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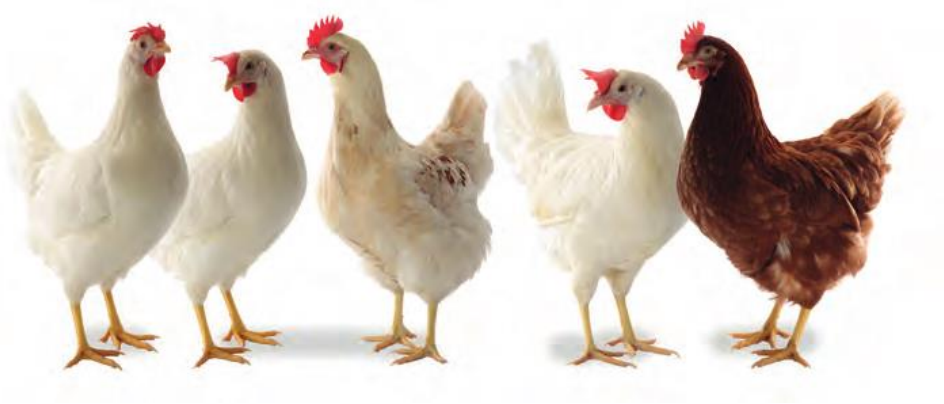

Management for Good Nesting Behavior

Maurice Raccoursier MV MSc

Content

- Introduction.
- Nesting Behavior.
- Cage Free: Housing Systems in Production.
- Factors influencing floor eggs
- Rearing - Perches
- Nests
- Lighting
- Others
- Summary
- Conclusions

Introduction

- The egg industry always work towards improve laying hens production, efficiency and welfare.
- Alternative/Cage free production.
- Feather pecking, toe pecking, cannibalism, reduced feather quality, smothering, social clumping and **hens laying eggs outside the nest boxes.**
- Proble c for the per
- Eggs la for the farr
- Mainly

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Introduction

- Floor eggs is multifactorial
- Could be a big problem.

a) Economic.
b) Labor increases.
c) Cloacal cannibalism (Savory, 1995).

- Onset of production – Big Challenge.

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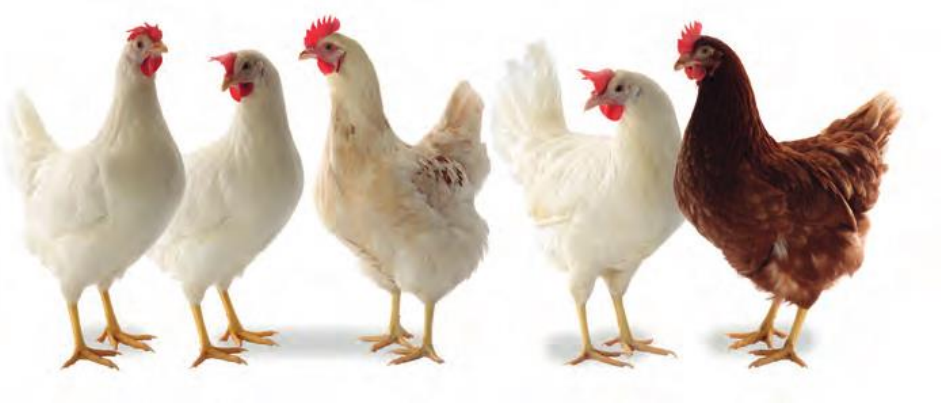

Nesting Behavior

Nesting behavior

- Understanding behaviors are important in management: for both efficient utilization of **beneficial aspects and control harmful.**
- Nesting behavior is important in both aspects.
- Complex interaction: environment, hormonal and neural stimuli from within the bird (Wood-Gush, 1975).
- Commercial laying hens do not show incubation or brooding behavior.
- Genetic selection – breed out.

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Nesting Behavior: Pre-laying

- When domestic hens are in **feral conditions,** an individual about to lay an egg will leave the flock and **find a comfortable place in which to nest** (McBride *et al.,* 1969; Duncan *et al.,* 1978).
- In cage free conditions there is a corresponding period of **restlessness** prior to laying: looking for potential nest sites (Wood-Gush, 1969).
- Examines a number of nests by inserting her head (Wood-Gush, 1963) and by entering them (Turpin, 1918).
- When one site is selected, the bird settles and makes a simple nest by rotating and drawing in nesting material (Wood-Gush, 1975).
- Oviposition usually follows.
- Pre-laying behavior usually extends over 1.5 to 4 hours (Wood-Gush, 1963).
- Shorter as hen ages.
- IMPORTANT at the beginning of Production

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Control of Nesting Behavior

- Triggered by ovulation, approximately 24 hr earlier (Wood-Gush and Gilbert, 1964).
- **Estrogen and progesterone** from the post-ovulating follicle act on the **central nervous system** (Wood-Gush *et al.,* 1977)(Wood-Gush and Gilbert, 1973).
- Egg is developing and oviposition is normally synchronized with nesting behavior.
- If ovum is resorbed internally, nesting behavior still occurs at the expected time but without an egg to be laid (Wood-Gush, 1963).
- Once nesting behavior has been triggered, various aspects of its expression are **affected by the environment**.

In commercial conditions the environment is largely under human control - MANAGEMENT.

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Timing of Nesting Behavior

- Nesting behavior can only occur during a certain period.
- However, **oviposition is sometimes delayed** beyond this period.

1. Social Inference: nest are occupied.
2. Human disturbance
3. Management: feeding: running during peak production or limited feeding.

- Egg on the floor not-nest eggs

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Location of Nesting Behavior

- In the past: Features of nest boxes that are supposed to be **attractive** include darkness and seclusion (Robinson, 1948; Winter and Funk, 1951; Card and Nesheim,1966).
- However, experiments on these factors show that hens' preference for them are equivocal (Appleby *et al.,* 1983a, 1984) and **are not the most important aspects for floor laying** (Perry *et al.,* 1971a; Appleby, 1984).
- Most nest boxes in commercial conditions are **raised off the ground** so that birds must perch to gain access to them.
- **Train young birds simply by providing perches during rearing**. (Appleby *et al.,*1983b).

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Summary of Nesting Behavior

- Pre-laying behaviour, is one of the **most important behavioral patterns in a hen's life** and has barely
- In
- In
- T
- G

Natural environment provides a large variety of possible nest sites,
Cage free is limited to one type of standardized roll-off group nest.

and nest boxes all influence this behavior in different ways.

