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# The Foundations of Success

H&N Layer Academy 2020

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Global Technical Service

# What is brooding?

- “The art and science of rearing baby chicks”
- “Application of heat to the birds at early part of their life”
- Transition period: first 3 - 4 weeks of life



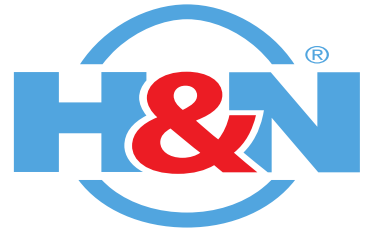
- **Temperature**
- Water and Feed

# Definitions and perspectives on brooding

- Brooding is the art and science of rearing baby chicks. A **newly hatched chick does not develop the thermoregulatory mechanism fully and takes about two weeks to develop this mechanism and homeostasis**. Therefore, they cannot maintain the body temperature properly for the first few weeks of life, and may be subjected to chilling, if not properly taken care of. Brooding can be classified into natural and artificial brooding.
- Application of heat to the birds at early part of their life.
- Brooding is the care of young chicks by provision of optimum environment. The temperature by external heat source provided until the chicks not become able to regulate its body temperature efficiently. The temperature is most important factor during brooding. The metabolic thermoregulatory capacity of chicken develops when feathering starts at 2-3 weeks of age to replace “down”.

# Stockmanship and tools



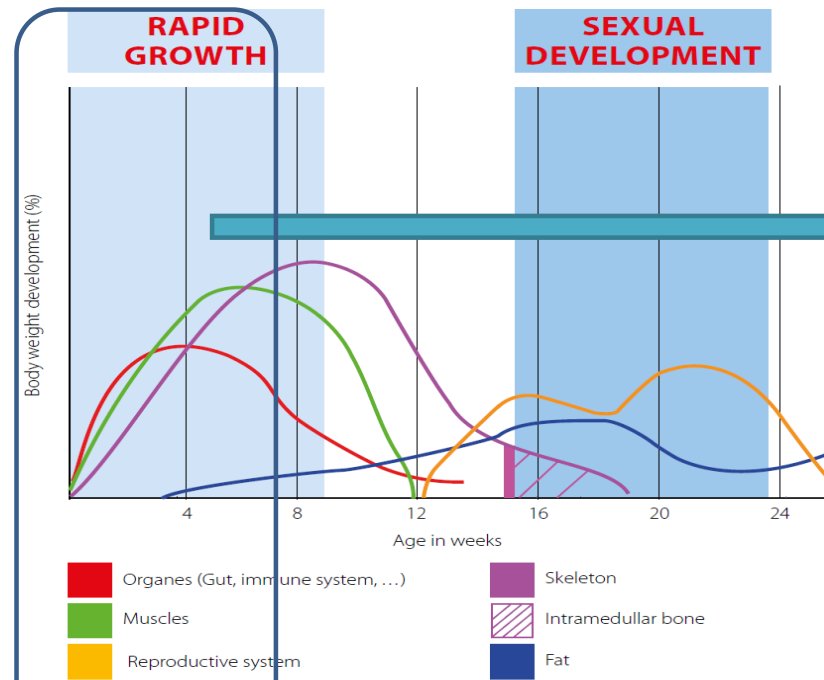


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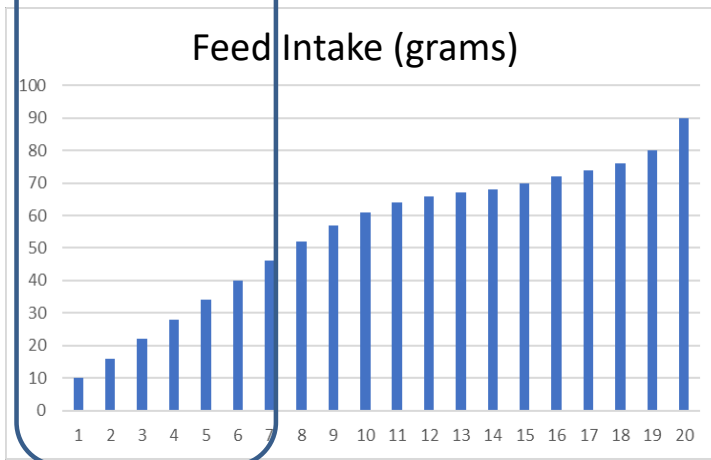
Why is so important?



