Future development of animal welfare science and use of new technologies

Jeremy N. Marchant-Forde

USDA-ARS, Livestock Behavior Research Unit

Trending topics - Focused

Search Term	Publications % change 2011 to 2015	Citations % change 2011 to 2015
Animal Welfare (AW)	**44**	**68**
AW + Behavior	27	64
AW + Aggression	5	26
AW + Cortisol	14	68
AW + Physiology	-25	54
AW + Emotions/Cognition	19	118
AW + Play	72	73
AW + Heart rate variability	140	145
AW + Technology/Automation	140	75

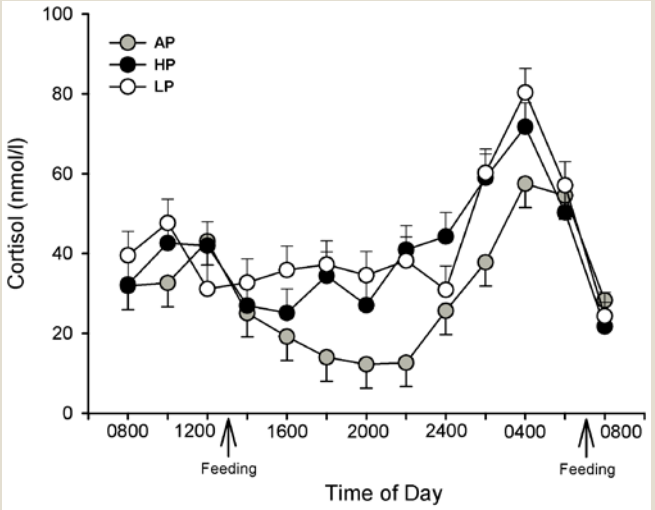
Trending topics - Broad

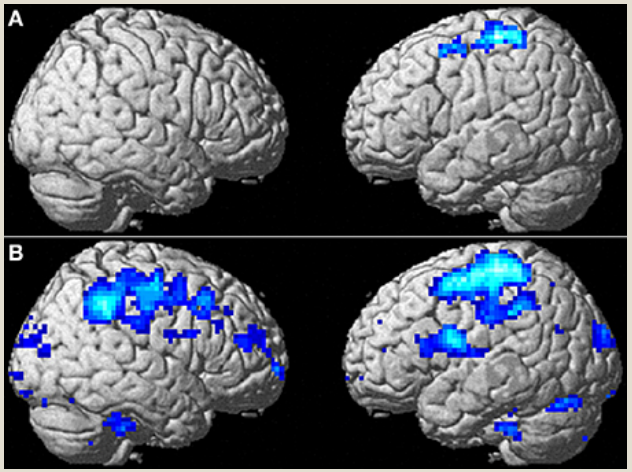
Search Term	Publications % change 2011 to 2015	Citations % change 2011 to 2015
Animal Welfare (AW)	**44**	**68**
AW + Food Safety	-31	21
AW + Sustainability	58	136
AW + Climate Change	50	586
AW + Food Security	250	900

So where's the shift?

Animal Welfare in Focus

- Less attention on the "negative"
- Less work on older, traditional indicators
  - Cortisol
  - Behavior
  - Aggression
- More attention on the "positive"
- More work on newer, refined indicators and/or "easier" ways to collect data
  - Emotions
  - Play
  - Technology





So where's the shift?

Animal Welfare and the "Big Picture"

- Animal welfare continues to be an important societal concern
- Animal welfare is accessible and interesting to the public
- "Animal Ambassadors"
- Increasingly, animal welfare is integral part of greater societal concerns

How do the trends in science and public concern complement with OIE Recommendations for Animal Welfare?

Key wording in OIE's definition:

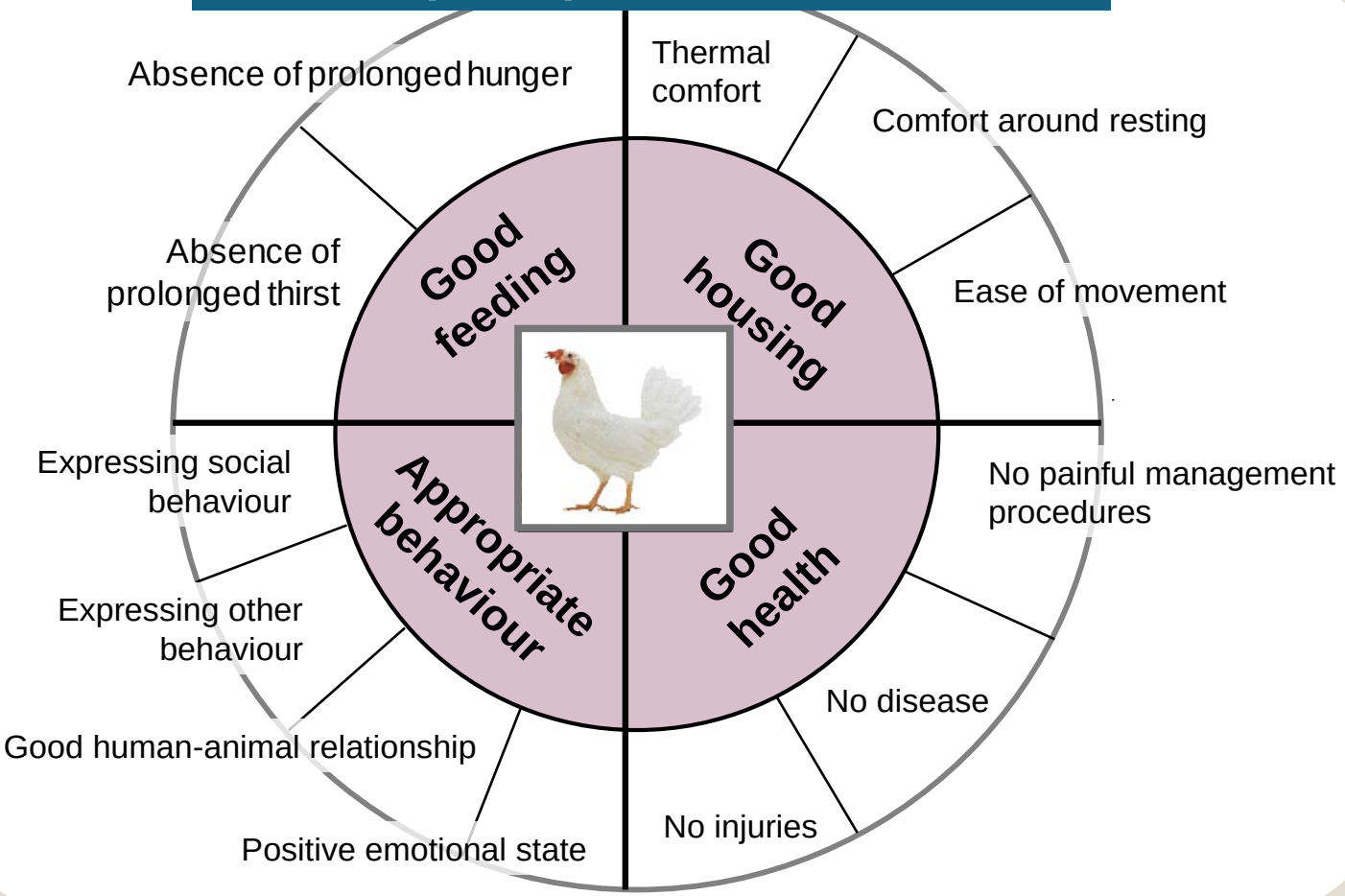
- Animal welfare means how an animal is coping with the conditions in which it lives
- An animal is in a good state of welfare if it is:
  - Healthy
  - Comfortable
  - Well-nourished
  - Safe
  - Able to express innate behavior
  - Not suffering from unpleasant states such as pain, fear and distress

