EGG INDUSTRY CENTER

Advancing research and outreach for a sustainable egg industry.

A Presentation at the Egg Farmers of Ontario 53rd Annual Meeting

Hongwei Xin, *EIC Director*

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Administered by the College of Agriculture and Life Sciences, Iowa State University, USA

Presentation Outline

1. Brief background about EIC
2. Funded/Led Research by EIC
3. Highlights of three EIC-led research projects
   a) Feeding behavior of individual hens in enriched colony housing (ECH)
   b) Dust reduction and summer cooling in an aviary henhouse by water sprinkling
   c) Impacts of full vs. partial litter access in aviary CF hen house

Brief background about Egg Industry Center (EIC)

Back in time – 2008

- Decline in Poultry Research Funding
  - Federal (poultry research ranks 54th in USDA funding)
  - Unstable check-off programs
- Decline in university poultry programs
  - Only 6 PS Depts left in the US (AL, AR, GA, MS, NC, TX), all in the Southeast
- Needs by the industry, hence the mission of L-G university (teaching, research, extension/outreach)
- EIC was established to:
  - ***Meet the needs*** of the egg industry and its constituents through coordination, collaboration and leadership.
  - ***Provide steady funding*** through creating a $10M endowment

EIC Mission

Add value to the egg industry by facilitating research and learning for egg producers, processors and consumers through national and international collaboration.

EIC Vision

Assist a thriving egg industry.

EIC Advisory Board

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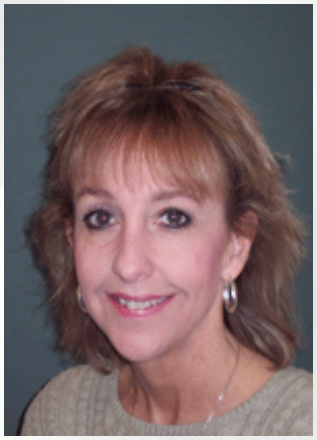

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Hongwei Xin
Director

Annual Intern
ISU Student

Funded/Led Research by EIC

EIC Research Outputs & Impacts

No. of Projects Funded

33

No. of Institutions Involved

8

Dollars Invested in Research

$865,232

No. of Research Pubs

57

No. of Researchers Touched/Trained

42

External Funding Leveraged

$3.5M

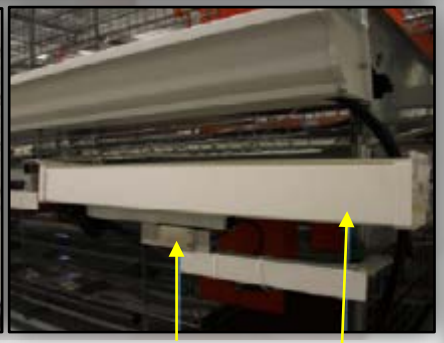
EIC Led/Funded Research

Project Name	Page	Topic Areas Addressed							
		Animal Welfare	Bird Health	Egg Processing & Products	Egg Quality & Safety	Environment	Genetics	Housing Systems	Production
Air & Environmental Sampling for AI	1	X	X			X		X	X
Role of Litter Beetles, Water, Feed & Rodents in AI	1	X	X						X
Understanding New HPAI Virus Persistance	1	X	X			X			X
Evaluation of Alternative Evironmental Sampling for AI	2	X	X			X			X
Evaluation of Feedstuffs for AI	2	X	X						X
Identifying Genetic Basis for Resistance to AI	2		X				X		
Evaluation of Electrostatic Air Filtration Systems	3	X	X			X		X	X
Modeling of Ventilation Shutdown to Stop AI	3	X	X						X
Role of Terrestrial Wild Birds, Rodents, & Insects in AI	3		X						X
Causes of Keel Bone Abnormalities	4	X	X					X	X
Evaluating Effects of LED vs. CFL Lighting	4	X			X			X	X
The Effects of Egg Yolk on Piglets	4			X					
Evaluating Behavioral Responses to Ultraviolet Light	5							X	X
Mitigation of Ammonia and PM Generation in Cage-Free	5	X	X			X		X	X
Relationship between HPAI & Weather Patterns	5	X	X						
Heat Treatment of Egg Flats to Ensure Biosecurity	6		X	X					
Quantifying Individual Hen's Feeding and Nesting Behaviors	6	X						X	X
Analysis of Sequence Data from HPAI Survivors	7		X				X		
Cage-Free Housing Ventilation Options	7	X	X			X		X	X
Feasible Methods to Extract Immune-Enhancing Yolk IgY	7		X	X					
Hen Gut and Lung Microbiomes in Different Housing	8	X	X					X	X
Improving Transition between Rear and Lay Environments	8	X						X	X

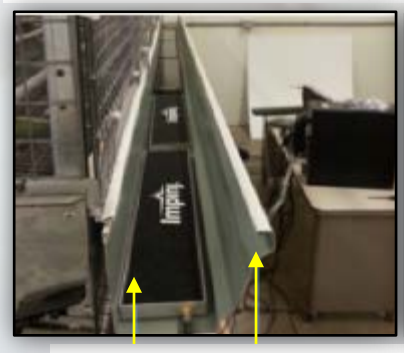
Highlights of three EIC-led research projects

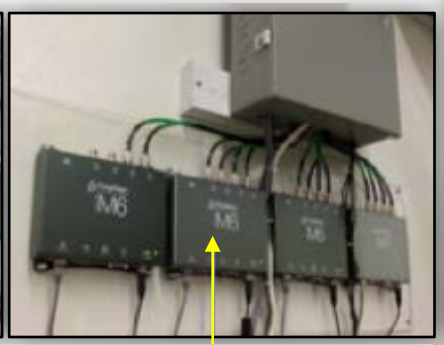
a) Feeding behavior of individual hens in enriched colony housing (ECH)

