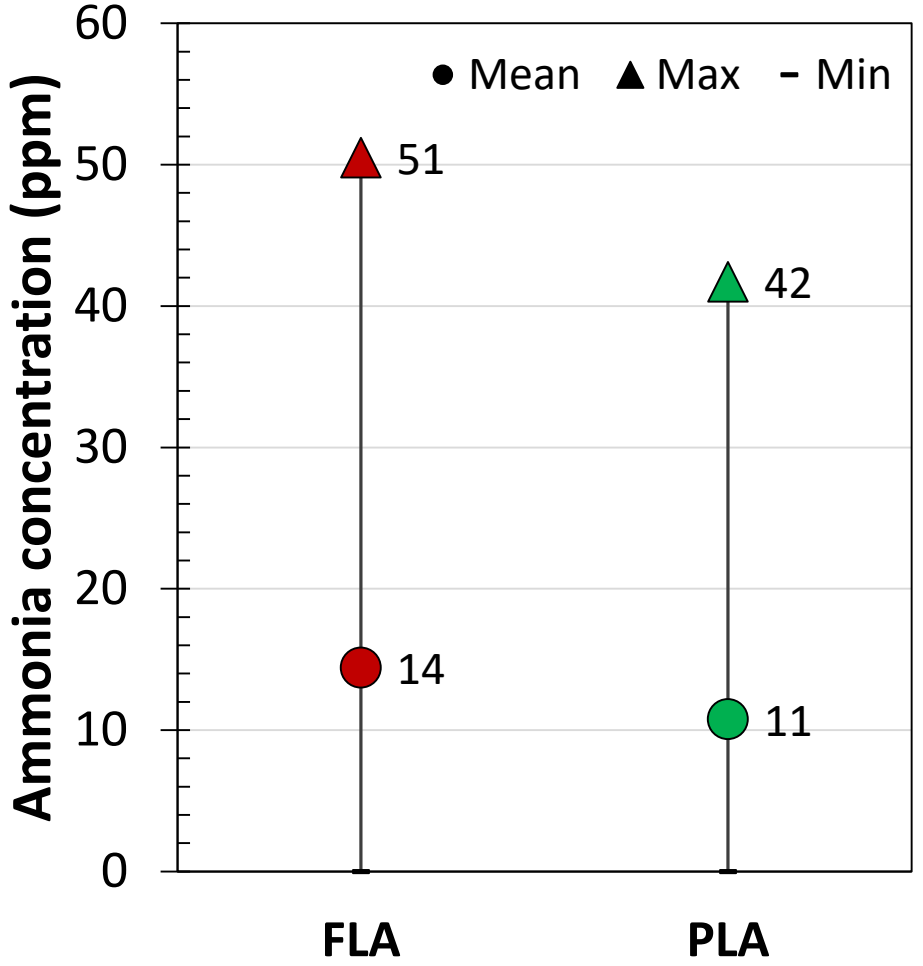
Results: *Effect of Older Hens*

Introducing older hens to the young flock showed no effect on the measured responses.