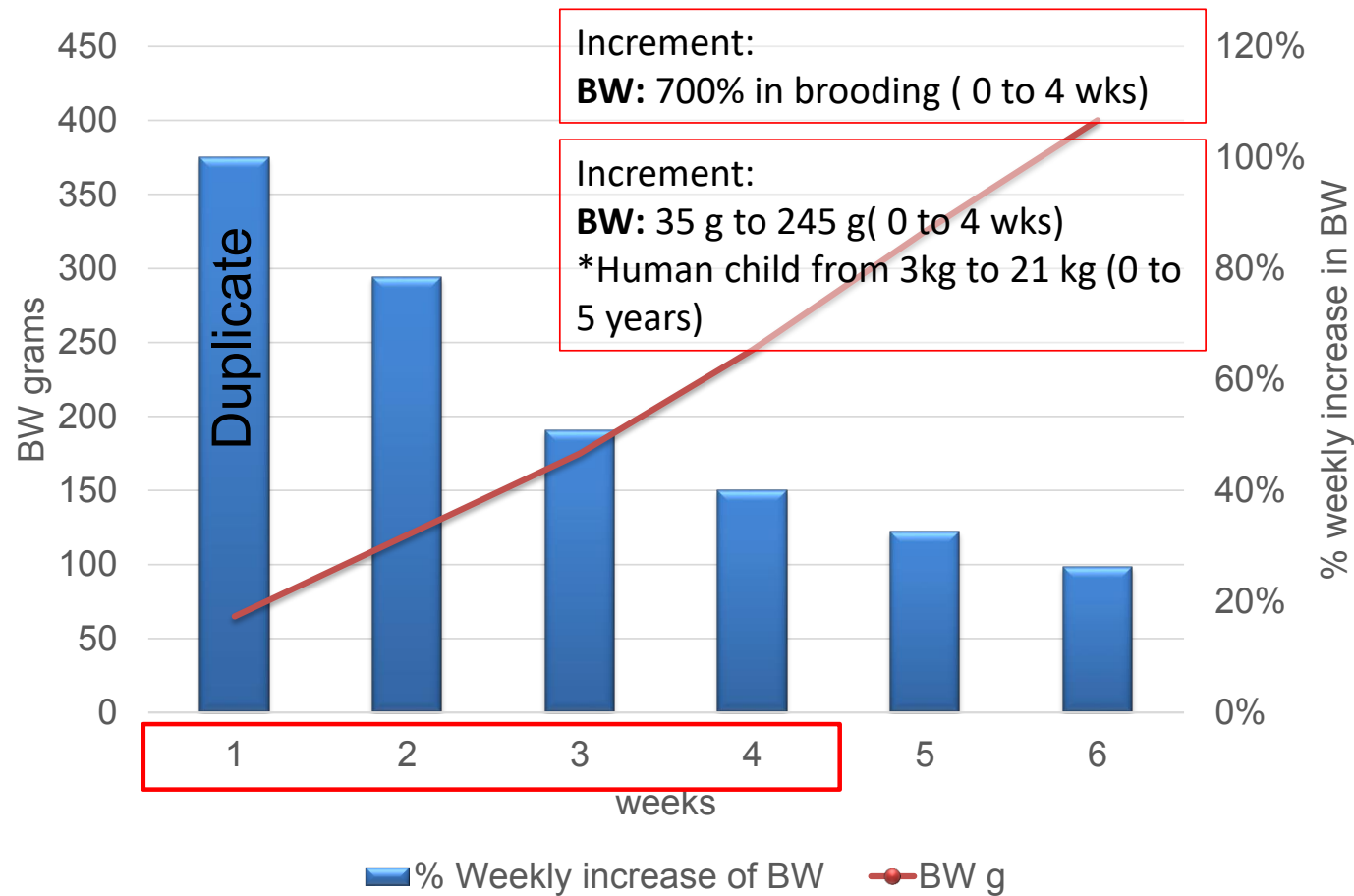
## Foundation of the bird

### Weeks 1-8:

- Fast growth
- Development of important organs:
  - a) Immune System.
  - b) Digestive system.
  - c) Thermoregulatory system
- Limited feed intake
