



Future of the layers

Dr. David Cavero Pintado

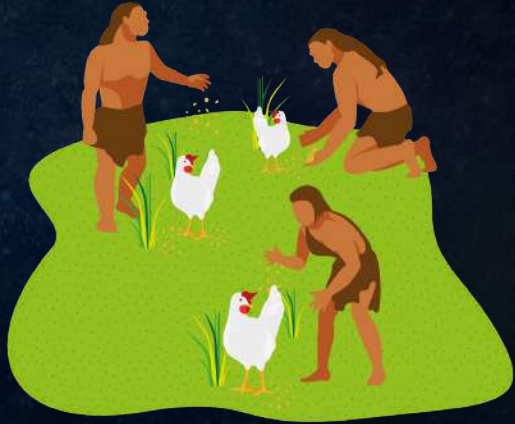
R&D Director

H&N Layer Academy, Philippines 2024

Evolution of the laying breeding sector

Continuous Progress

Past



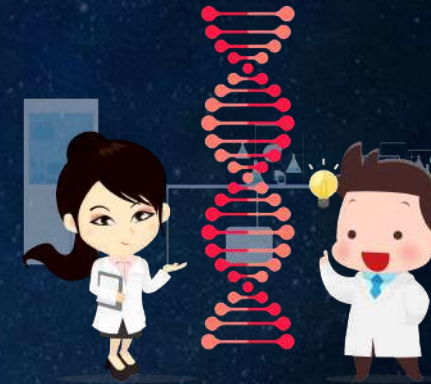
1930



1980



2010



2020



Pure lines – Breeding farms



Data Recording

Breeding Farms

Single Cages



Group Cages



Cage-Free



Data Recording

Field Testing – Commercial Farms

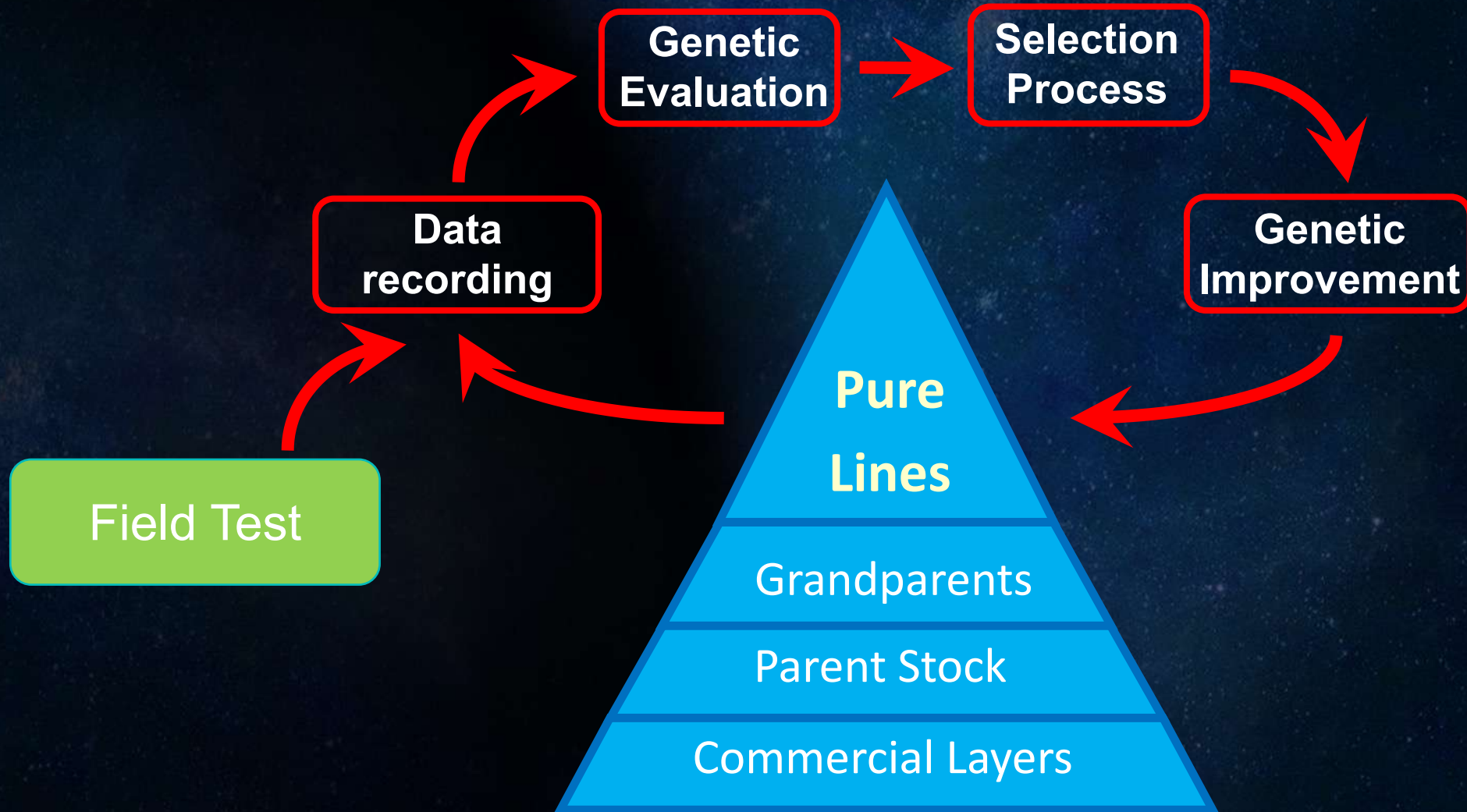