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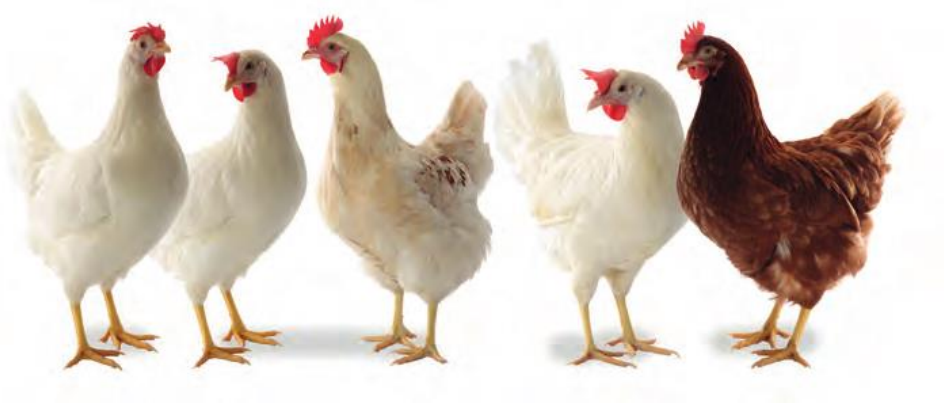
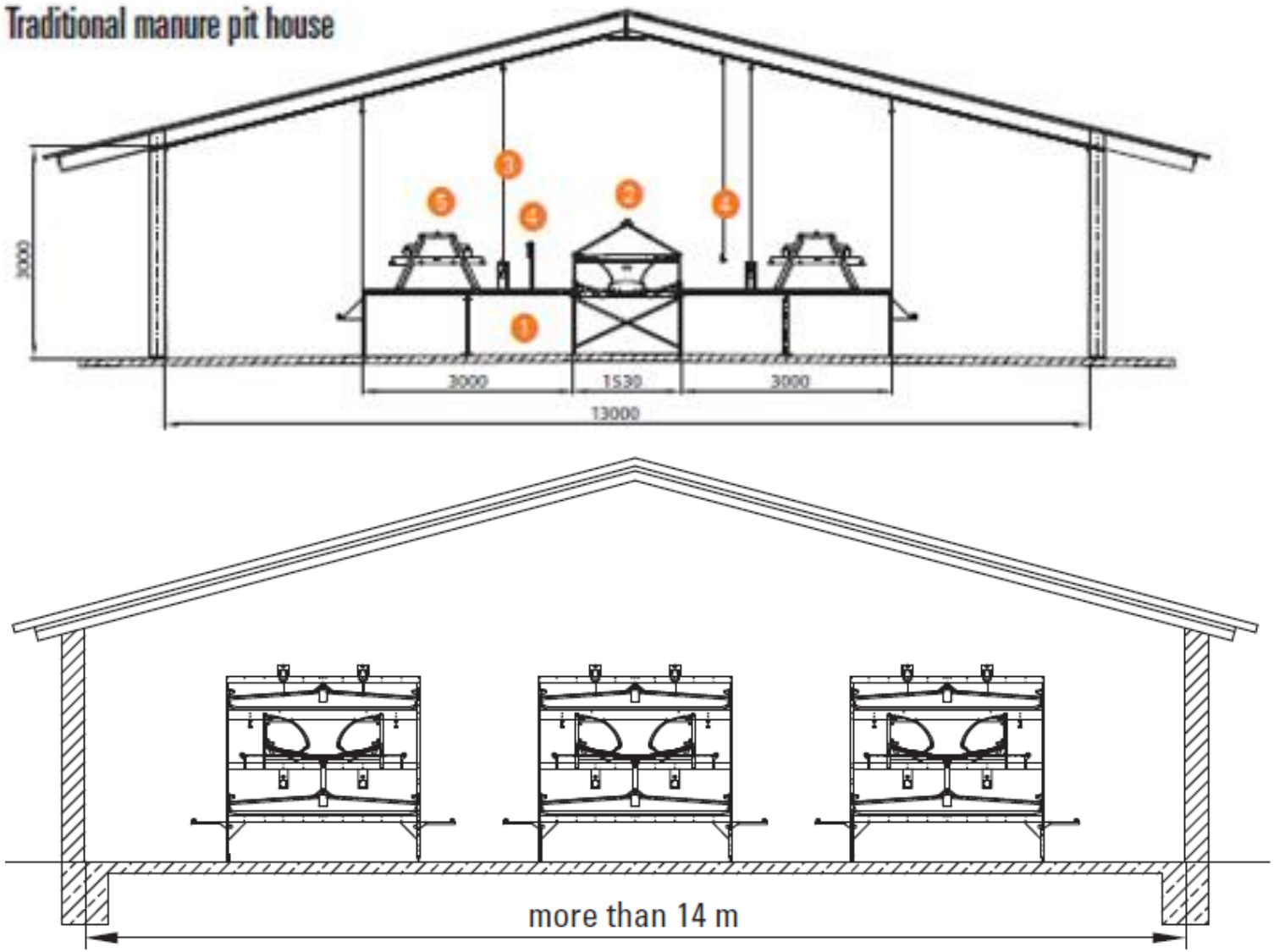


Housing type in production

Alternative Housing Systems in production



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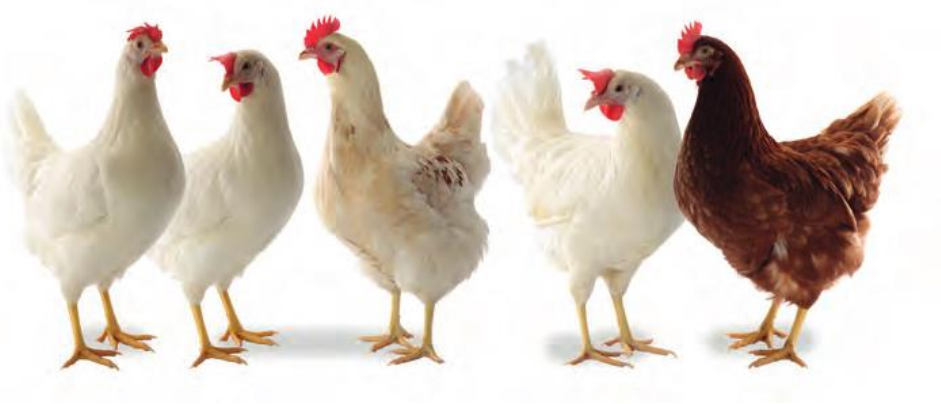

Factors influencing Floor Eggs

Factor influencing Floor eggs

1. Inability to reach nest (Appleby, 1984; Emous and Fiks - van Niekerk. 2003)
2. Mismatch between nest characteristics and hens preferences (Zupean et al, 2008)
3. Unfamiliarity with laying (Appleby, 1984; Emous and Fiks - van Niekerk. 2003)
4. Presence of other eggs on the floor (Emous and Fiks – van Niekerk, 2003).

- MANAGEMENT

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Solutions

1. **Appropriate training (imprinting) of the birds**
2. **Nest**
3. **Lighting Program**

- Less than 1%
- MANAGEMENT

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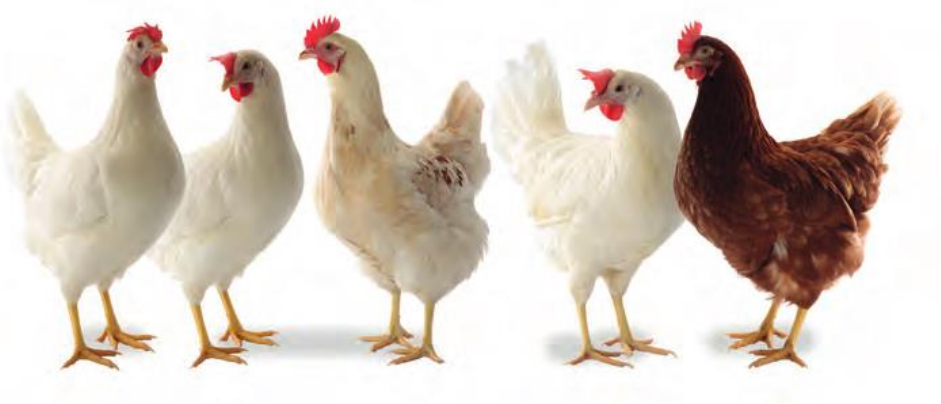

Rearing

Rearing

- Stress experienced during the rearing period can have short-term as well as long-term negative impacts (Ericsson et al., 2016).
- The importance of optimizing rearing periods, particularly for birds going into **alternative housing systems** (Staack et al., 2007; Colson et al., 2008; Leenstra et al., 2014).
- For **optimal welfare and productivity → match** the rearing housing system with the layer housing system (Janczak and Riber, 2015).
- Modifications can also be made during rearing to best prepare birds for an optimal laying cycle.
- In **production is too late.**

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Rearing

- Environments with simple rearing systems are not **cognitively stimulating or spatially complex** enough to adapt pullets to navigate in aviary or outdoor laying systems.
- Good nav… …ed spatial ski… …**e with perc**…
- The **first** … hemisphe… continue t… …1995).

IMPRINTING

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Perches

- Perches in non-cage systems: **toes be able to wrap around the structure to enable a balanced**, relaxed posture for an extended period of time (United Egg Producers Guidelines, 2010; Schrader and Muller, 2009).
- Perching behavior in domestic laying chicks is observed to begin after 1 wk of age (Kozak et al., 2016).
- Chicks that perch earlier will also show earlier use of perches for n**ight-time roosting** (Heikkil et al., 2006) and **use more tiers during day.**
- **Early access to perches (4 weeks of age)** during the rearing period reduced both cloacal cannibalism and the **prevalence of floor eggs** during the production period (Applebay, 1986: Gunnarsson et al., 1999).
- Perch use increased with age, peaking at 12 wk of age and maintained untril the end of production (Enneking et al., 2012b).
- Too late in production.