- Excellent correlation between BW at 5 weeks and production parameters



# Brooding period: % of weekly increase of feed intake



**Why is it so important to be 100 % aware**

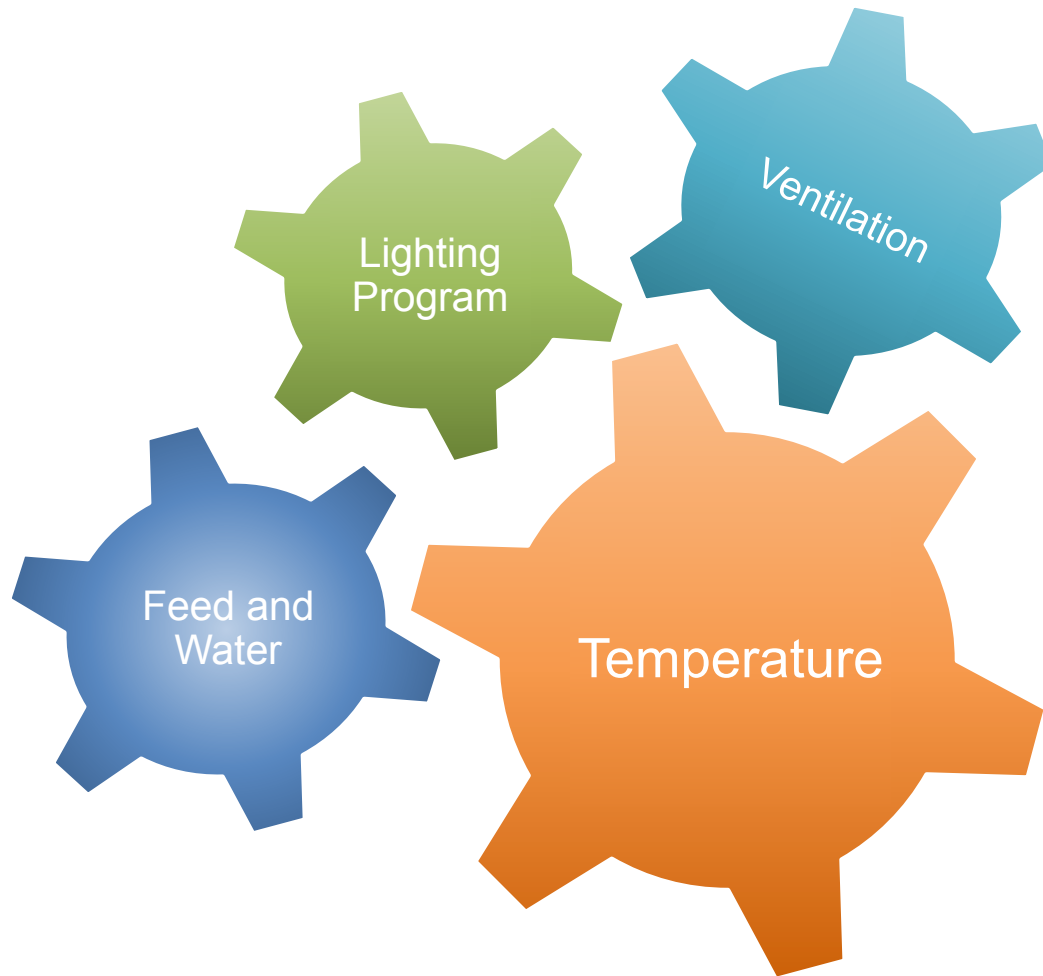
**Mistakes in this early  
period of life cannot be  
corrected later.**