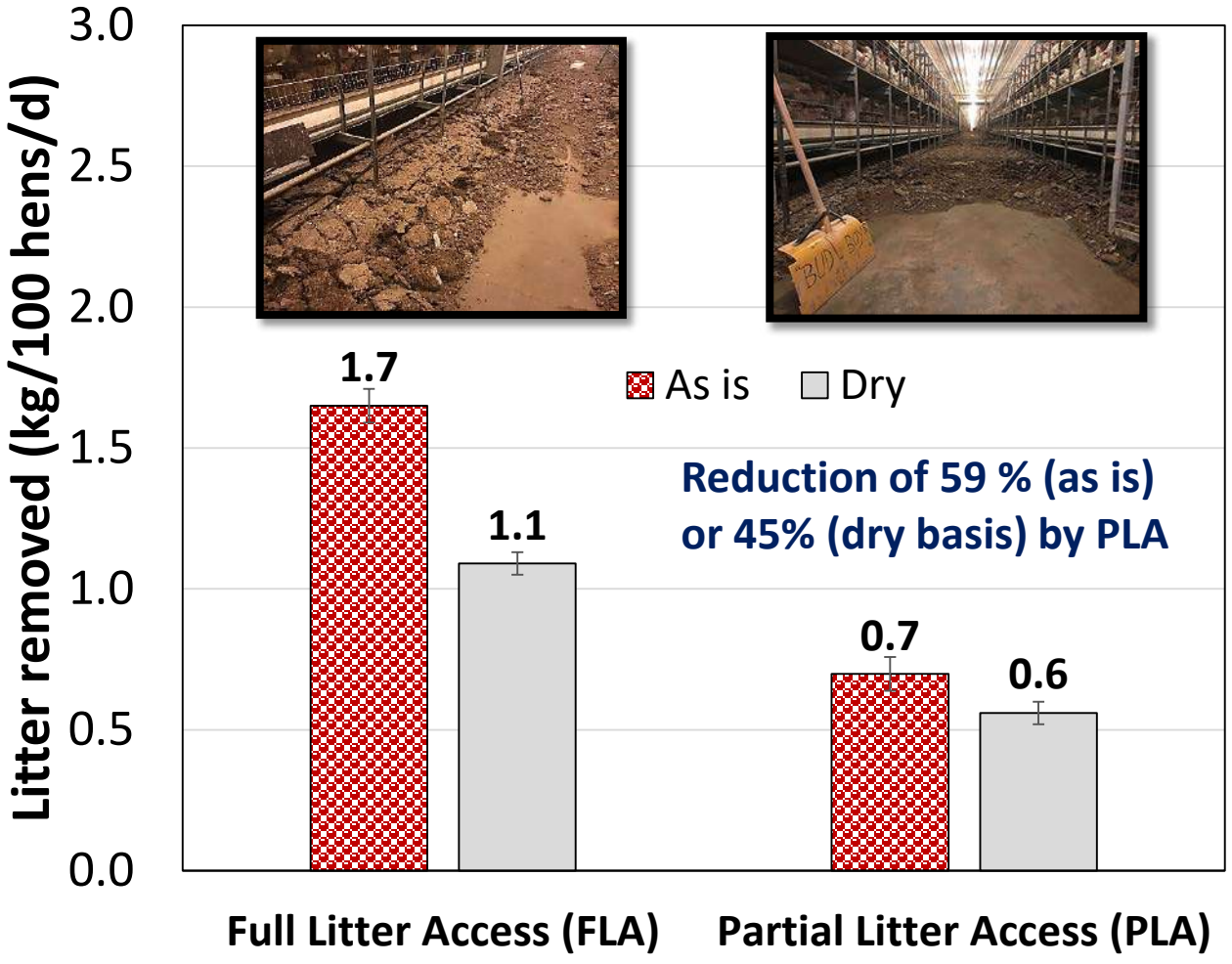
Results: *Ammonia level*



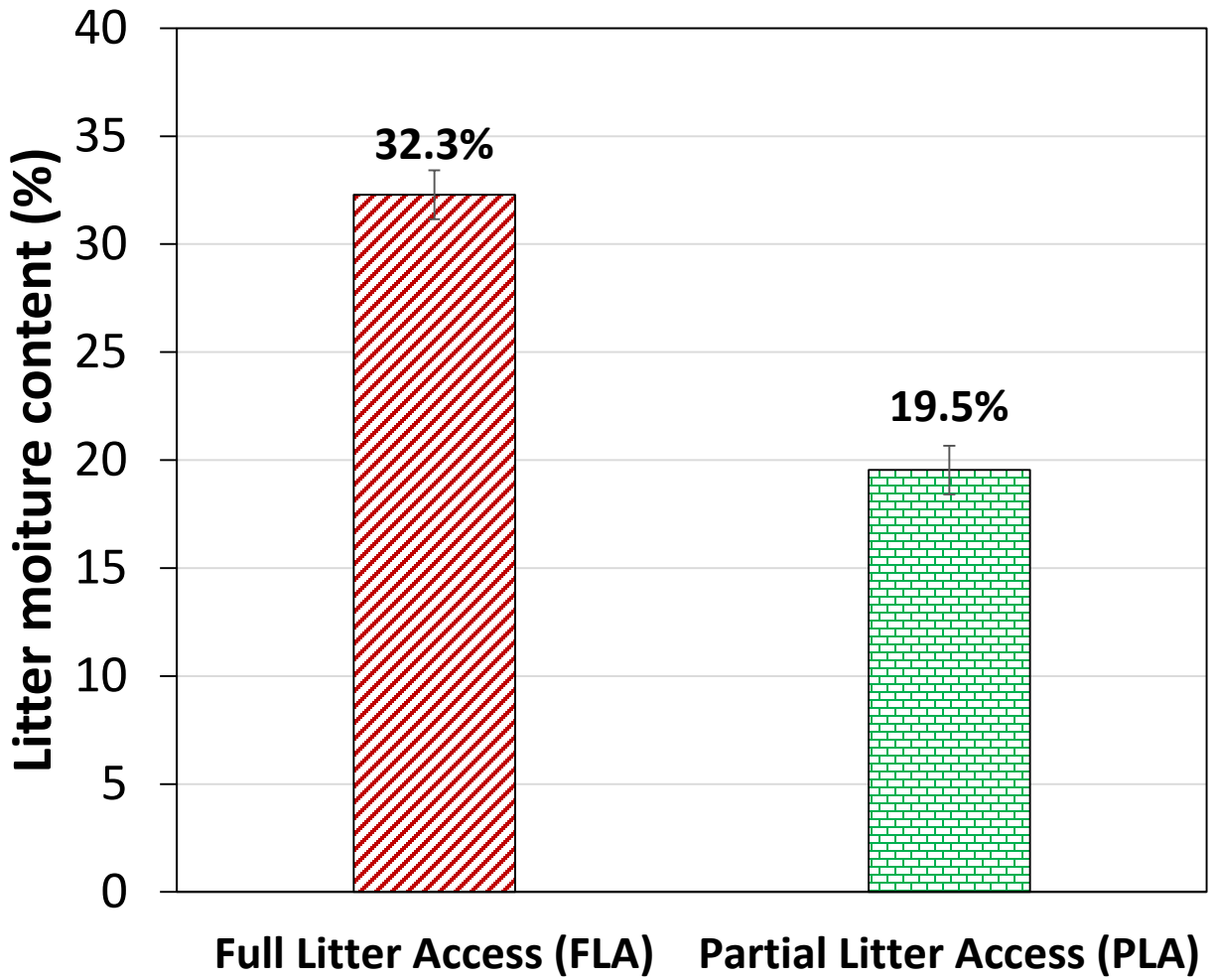


P-value < 0.001