Group Cages



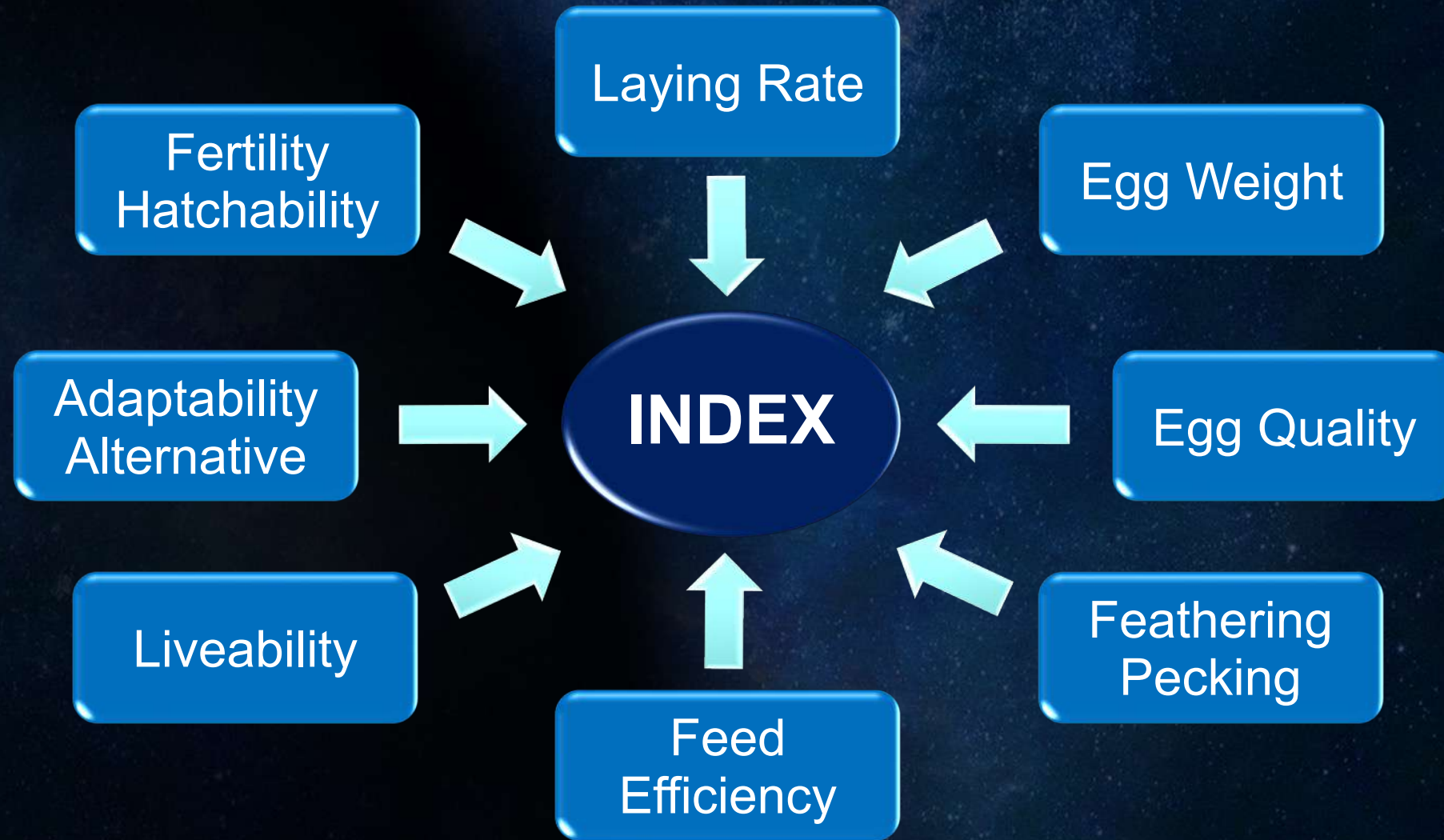
Free Range



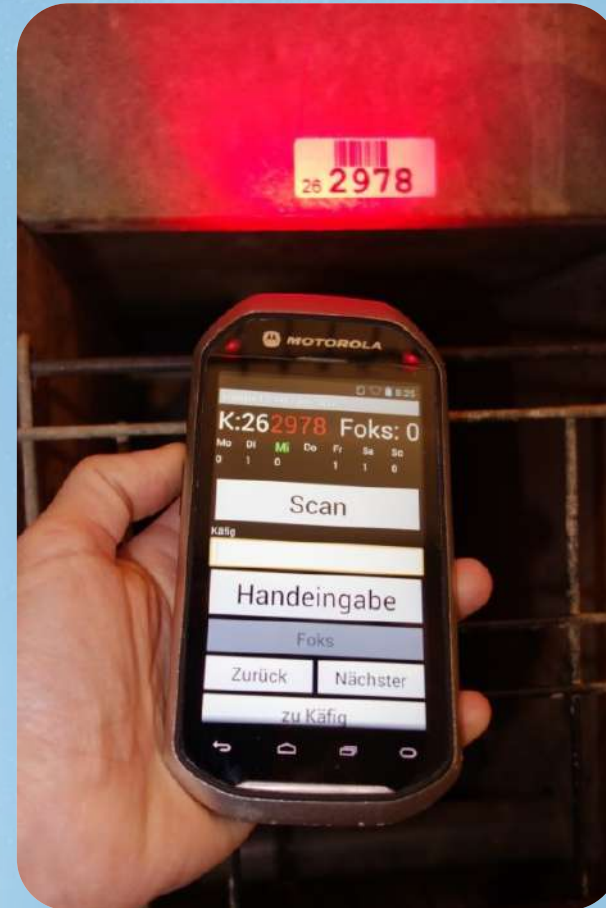
Structure of the Laying Breeding



Balanced Selection

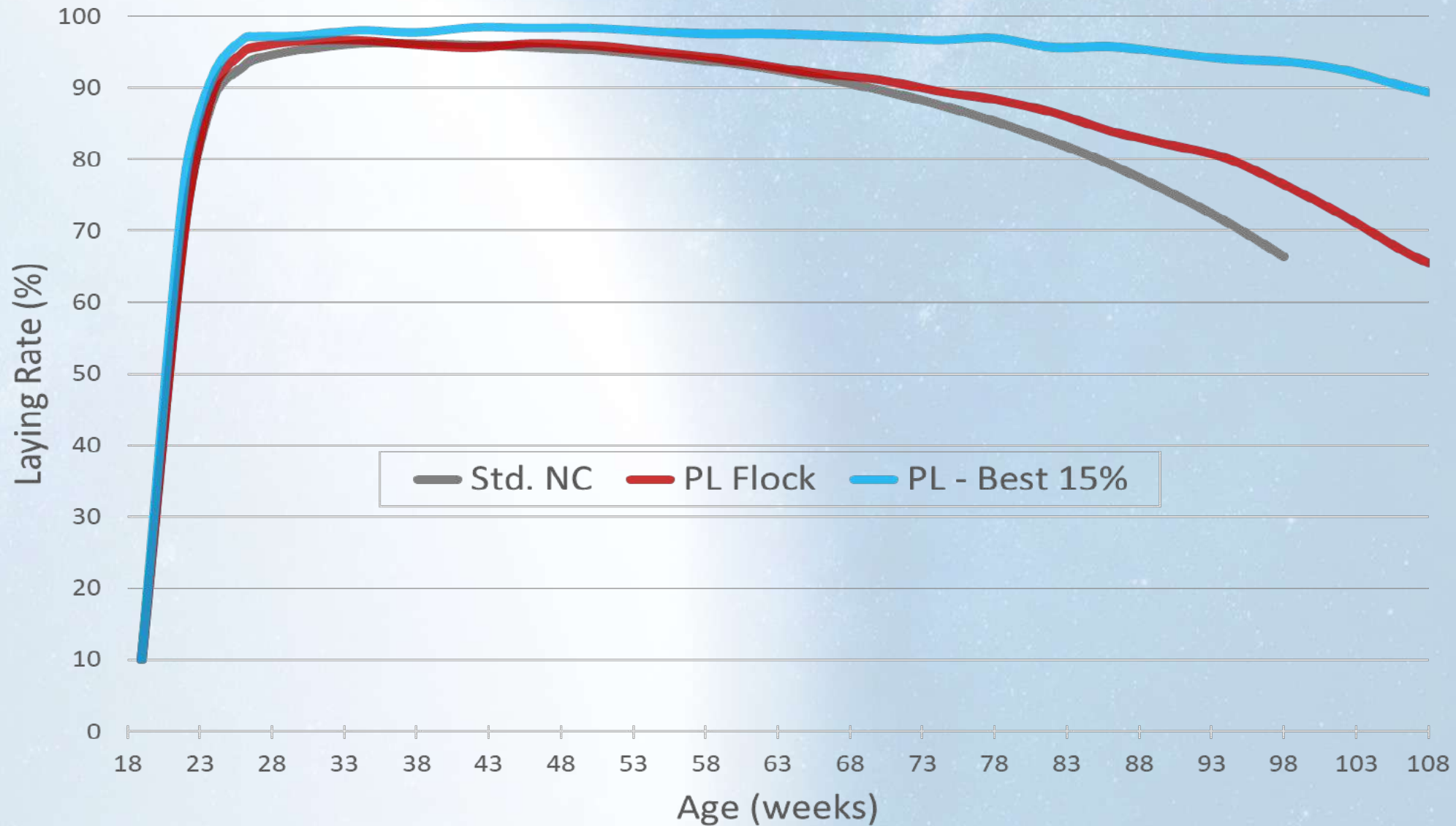


Daily egg number

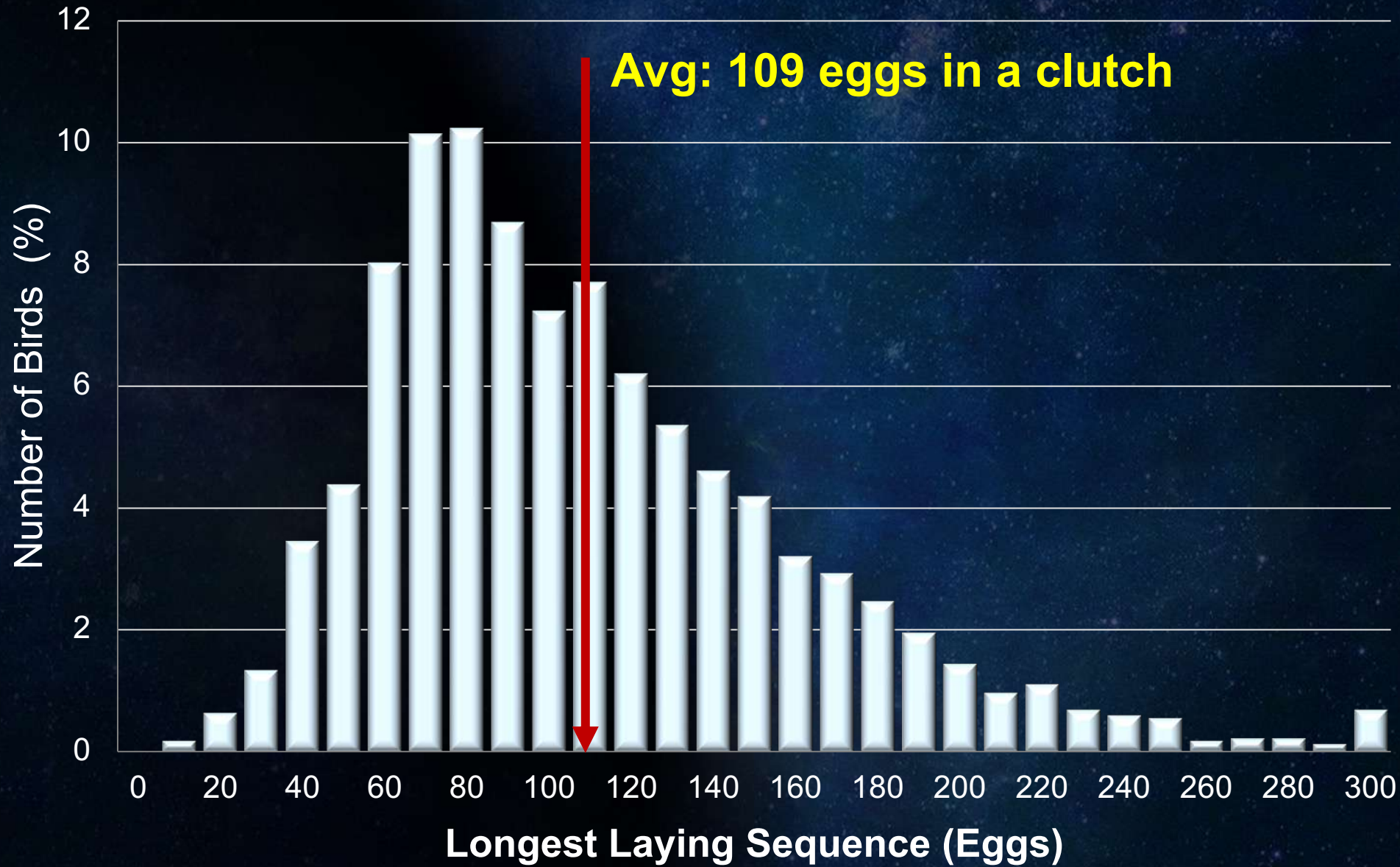


**Only
saleable
eggs!**

Laying Performance - Persistency



Clutch length



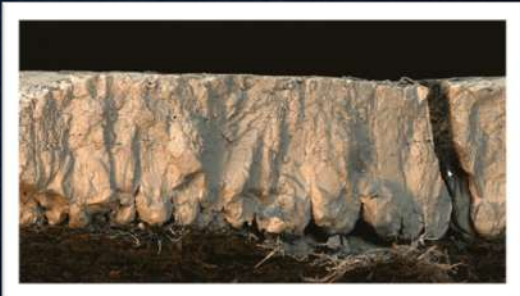
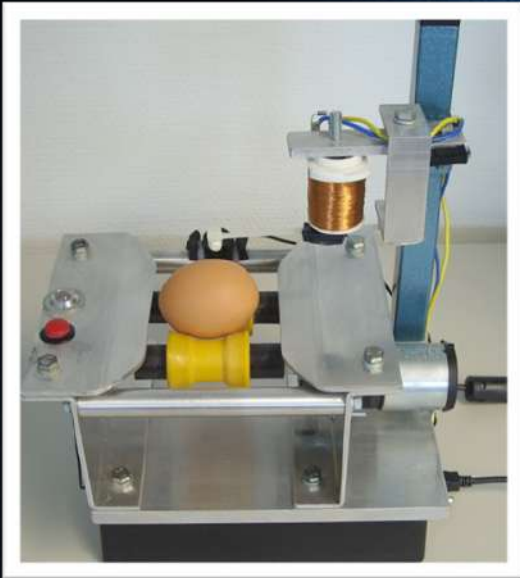
Number of eggs

