



The Dynamics of Respiratory Pathogen Transmission Among Backyard Chickens and wild birds

Andrea Ayala, Patti Miller, Claudio Afonso
Sonia M. Hernandez, University of Georgia



Backyard Chickens

- Backyard chicken ownership is unknown—estimated <1% of households, but “on the rise”
 - Kept as companions, for food, and local food markets
 - Receive little veterinary care
 - Not regulated/protected by biosecurity
- Present a concern for public health
- Might reservoirs for commercial poultry
- 30% of chicken owners maintain wild bird feeders



Newcastle Disease Virus

- Avian avulavirus
- Virulent strains (mesogens, velogens)
 - endemic in Asia, Africa, and the Middle East, Central and South America in domestic poultry
 - In USA, endemic in wild pigeons and cormorants



Backyard Chickens and Wild Birds:

Many types of contact

- **Sympatric and use similar resources**
- Supplemental feed/water
- Coops as nest sites
- Predation
- When poultry outbreaks do occur, wild birds often overlooked



Many types of contact

- Sympatric and use similar resources
- **Supplemental feed/water**
- Coops as nest sites
- Predation
- When poultry outbreaks do occur, wild birds often overlooked



Many types of contact

- Sympatric and use similar resources
- Supplemental feed/water
- **Coops as roost/nest sites**
- Predation
- When poultry outbreaks do occur, wild birds often overlooked



Many types of contact

- Sympatric and use similar resources
- Supplemental feed/water
- Coops as nest sites
- **Predation**
- When poultry outbreaks do occur, wild birds often overlooked



Many types of contact

- Overlap in habitat
- Supplemental feed
- Coops as nest sites
- Predation
- Water sources
- **When poultry outbreaks do occur, wild birds often overlooked**

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Newcastle Disease outbreak hits north Chino

Story

Comments

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Champion photo by Brenda Dunkle

Connie Schofield feeds some of her ducks and geese on her property in the unincorporated area of north Chino. The area is part of a large outbreak zone for the highly contagious Newcastle Disease that affects poultry.

Posted: Saturday, October 6, 2018 8:00 am

By Brenda Dunkle | 0 comments

Throwing out grain to some of her more than 100 geese, ducks, and chickens, Connie Schofield said "Everyone deserves a last meal, right?"

For more than a week, Ms. Schofield who lives on a large property in the unincorporated area of north Chino, has been weeping, barely eating, hardly sleeping, and visiting with her birds, whom she calls "her babies."

Ms. Schofield received notice Sept. 26 that all her birds would be euthanized two days later because of an outbreak of virulent Newcastle Disease in the area. She was stunned because recent county tests had found them negative for the disease. The appointment was later cancelled and as of this Friday morning, the birds had not been euthanized.

A peacock and 10 chickens at neighbor Helen Rivera's home were euthanized Sept. 28, leaving the woman in tears.

Introduction:

Importance of
Backyard
Chickens



Year 1 – 2:
Identify
susceptibility and
transmission of
lentogenic NDV
Experimental
Inoculation at
SEPRL



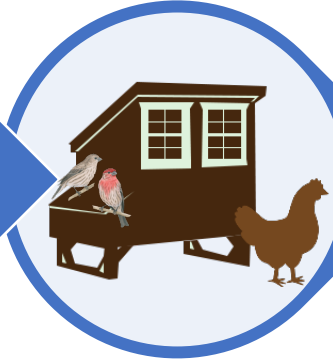
Year 2 - 3:
Identify wild bird
species most likely
to come in contact
with chickens
Behavioral Study



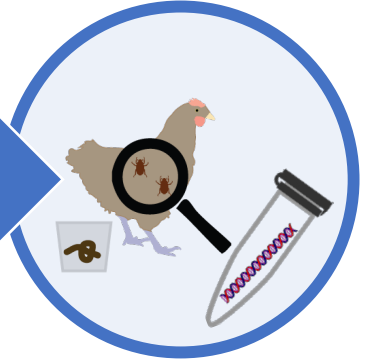
Year 1:
Determine
baseline
prevalence of NDV
in songbirds
Surveillance for
NDV in Athens, GA



Year 2:
Identify natural
transmission of
NDV
Field Vaccine
Study



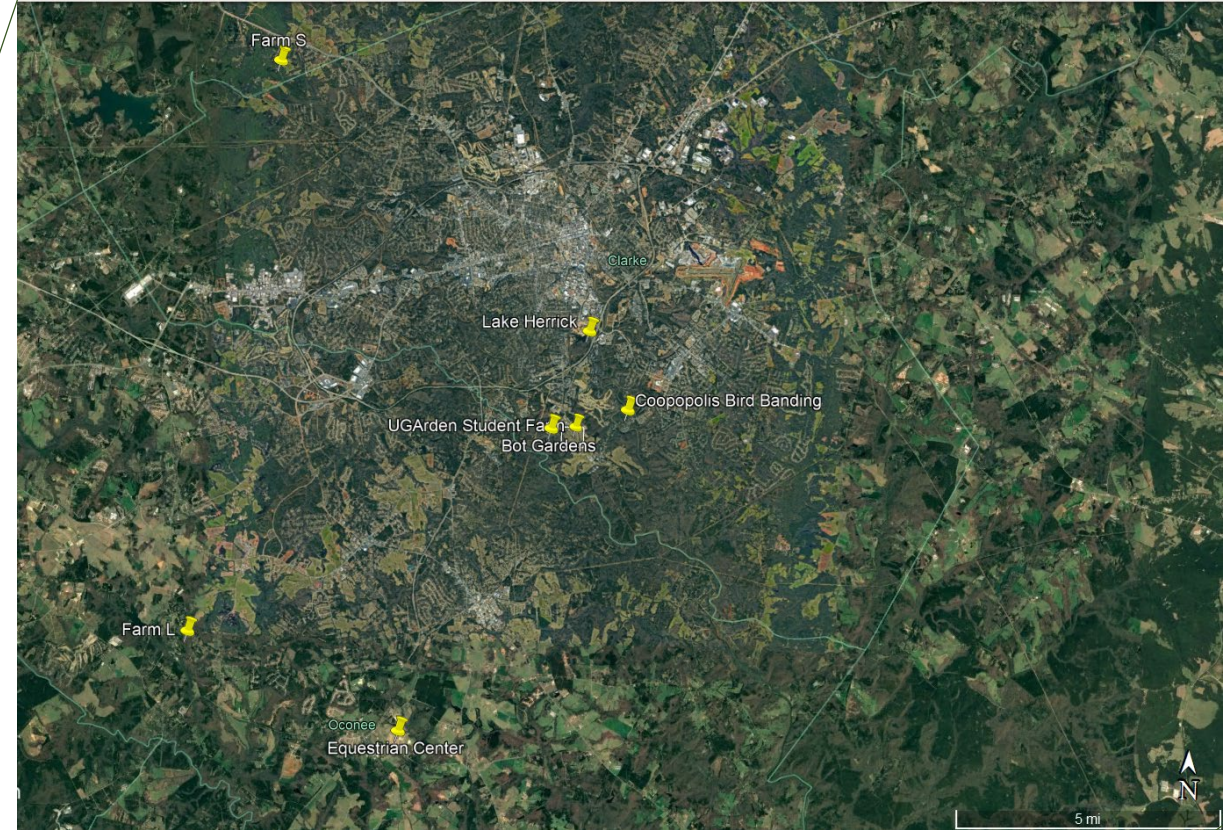
Year 3:
Ongoing Work
(Serology/rt RT-
PCR/Statistical
analyses)



Year 1 Surveillance Effort for NDV:

N=465 wild birds captured at seven sites

- 55 species
- 245 bird swabs
 - VI or rt-RT-PCR
 - ALL negative for wild-type NDV
- 50 serum samples
 - ALL Negative for NDV antibodies by HI
 - Remaining samples in progress