Results: *Litter accumulation on floor and moisture content*

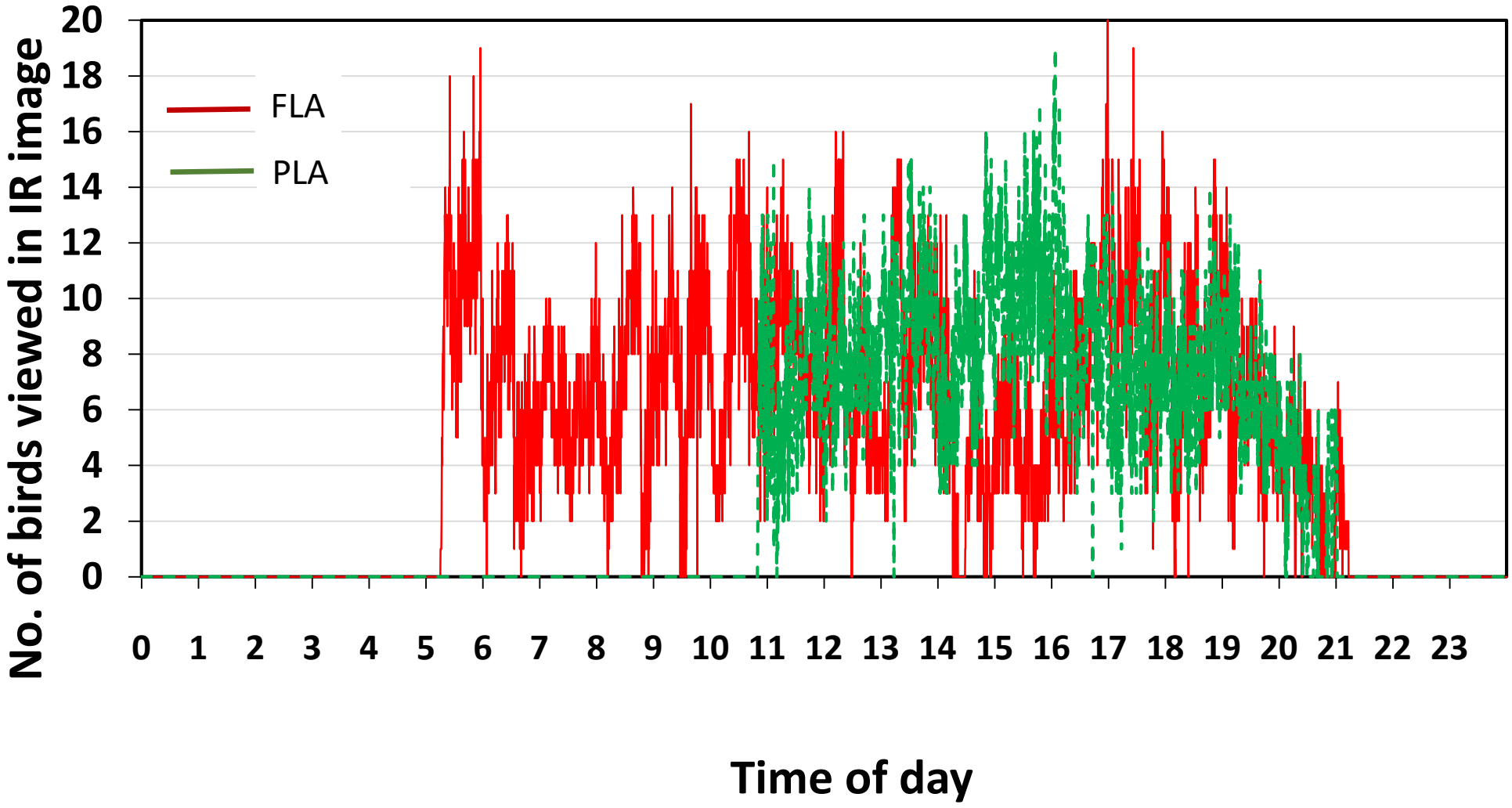


P < 0.0001 (As is) & P < 0.0001 (Dry)