Management Guide – Nick Chick

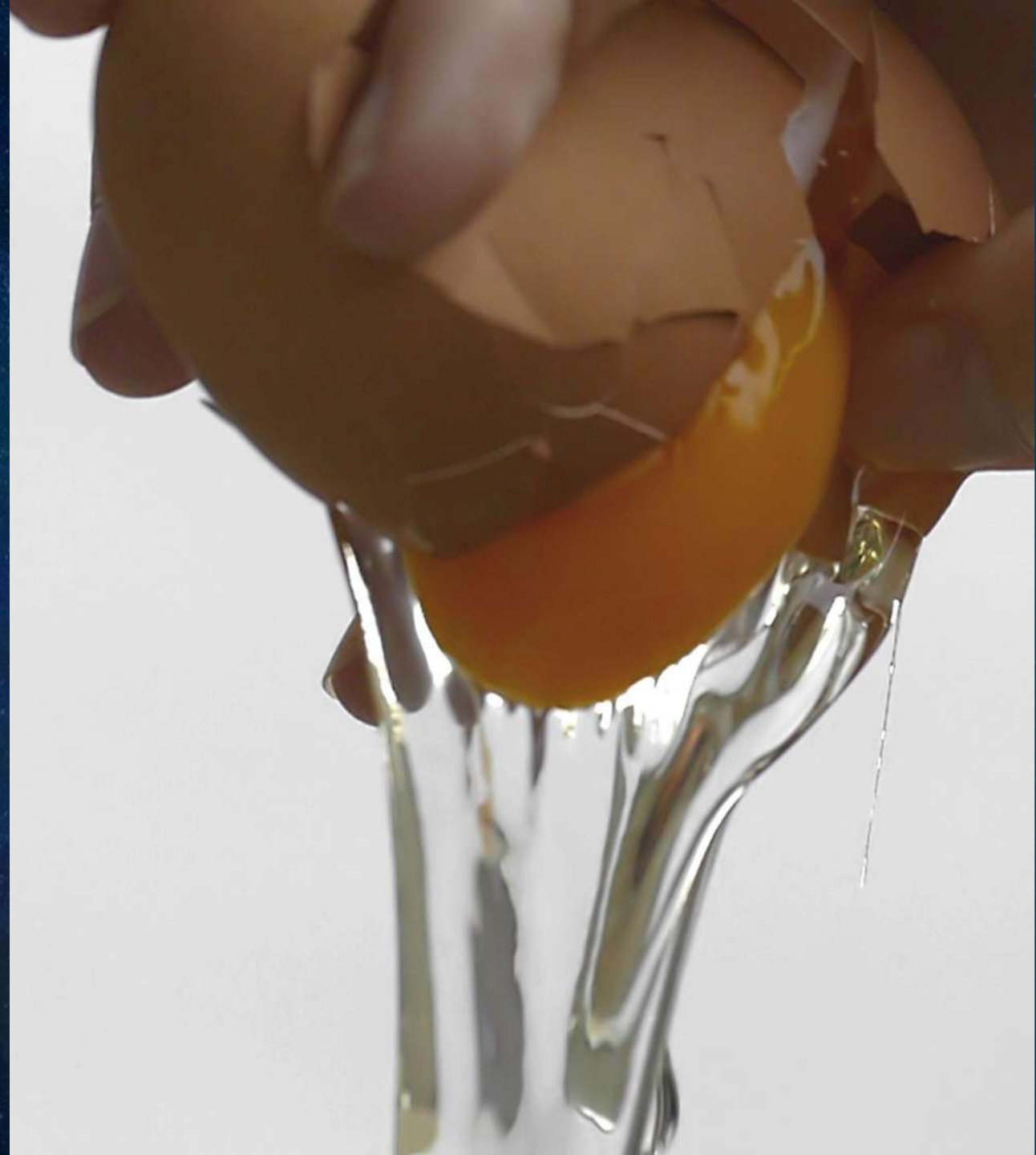


Eggshell Strength

Eggs breaks at the right time!



- ✓ Reduce waste
- ✓ Decrease contamination risk
- ✓ Extend flock production life