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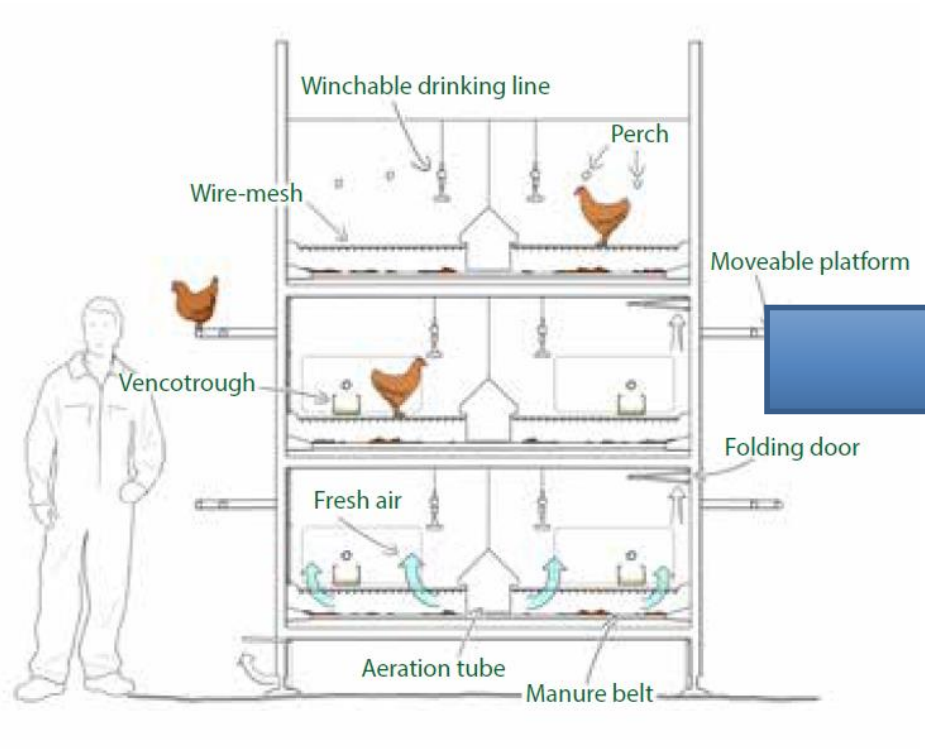
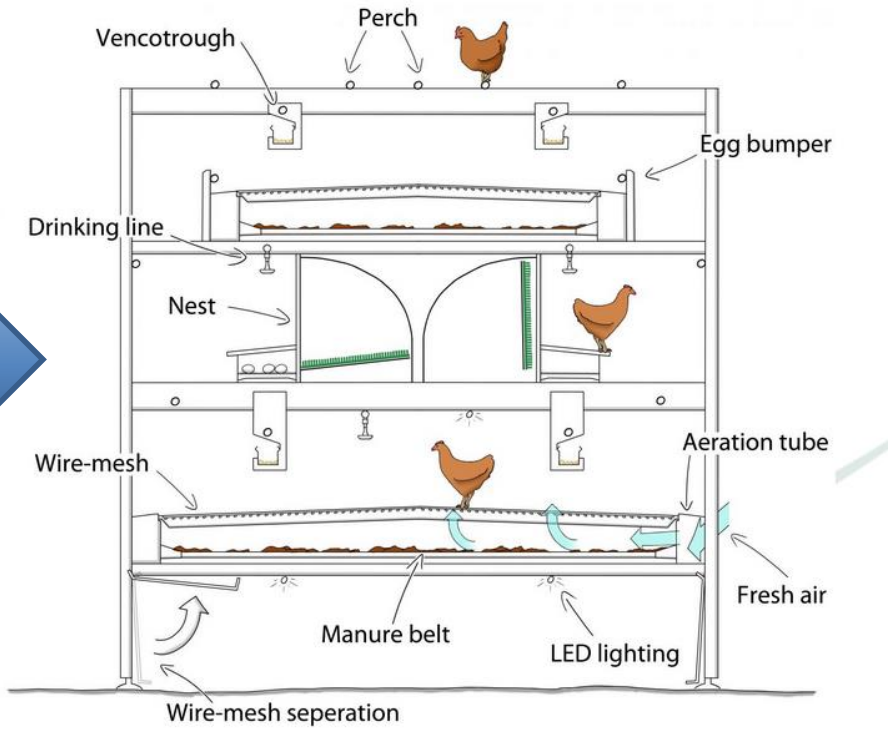
Perches

- Hens reared without perches started to perch as adults only slowly (Appleby and Duncan, 1989).
- Faure and Jones (1982) reported that experience with perching prior to lay affected perching behavior during lay and floor eggs increase.

Same equipment: rearing and Production - Complexity!





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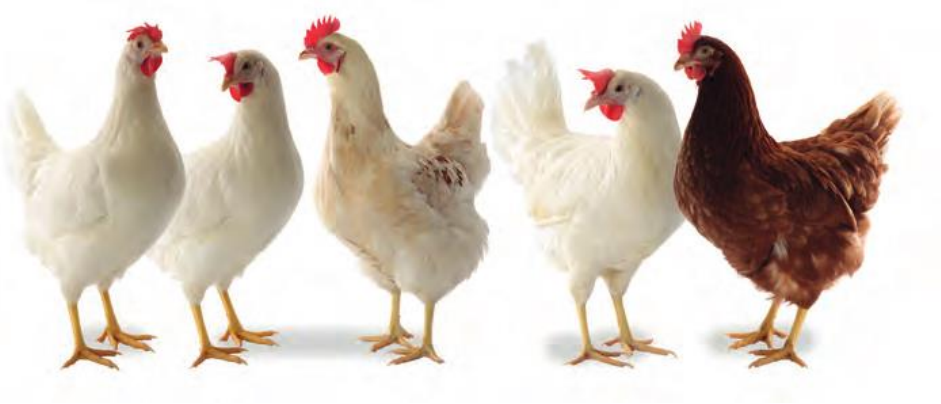

Nest

Nest

- Hens exhibit gregarious nesting (Appleby and Smith,1991; Riber 2010; 2012).
- Enough nest space.

1. Lay is in **morning hours** (Boz et al., 2014), can result in overcrowding.
2. Crowding in the nests may increase the **risk of welfare issues.**
3. Insufficient space for simultaneous use of the nest by all hens **may result in litter or non-nest laid eggs** by individuals unable to access the nest (Kruschwitz et al., 2008).

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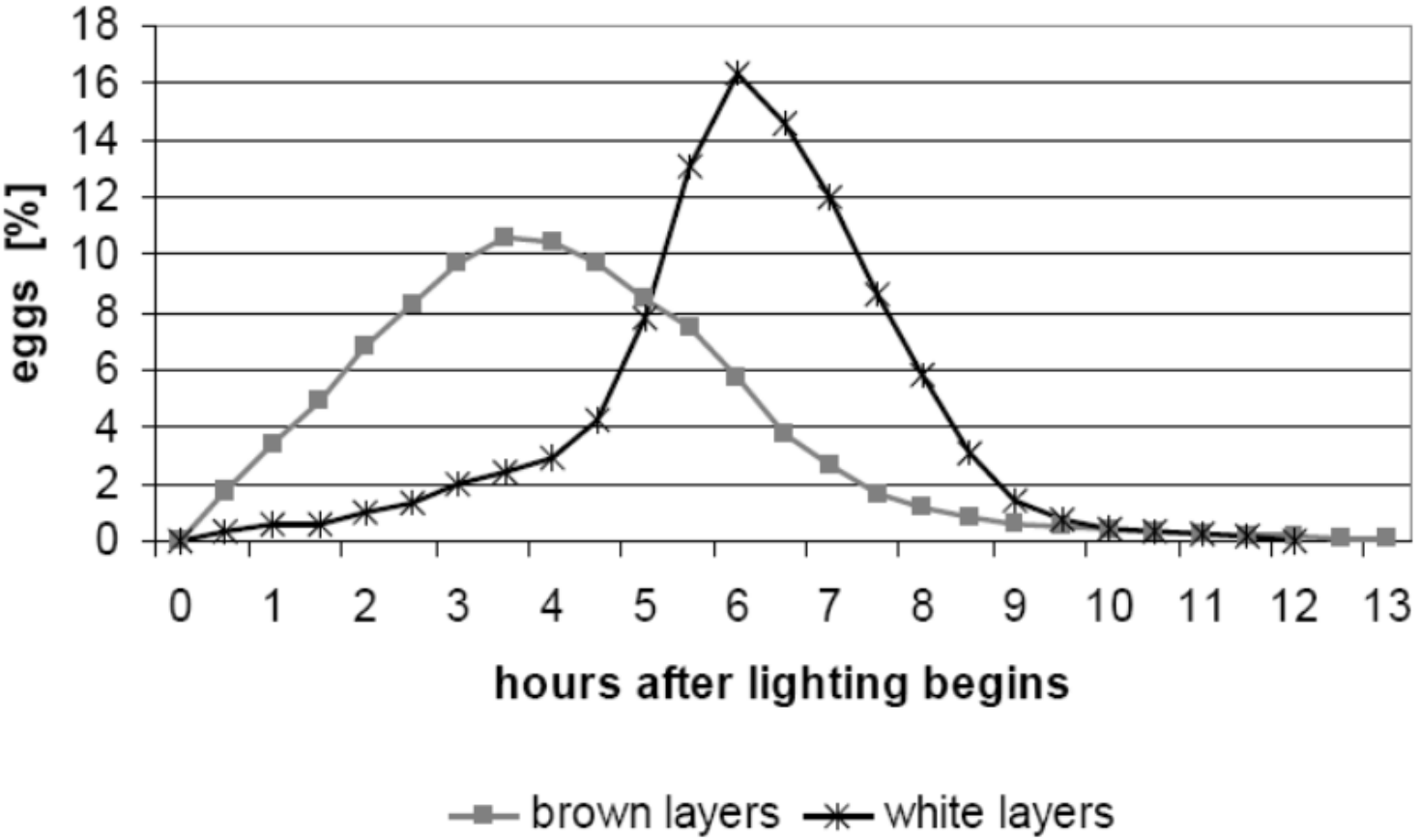
Comparison of oviposition time in different strains