• BACKYARD BIRDS of GEORGIA •



Pine Siskin



Brown Thrasher



Northern Mockingbird



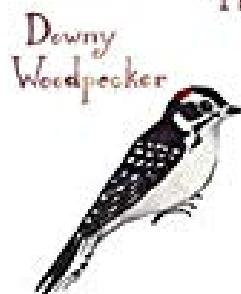
Chipping Sparrow



White-throated Sparrow



Northern Cardinal



Downy Woodpecker



Yellow-rumped Warbler



White-breasted Nuthatch



Red-winged Blackbird



Tufted Titmouse



American Goldfinch



Blue Jay



Eastern Bluebird



Eastern Towhee



Song Sparrow



Dark-eyed Junco



House Finch



Mourning Dove



Carolina Chickadee



American Robin



Pine Warbler



Red-bellied Woodpecker

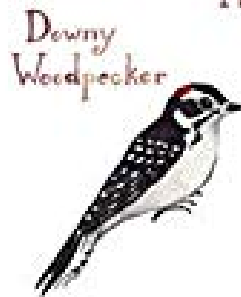


Carolina Wren



Brown-headed Nuthatch

• BACKYARD BIRDS of GEORGIA •



Eastern Towhee



Dark-eyed Junco



Eastern Bluebird



Mourning Dove



American Robin



Pine Warbler



Red-bellied Woodpecker



Carolina Wren



Brown-headed Nuthatch



Day 0

Year 1 - 2 Wild Bird Susceptibility to LaSota vaccine

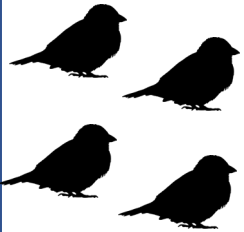
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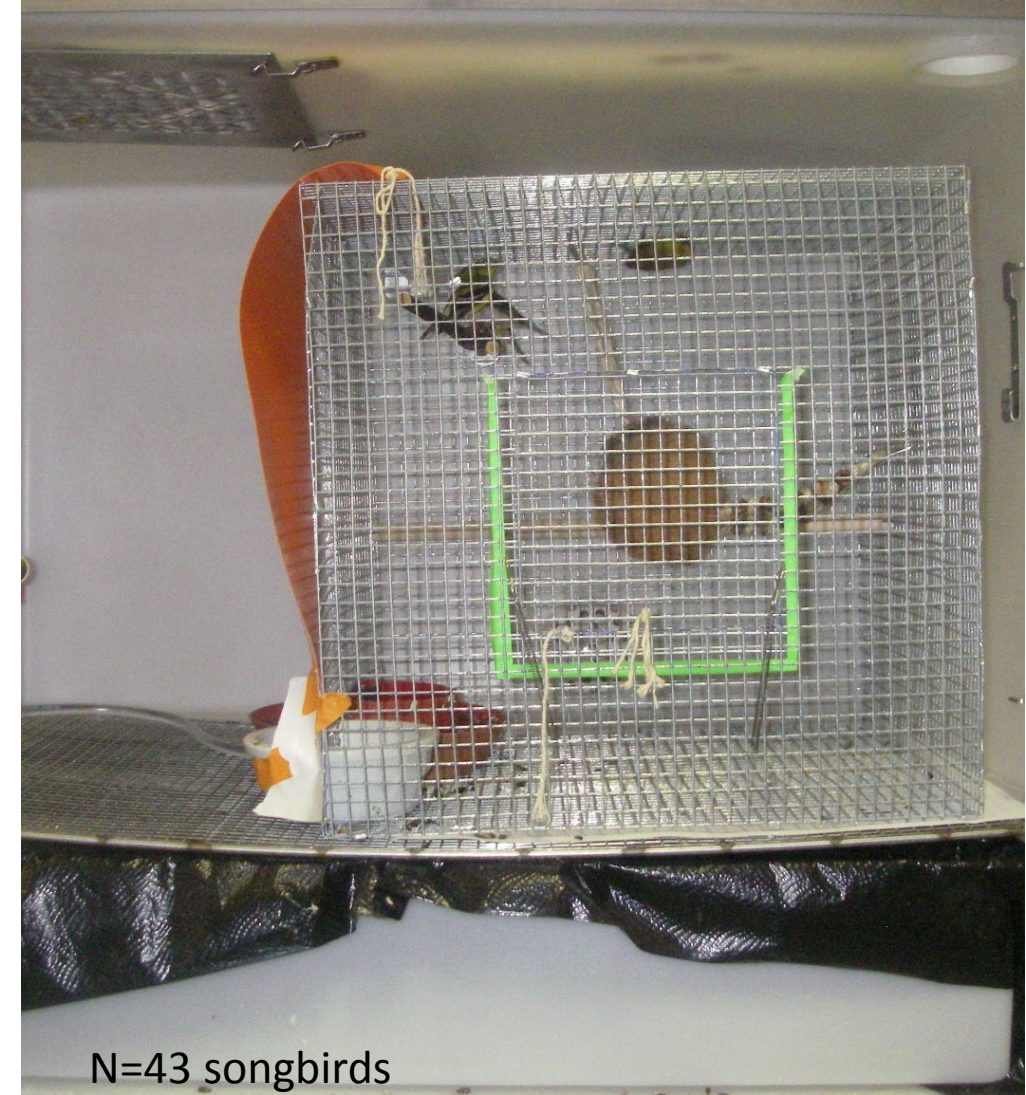
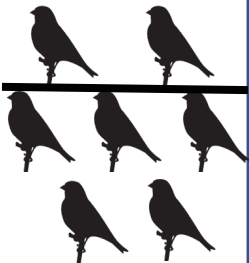
BHCO



HOFI



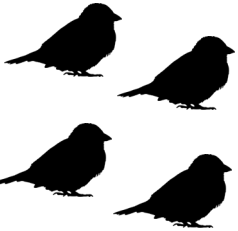
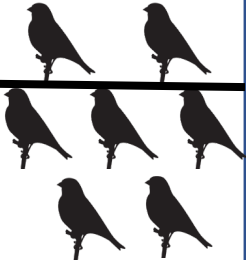


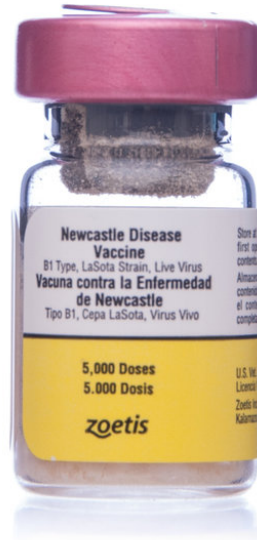
AMGO









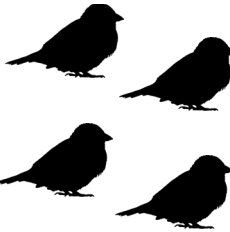
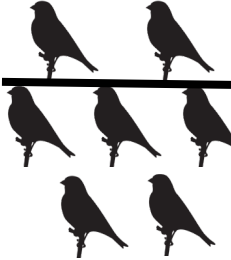
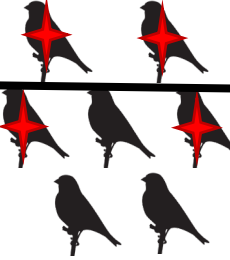
N=43 songbirds



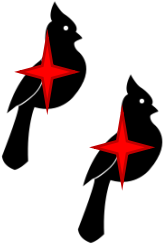


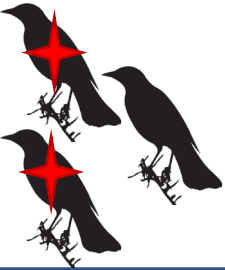
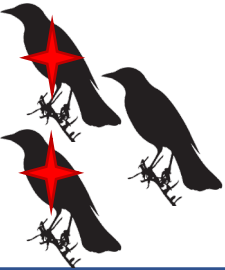
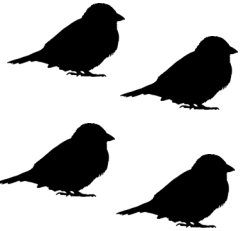
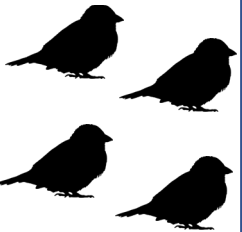
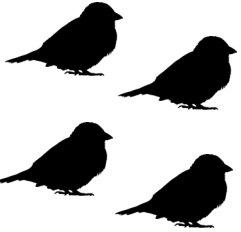
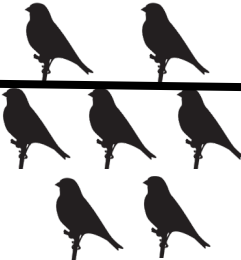
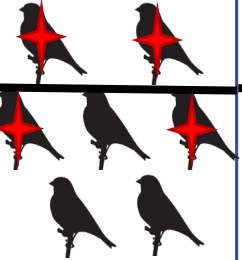
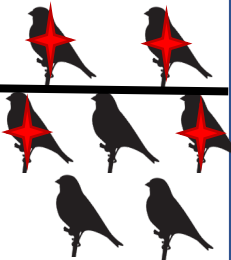
NOCA, BHCO, HOFI, AMGO-confirmed NDV NEG
5 groups → directly inoculated



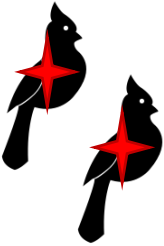



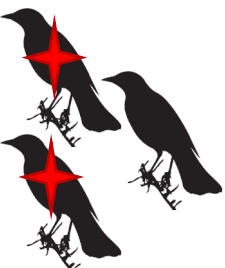
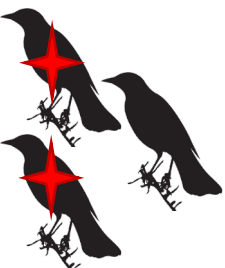

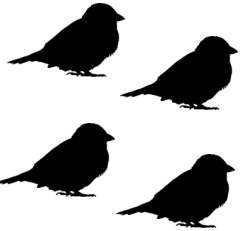
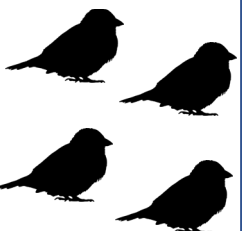
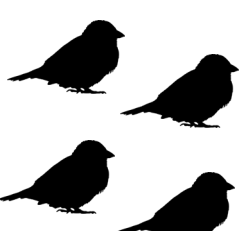

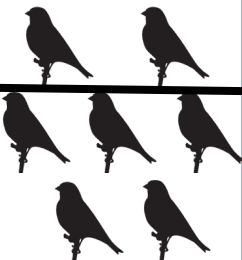
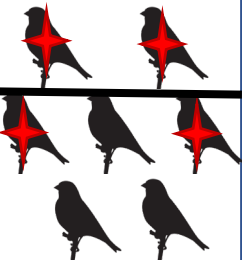
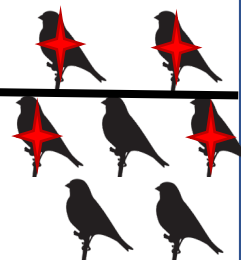

	Day 0
NOCA	
BHCO	
HOFI	
AMGO	



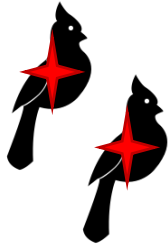








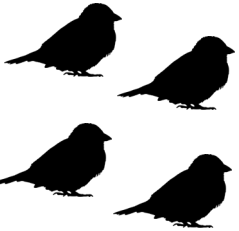
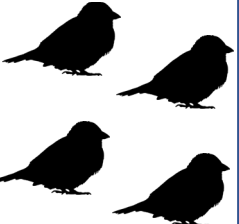
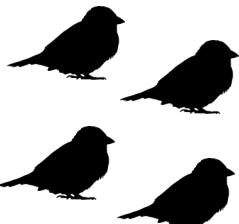


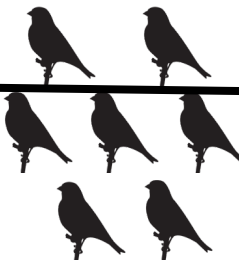
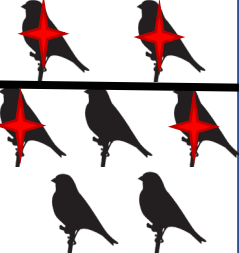
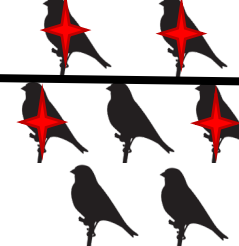
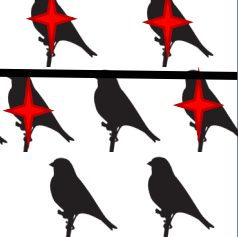