Eggshell Quality

Genetic Trend at 90w



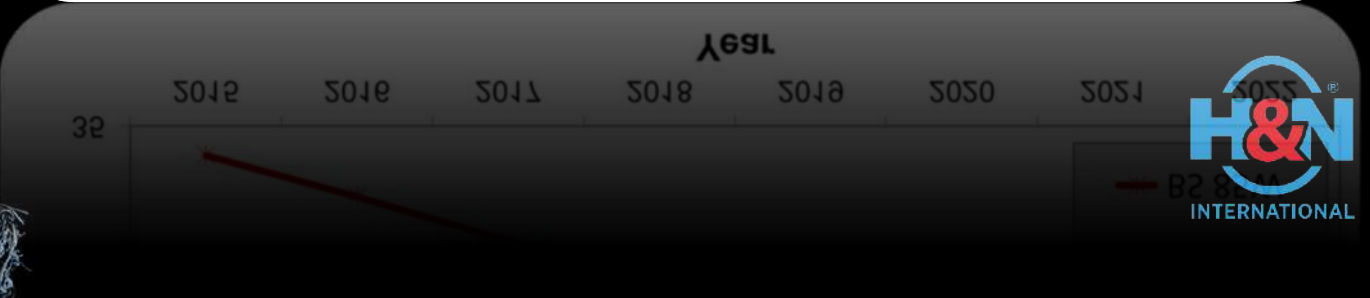
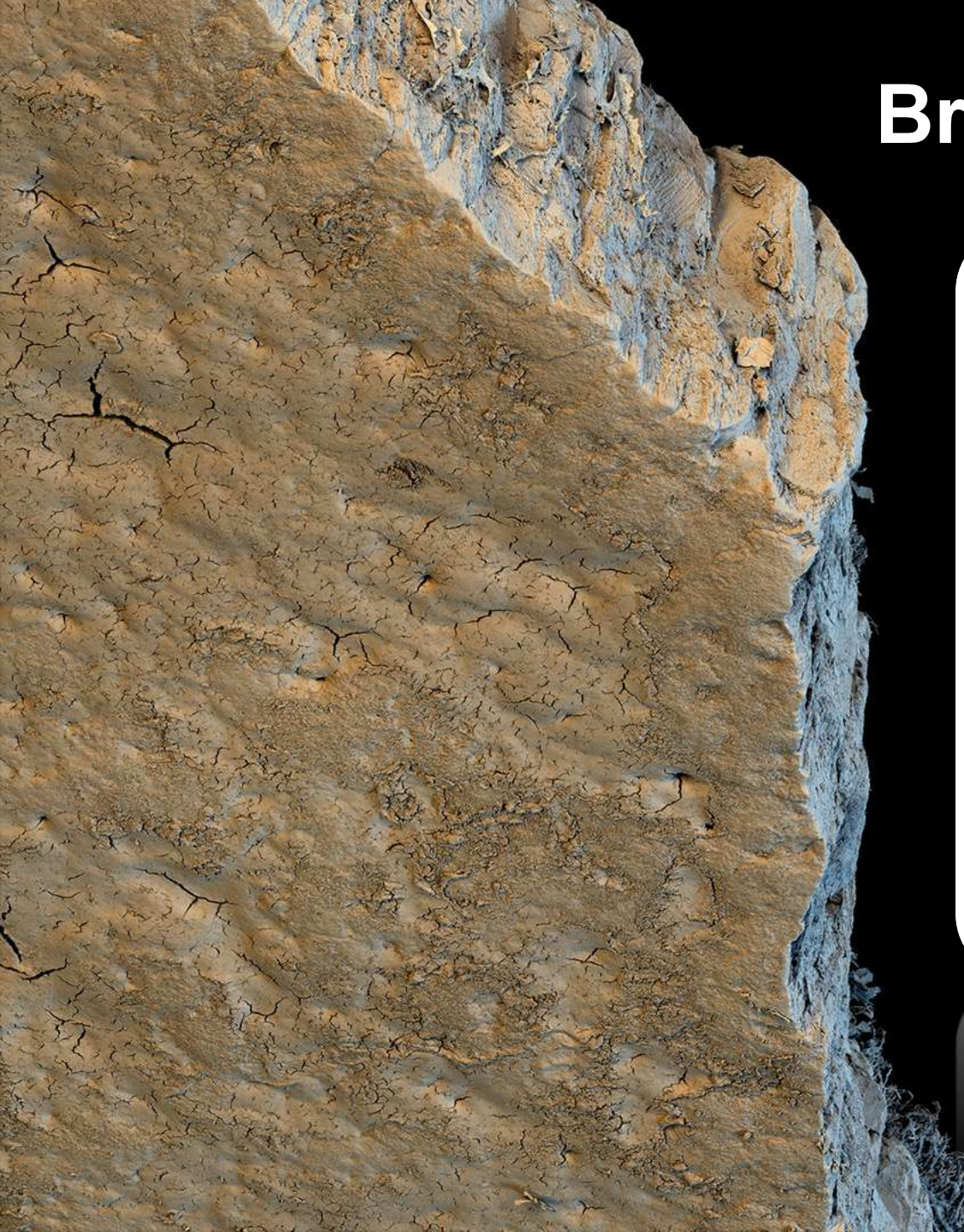
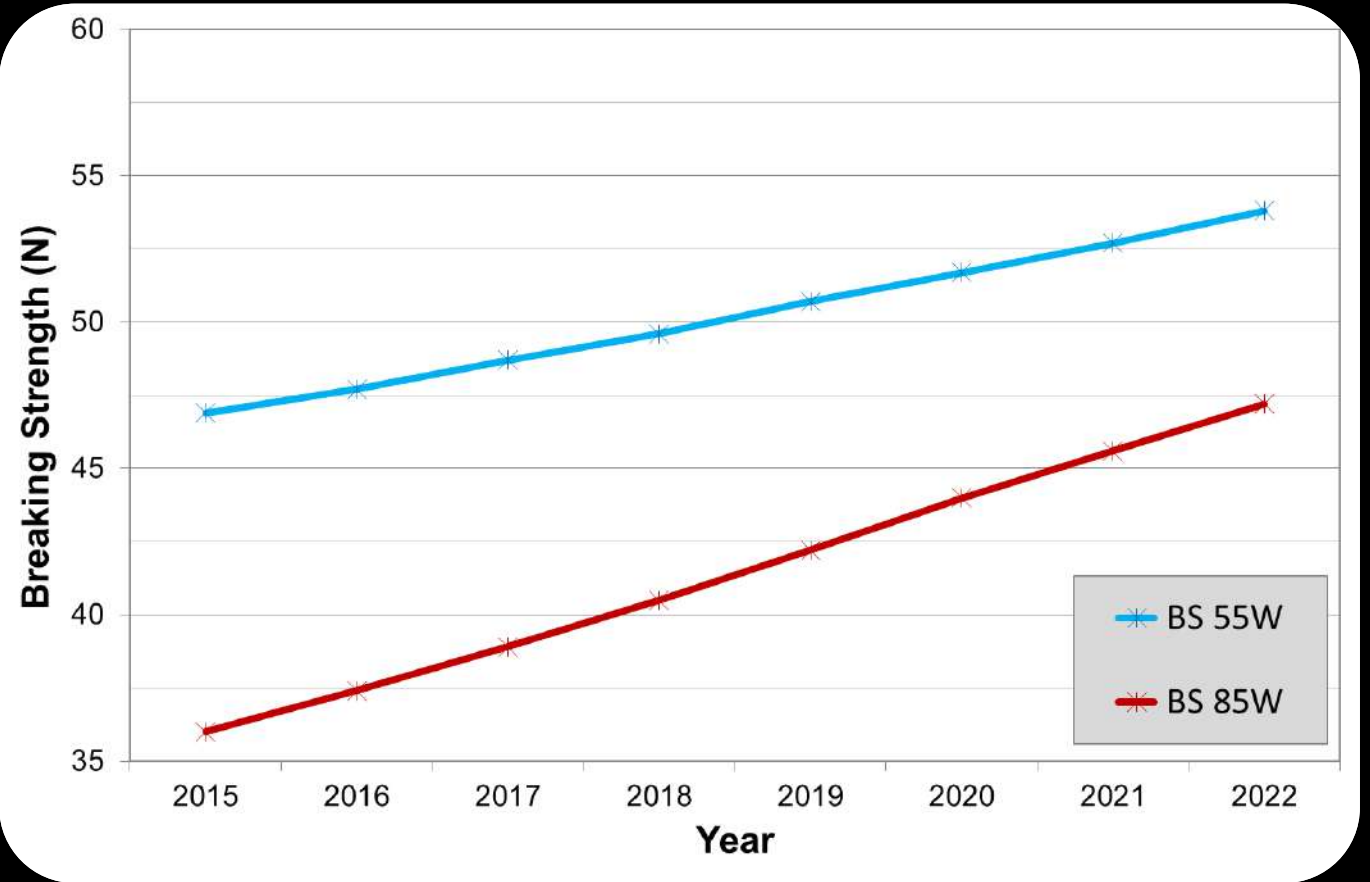
+0.8 N per year