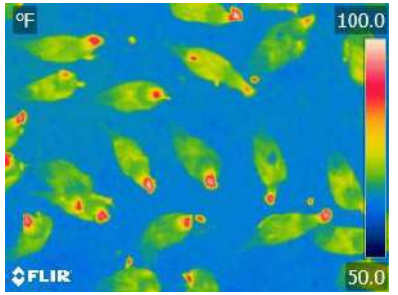


P < 0.0001

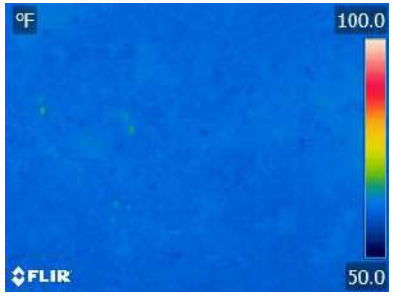
Results: *Litter floor access*



Time: 10:49:45 AM

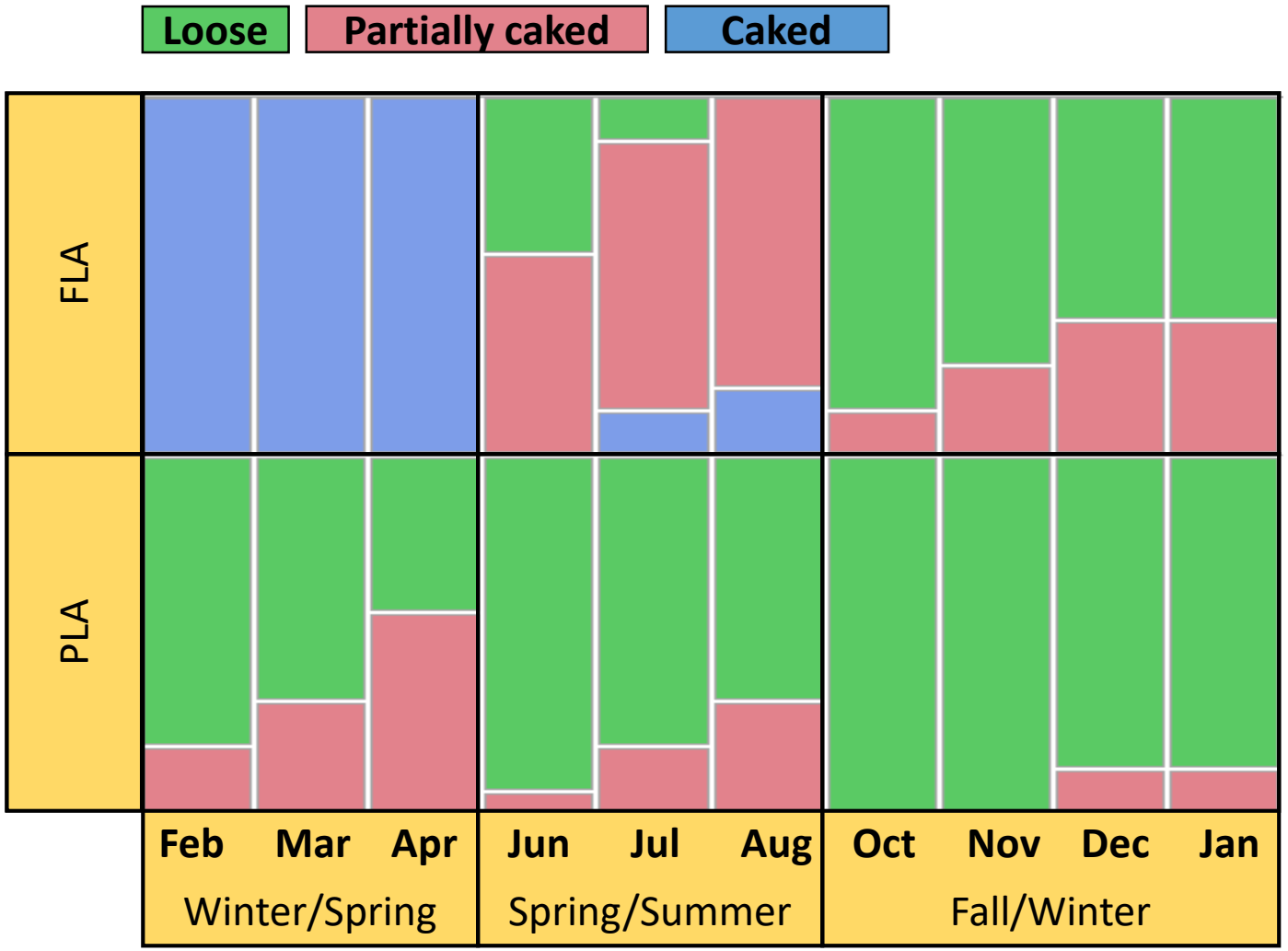


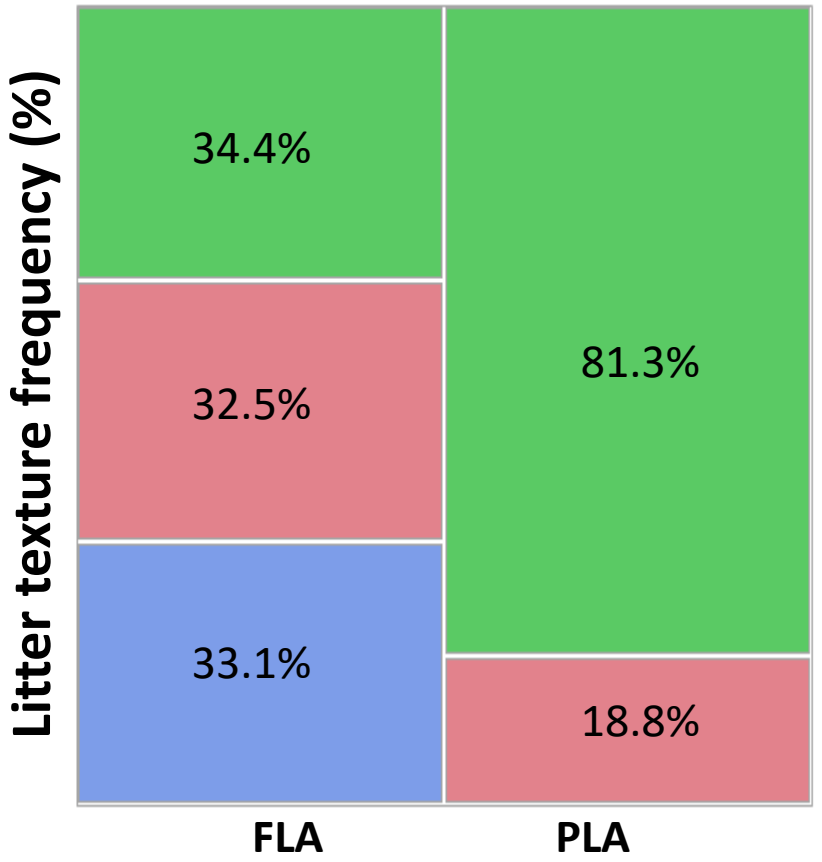
Time: 11:06:00 AM



Time: 09:01:30 PM

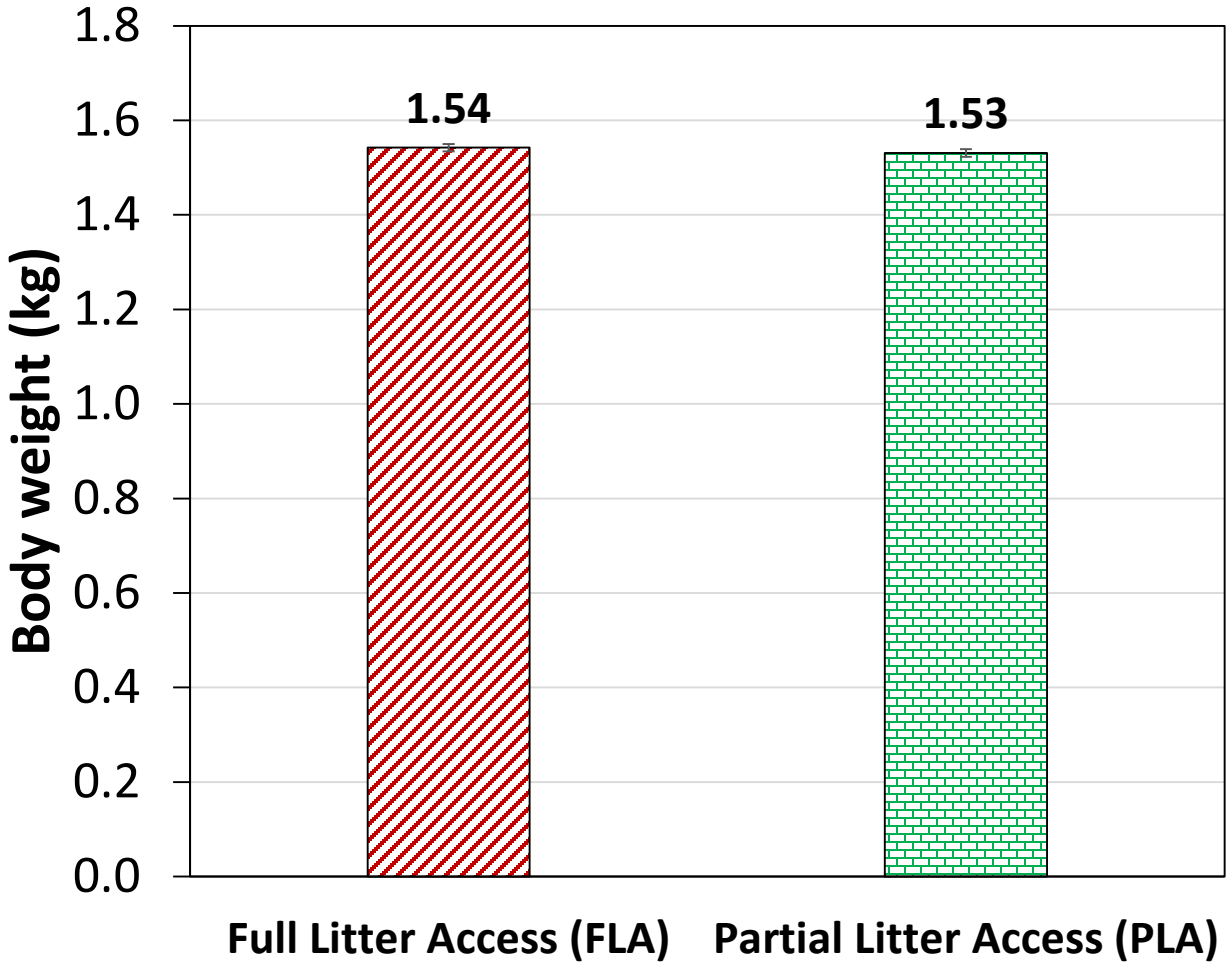
Results: *Litter texture*



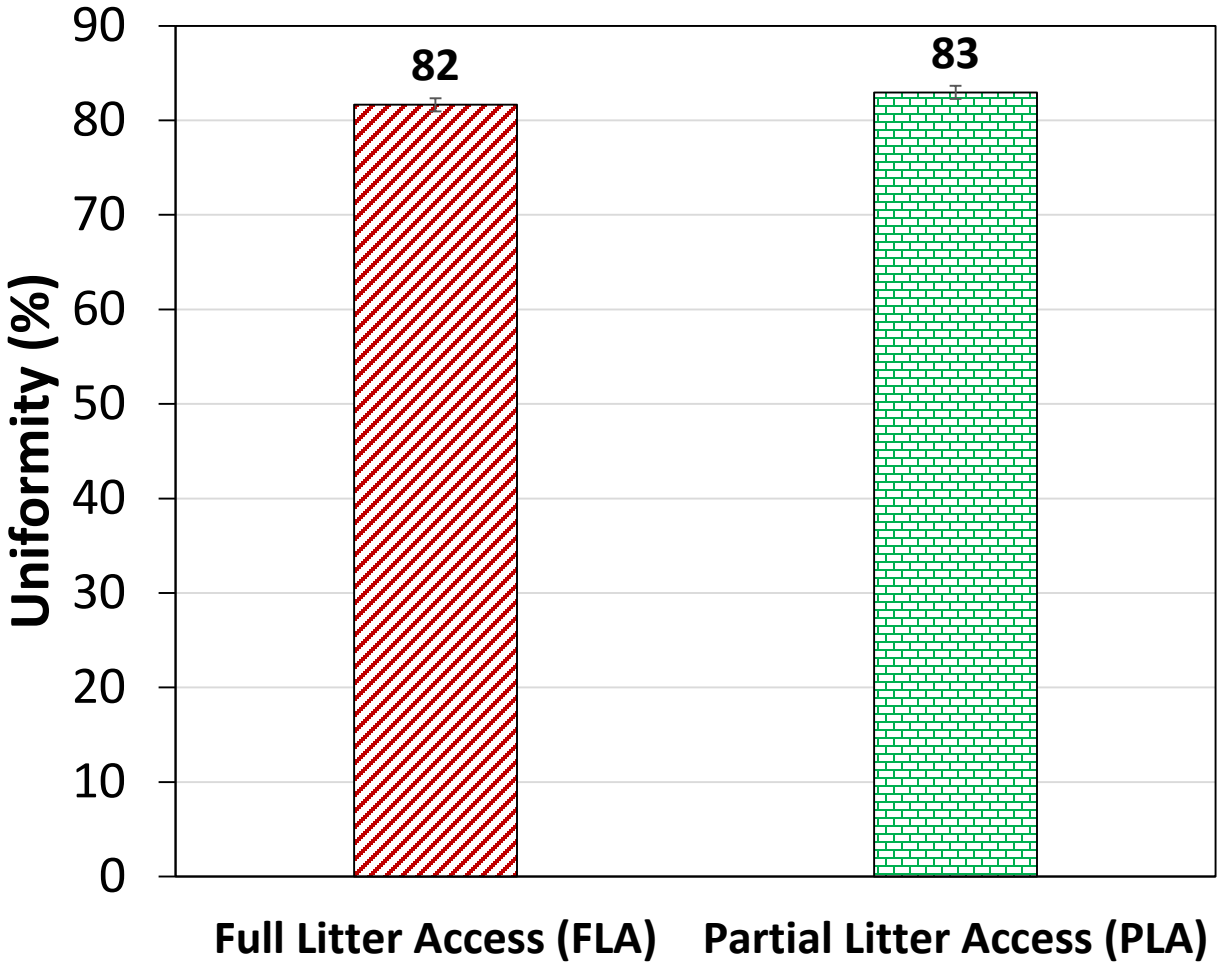


P-value < 0.001

Results: *Body weight & BW uniformity*