Experiment System Setup



Feeder Load Cell Support Load Cell Water Tank Load Cell Collector

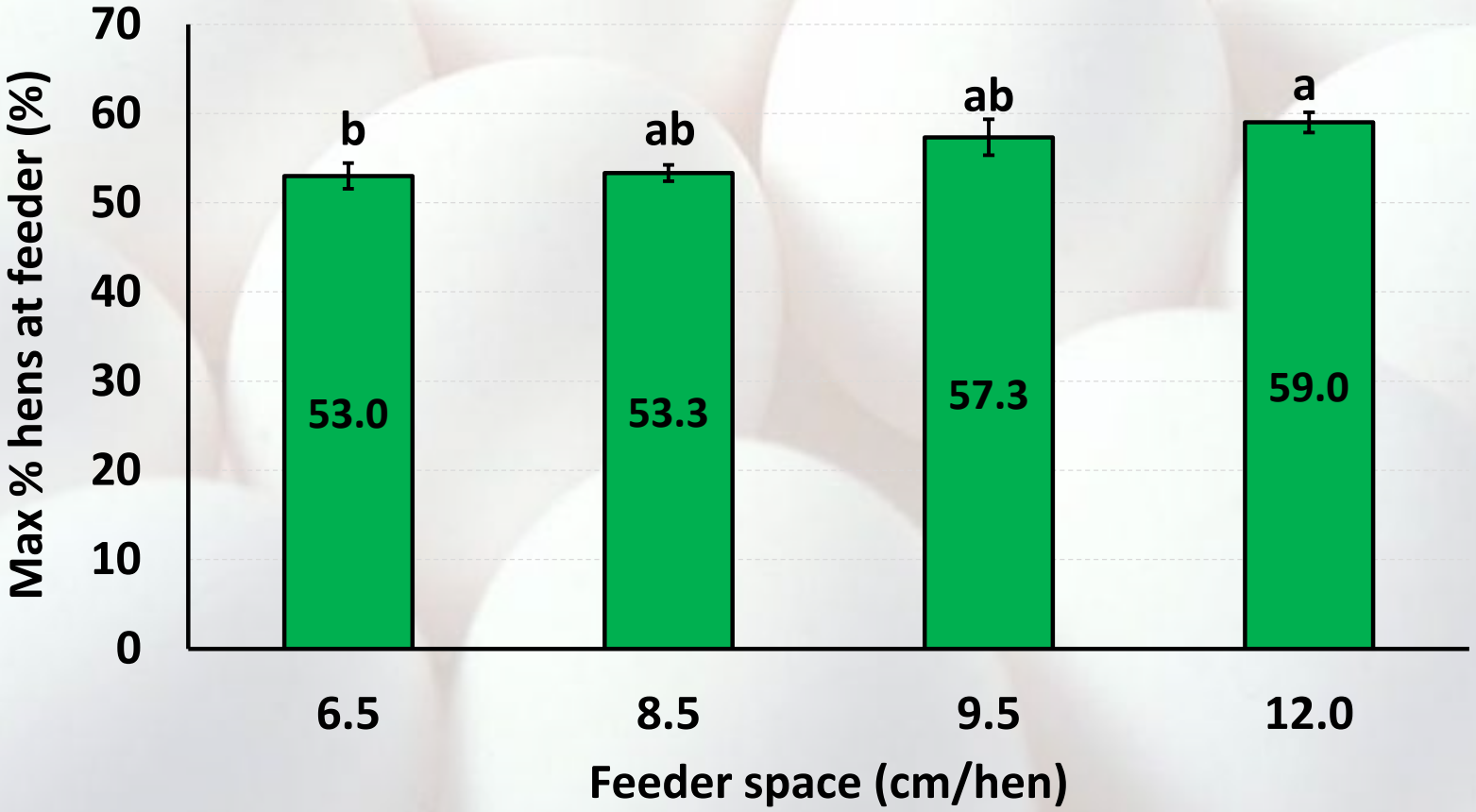




Antenna Feeder Plastic Cover RFID Reader (902-928 MHz)

Study Findings

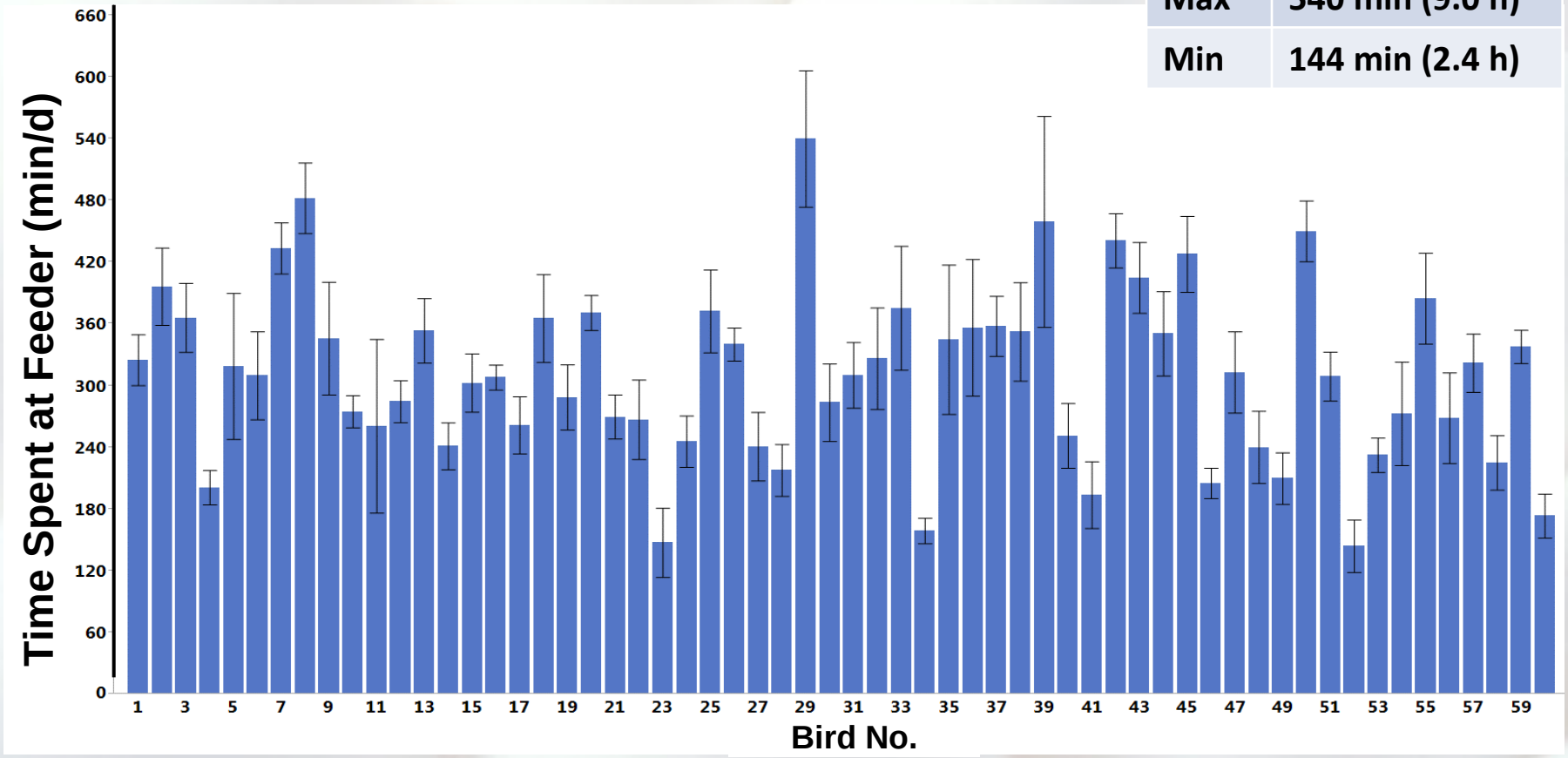
1) Not all hens in ECH feed at the same time.