Breaking Strength (N)



Breaking Strength



Egg Weight

Influencing Factors:

- Light stimulation, Body Weight, Feed
- Genetic – $h^2 \sim 0.6$



Goals:

- Max. N. eggs in desired class
- Fast EW increase at the beginning
- Flat EW curve after 60 weeks

Brown Chick – flexible in egg weight

You decide with Management and Nutrition – Our birds adapt

470 Eggs x 64 g



Egg Mass

30,08 kg

460 Eggs x 66 g



Egg Mass

30,36 kg

Rearing: An investment for the future

Not only Costs! - BW & Uniformity: The key for success!

Good
Immune
System



Feed
Intake
Capacity

IN ALTERNATIVE SYSTEMS:

Birds eat and drink at different levels

Good bird activity throughout the system

Improve Bone Stability



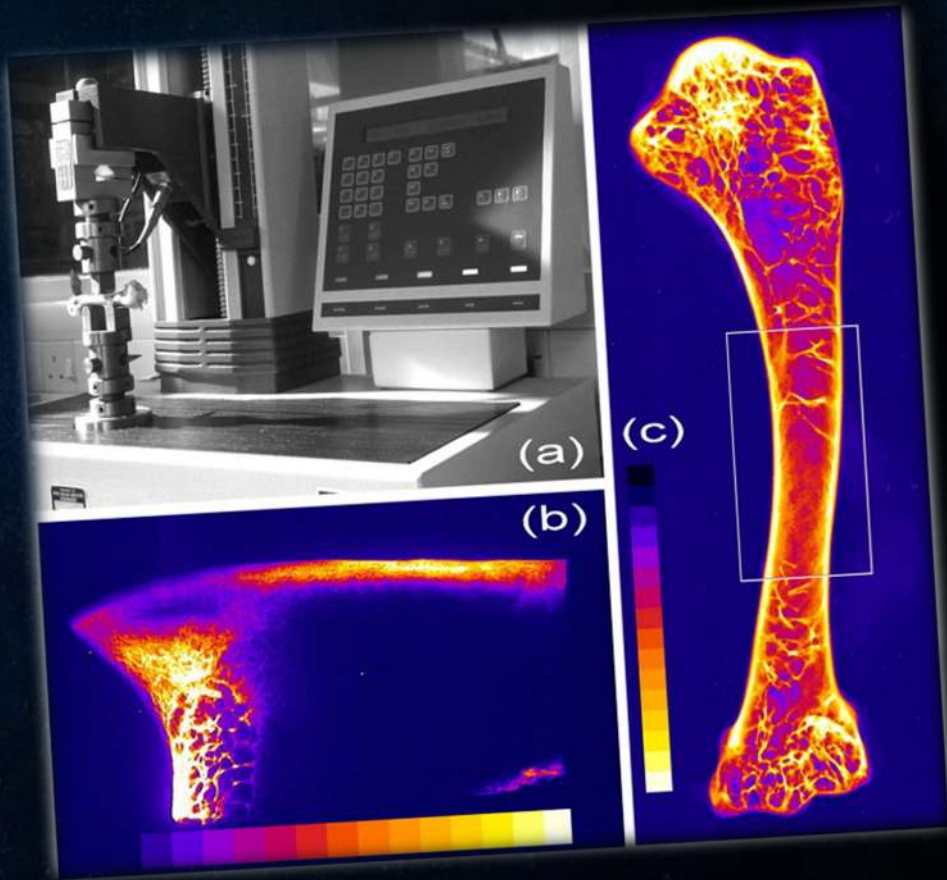
Palpation



X-Ray Analysis (Tibiotarsus)

Bone Quality

Post-mortem Bone Quality



- ✓ Keel bone is hard to measure and $h^2=0.03$
- ✓ No neg. correlation with persistency ($r_g=+0.25$)
- ✓ No link to BS ($r_g=\pm 0.1$)
- ✓ Neg. correlation with early maturity ($r_g=-0.73$)
- ✓ **Well-mineralised medullary bone is important for skeleton quality**

(Source: Dunn et al., 2021)

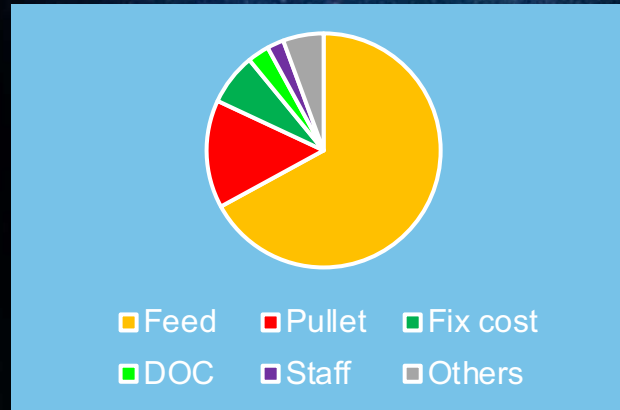
Selection for better feed efficiency



- **Sufficient feed intake at greatest nutrient demand**
- Focus is not only in FCR, but mainly in IOFC
- **No special high-density diet – Flexible in raw material**
- Feed intake according to production