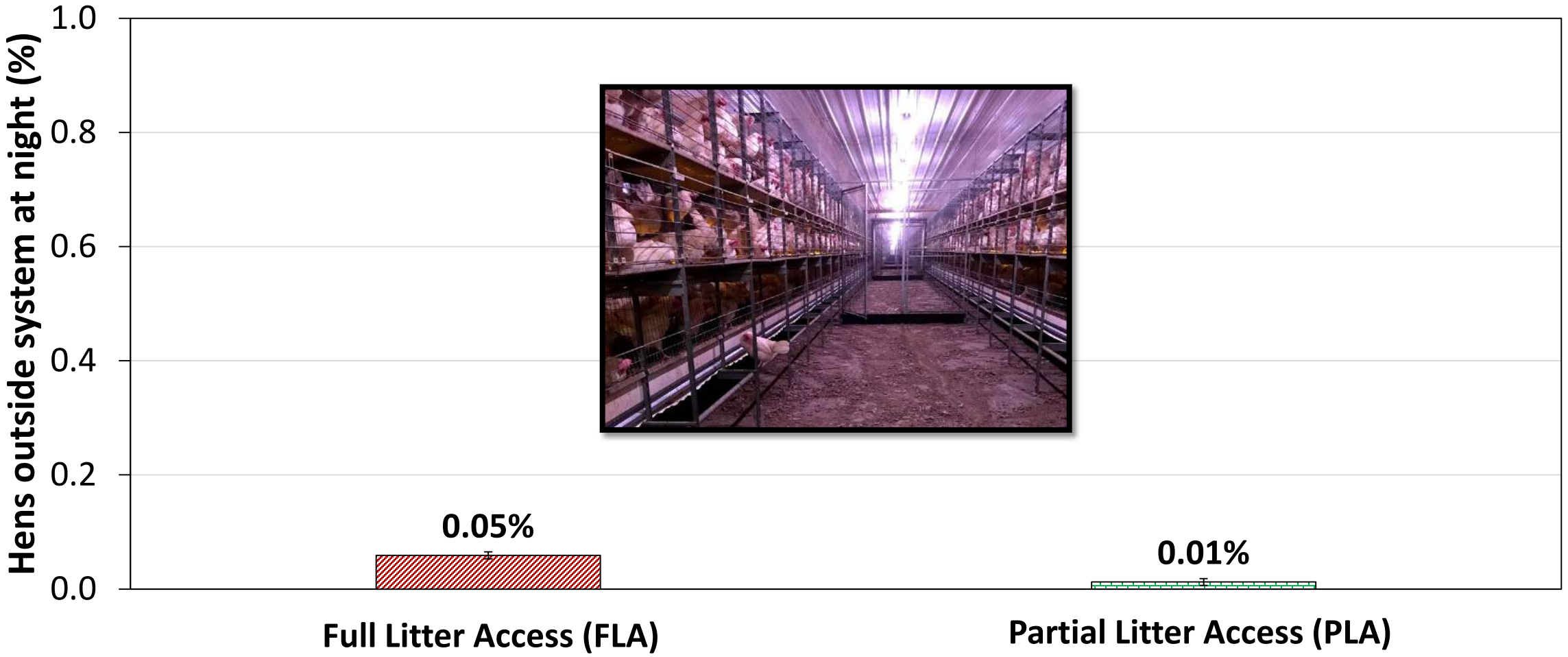


P-value = 0.49



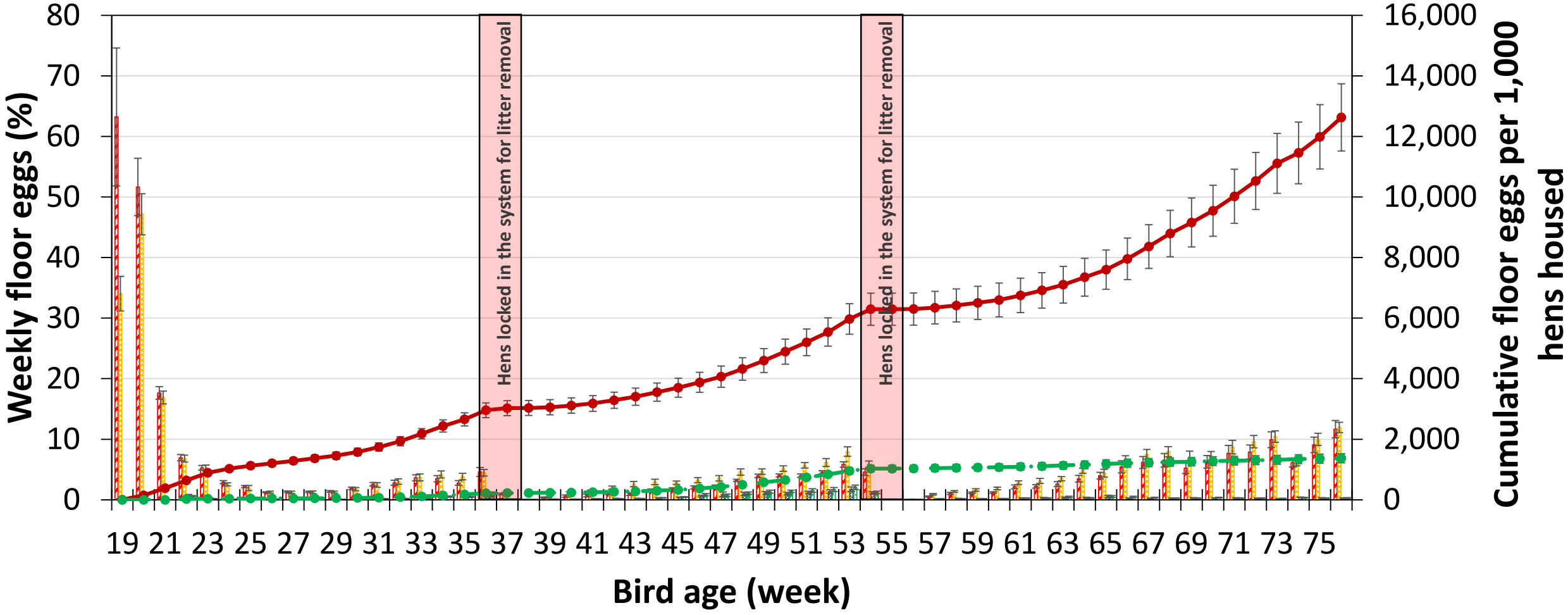
P-value = 0.46

Results: *Hens outside system at night*

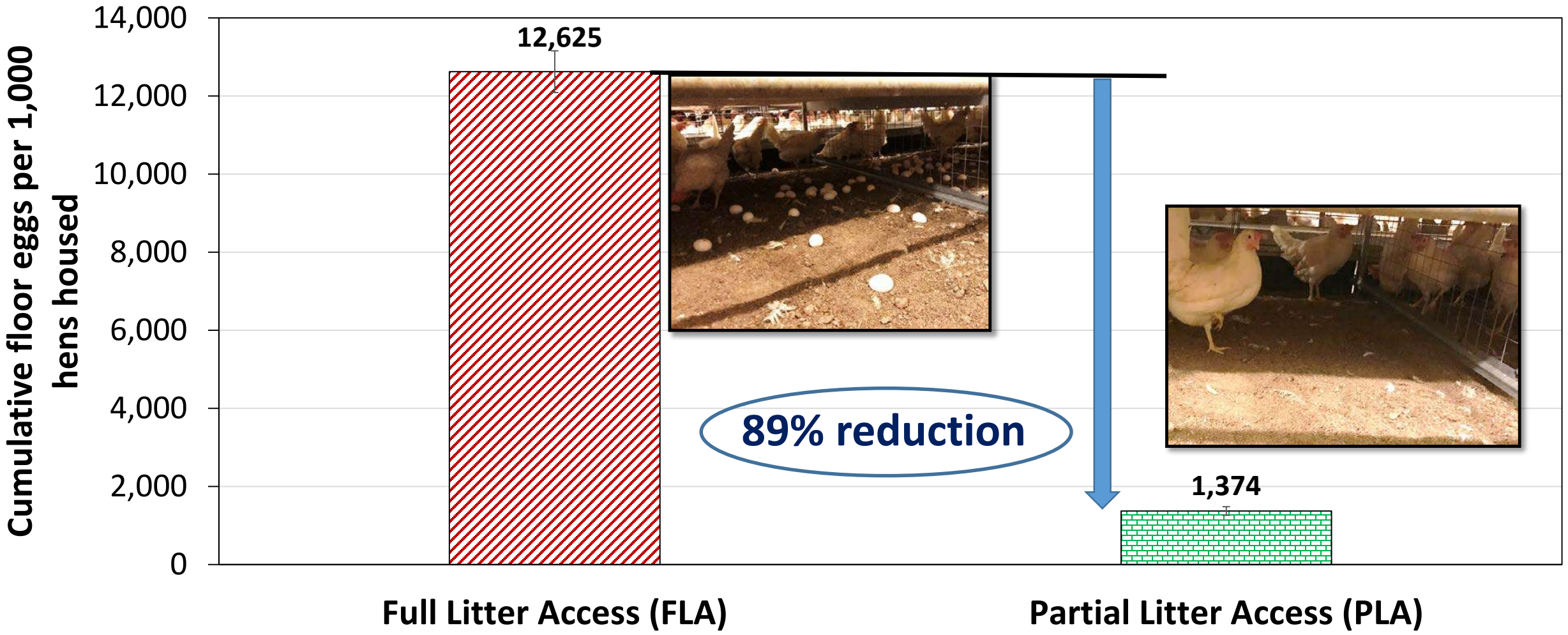


P-value = 0.03

Results: *Floor eggs*

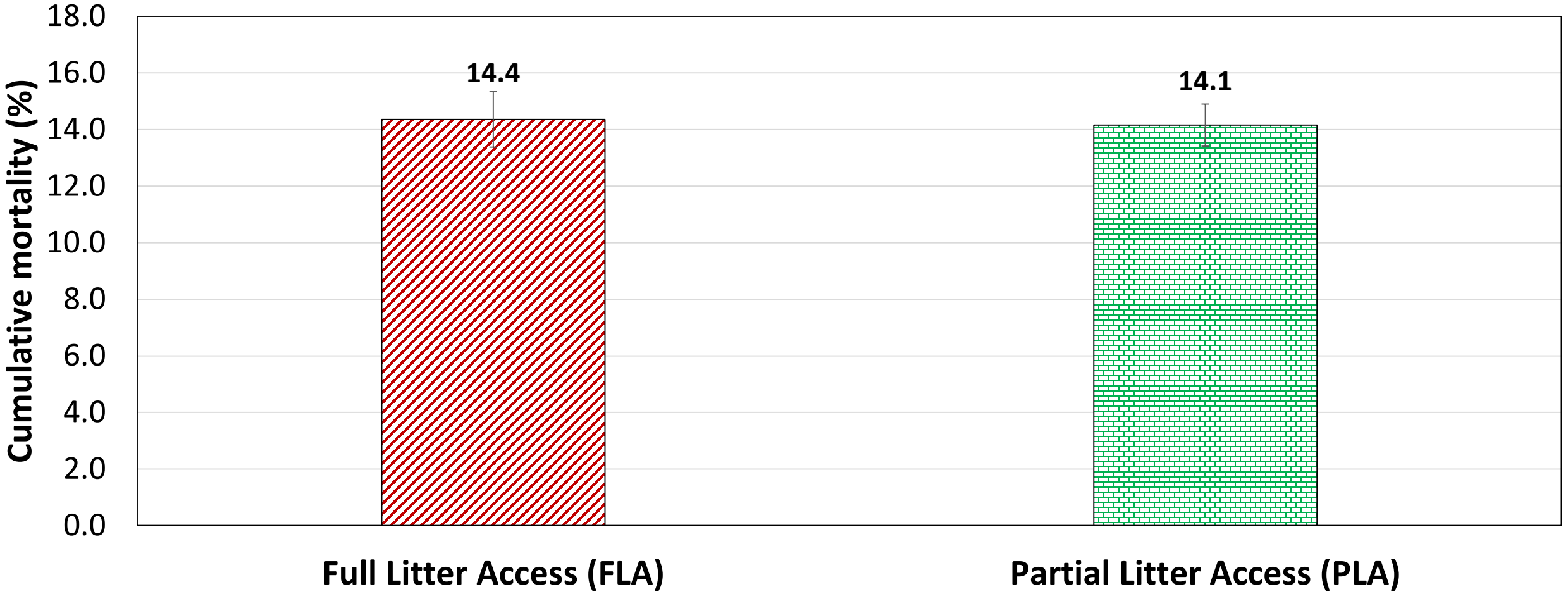


Results: *Floor eggs*



P-value = 0.0012

Results: *Mortality (17 – 76 WoA)*



P-value = 0.50

Results to Date: *Welfare Assessment (72 WoA)*