# More facts about a chicks early life period

- Early in life, breeder pullets are given vaccines allowing them to produce antibodies that will be passed on to their progeny. These maternal antibodies travel through the hen's bloodstream to the egg yolk, then to the developing chick when the yolk sac is absorbed. Antibodies absorbed through the yolk sac help protect the chick from immunosuppressive viral disease, such as reovirus and infectious bursal disease found in the environment. These viruses may cause disease if the maternal antibodies from the yolk sac do not get into the chick's blood stream.
- Once absorbed, the yolk material protects the chick for the first 10 to 15 days of life. After this time, the chick will make its own antibodies. If the chick is not managed properly, the yolk sac, and the antibodies contained in the yolk material, will not be absorbed by the chick. The primary factor that interferes with the absorption of the yolk material is **stress**. Stress also interferes with feed and water intake and ultimately performance.
- Stress is a major problem for the chicks during the first two weeks of life. Stress is anything that causes the chick's adrenal gland to produce excess steroids, resulting in immunosuppression (the suppression of the bird's immune system). When a chick is stressed, the blood vessels surrounding the yolk sac constrict. This impedes the ability of the mesenteric vessels to transfer the antibodies and nutrients that the immature chick needs to thrive (Illustration 1).
- If this yolk material is not absorbed, it will remain as foreign material in the chick's abdomen and the chick will not reach its full growth potential and feed conversion. Not only will the mature broiler experience decreased weight gains and increased feed conversion, the unabsorbed yolk may cause birds to be salvaged or condemned in the plant.

# Keystones of brooding and how to target them



# Pre-placement Checklist

## Delivery note

Flocks Age < 27		%
Flock Age > 67		%
Brown Nick < 35 weeks		Y/N
Hatching supplement		Y/N
Extra Hatching supplement		Y/N
Vaccines		OK?
IRBT		Y/N

## Placement

Feeder Space		/bird
Including extra feeders		/bird
Type of feeders		
Drinker Space		/bird
Including auxiliary drinkers		/bird
Type of drinkers		
Type on nipples		360?
Lighting Program		OK?
Temperature Program		OK?

# Placement Check List

## PLACEMENT CHECK LIST

Chicks condition										
Aiport										
Transport										
Males dubbed										
IRBT		Males								
Chick Quality		Legs			Hocks			Navel quality		
Temperature	AIR TEMP		FLOOR TEMP		Prewarming					
relative Humidity										
Type of Feed										
Paper on floor		Covering % (aprox)		Under drinkers (Y/N)		Feed on paper (Y/N)				
Feeder space										
Type of Feeders								Extra Feeders (Y/N)		Extra Feeders Space: ____ birds / feeder
Water	Pressure (ok)		Drinkers are clean		Water treatment (Y/N)		What type			
Drinker type	Nipples or cups		Nipples 360 (Y/N)							
Drinking space			birds/nipple or cup				Extra Driners (Y/N)		Extra Drinkers Space: ____ birds / drinker	
Crop fill	Females SN		Males SN							
Weights at placement g	Females SN		Males SN							
Light intensity										
Lighting program										
Vaccination Program										
Employees								Counted (Y/N)		
Source										

# Post-placement check list

	Day						
	1	2	3	4	5	6	7
Mortality (high/low)							
Vent Temperature							
Set point Temperature							
Pasty Vents (y/n)							
Crop Score 4th day							
7-day body weight duplicate (y/n)							
Uniformity >85% (y/n)							
IRBT at 7 days (good/bad; pictures)							