Income Over Feed Cost (IOFC)

Conversion €/€ and not kg/kg

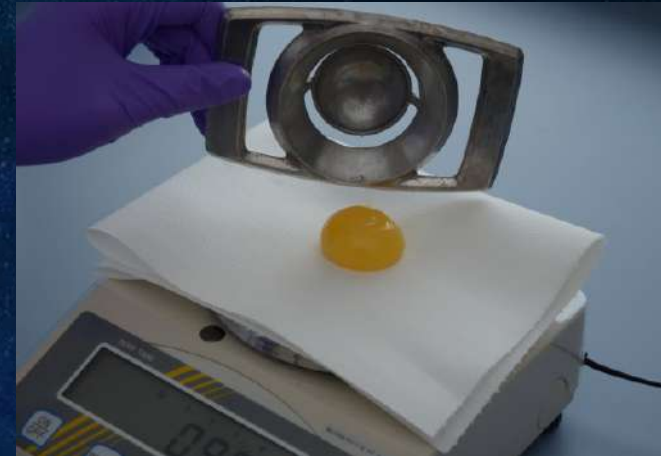


Eggs are ~3-4x more expensive than feed



$$\text{Eggs} \times \text{Egg Price} - \text{Feed (kg)} \times \text{Feed Price (€/kg)} = \text{IOFC (€)}$$

Selection for better internal egg quality



H.U.: maintain the aesthetic appearance of a fresh egg

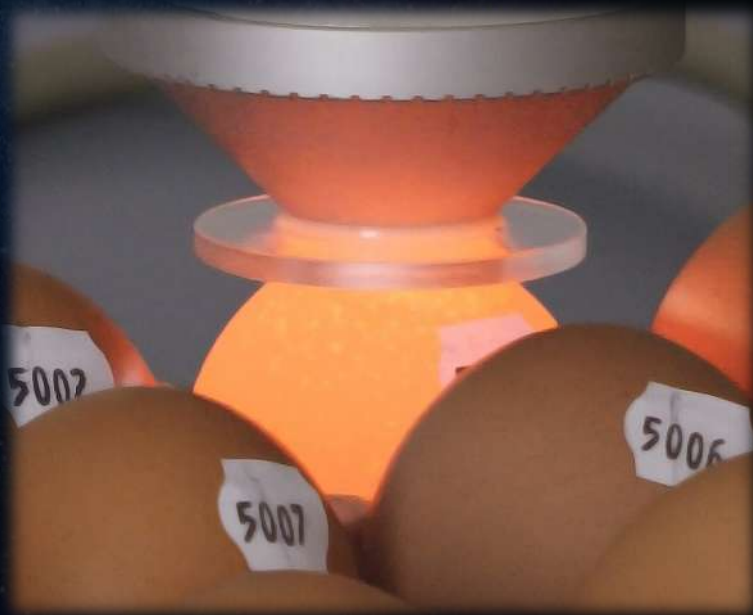
Blood & meat spots: decrease number & size

Yolk %: increase the % solids

Selection for good eggshell colour

Brown Nick – Makes the difference!

- ✓ Attractive and uniform brown/cream/white shell colour
- ✓ Good shell colour until the end of production