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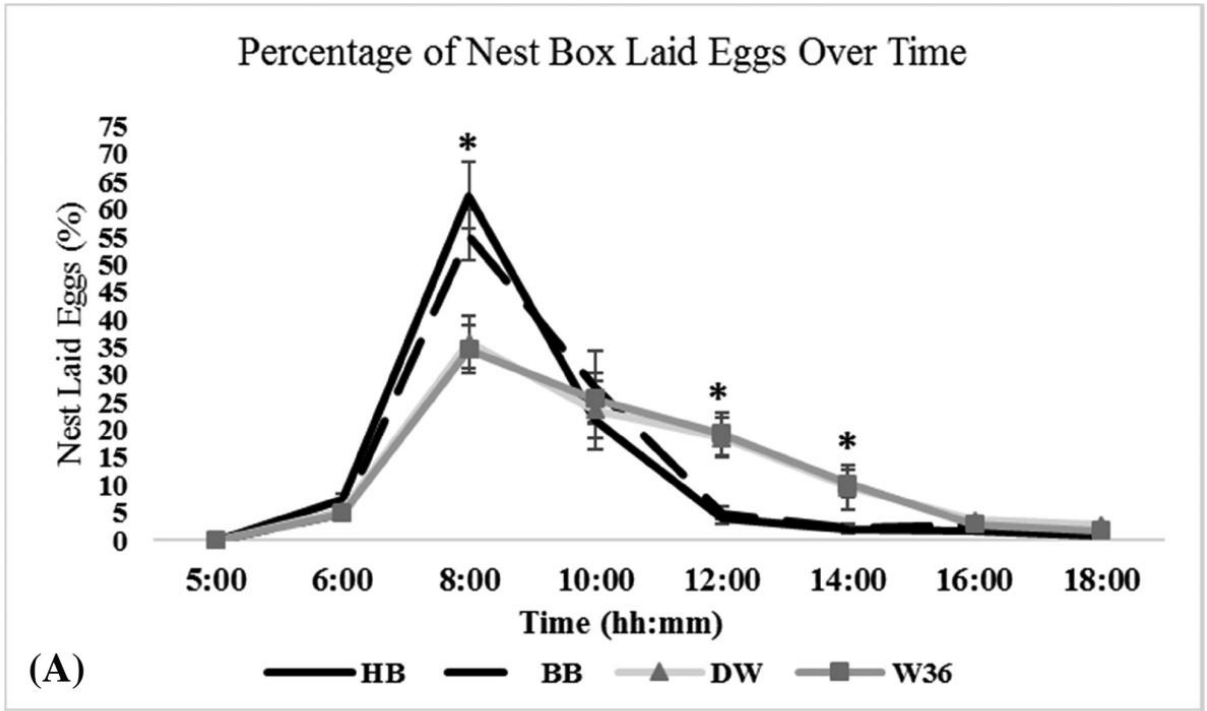
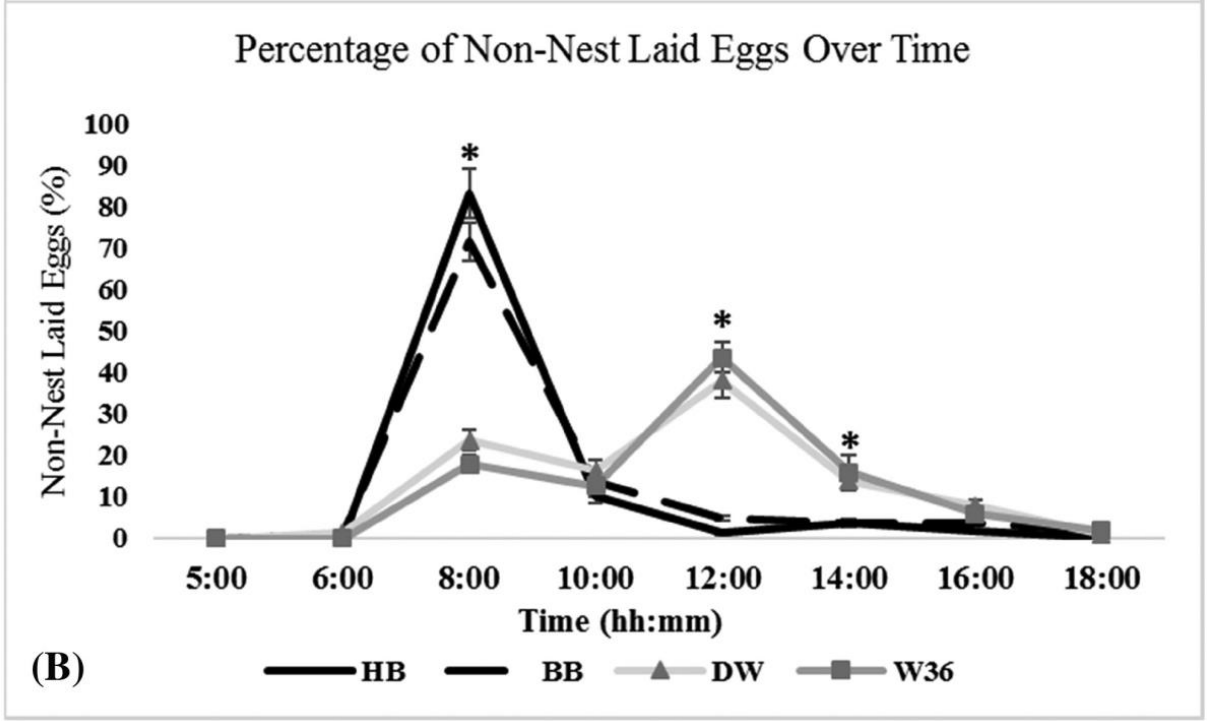
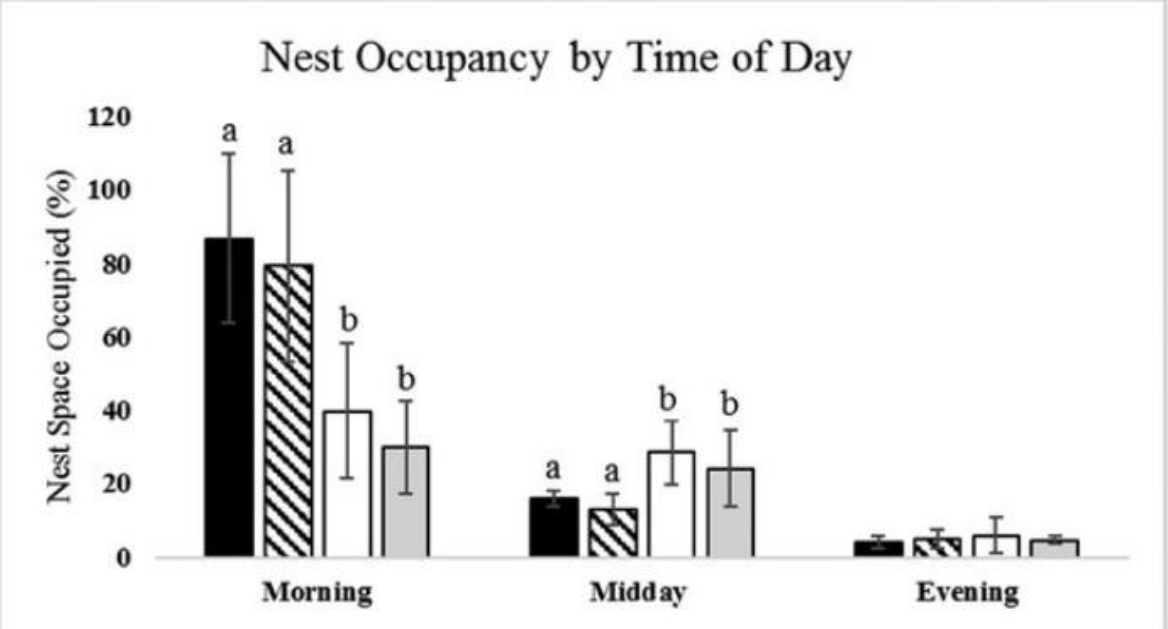
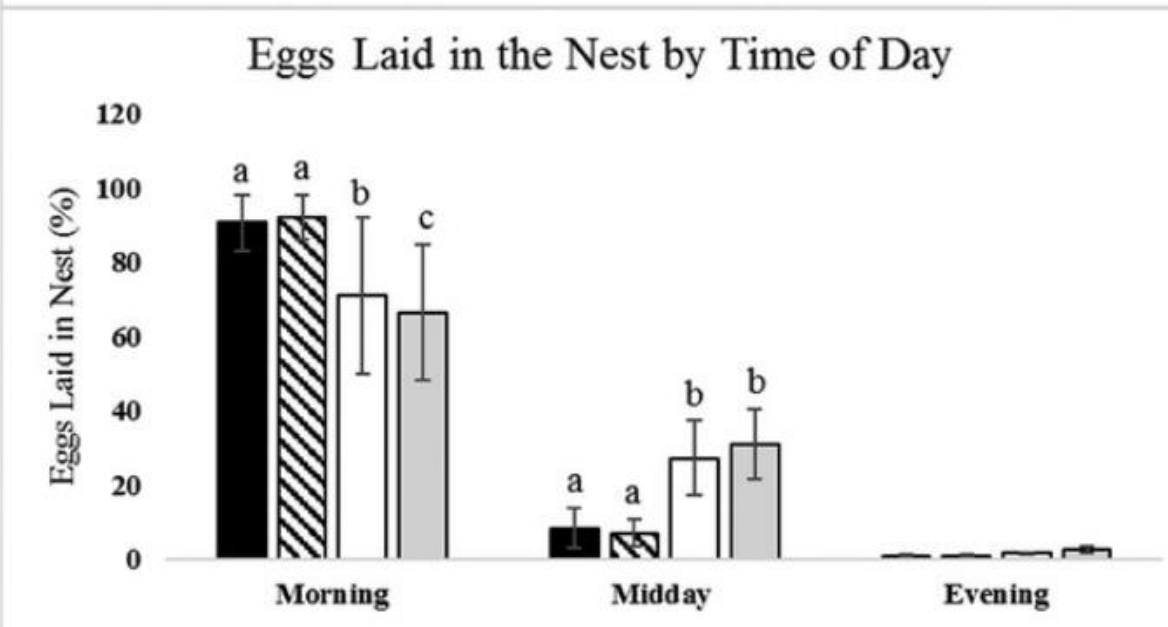