- There is more focus on the animal itself: animal-based measures

The Welfare Quality® System

Welfare® Quality
Science and society improving animal welfare

Four principles and 12 criteria



Animal based measures

Thermal

Broiler feet

Photos: Butterworth and de Jong

behaviour

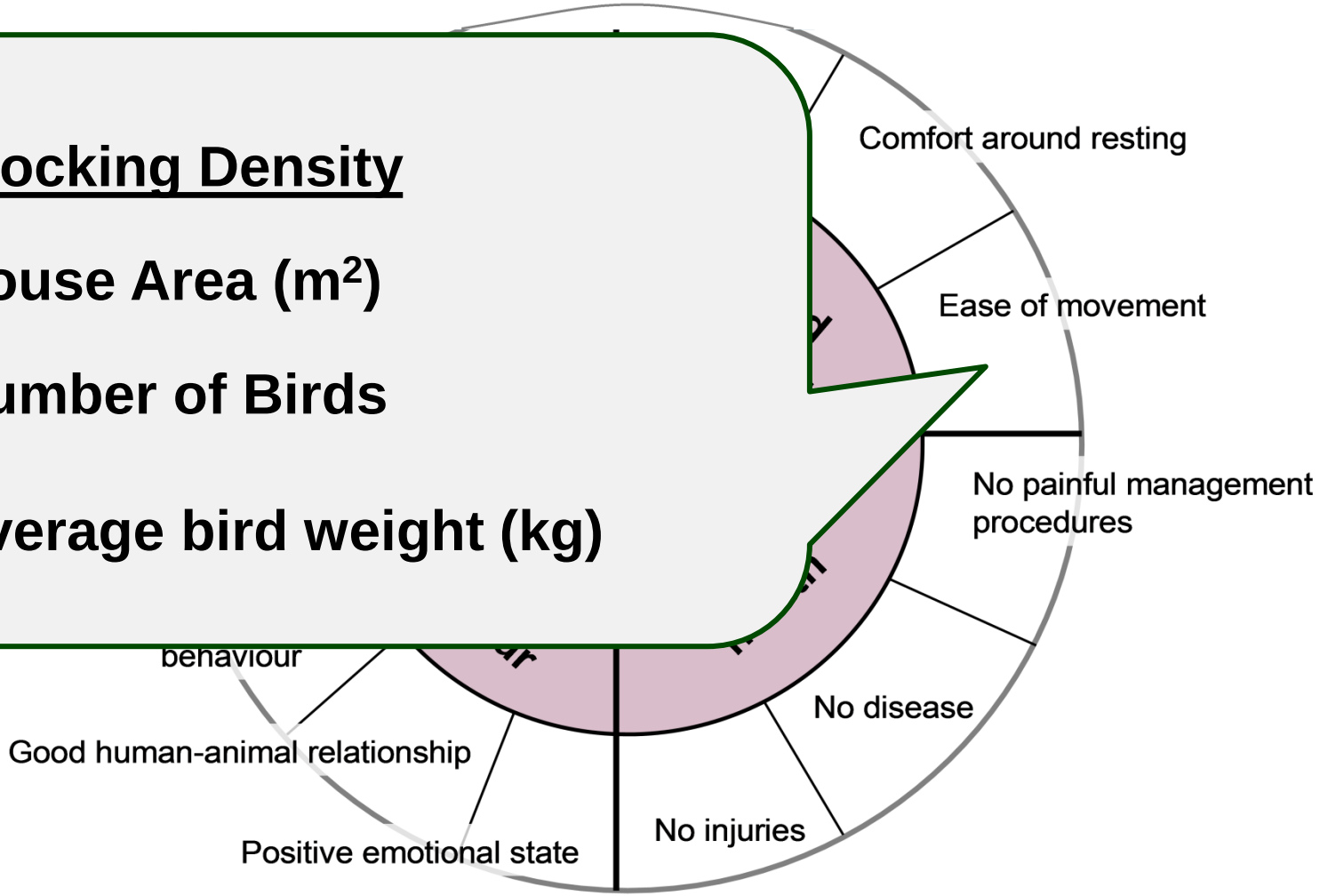
No disease

Good human-animal relationship

No injuries

Positive emotional state

Resource based measures

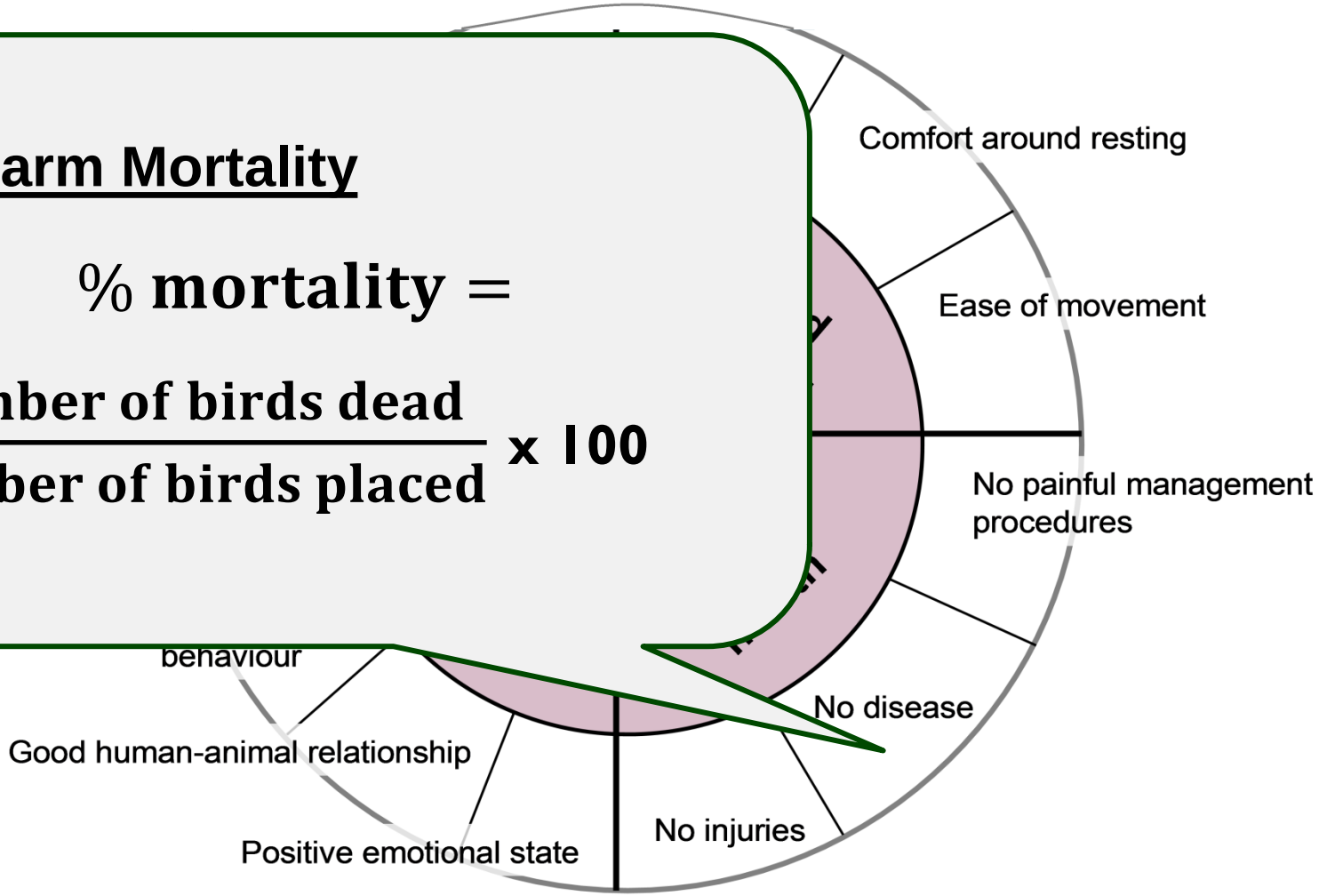


Stocking Density

House Area (m^2)

Number of Birds
or
Average bird weight (kg)

Management based measures



On Farm Mortality

$$\% \text{ mortality} = \frac{\text{Number of birds dead}}{\text{Number of birds placed}} \times 100$$