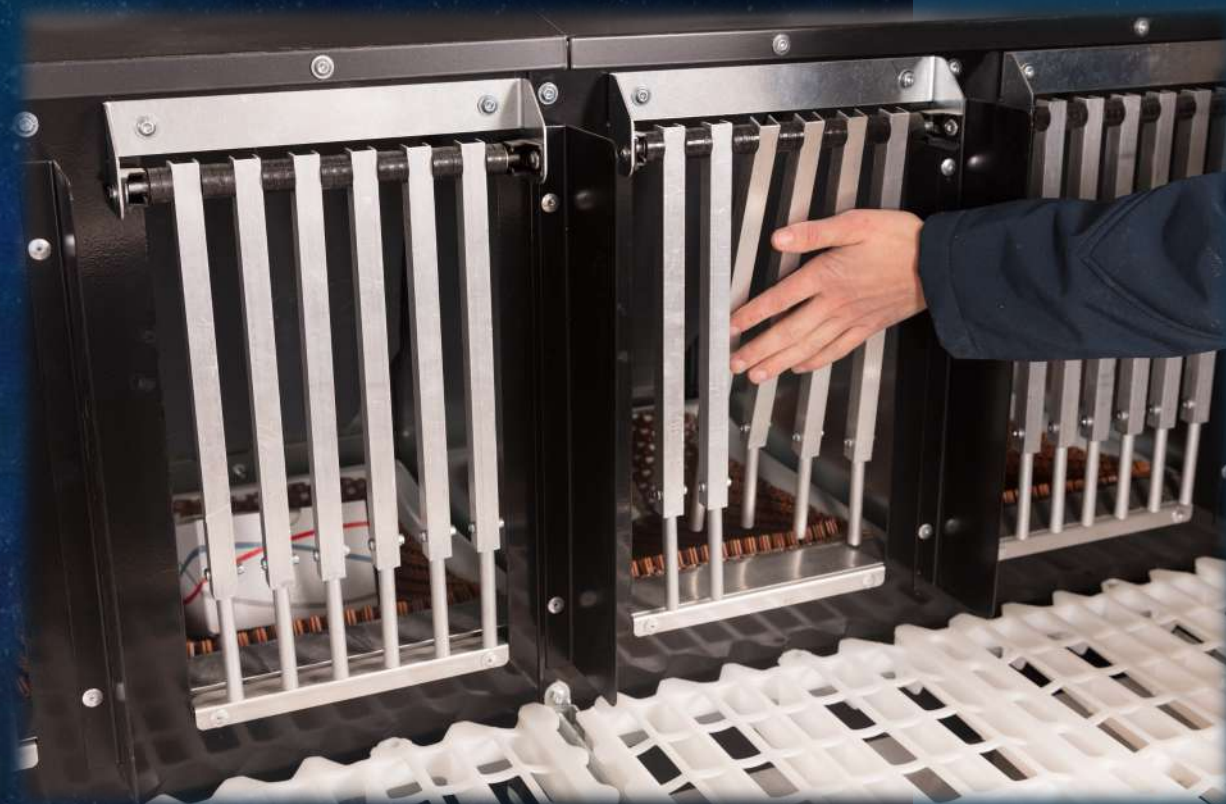
Better behaviour

Selection for low mortality, calmness & good feather cover



Automatic Trap Nest

Floor System

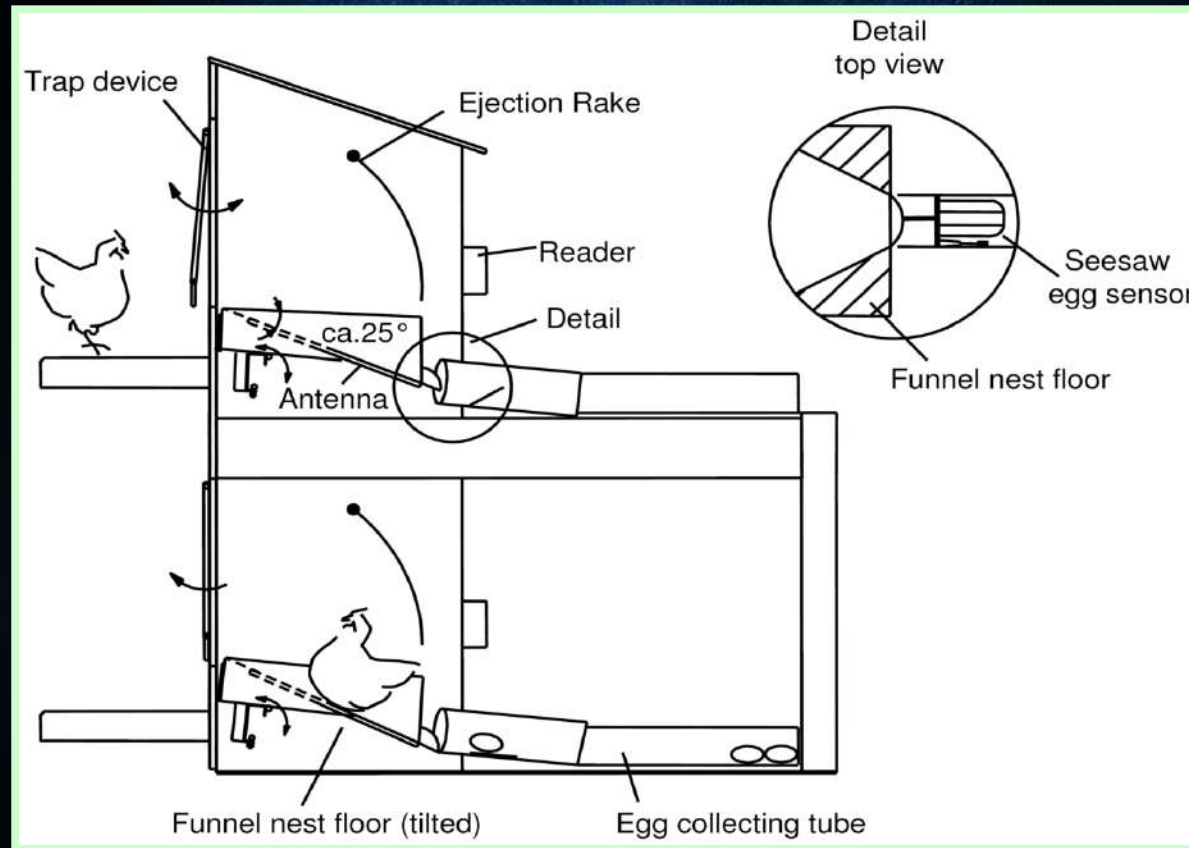


Automatic Trap Nesting

Increase of Saleable Nest Eggs



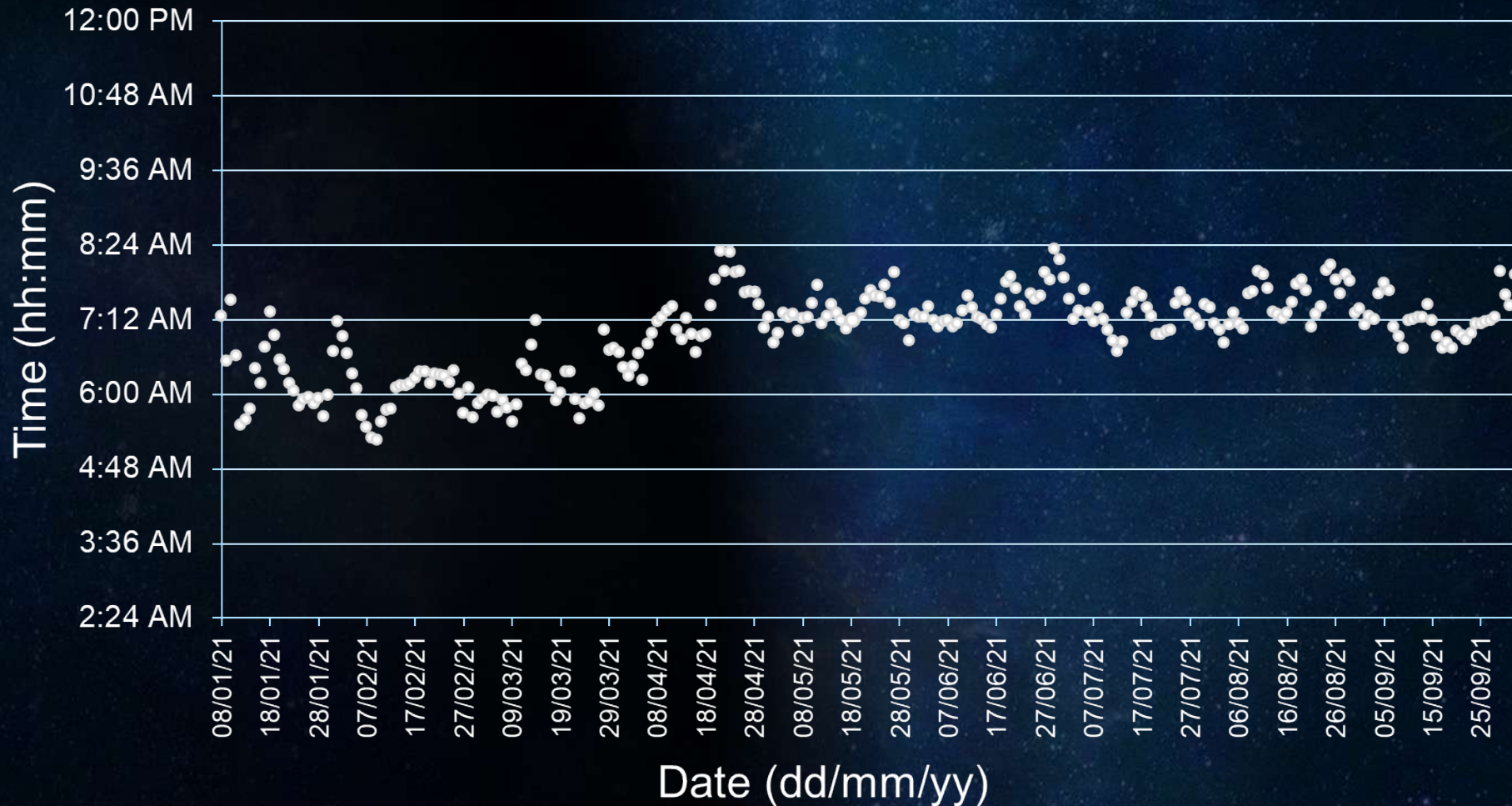
No more!