Study Findings

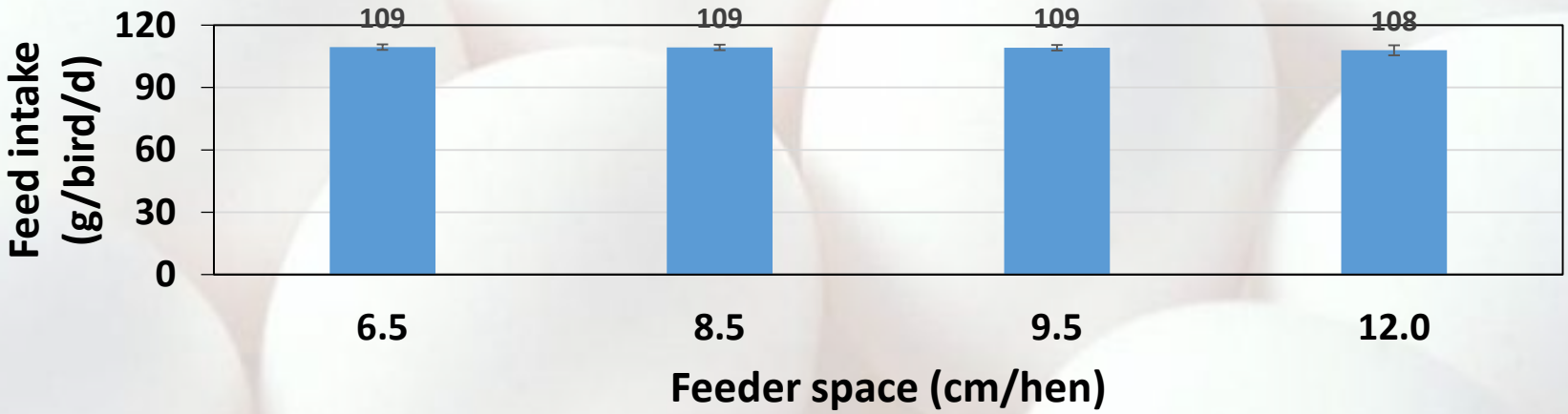
2) Considerable variations among individual hens in time spent at the feeder

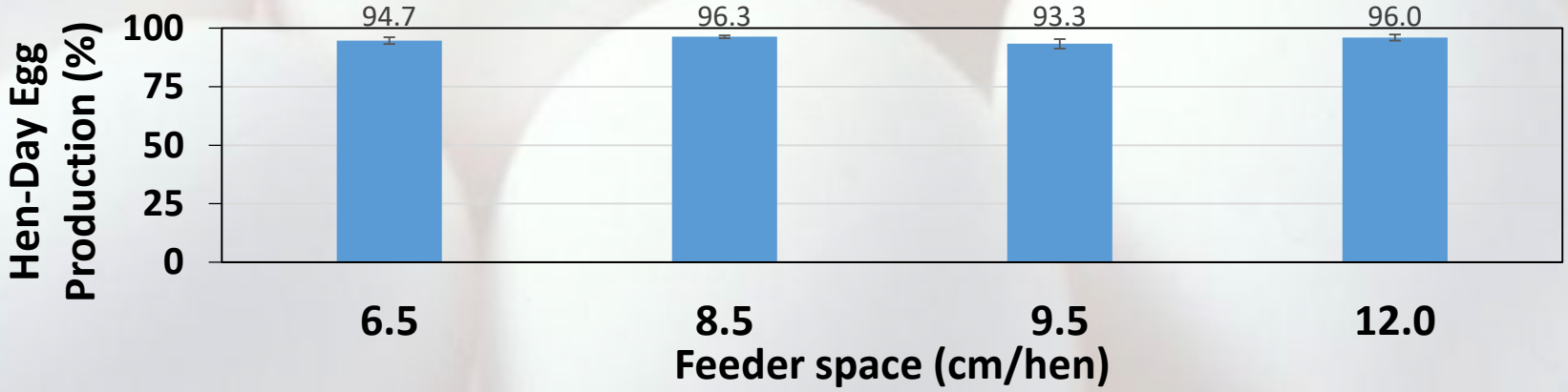
Mean	310 min (5.2 h)
Max	540 min (9.0 h)
Min	144 min (2.4 h)



Study Findings

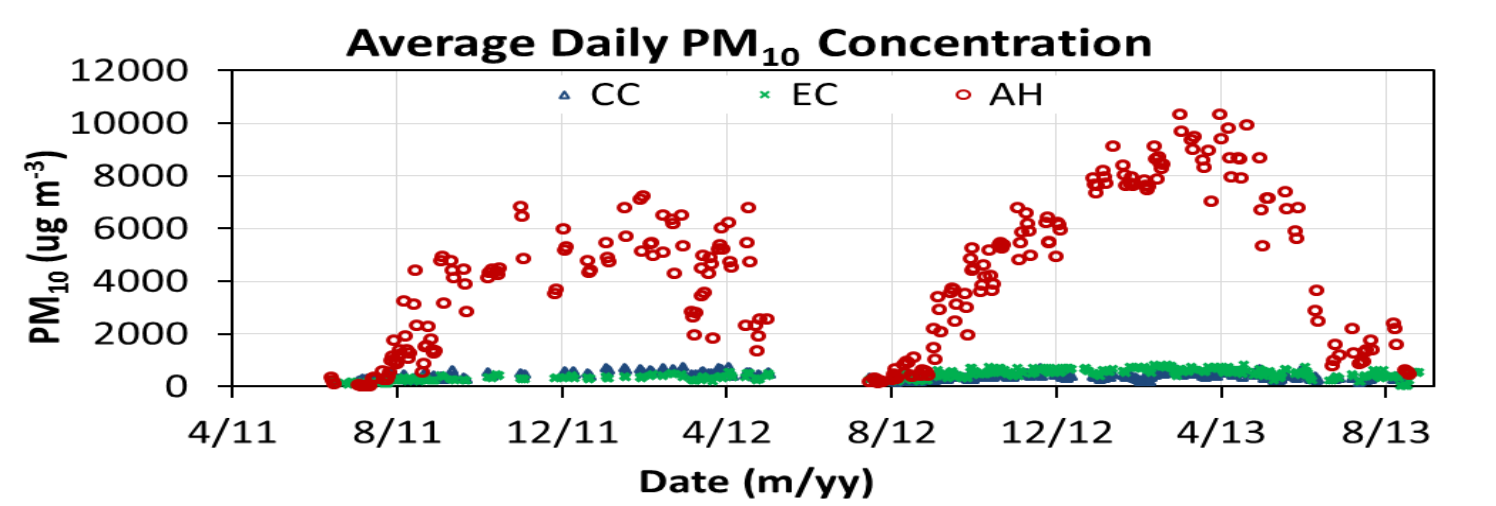
3) No difference in production performance among 6.5, 8.5, 9.5, & 12.0 cm feeder spaces