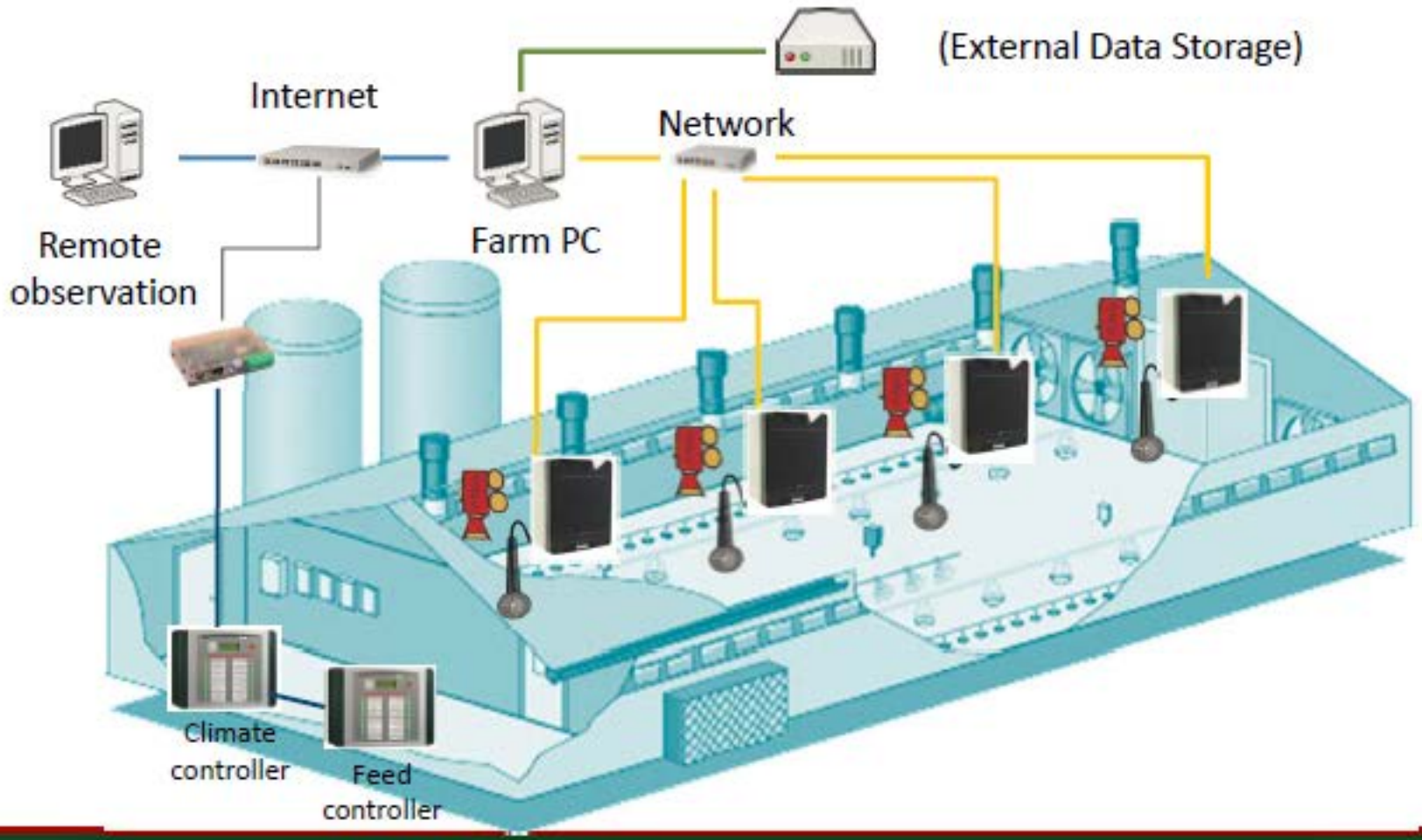
Welfare Assessment

Technology/Automation

On farm

- Major European Union project on Precision Livestock Farming (EU-PLF) just completed, led by Daniel Berckmans
  - http://www.eu-plf.eu/
- Focused on pigs, dairy cattle and broiler chickens