Percentage of Nest Box Laid Eggs Over Time
Nest Laid Eggs (%)
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
*
*
*
5:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
Time (hh:mm)
(A)
HB
BB
DW
W36


Percentage of Non-Nest Laid Eggs Over Time
Non-Nest Laid Eggs (%)
100
90
80
70
60
50
40
30
20
10
0
*
*
*
5:00
6:00
8:00
10:00
12:00
14:00
16:00
18:00
Time (hh:mm)
(B)
HB
BB
DW
W36


Nest Occupancy by Time of Day
Nest Space Occupied (%)
120
100
80
60
40
20
0
a
a
b
b
a
a
b
b
Morning
Midday
Evening


Eggs Laid in the Nest by Time of Day
Eggs Laid in Nest (%)
120
100
80
60
40
20
0
a
a
b
c
a
a
b
b
Morning
Midday
Evening

Nest choice

- High-placed nests (Lundberg and Keeling, 1999) and corner nests are favored (Riber, 2010).
- The quality of the **nest floor,** the **nest color** , **illumination, and the privacy of the nest sites** (Appleby and McRae, 1986; Struelens et al., 2008; Buchwalder and Frohlich, 2011)
- The incidence of floor eggs has also been found to be affected by **nest material** (Daly *et al,* 1964).
- Nesting place that **allows rotation** of the body and scratching out with the feet is essential (Duncan and Kite, 1989).

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Nest Choice

- Furthermore, **strains are known to vary in nest-site selection** (Appleby *et al,* 1983, 1984).
- Rearing conditions and social interactions: **important factors for nest choice** (Appleby et al., 1984; Colson et al., 2008; Riber, 2010).
- Individual differences: **Nest and floor layers** (Cooper and Appleby, 1996, 1997; Kruschwitz et al., 2008; Zupan et al., 2008).

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Alternative Systems: Aviary

- Nest choice is typically limited to one type of **standardized rollaway group nest.**
- The **drinkers** are often placed in **front of nests**.
- Some research: In some cases, this led to **agonistic interactions** between the hens in front of the nests (Lentfer et al., 2011).
- **Nest platform is important (more than 30 cm in width)** (Lentfer et al, 2013)**.**
- Unsuitable access platforms may increase social interactions and aggression between hens and lead to unsettled pre-laying behavior → Floor eggs.
- Confinement type – after transfer. Good option

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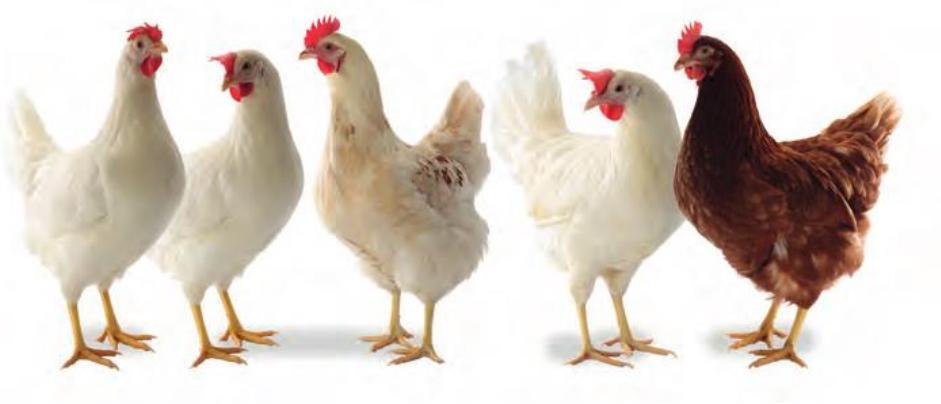

Lighting

Lighting

Rearing

- Light intensity in rearing may affect the birds' response to light in the production house.
- Reduction of light intensity after 2-3 weeks. Uniformity.

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Lighting

Production

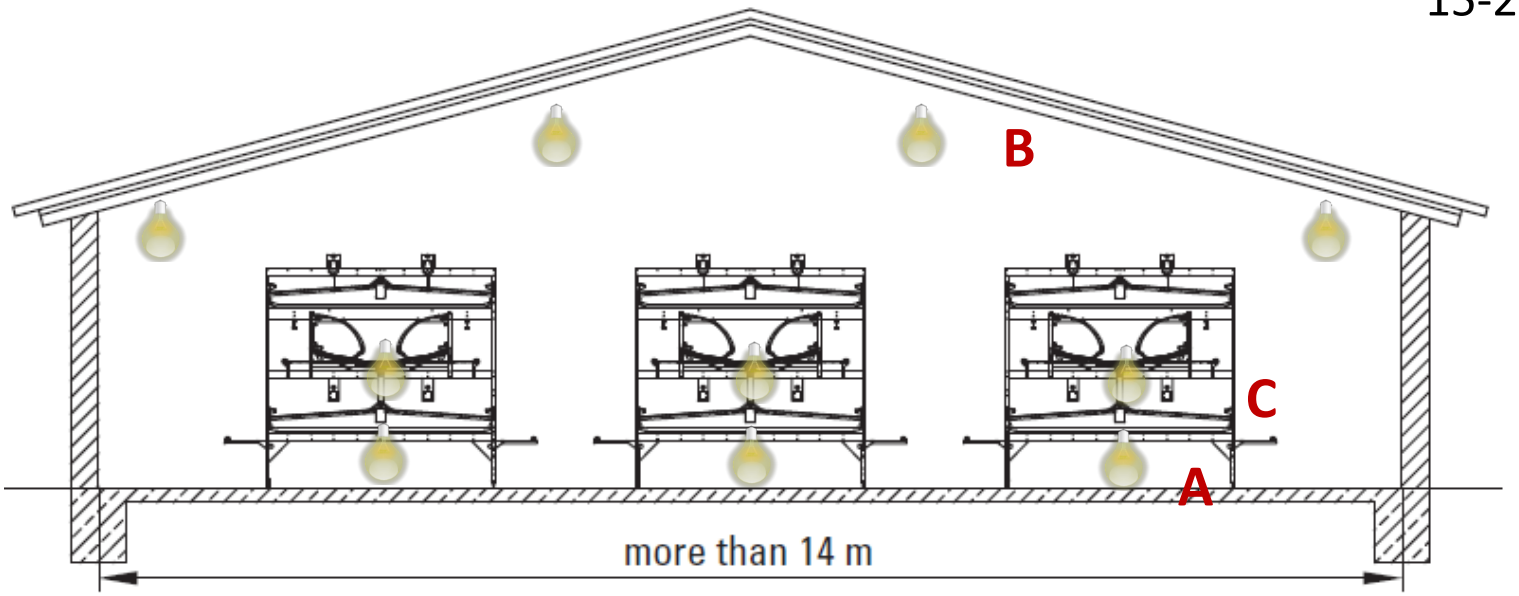
- Ensure birds sleep in the system
- Nest box lights. 15-30 minutes before turning on the house light. After successful use, lower intensity.
- No dark areas in litter.
- Light underneath the system
- No high intensity on the nest.