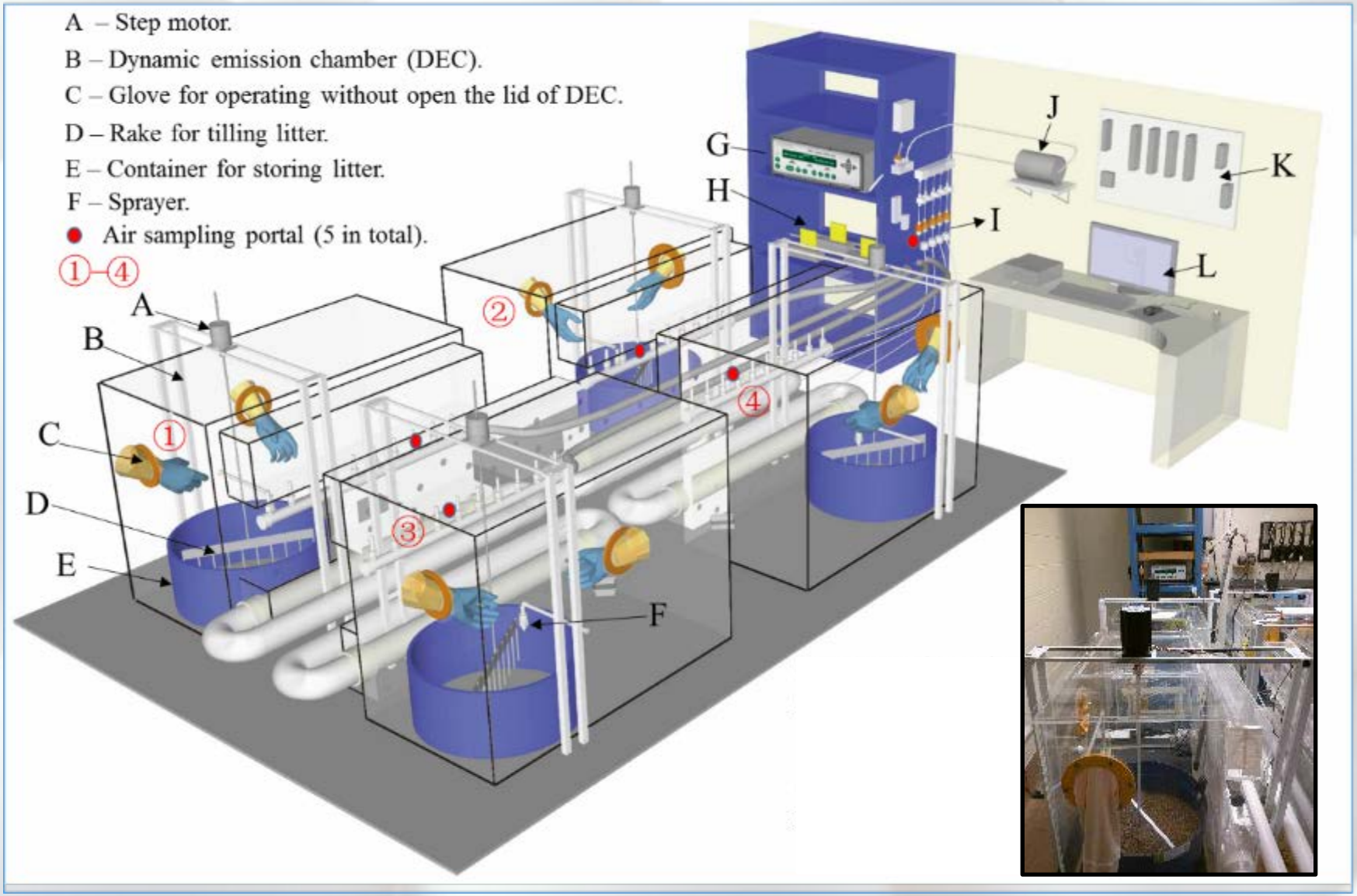


Highlights of three EIC-led research projects

b) Dust reduction and summer cooling in an aviary henhouse by water sprinkling



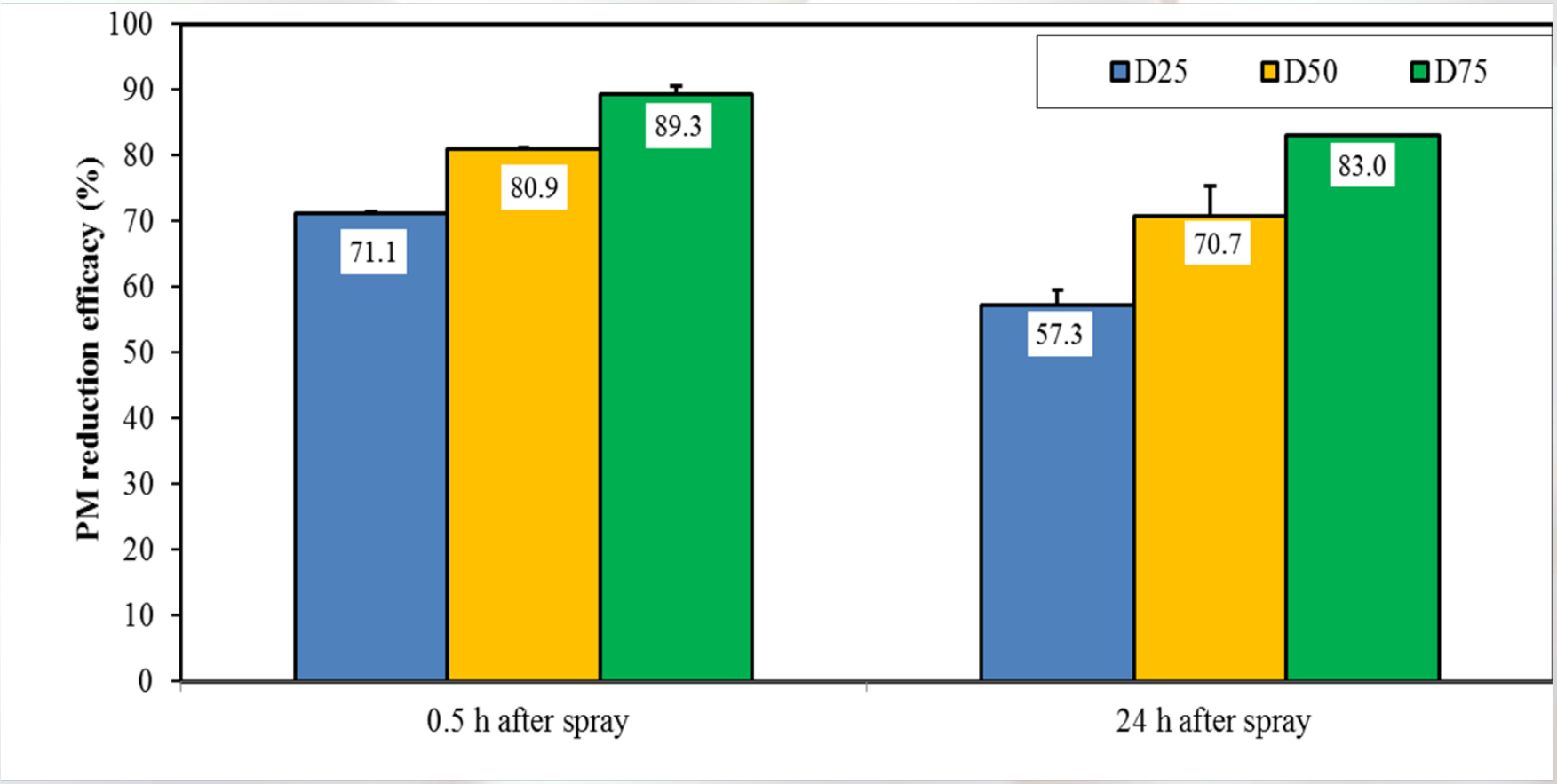
System Setup – *Lab test*