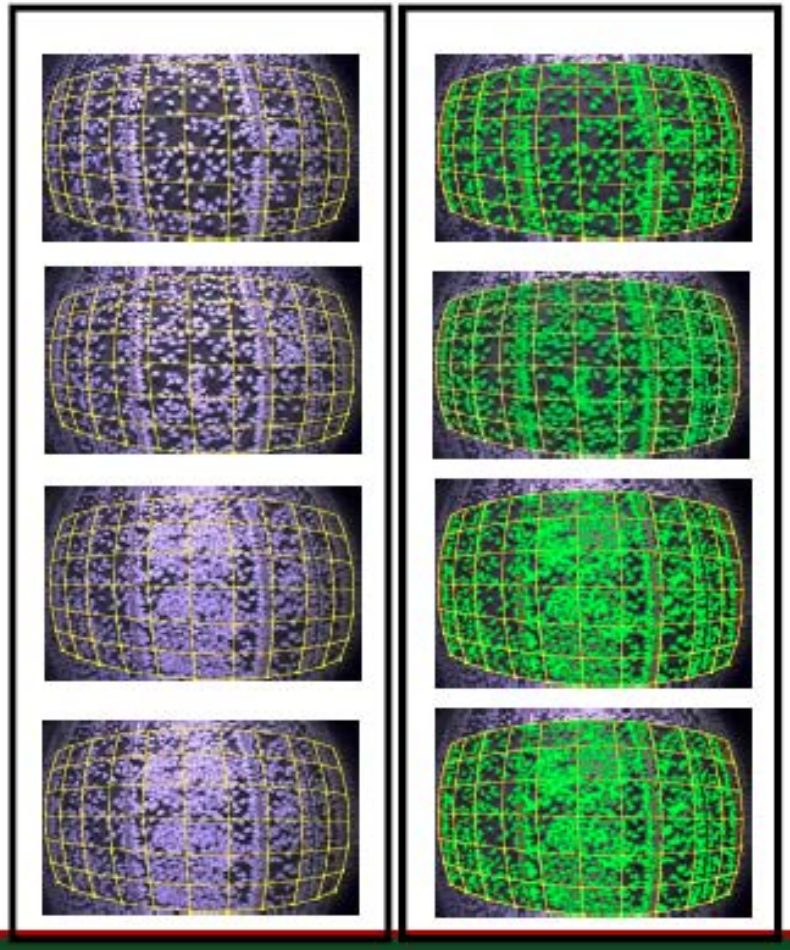
Data collection



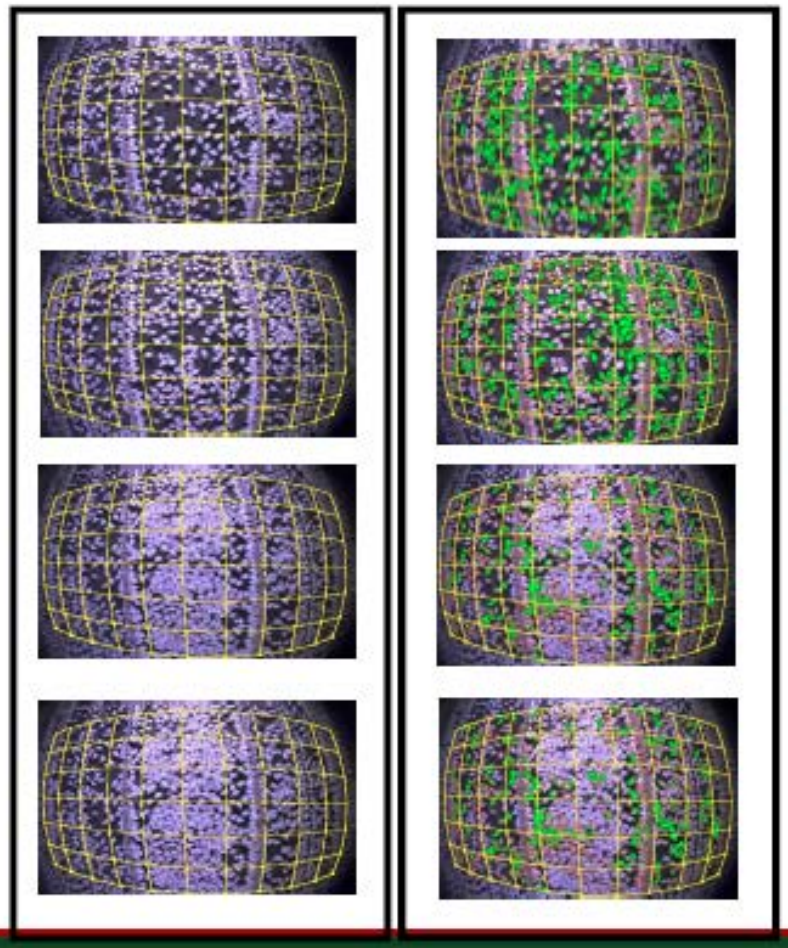
PLF applications

1. Early warnings based on camera observations
2. Risk factor for leg problems
3. Human – Animal relationship
4. Sound monitoring
5. Emission reduction