Lighting in Aviary system
Turn out the light

Objective: hens sleep in the system

¡Example!

- Light A: Turn off.
- Light B : Dimmig 15-20 min
- Light C: Dimming in 15-20min



Cortes, 2018

Cortes, 2018

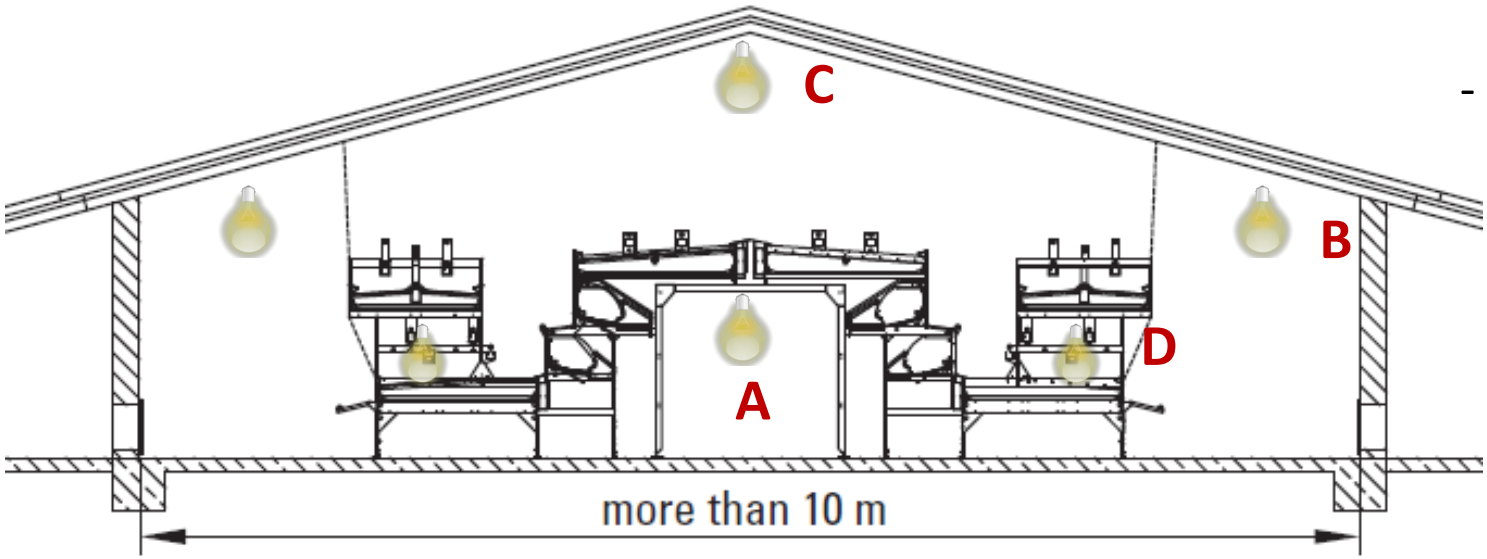
Picture: Raúl Rodríguez y Diego Cortés

Cortes, 2018

Foto: Raúl Rodríguez y Diego Cortés

Aviary System: Open
How to turn off the lights

Objetive: hens sleep in the system



¡Example!

- Light A: Turn off.
- Light B : Dimming in 15min. 20 min after A.
- Light C: Dimming in 15min
- Light D: Dimming in 15 min or less.

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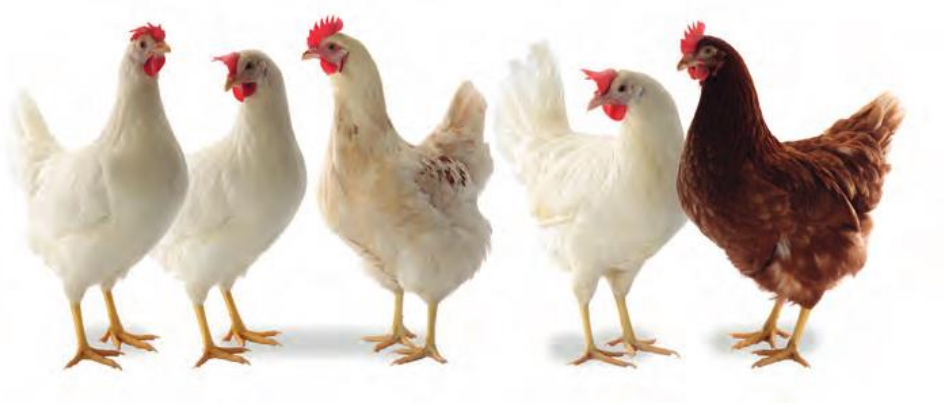


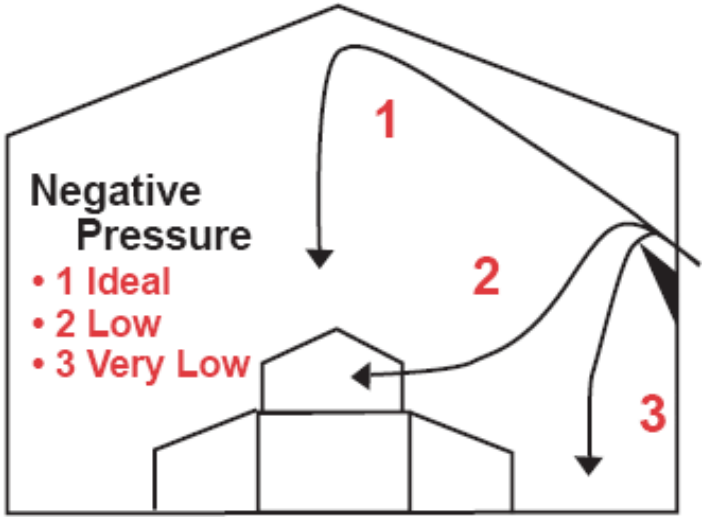
Tips to Control Floor Eggs

Possible Causes and Solutions

- There are several items:
- Critical are: rearing, lighting, and equipment.
- Others

Ventilation

- Airflow patterns are another important factor.
- For example, **uneven ventilation** may cause birds to migrate to more comfortable areas of the house, thus creating an “artificial” shortage of nest space.
- Drafts.



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Feeding

- The time of feeding can also interfere with laying.
- When: Right after lights on and then after production peak.
- Try not to feed during production peak.
- Do no limited feed intake.

Feeding times in Aviary

Feeding Times

	LUZ			Agua		Alimentación					
Semana	de	a	hora	de:	a:		F1	F2	F3	F4	
17*	9:00	19:00	10:00	8:45	19:00	9:30	11:00	14:30	16:00		
18*	8:30	19:30	11:00	8:15	19:30	9:00	12:30	14:30	16:00		
19	8:30	19:30	11:00	8:15	19:30	9:00	12:30	13:30	15:30	17:30	18:30
20	8:00	20:00	12:00	7:45	20:00	8:30	13:00	14:00	16:00	18:00	19:00
21	7:30	20:30	13:00	7:15	20:30	8:00	12:30	13:30	15:30	17:30	19:30
22	7:30	21:00	14:00	6:45	21:00	7:30	13:00	14:00	16:00	18:00	20:00
23	7:30	22:00	15:00	6:45	22:00	7:30	13:00	14:00	16:00	18:00	21:00
24	6:30	21:30	15:00	6:15	21:30	7:00	12:30	13:30	15:30	17:30	20:30
25	6:30	22:30	16:00	6:15	22:30	7:00	12:30	13:30	15:30	17:30	21:30
26	6:00	22:00	16:00	5:45	22:00	6:30	12:00	13:00	15:00	17:00	21:00
27	6:00	22:00	16:00	5:45	22:00	6:30	12:00	13:00	15:00	17:00	21:00

Control BW and Uniformity!!!

1. **First Feeding**: ½ a 1h after lights on.
2. **Second Feeding** **4-5h after de lights on**
3. **Third Feeding:** 1h after second.
4. **Next two** distributed afternoon.
5. **Last feeding** 1 hour before lights off.