Transponder

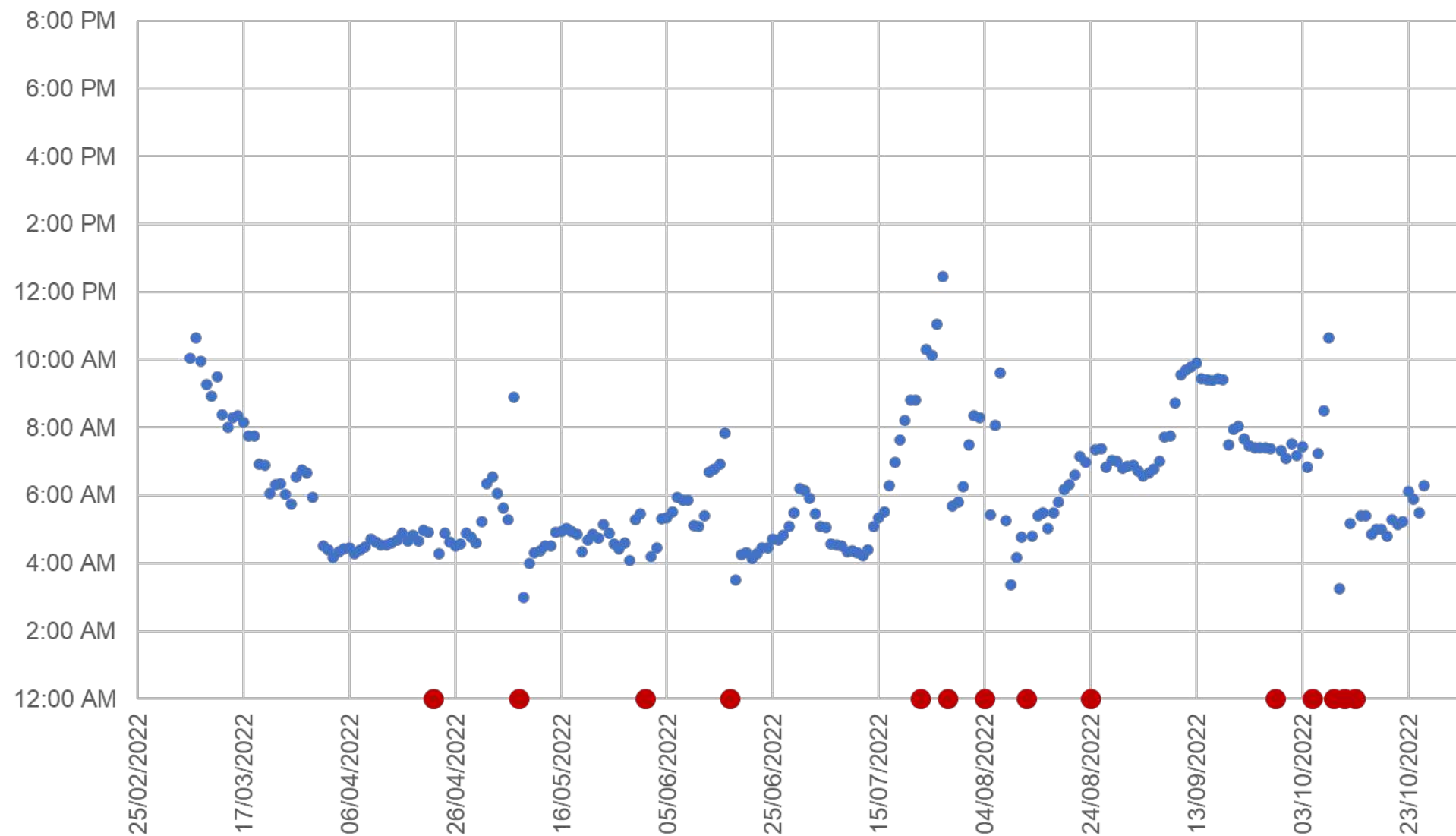
Laying time

White egg line – 269 Eggs in 269 production days (100%)



Berta

Evaluating Nesting Behaviour



Adaptability to different environments



Field Test - Performance recording

Birds tested in several continents



Performance Testing:

- ✓ Egg Production
- ✓ Egg Quality
- ✓ Livability
- ✓ Pecking
- ✓ Plumage Condition



GENOMIC



DNA Analysis

SELECTION



- ✓ MD 50k SNP-Array
- ✓ By-product: Pedigree check
- ✓ **Higher accuracy in BVs**
- ✓ Better use of genetic variation
- ✓ Reduce generation interval

More Genetic Gain

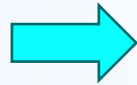
Application of New Technologies

Birds in cage-free environment - Behaviour



Feather Condition Scoring

Automated scoring using Cameras + AI

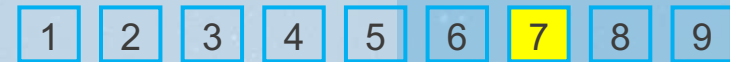


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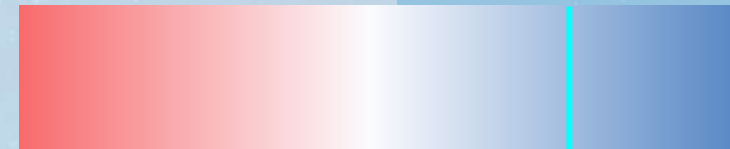
1 # Load the data
2 data = load_data('data')
3 # Split the data into training and testing sets
4 train_data, test_data = data.train_test_split(0.8)
5 # Create a neural network with one hidden layer
6 net = nn.Sequential(
7     nn.Linear(1000, 100),
8     nn.ReLU(),
9     nn.Linear(100, 10)
10)
11 # Train the model
12 optimizer = optim.Adam(net.parameters())
13 trainer = GradientDescentTrainer(
14     net, train_data, test_data, optimizer)
15 trainer.train(10)
16 # Evaluate the model
17 accuracy = trainer.evaluate(test_data)
18 print('Accuracy: %f' % accuracy)
19 # Save the model
20 net.save('model.pkl')
21 # Load the model
22 net.load('model.pkl')
23 # Predict the class of a new image
24 image = load_image('image.jpg')
25 prediction = net.predict(image)
26 print('Prediction: %s' % prediction)
27 # List the data frames in the global environment
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99 # List the data frames in the global environment
100 ls()
    
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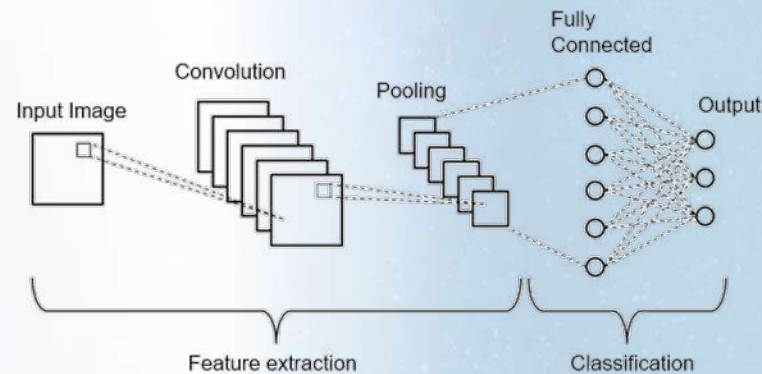
Farm Score:



AI Score:



7.38



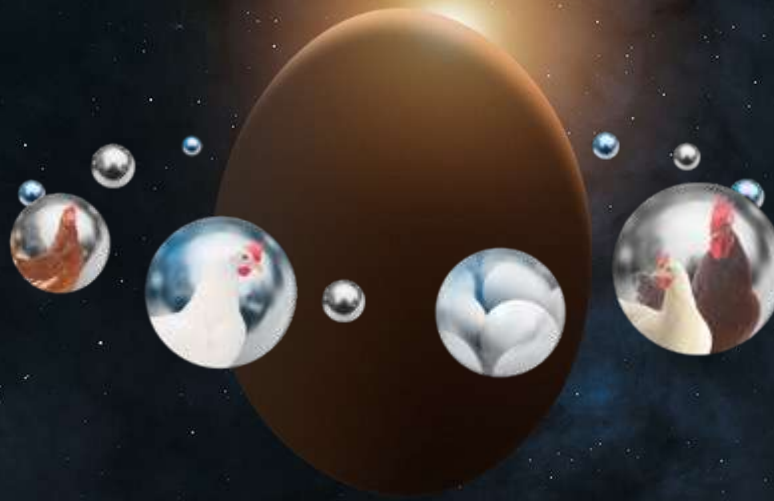


Take Home messages

Driving Genetics Forward

- ✓ Increase productive life of the bird
- ✓ Continuous improving the quantity & quality of the eggs
- ✓ Test in different environments for more resilient birds
- ✓ Stay ahead in genetics - Using latest technology

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