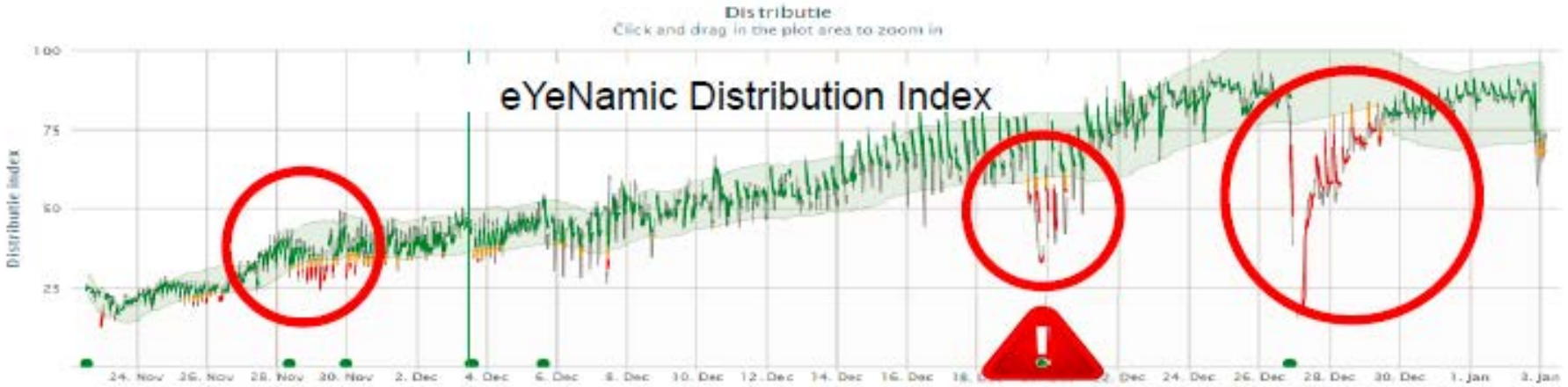
eYeNamic: Distribution



eYeNamic: Activity



eYeNamic Early warnings



Farmer takes action:
removing feed blockage

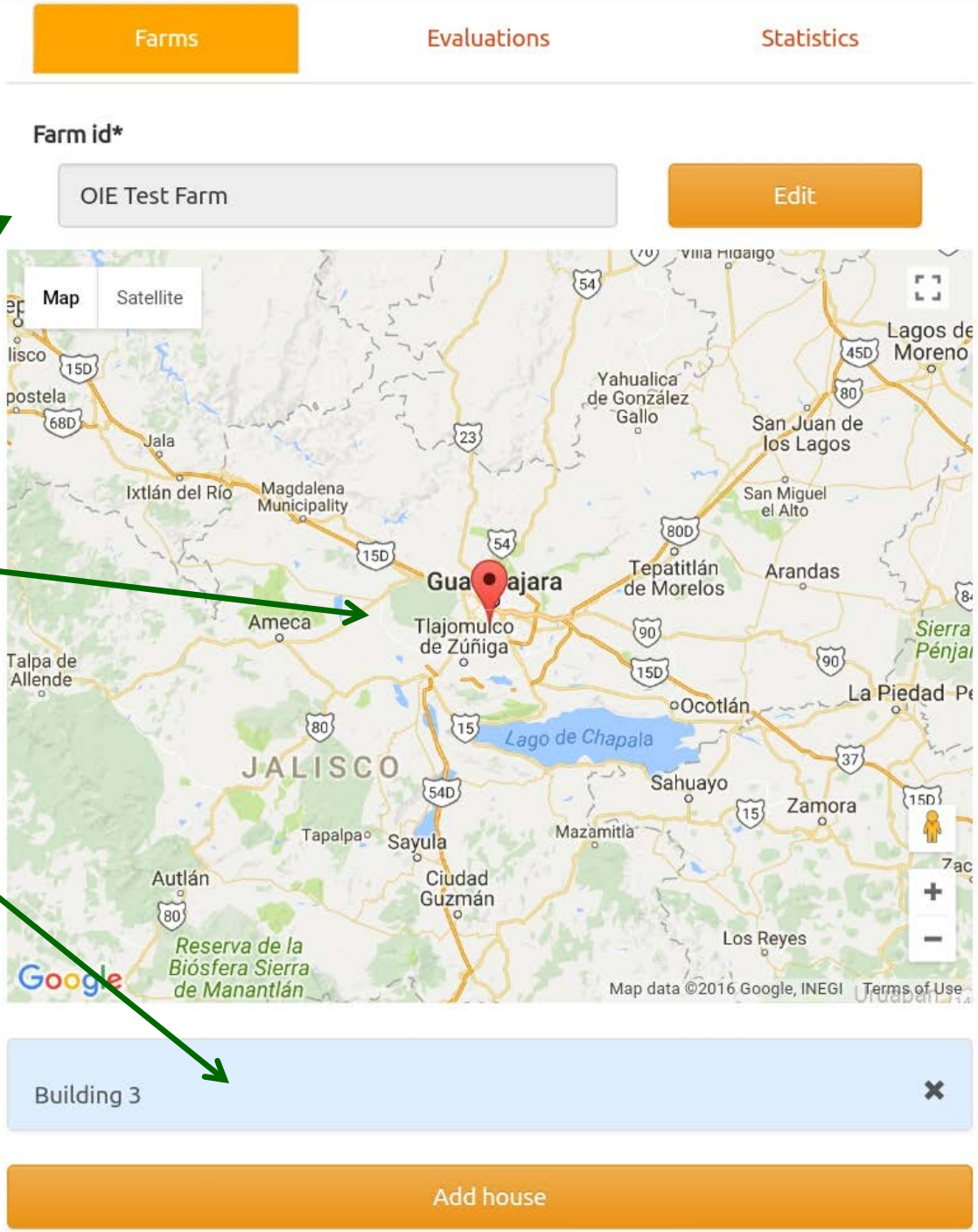
Technology

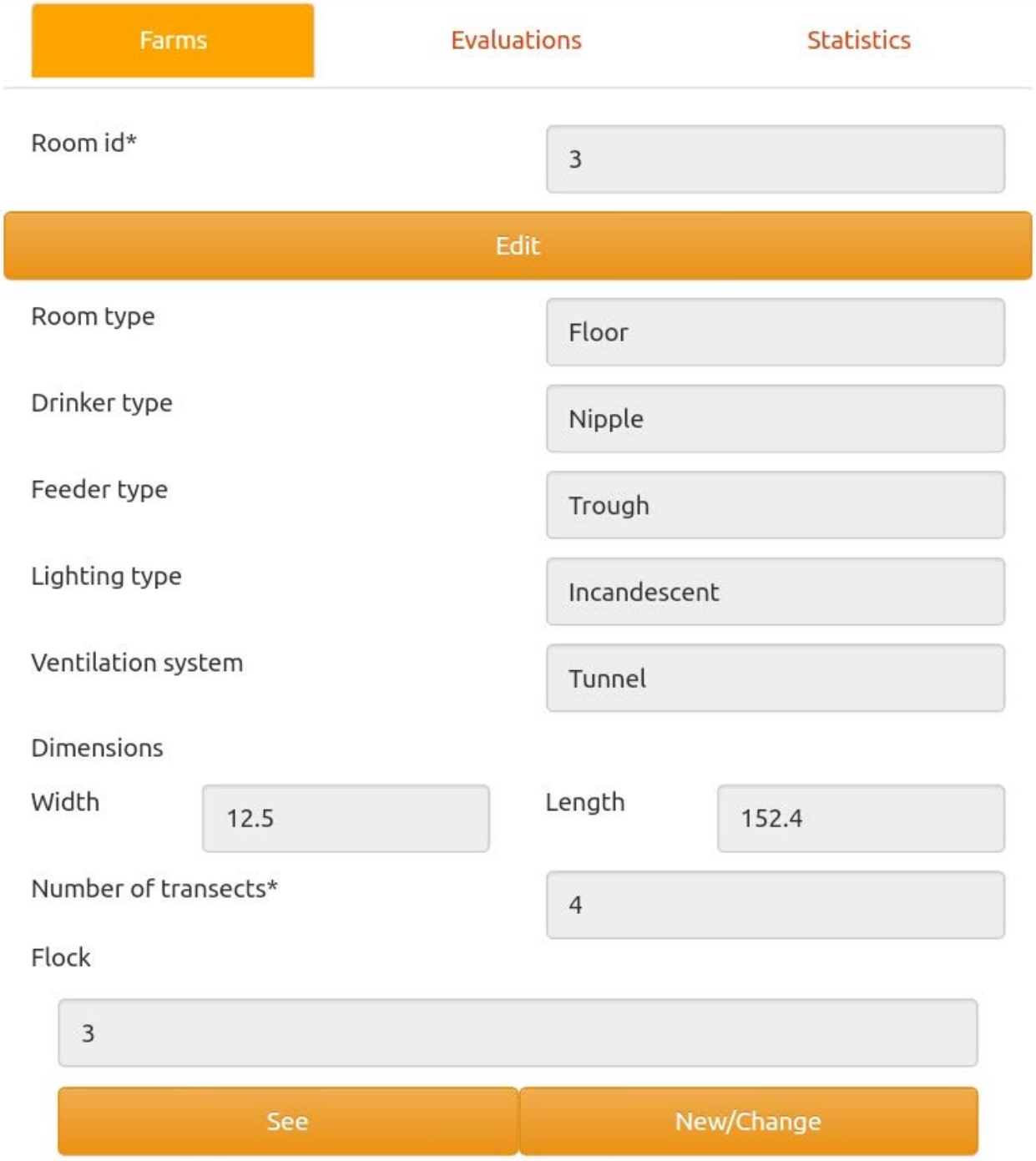
- Quantify health and welfare status of turkey flocks in a standard, science-based way
- Statistics tool allows users to compare results to previously evaluated flocks
- Housing and husbandry practices can be linked to bird performance, health and welfare