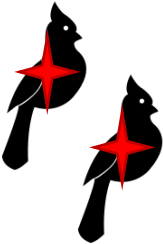

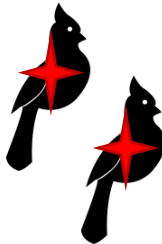



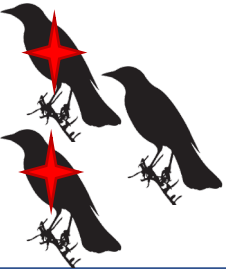




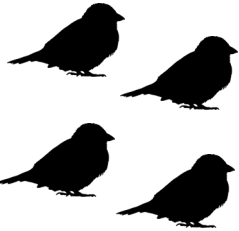
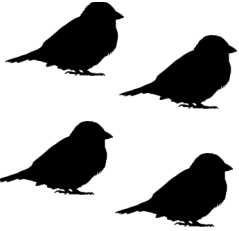
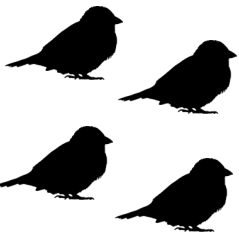
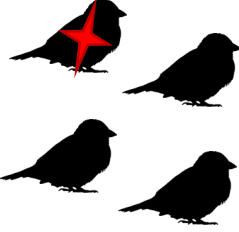
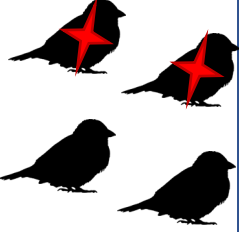
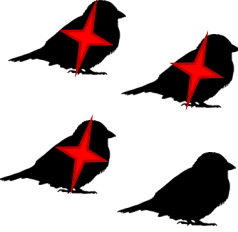
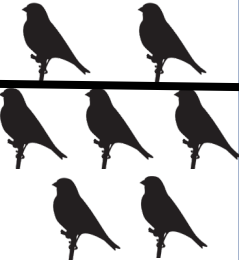
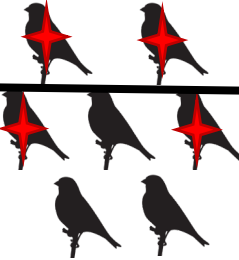
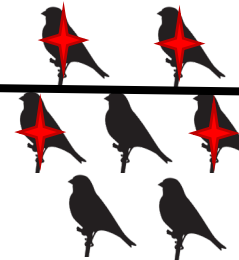
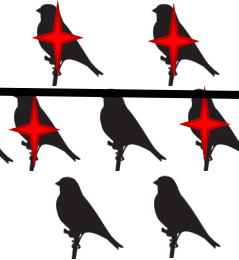
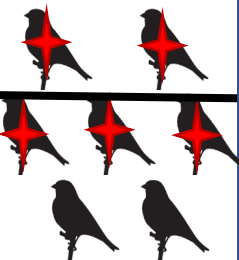
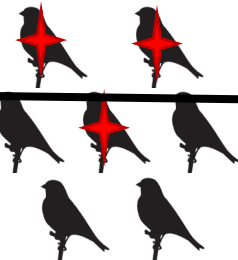
= 0.1 ml of $10^{6.7}$ EID₅₀ titrated virus



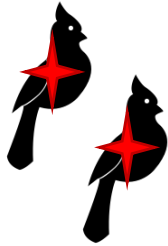









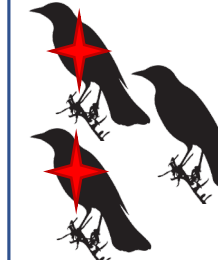
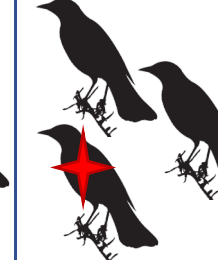

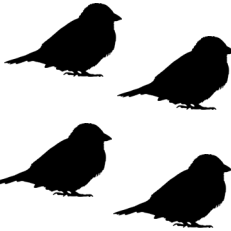
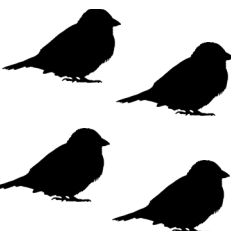
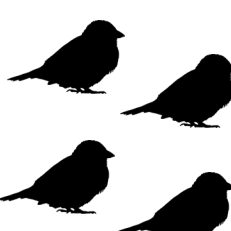

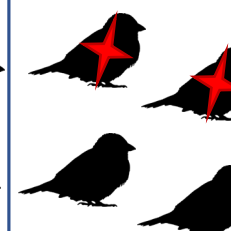
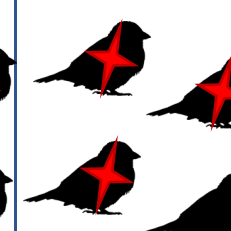
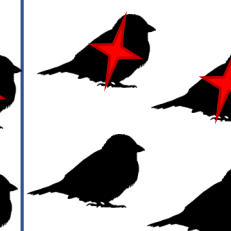
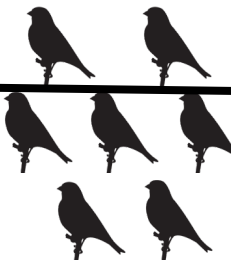

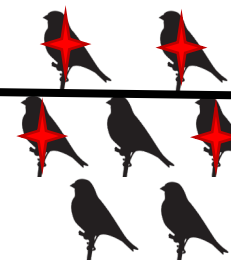
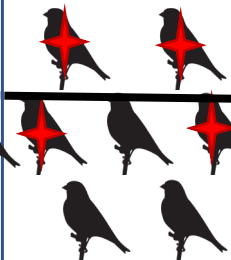


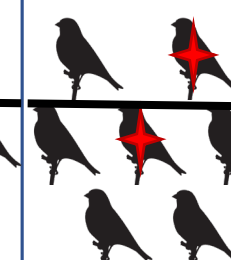
	Day 0	Day 1
NOCA		
BHCO		
HOPI		
AMGO		



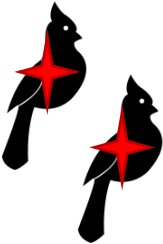

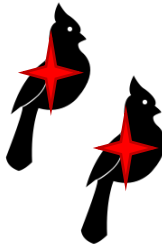

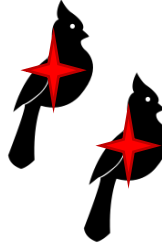



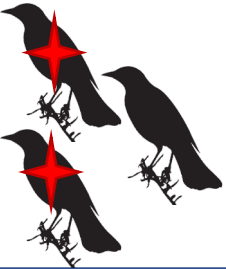






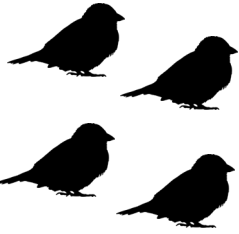
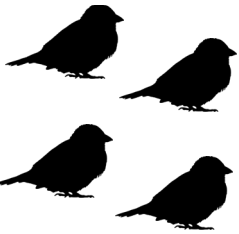
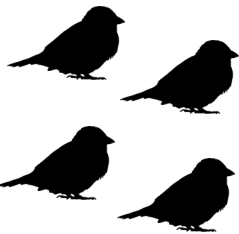
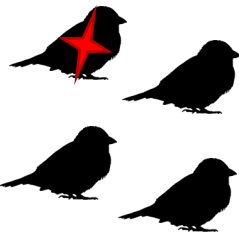
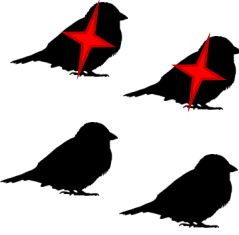
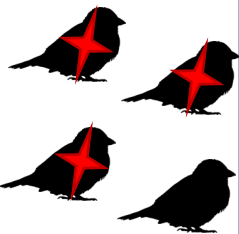
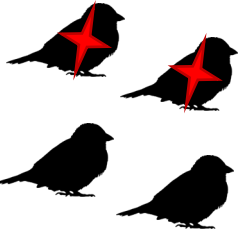
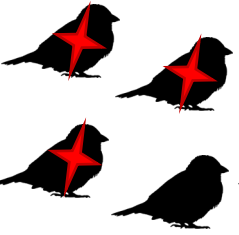
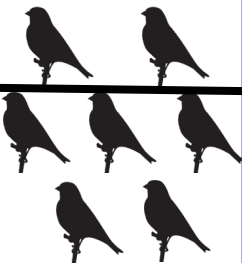
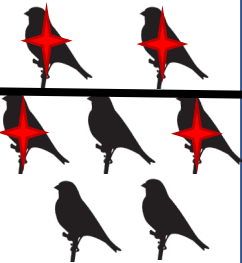
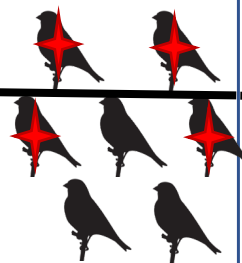
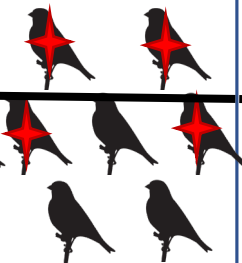
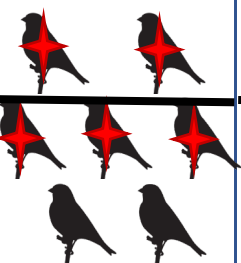
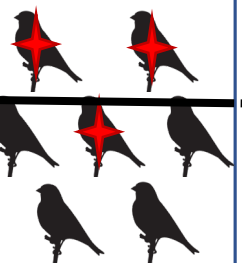
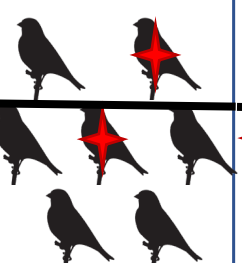
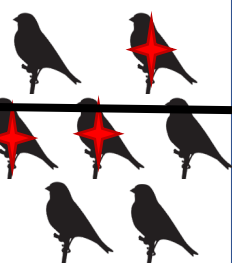
	Day 0	Day 1	Day 2
NOCA			
BHCO			
HOFI			
AMGO			



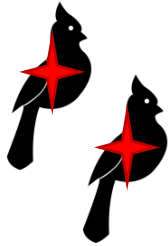






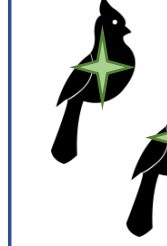




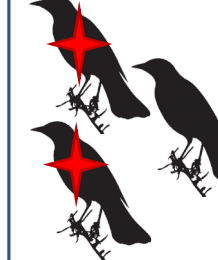
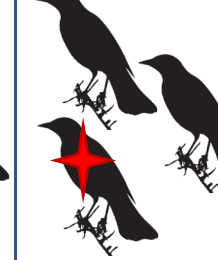
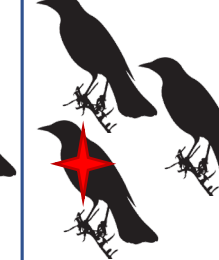
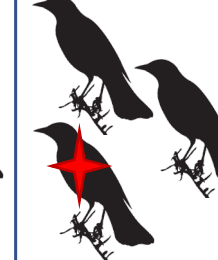

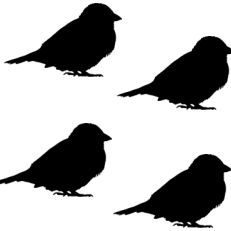
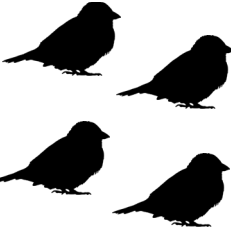
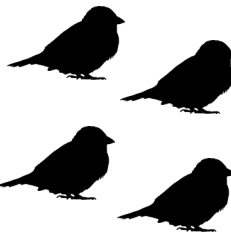
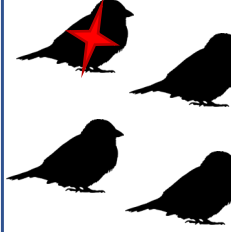
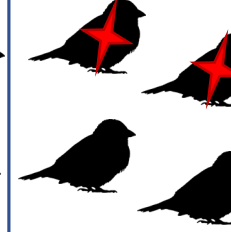
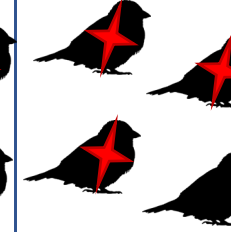
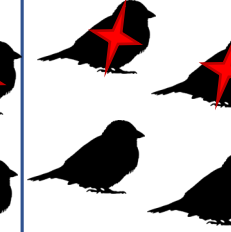
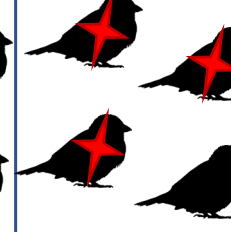