Parameter	FLA (Mean ± SE)	PLA (Mean ± SE)	P-Value
Overall Plumage Score (0-14)	4.71 ± 0.24	4.97 ± 0.24	0.54
Cleanliness (0-3)	0.43 ± 0.05	0.34 ± 0.05	0.30
Keel deformation (0 or 2)	1.26 ± 0.10	1.04 ± 0.10	0.11
Comb pecking (0-2)	0.09 ± 0.03	0.05 ± 0.03	0.35
Comb abnormality (Yes - 1, No - 0)	0.01 ± 0.01	0.01 ± 0.01	1.00
Foot pad dermatitis (0 or 2)	0.29 ± 0.05	0.38 ± 0.05	0.18
Claw length (Long-1, Short-0)	0.82 ± 0.04	0.83 ± 0.04	0.85
Skin lesions (0-2)	0.04 ± 0.02	0.07 ± 0.02	0.35
Beak trimming (0-2)	1.19 ± 0.04	1.18 ± 0.04	0.86
Toe damage (Yes-1, No-0)	0.00 ± 0.01	0.02 ± 0.01	0.09

Summary

1) No difference in BW, BW uniformity or mortality between partial litter access (PLA) and full litter access (FLA)
2) No difference in all measured welfare parameters between the treatments
3) PLA reduces floor eggs by 89% (19-76 WOA) vs. FLA.
4) PLA reduces manure deposition on litter floor by 45-59%; lower ammonia 21%, and less litter caking in winter.
5) Introducing older hens to young flock showed no benefit.

Acknowledgements

- Collaboration of ICF staff
- Dr. Suzanne Millman and Becky Parsons for assistance with hen's welfare assessment
- Egg Industry Center endowed professorship fund
- Brazilian CNPq scholarship for Jofran Oliveira
- Undergrad RA's for assistance with data collection