Cortes, 2018

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Water

- Drinker space, type, and flow rate are also important.
- If not adjusted properly, bell type drinkers can encourage hens to lay under them.
- Nipple drinkers that are set too low may cause a **physical barrier** to the bird movement to the nests.
- An **inadequate number of nipples or a low flow rate** can cause the hens to stay next to the drinker line a long time.

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Nest

- **Constant management** → comfortable
- **Enough room** to turning around, and exiting the nest comfortably.
- There must be **adequate ventilation** inside the nest to keep the hen comfortable in hot weather and no draft.
- The nests should be located where the hens do not have to range more than necessary to find the proper place to lay.
- **Nest space** 4 to 7 hens/nest or 120 birds/m2
- **Cleanliness** of the nest pads and egg belt.
- Adequate space for hen movement just **outside the nest** opening: pre-lay behavior.

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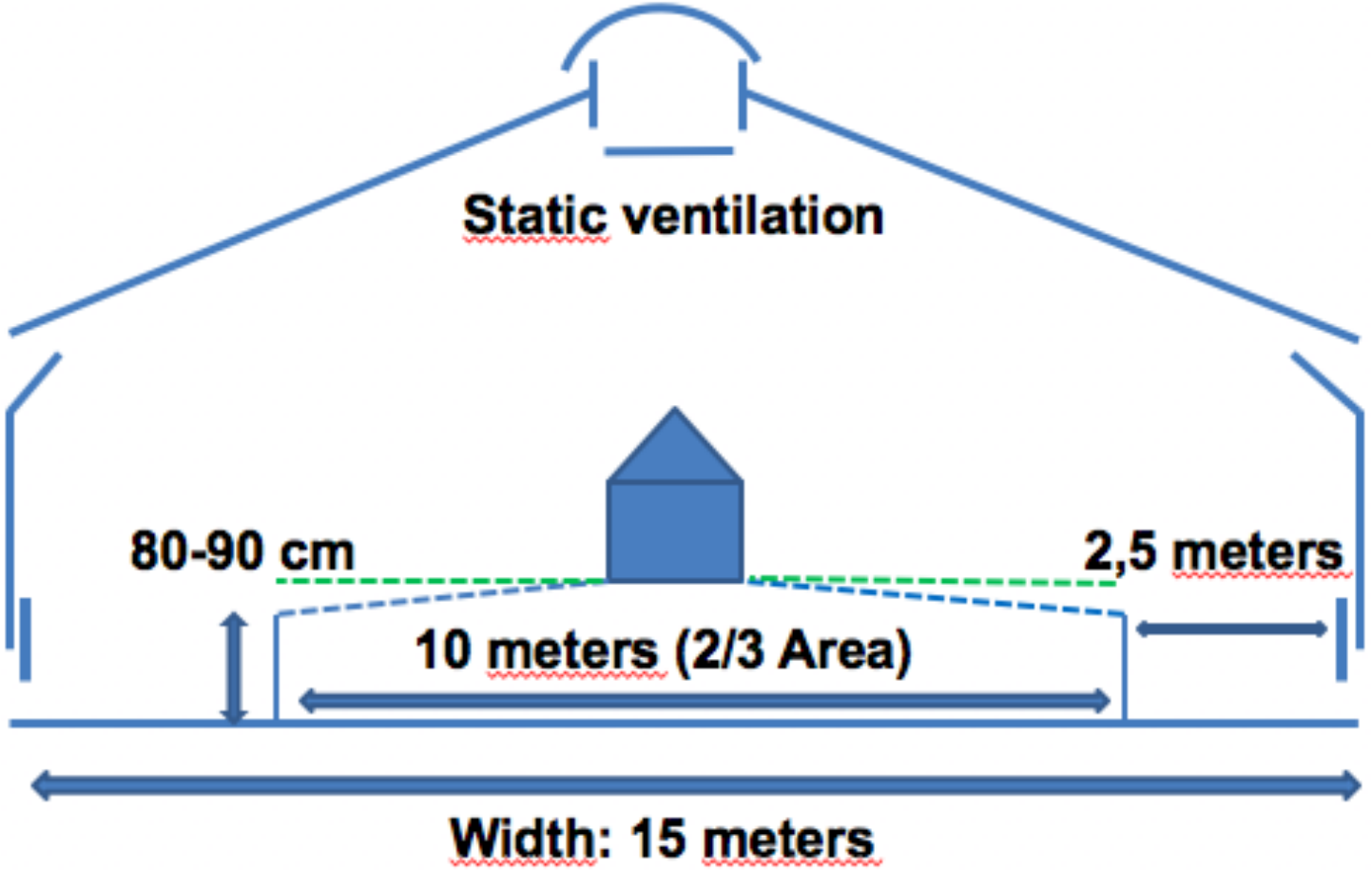
Nest (cont.)

Slat


Static ventilation
80-90 cm
2,5 meters
10 meters (2/3 Area)
Width: 15 meters

Health

- Bird health should not be overlooked.
- Sick birds less active to use nest.
- Red Mite

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Genetic

- Moderate heritability of good nesting behavior.
- Expected some progress
- BUT Management is the key factor!

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Test on Floor:
Saleable eggs in the nest

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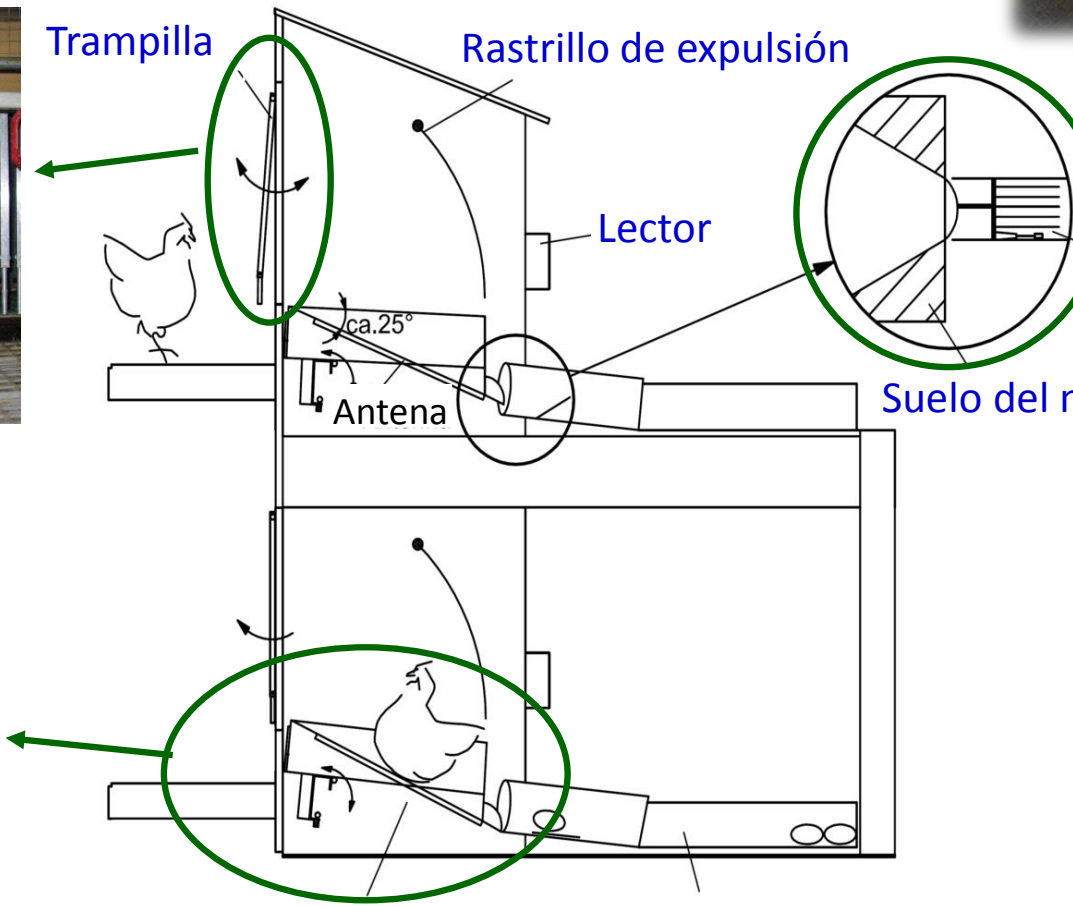
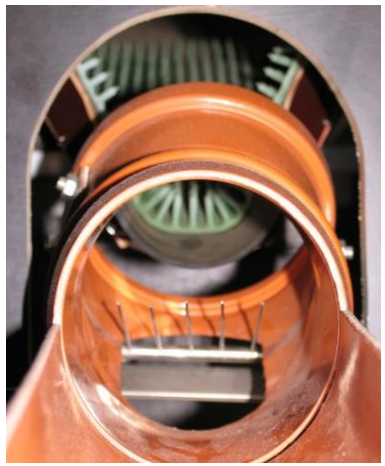
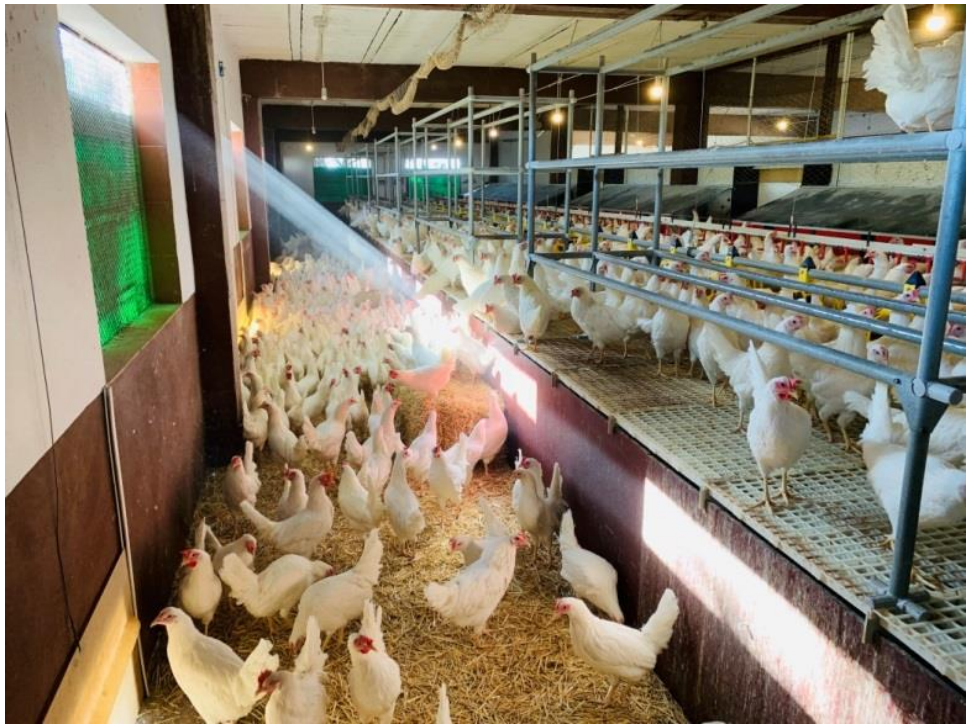
Test on Floor