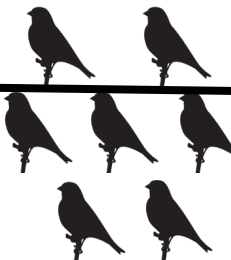

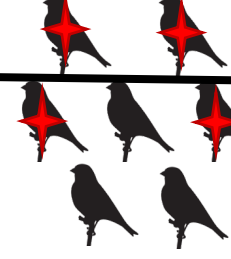
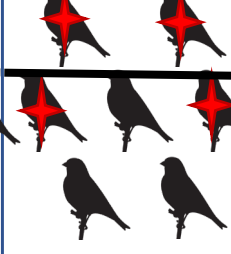


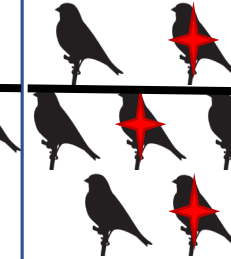
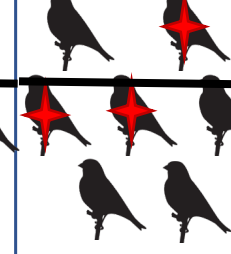
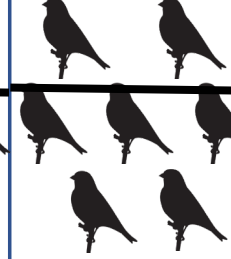
	Day 0	Day 1	Day 2	Day 3
NOCA				
BHCO				
HOFI				
AMGO				


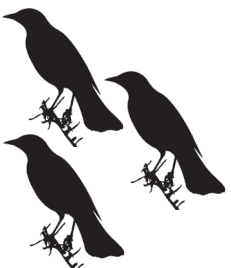
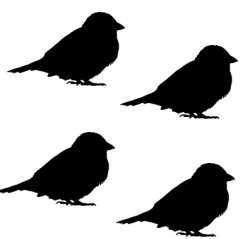
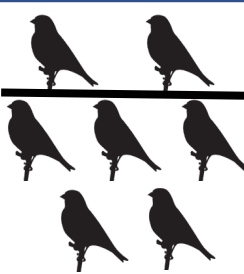
	Day 0	Day 1	Day 2	Day 3	Day 4
NOCA					
BHCO					
HOFI					
AMGO					

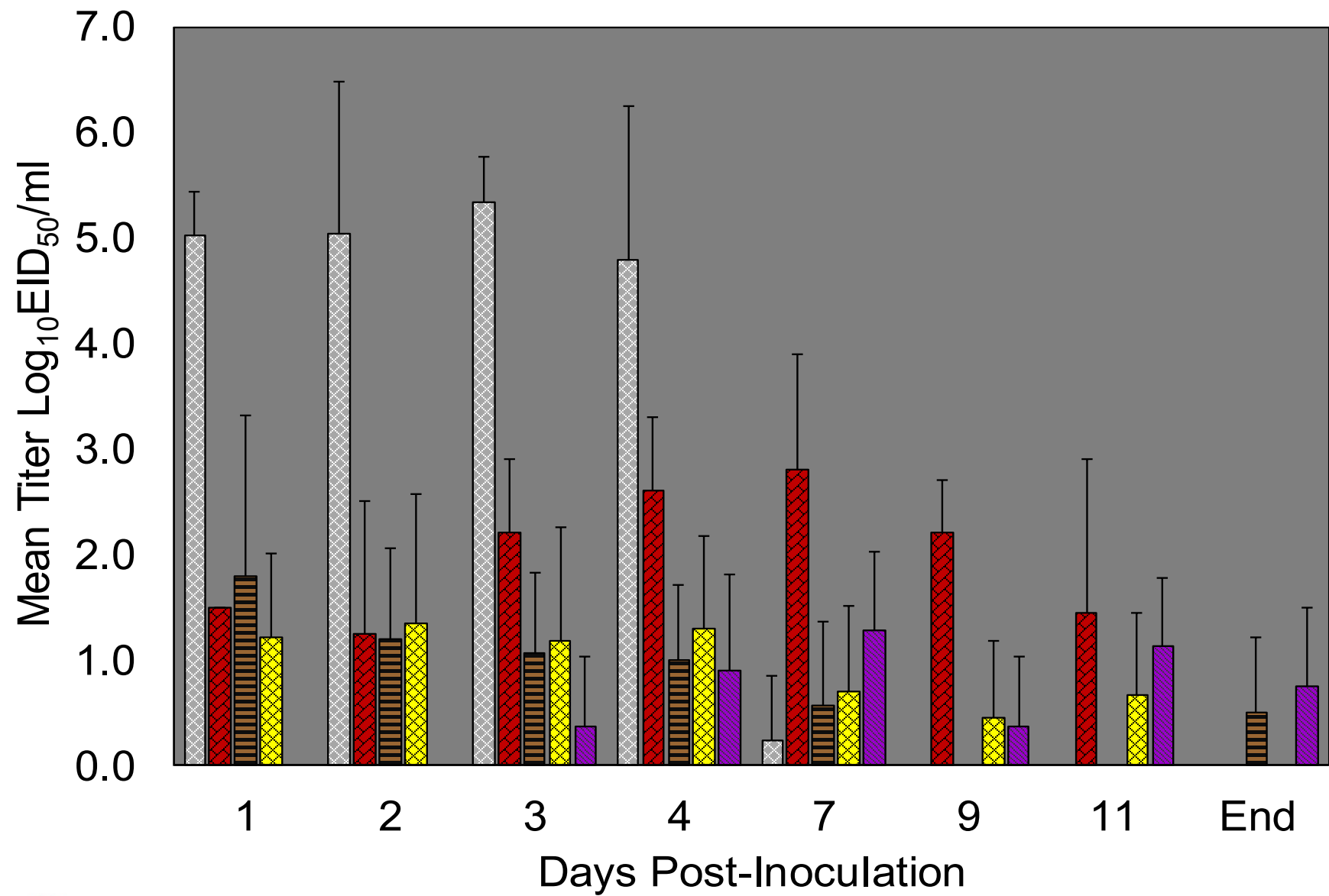
	Day 0	Day 1	Day 2	Day 3	Day 4	Day 7
NOCA						
BHCO						
HOFI						
AMGO						

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 7	Day 9
NOCA							
BHCO							
HOFI							
AMGO							

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 7	Day 9	Day 11
NOCA								
BHCO								
HOFI								
AMGO								

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 7	Day 9	Day 11	Day 14
NOCA									
BHCO									
HOFI									
AMGO									

	Day 0	
NOCA		<p>2/2 shed virus</p> <p>2/2 seroconverted</p> <p>Maximum titer shed = $10^{3.9}$ EID₅₀/ml</p>
BHCO		<p>3/3 shed virus</p> <p>1/3 seroconverted</p> <p>Maximum titer shed = $10^{3.7}$ EID₅₀/ml</p>
HOFI		<p>4/4 shed virus</p> <p>0/4 seroconverted</p> <p>Maximum titer shed = $10^{1.9}$ EID₅₀/ml</p>
AMGO		<p>7/7 shed virus</p> <p>0/7 seroconverted</p> <p>Maximum titer shed = $10^{3.1}$ EID₅₀/ml</p>



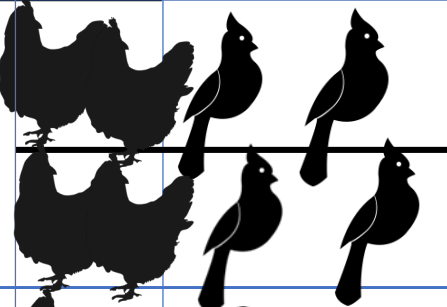
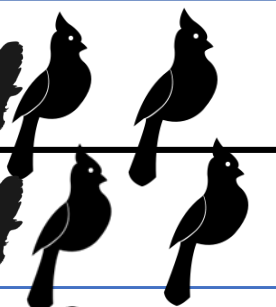


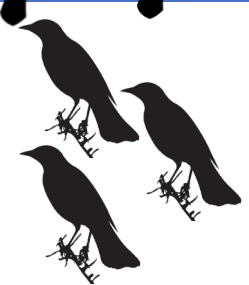

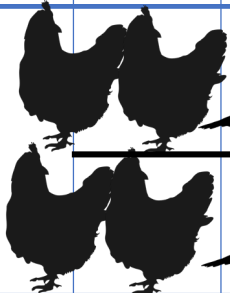
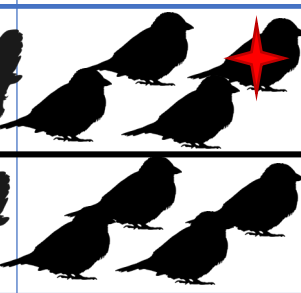