System Setup – *Field verification*

Study Findings – *Lab test*

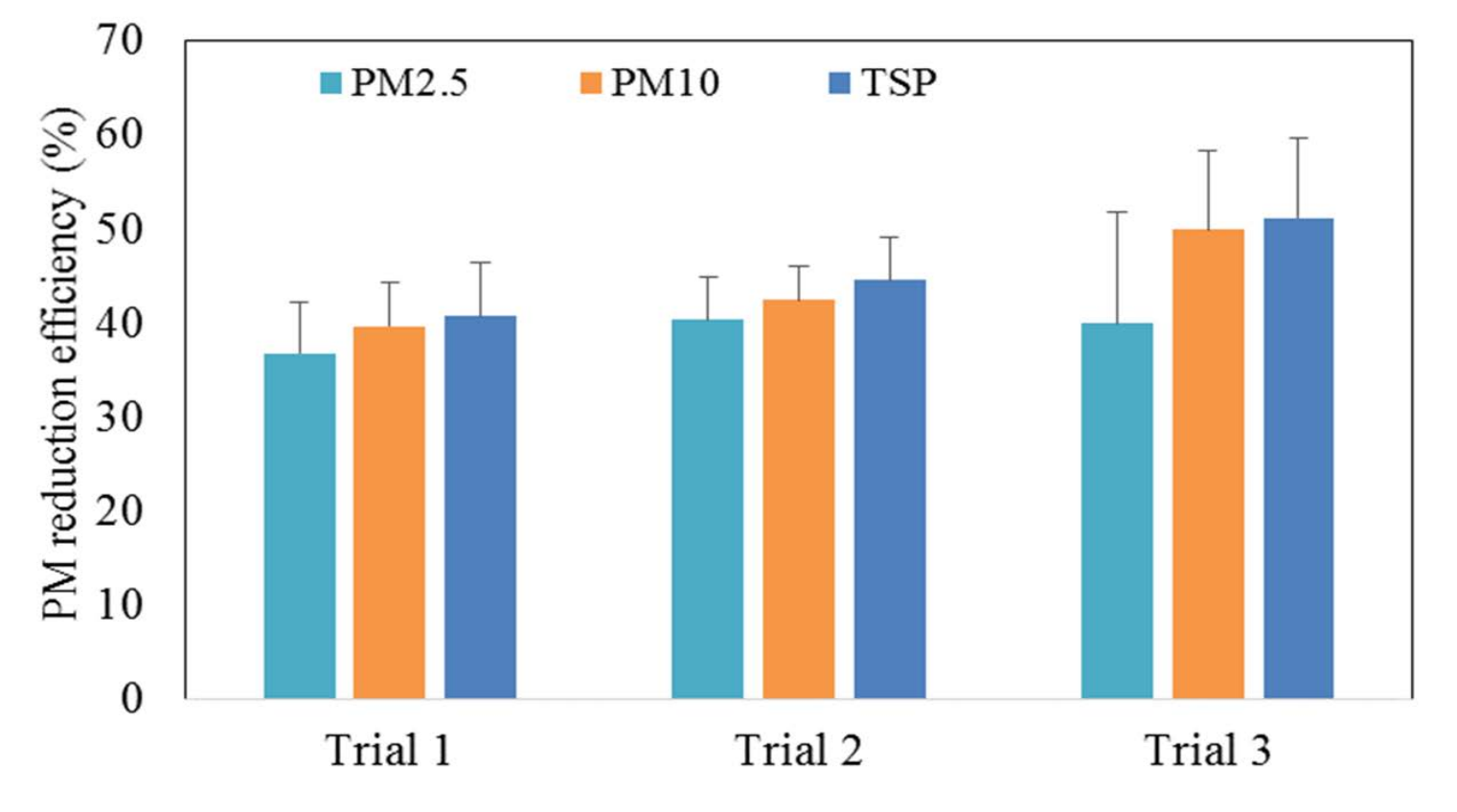
1) PM levels were reduced by 71-89% right after water spray and 57-83% 24 hr post-spray at three dosages.