Enter farm ID

Enter farm location

Enter buildings



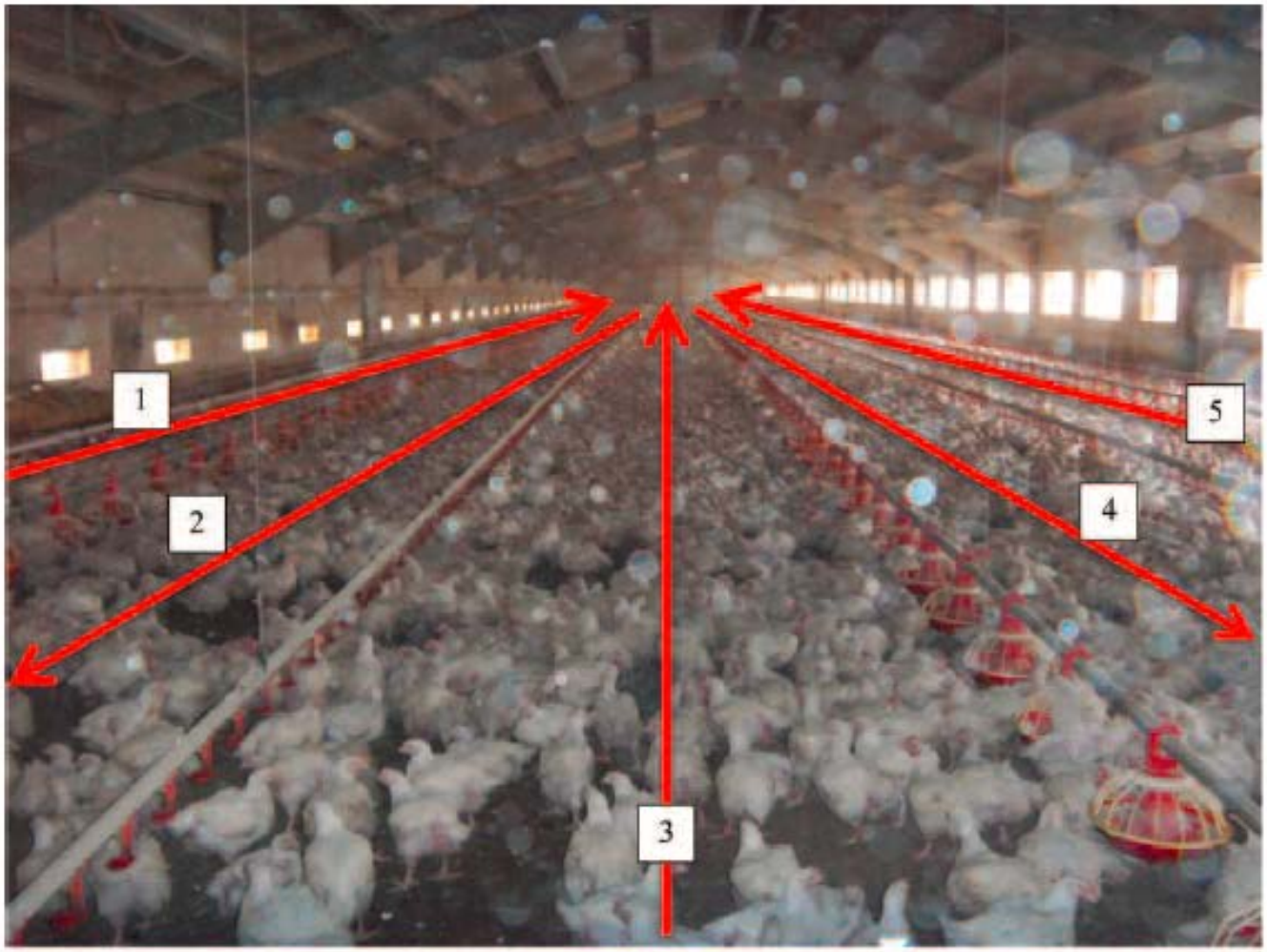

Farms
Evaluations
Statistics
Room id*
3
Edit
Room type
Floor
Drinker type
Nipple
Feeder type
Trough
Lighting type
Incandescent
Ventilation system
Tunnel
Dimensions
Width
12.5
Length
152.4
Number of transects*
4
Flock
3
See
New/Change