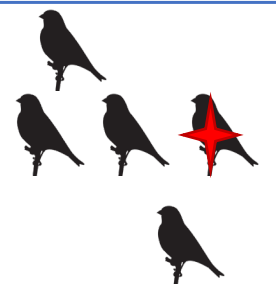
CHIX

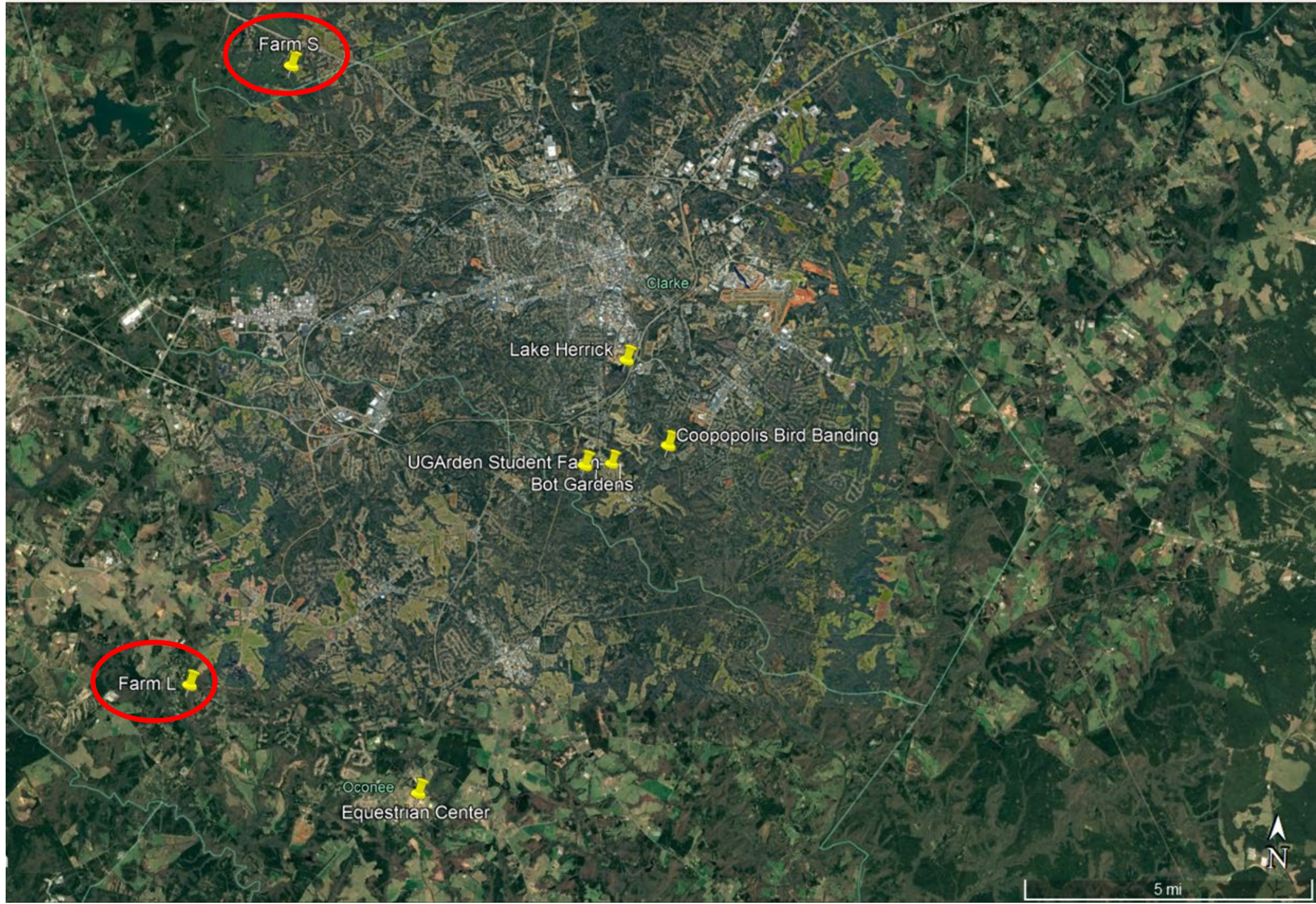
NOCA

BHCO

AMGO

HOFI

	Experiment 2 (Birds Exposed to One Chicken)			Experiment 3 (Birds Exposed to Two Chickens)		
NOCA					0/4 shed virus (2 groups) 0/4 seroconverted Maximum titer shed = NA	
BHCO		0/3 shed virus 0/3 seroconverted Maximum titer = NA			0/3 shed virus 0/3 seroconverted Maximum titer shed = NA	
HOFI		0/4 shed virus 0/4 seroconverted Maximum titer = NA			1/8 shed virus (day 13 – RTPCR) 0/8 seroconverted Maximum titer shed = CT = 29.9	
AMGO					1/5 shed virus (orally, day 7 – VI) 0/5 seroconverted Maximum titer = $10^{1.5}$ EID ₅₀ /ml	



Farm S

Clarke

Lake Herrick

Coopopolis Bird Banding

UGarden Student Farm
Bot Gardens

Farm L

Oconee
Equestrian Center

5 mi

N

Year 2: LaSota Transmission between an Enclosed vs. Free-range Flock



Far S: chickens enclosed; n=9 chickens
N=43 wild birds prior to experiment



Farm L: chickens free-range; n=16 chickens
N=31 wild birds prior to experiment

Backyard Chickens

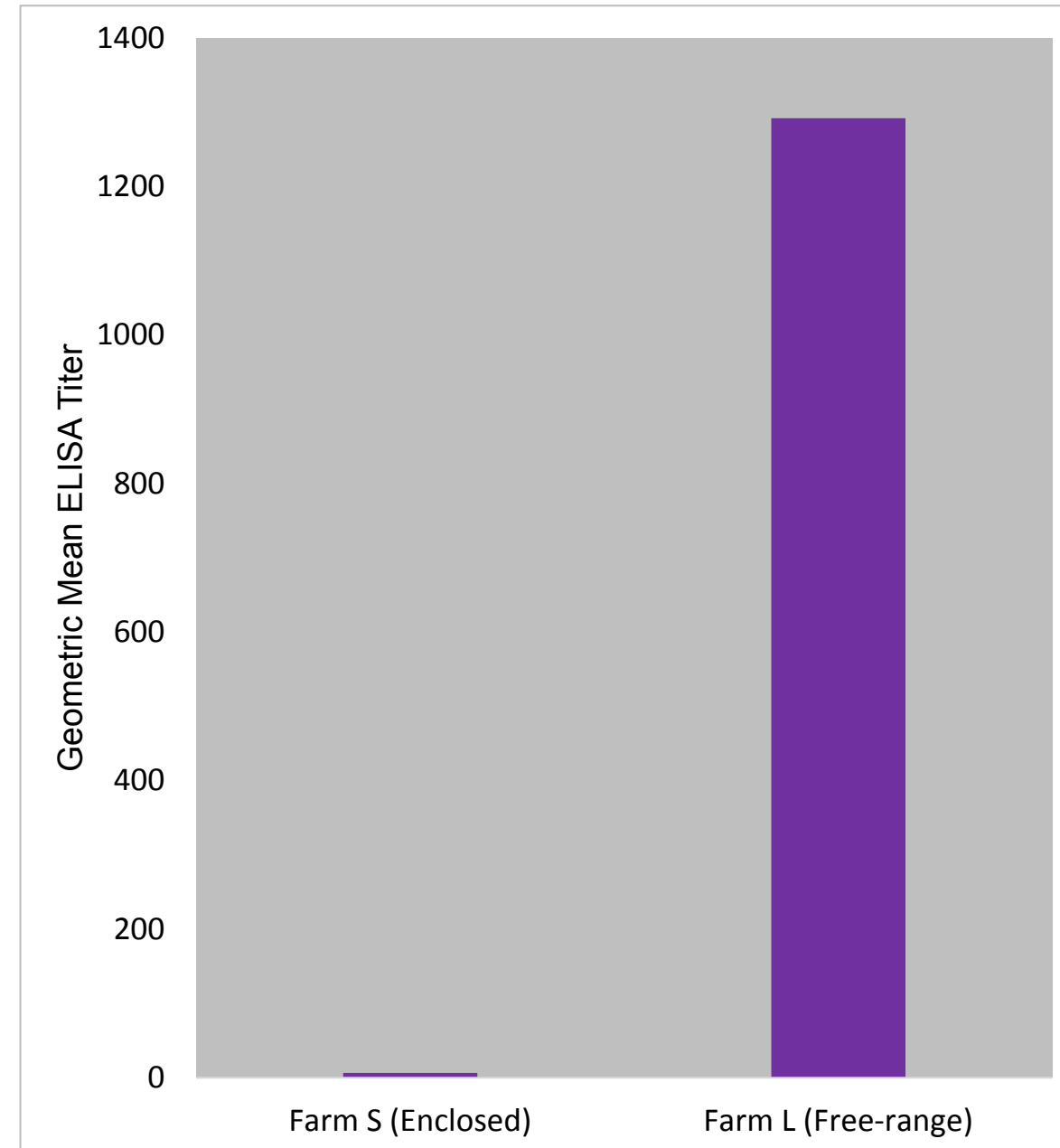
Physical exams

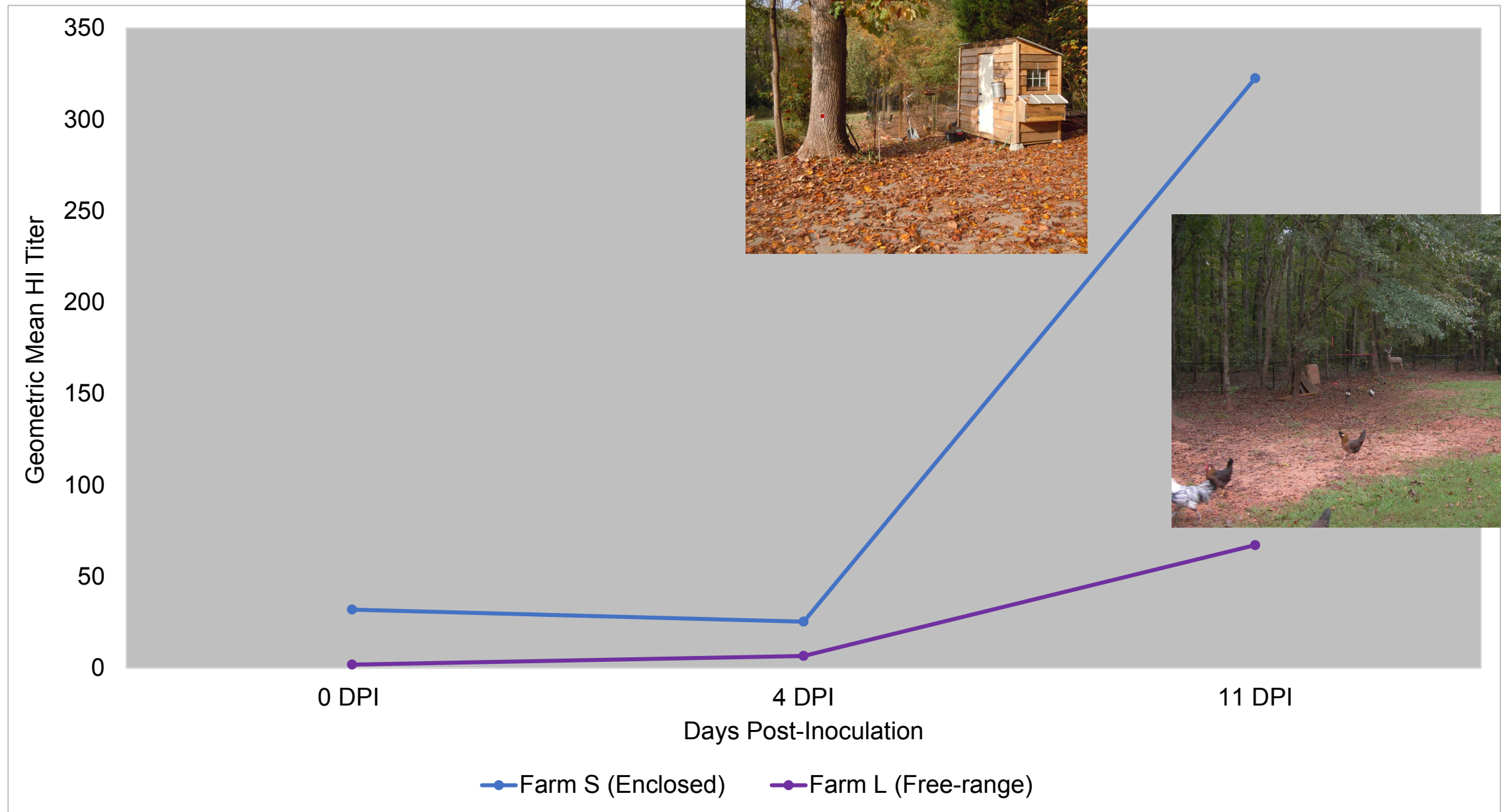
Biological sample collection

- serum: 0, 4, 11, and 18 DPI for NDV antibodies by HI
- swabs: 0, 7, 9, 11, 13, 18 for VI and rtPCR
- Mycoplasma* spp by ELISA