New test - Free Range + 2 Feeds

New test - Free Range + 2 Feeds



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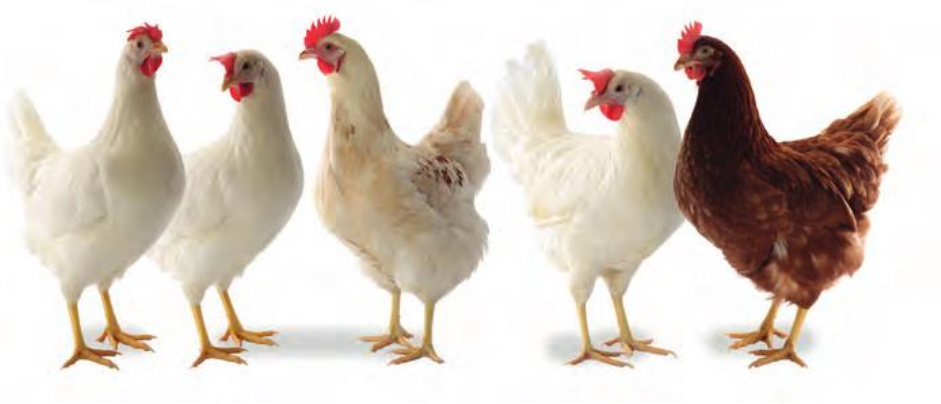

Equipment

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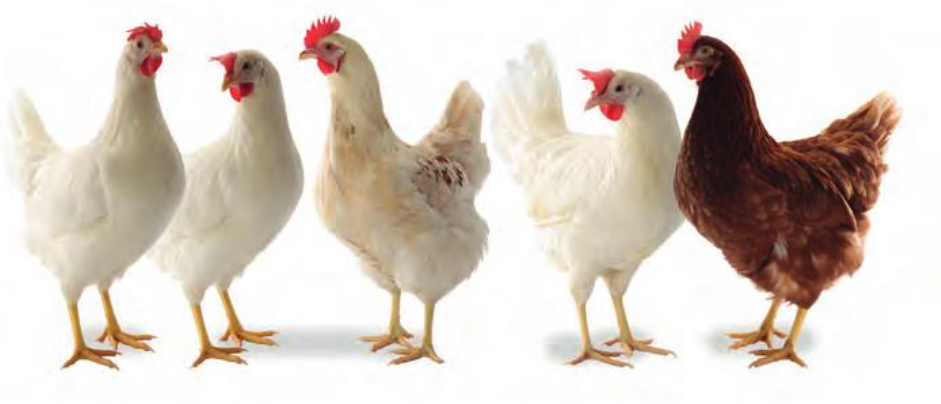

Summary: How to Prevent Floor Eggs

How to prevent floor eggs: Aviary

- NEVER Transfer later tan 17 weeks of age. Pullets need to get used to the new housing.
- Open nests before first egg.
- Open the nest 1-1,5 h before turn on the lights.
- Drinker on front of nests.
- Make sure there are not “nesting spaces” beside the true nests.
- Keep the birds under confinement after transfer. Max. One week (if it is possible).

Cont.

- Avoid direct light on nests
- Avoid dark areas
- Pick up floor eggs ASAP
- Walk through the house for the first weeks after transfer.
- Do not feed during the daily production peak
- Avoid air draft or high temperature in the nests
- Make sure all birds sleep in the system.

Foto: Raúl Rodríguez y Diego Cortés

Foto: Raúl Rodríguez y Diego Cortés

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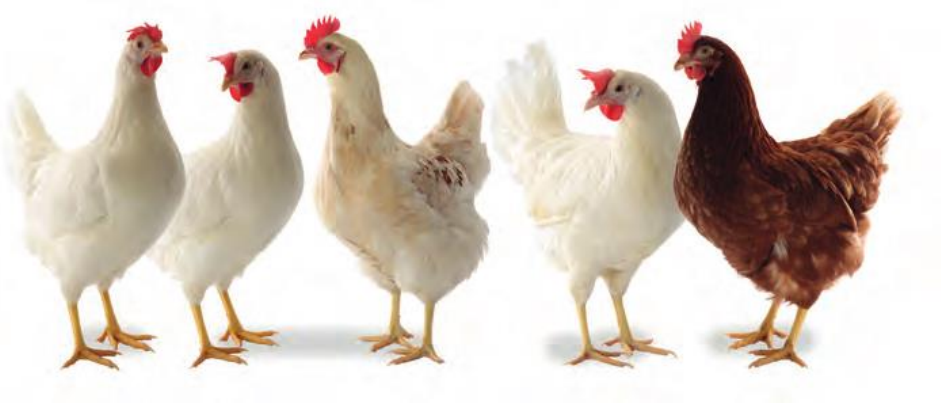

Conclusions

Conclusion

- Controlling floor eggs start in rearing.
- By Imp…or:
1. Perc…
2. Light…
3. Equi…
- Contin…
- Management (Lighting, feeding and training).

MANAGEMENT
Be there with the hens

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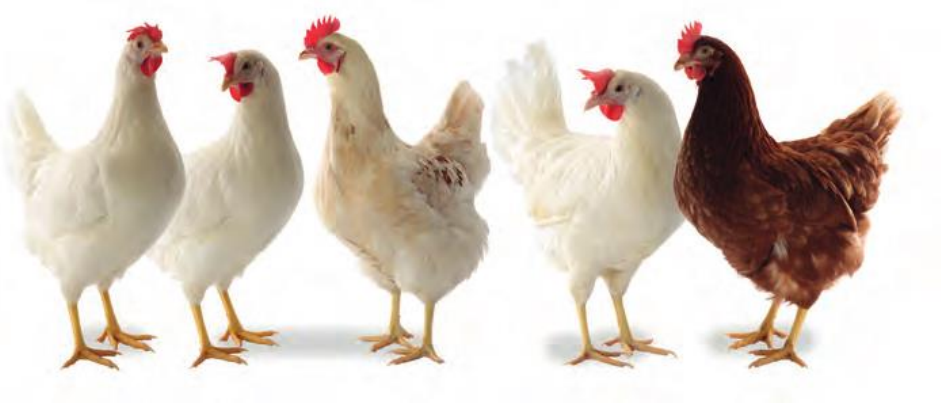

Thank you!