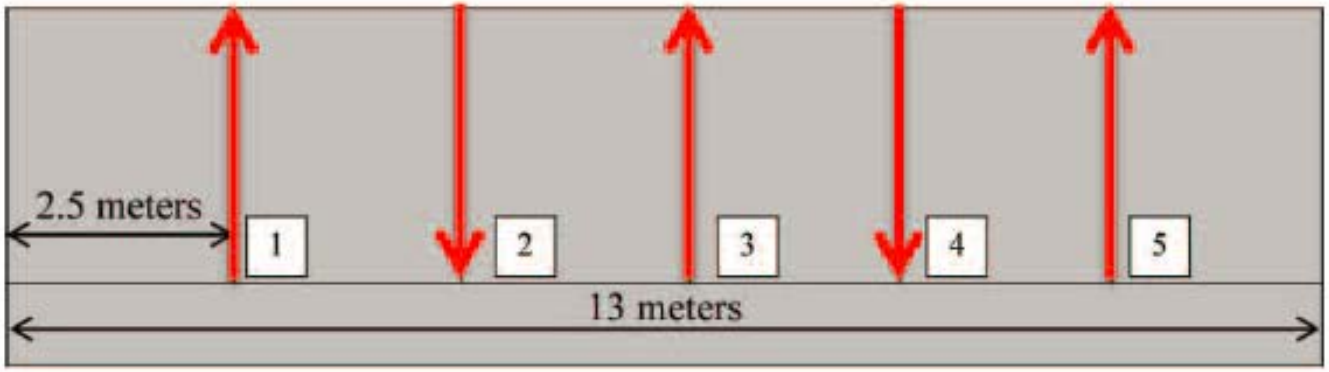
Farms | Evaluations | Statistics

Flock id*	3

Edit

Initial flock-size*	6600
Age at entrance* (w)	6
Flock of origin	OIE Example
Genetic line	Hybrid
Sex	Male
In-date*	9/1/2016
Out-date	11/6/2018





Building

13x150=1950m^2

Stocked @ 3/m^2

Transect 3=2m wide

Birds assessed= 900

e.g. 57 lame = 6.33%

Farms | Evaluations | Statistics

Transect:

Transect 2

Inmobile	Lamed 1	Dirty
Sick 1	Small 2	Dead
Head wounds	Back wounds	Tail wounds 2
Featherless 1	Terminally ill	Mating
Aggression to turkey	Interaction with human	
Add new category to same bird		
New Category		

Tail wounds - 2

Delete

Save transect

End Evaluation

Technology/Automation

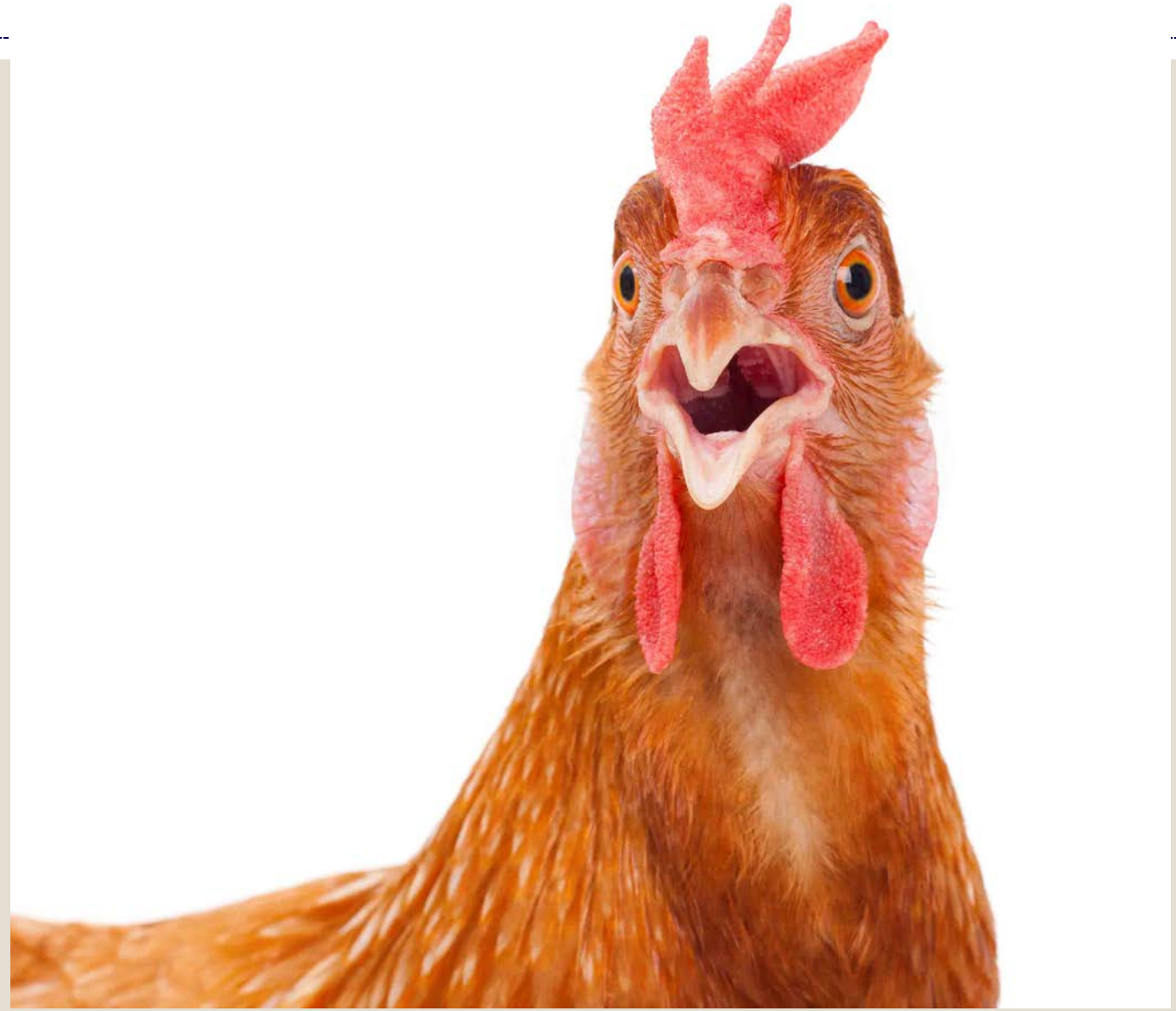
On farm

- Herd/Flock/Building level monitoring technology
- Some individual animal monitoring technology
- Some assessment tool technology

How do we facilitate:

- Development of new technology
- Application of technology used in other fields

Need for technologies that are:

- Low cost
- Flexible/adaptable
- Low energy
- Robust
- Automatic?
- User input?
- Resource-based measures?
- Animal-based measures?

Discussion!