ELISA for *Mycoplasma* spp





Wild Bird Captures at Farm S (enclosed)

- N=43 wild bird prior to inoculation
 - NEG for NDV
- N=83 wild birds after inoculation

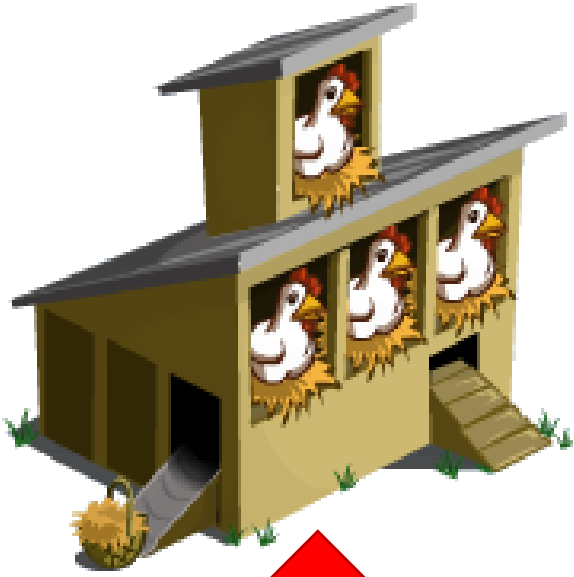
Wild Bird Captures at Farm L (free-range)

- N=31 wild bird prior to inoculation
 - NEG for NDV
- N=56 wild birds after inoculation

Results (rt-PCR & HI) in progress...



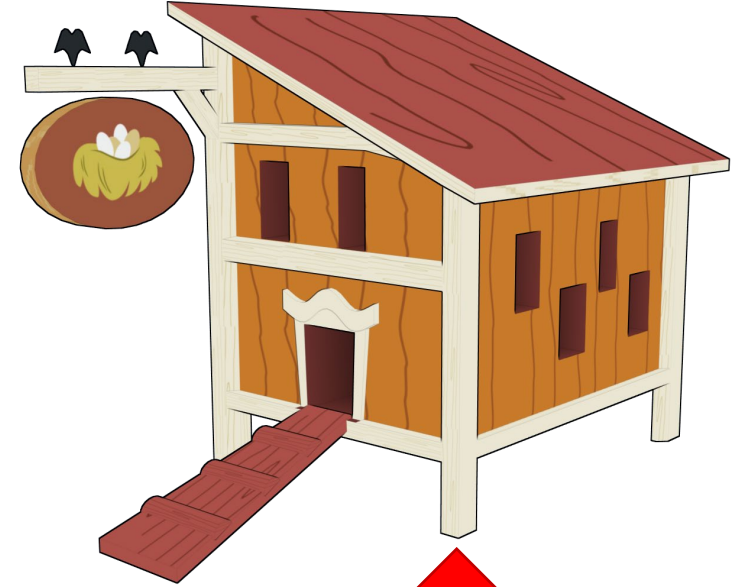
Year 3: Behavioral/Occupancy Study



Farm S (Enclosed)



Farm L (Free-range)

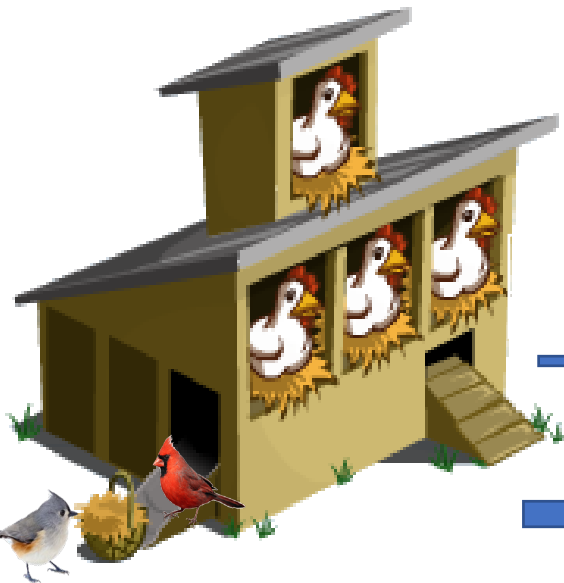


Farm C (No Chickens)

Sites were observed to record avian presence 2X/week from February—May, 2018 at 3 Farms