(Chai et al., 2017)

Study Findings – *Field test (prelim)*

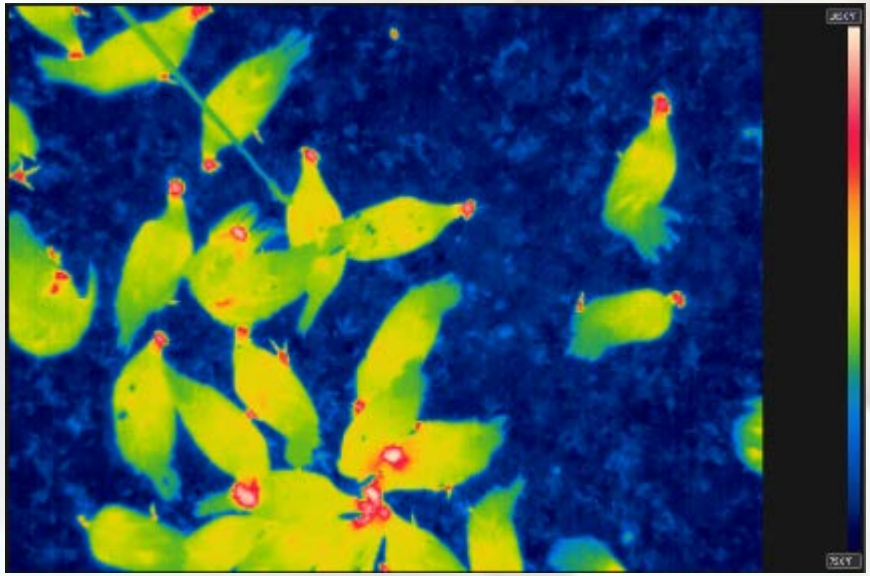
2) PM levels were reduced by 37-51% when the litter was sprayed once a day, w/o increasing ammonia.



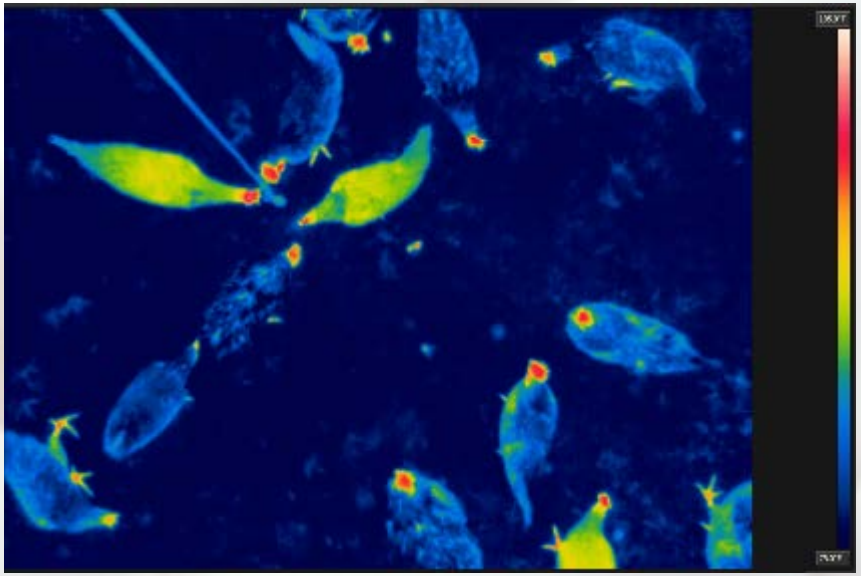
(Chai et al., 2018 - unpublished)

Study Findings – *Field test (prelim)*

3) The water sprinkling system may help cooling the hens in summer (surface wetting).



Before sprinkling

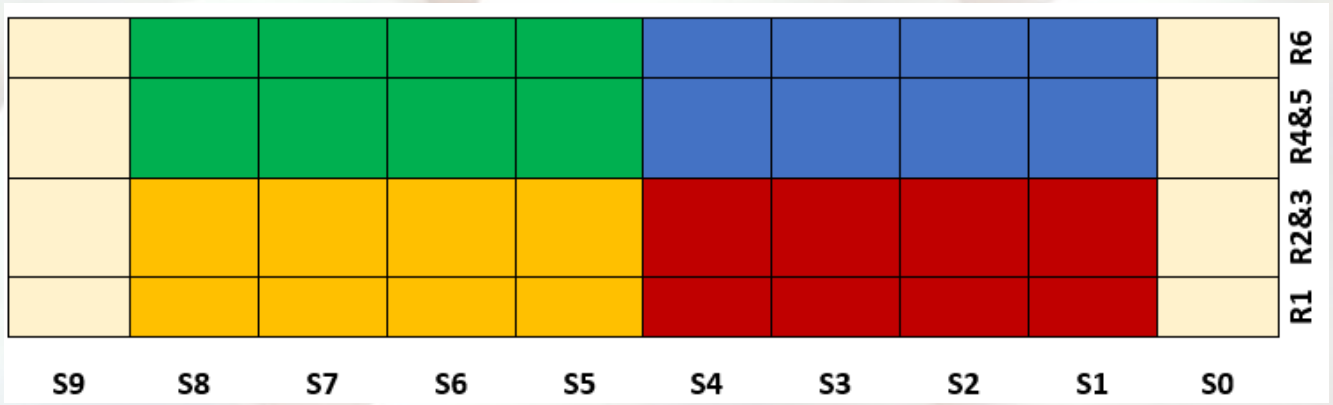


After sprinkling

Highlights of three EIC-led research projects

c) Impacts of full litter access (FLA) *vs.* partial litter access (PLA) in an aviary cage-free hen house

Experiment Setup in the Commercial Aviary Cage-Free Hen House



End sections (not used in the study)

FLA_E Full litter access with experienced hens

FLA_P Full litter access with pullets only

PLA_E Partial litter access with experienced hens

PLA_P Partial litter access with pullets only

- **R = Row, S = Section**
- **Total hens = 51,405 (Dekalb white); 41,136 used in the study**
- **Narrower rows = 857 hens, wider rows = 1,714 hens, Lights on at 5:15 h, POD open doors at 10:50 h, Lights off (POD doors closed) at 21:00 h**
- **1.5% Experienced hens (Bovan White at 49 WoA – 4 weeks delay for PLA treatments)**
- **Study period: 11/27/16 (pullets at 17 WoA) – 01/24/18 (hens at 76 WoA) (14 months)**

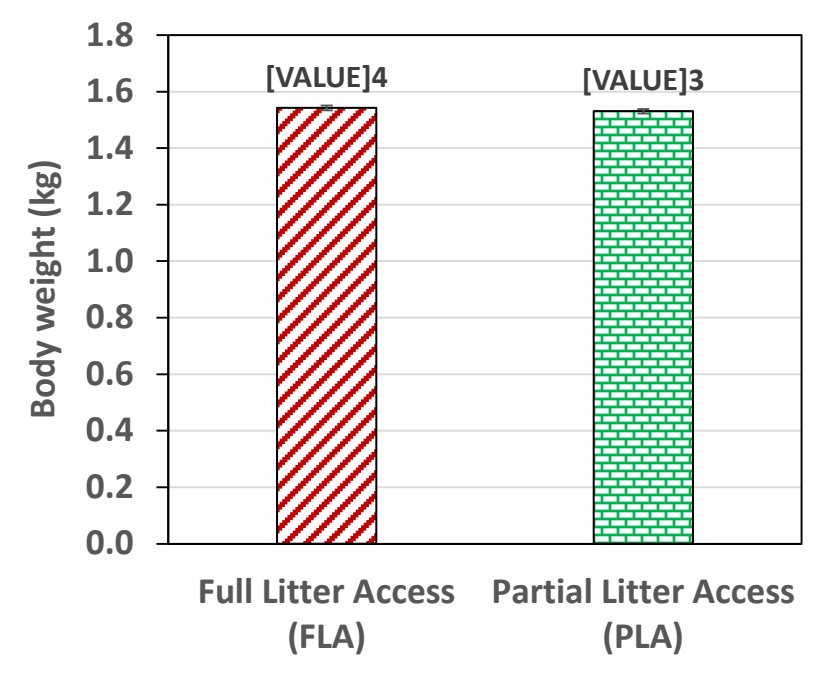
Study Findings

1) No difference in all measured welfare parameters between full and partial litter access regimens

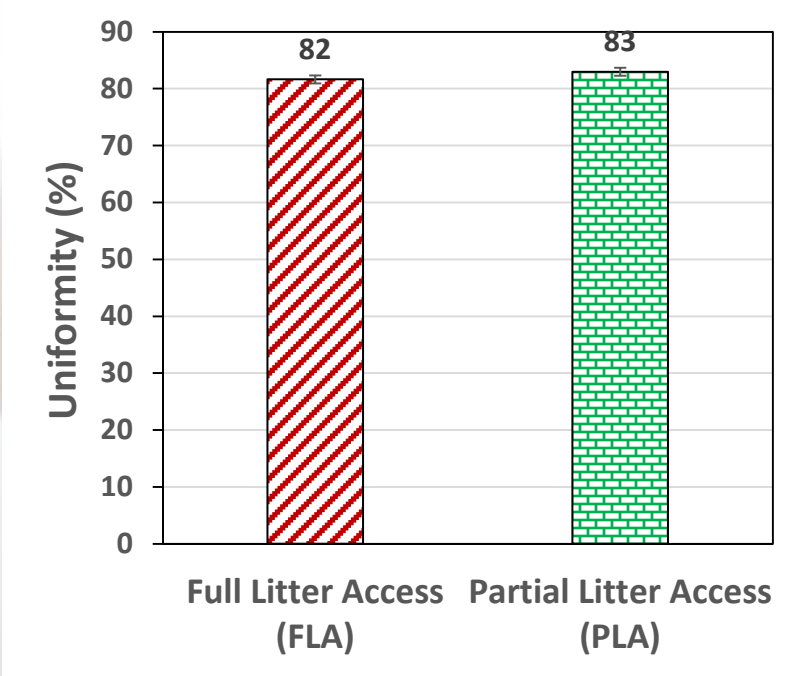
Parameter	FLA (Mean ± SE)	PLA (Mean ± SE)	P-Value
Overall Plumage Score (0-14)	4.71 ± 0.24	4.97 ± 0.24	0.54
Cleanliness (0-3)	0.43 ± 0.05	0.34 ± 0.05	0.30
Keel deformation (0 or 2)	1.26 ± 0.10	1.04 ± 0.10	0.11
Comb pecking (0-2)	0.09 ± 0.03	0.05 ± 0.03	0.35
Comb abnormality (Yes - 1, No - 0)	0.01 ± 0.01	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

Study Findings

2) No difference in body weight uniformity between full and partial litter access regimens