In/At Coop Pen

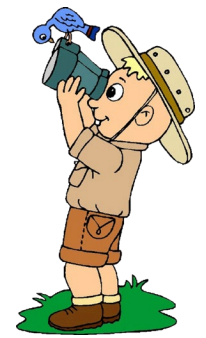


Coop to 10 m

10 m to 25 m

25 m to 50 m

Fly over





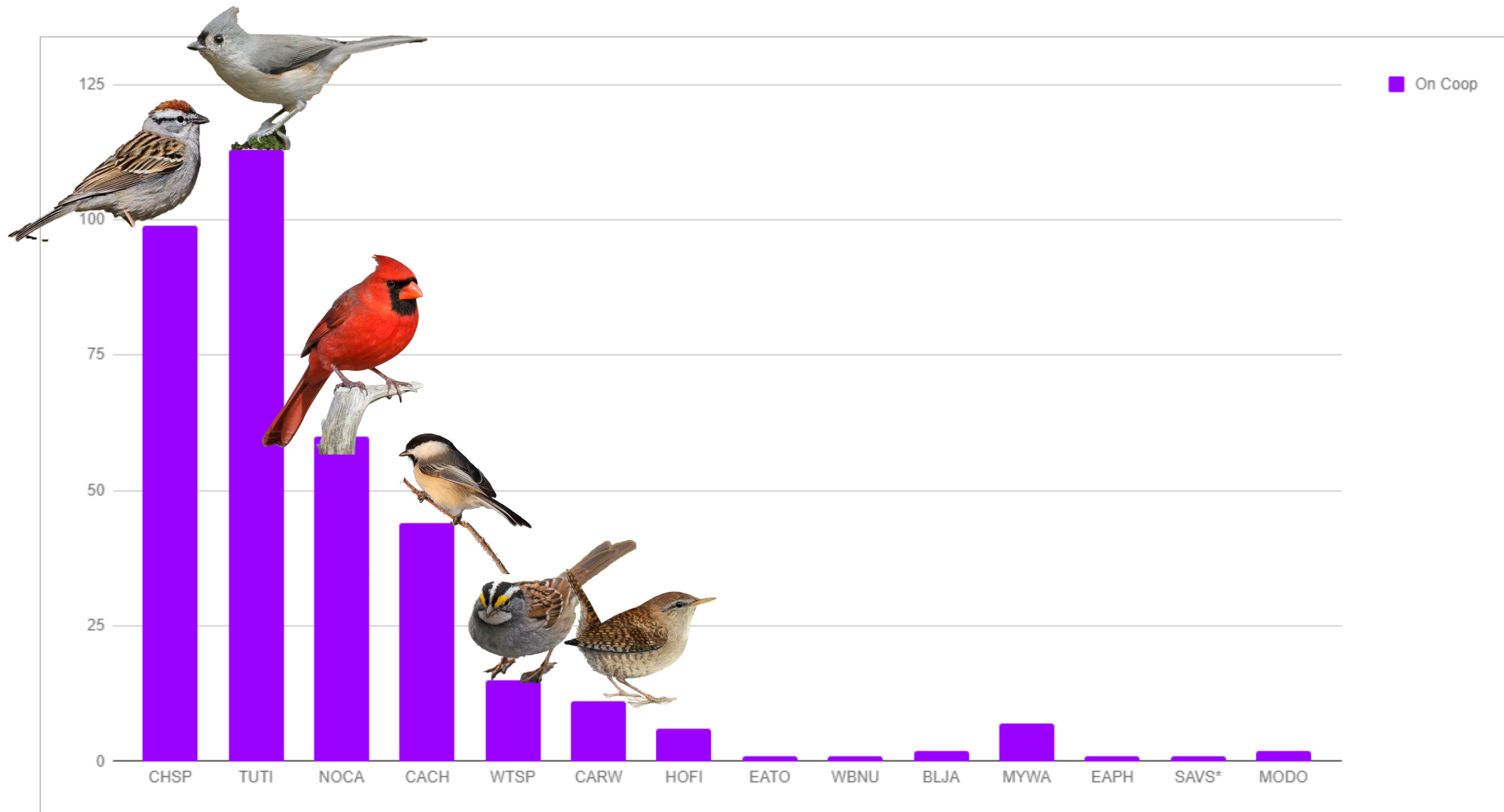
12°C



01/29/10

07:52PM

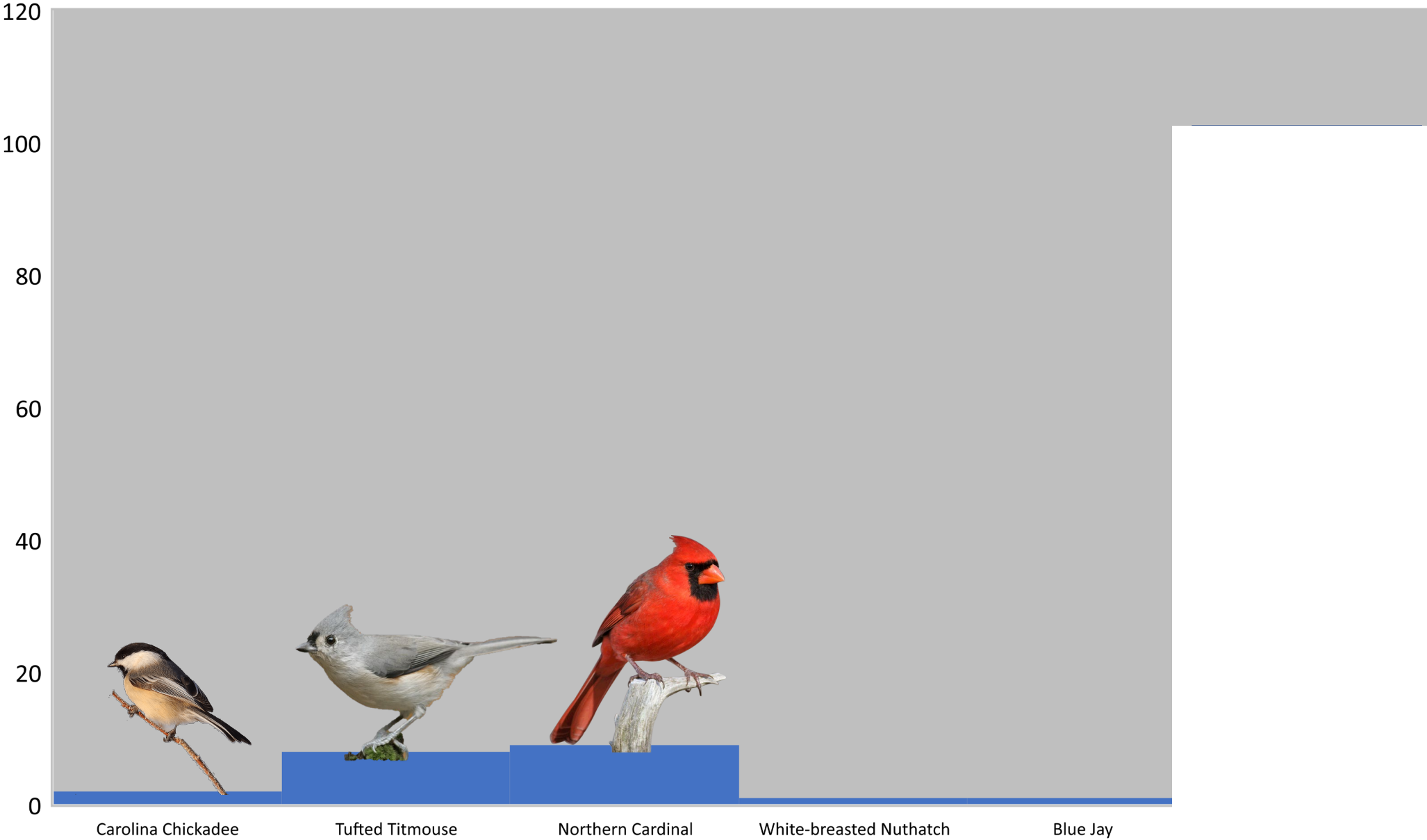
EAST LINE



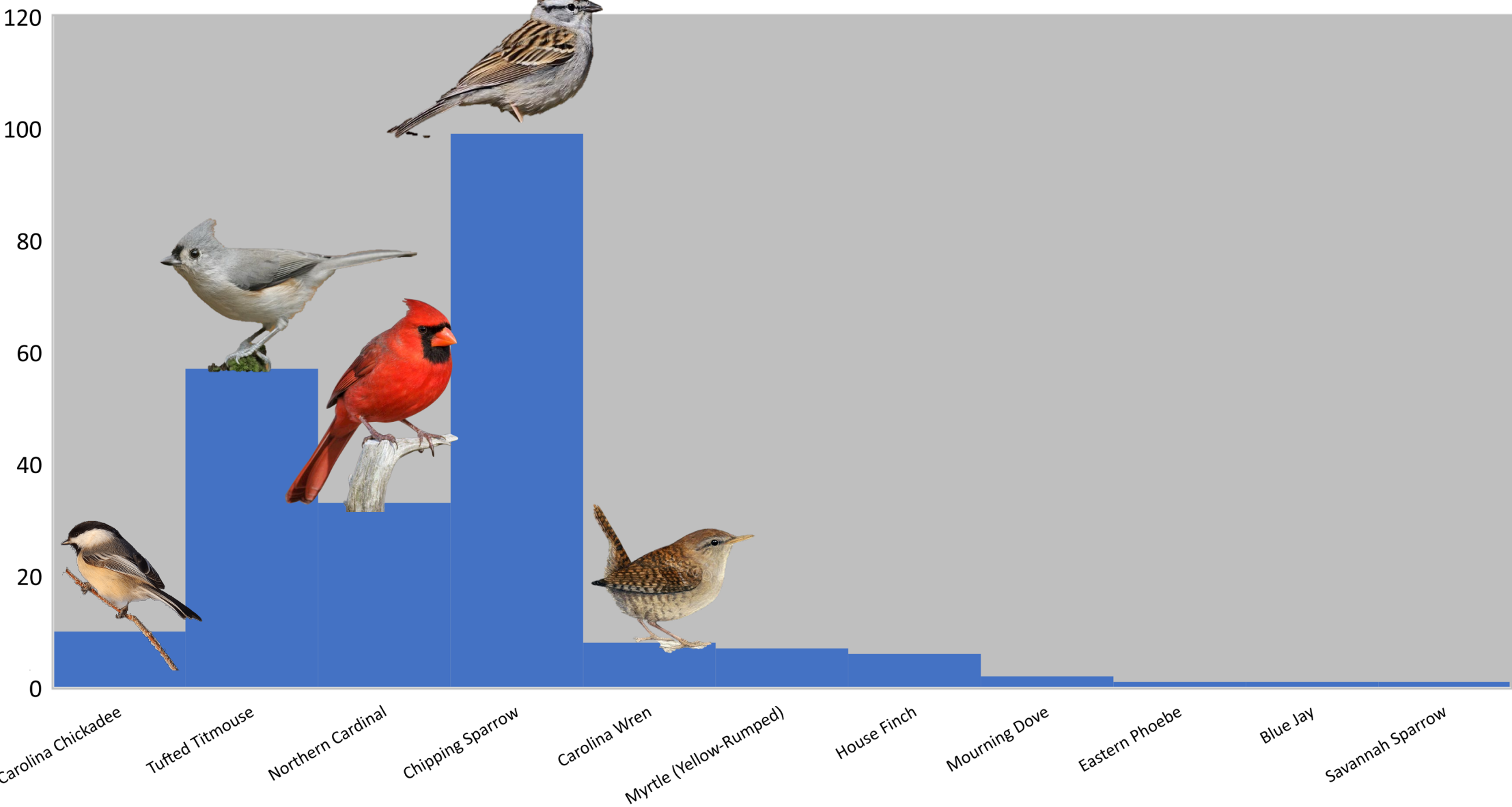
Farm C (no chickens) of Species in Coop



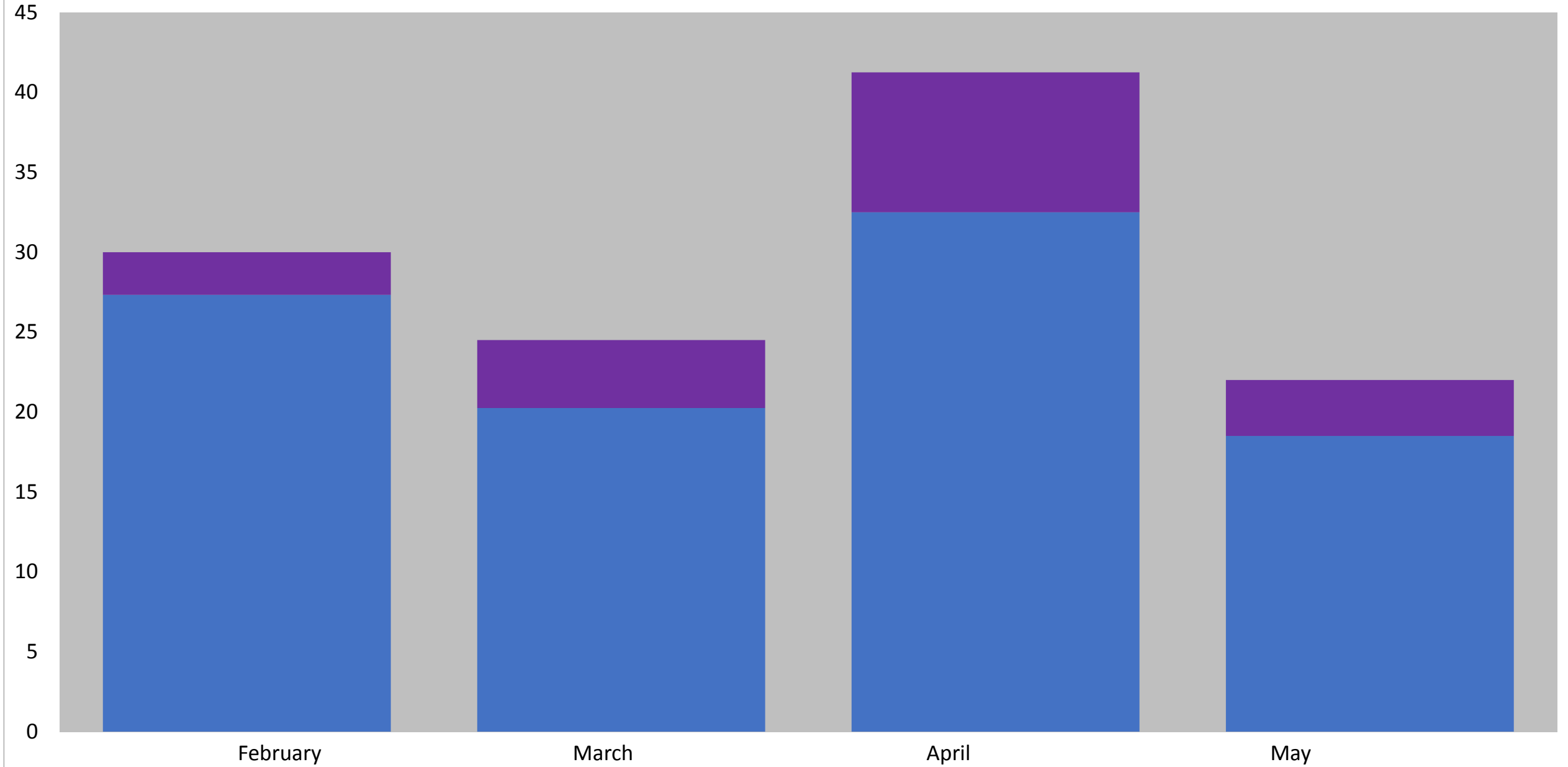
Farm L (free-range) of Species in Coop



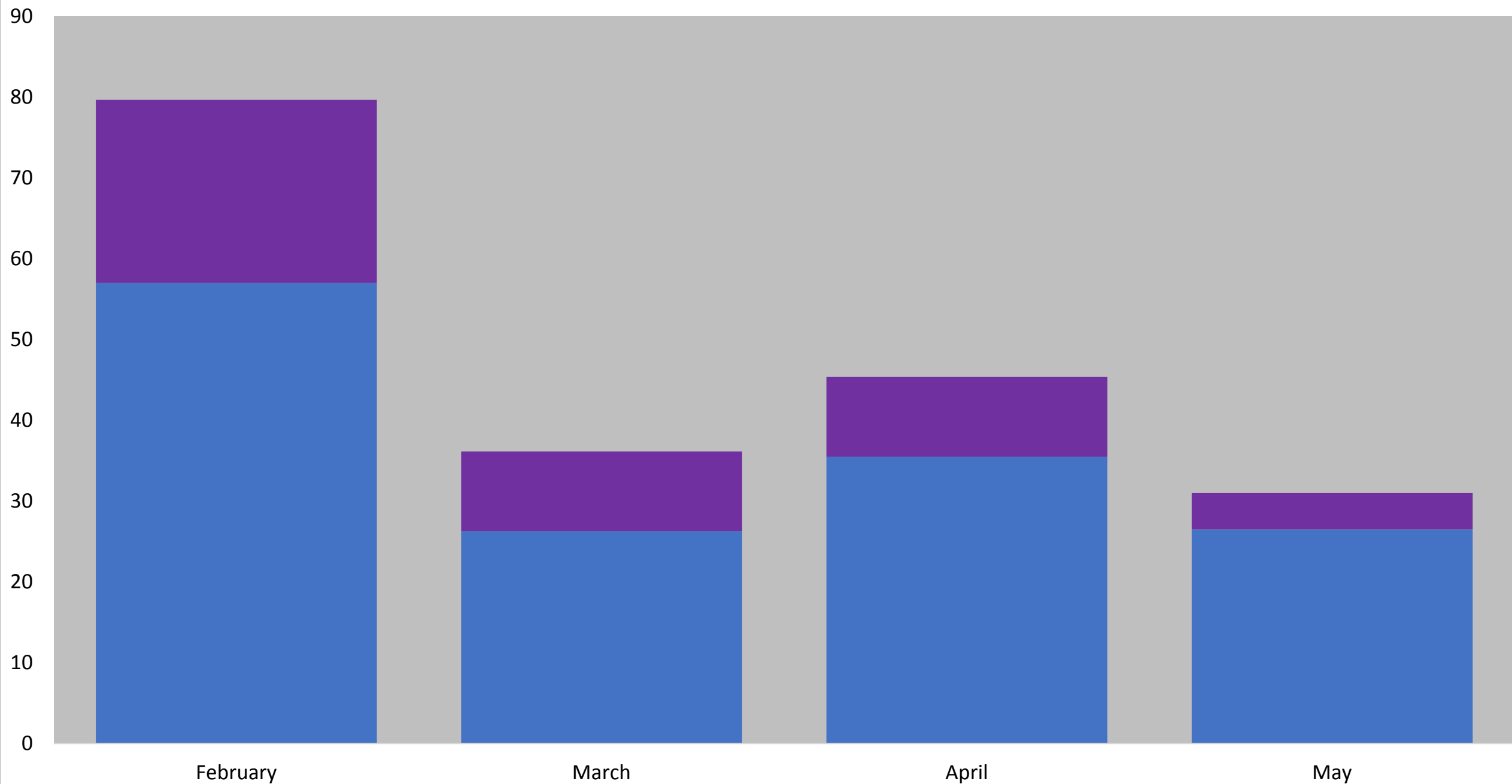
Farm S (enclosed)of Species in Coop



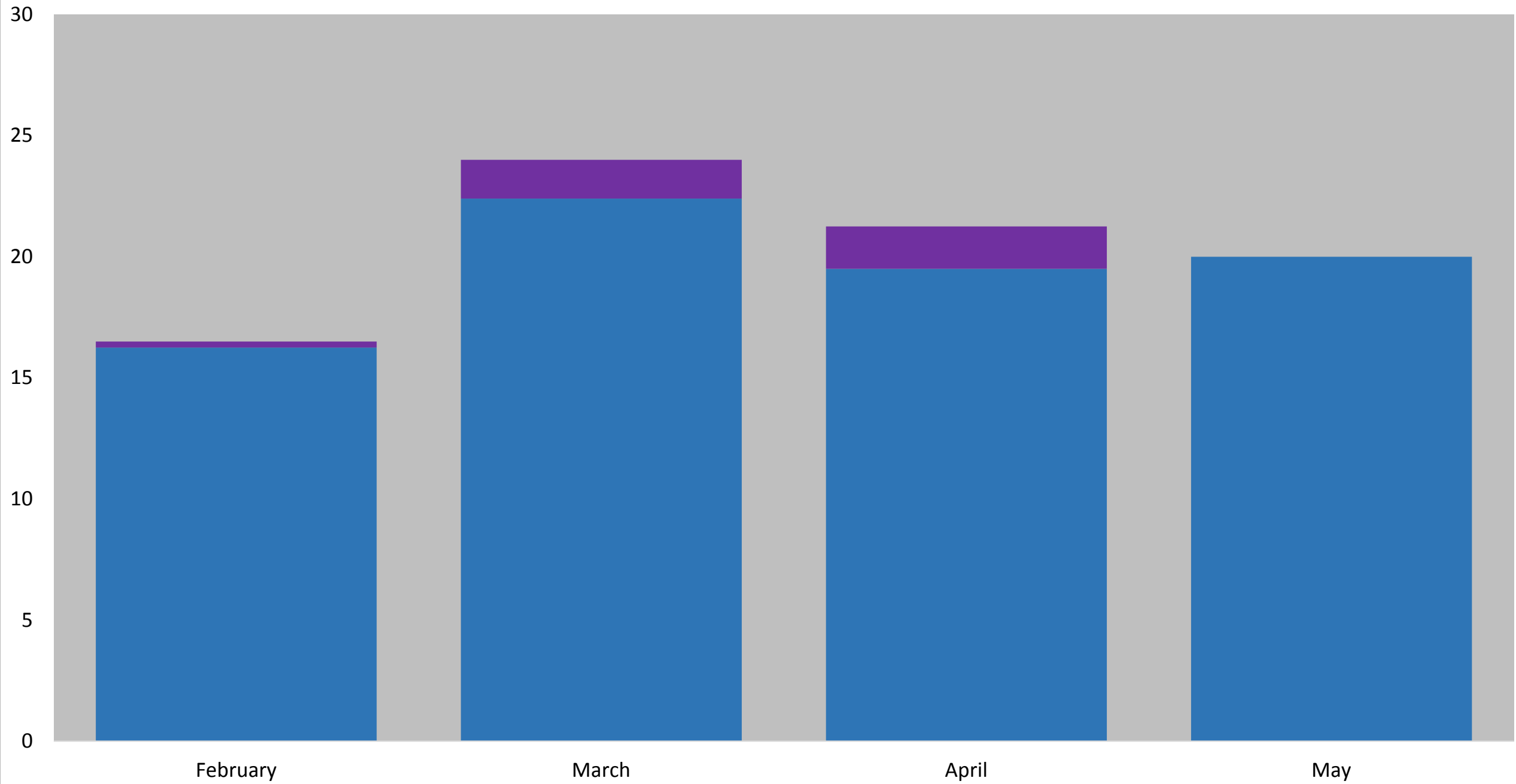
Farm C—No Chickens



Farm S—Enclosed



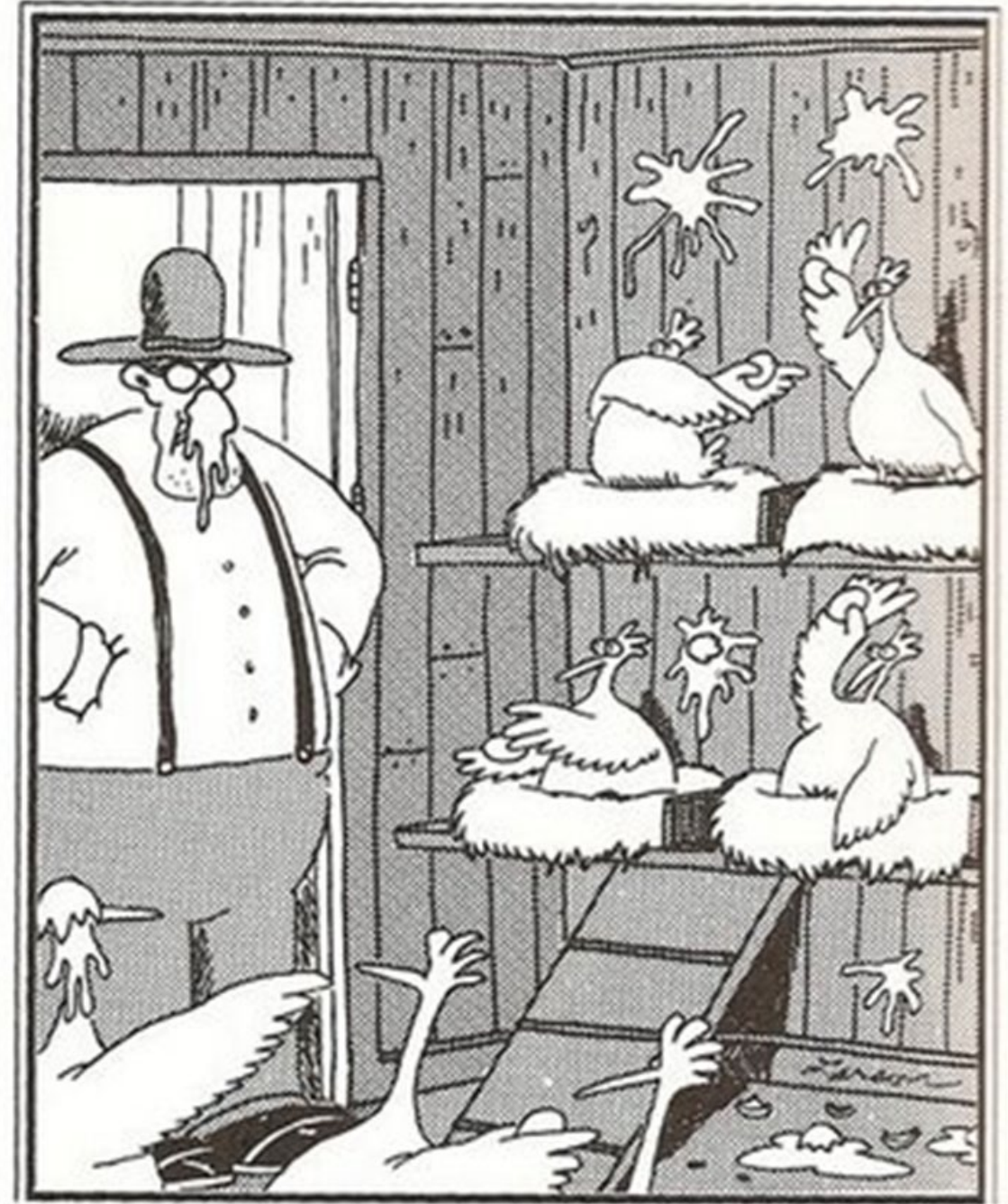
Farm L—Free-range



Thank you for your Attention!

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Fred Torpy
Taylor Ellison
Sam Furey
Catie Welch
Anje Kidd
Carly Crow
Courtney Camp
Marissa Crowe
C. Ron Carroll
Michael J. Yabsley



As quickly as it had started, the egg fight was over.