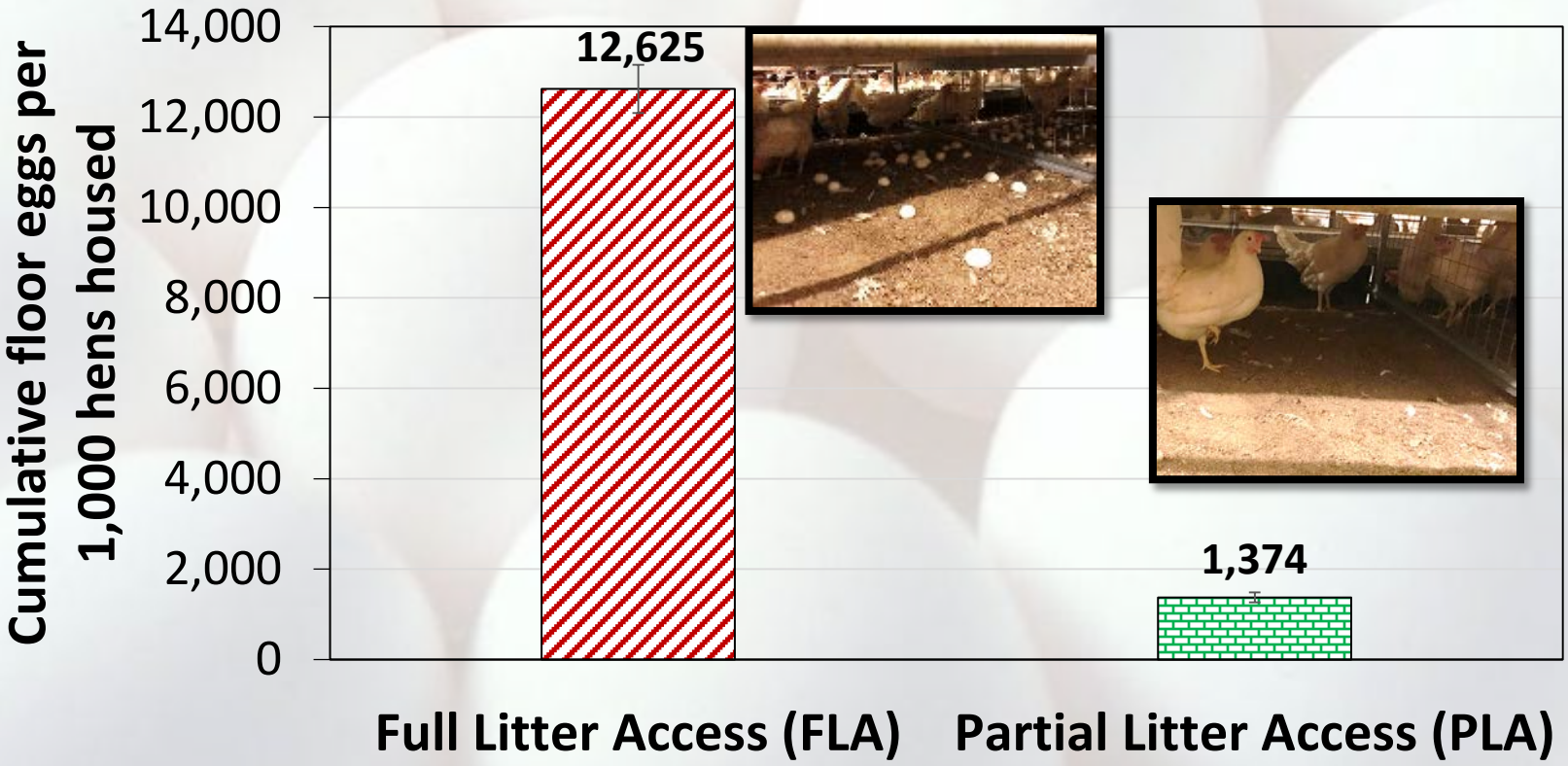
P = 0.49



P = 0.46

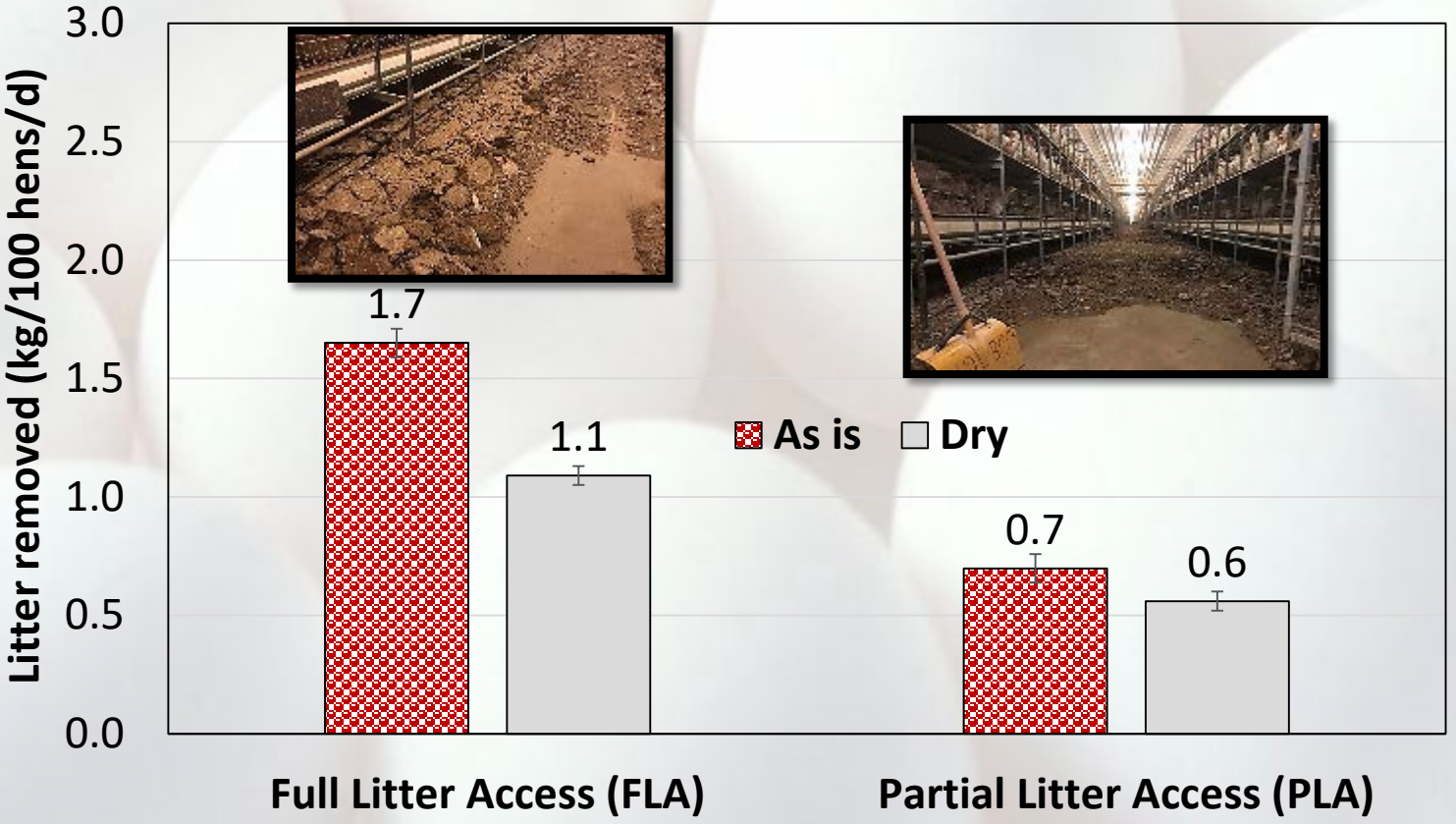
Study Findings

3) Partial litter access (PLA) reduced floor eggs by 89% *vs.* full litter access (FLA).



Study Findings

4) Partial litter access (PLA) reduced manure deposition on litter floor by 45% (DM) to 59% (as-is), lower ammonia (21%), and less litter caking in winter.



10-year Anniversary

Egg Industry Issues Forum

April 16-18, 2018

Scottsdale, AZ

Egg Industry Center

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