	Week						
	1	2	3	4	5	6	7
Feces are normal?							
Weekly Body weight at or above std							
Uniformity > 85% at 5 weeks							

# Checklist

- Farm (sensors, heater, fans, etc)
- C&D
- Hatchery
- Source
- Transport
- Housing
- Chick quality
- Body weight at placement
- Temperature
- Relative Humidity
- Ventilation

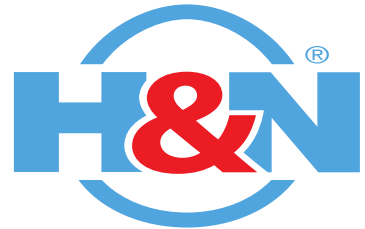
Pre-placement

Placement &  
Brooding

- Feed
- Feed intake
- Feeders
- Water
- Drinkers
- Paper on floor
- Lighting program
- Crop Score
- Mortality (DOA and daily)
- Body weight 7d & 5w

Placement &  
Brooding





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**PRE-PLACEMENT**

# EXAMPLE



H & N International GmbH - Am Seedeich 9-11 - 27472 Cuxhaven

Page: 1 / 2

**H & N International GmbH**  
 Am Seedeich 9-11  
 27472 Cuxhaven  
 Germany  
 Phone No. +49 4721 564-0  
 Fax +49 4721 564-111  
 E-Mail info@hn-int.com  
 Home Page www.hn-int.com

**DELIVERY NOTE 13141**

Customer No. Document No.  
 10144 10.07.19 13141  
 Point of Arrival Bangkok

Contact Jessica Korella Dispatching Amsterdam

Art.No.		Quantity
20020	H&N BROWN NICK PARENT STOCK FEMALES, DAY OLD CHICKS	10.000 pieces
20021	H&N BROWN NICK PARENT STOCK MALES, DAY OLD CHICKS	1.120 pieces
98001	Marik Rispens (monovalent) vaccination service	11.120 x
98029	Innovax-ND-IBD vaccination service	11.120 x
98020	IB Ma5 vaccination service	11.120 x
98023	Hatchling Supplement treatment	11.120 x
98011	Paracox 8 vaccination service	11.120 x
98025	Comb treatment males	1.120 x

Number of boxes: 139 Boxes

Terms of delivery/dispatch

Custom Office No:

Packing

139 Boxes marks addr. no. 1 - 139  
 Total Net Weight 445 kg  
 Total Gross Weight 578 kg

Packing list:  
 10.000 Pos. 1 ( 125 Crates à 80 Females ) Nr. 1 - 125  
 1.120 Pos. 2 ( 14 Crates à 80 Males ) Nr. 126 - 139

**Packing list  
 (number of  
 boxes per  
 flock/line)**

Tax ID No. 68/207/03981 - VAT ID No. DE 189 148 615  
 Bank details: Commerzbank

Regd. Reg-No. HRB 110334  
 COBADEFF 286

**From young or old flocks**



Page: 2 / 2

0.00 % chicks from flocks < 27 weeks  
 0.00 % chicks from flocks > 67 weeks

	Name of Vaccine	Batch Number	Expiry date
D4 ml Rispens + Innovax-ND-IBD	NOBILIS RISPAVAC INNOVAX-ND-IBD	A 333 C E 263 B	07-2021 03-2020
IB Ma5 + Paracox 8	NOBILIS IB Ma5 VET. PARACOX 8	A 258 A 14 04 D 628 B	08-2020 19-09-2019

**Vaccines info**

	Marking:
1. 20020   H&N BROWN NICK PARENT STOCK	
2. 20021   H&N BROWN NICK PARENT STOCK	

**Marking**

**Quantity  
 Vaccines  
 Supplement**

➤ *Hatchery: body weights, flock distribution, chick quality control*

The delivery has been verified and corresponds to the information on the delivery note.

4160 Herbymagle R. Nader Location Code Denmark	Date Time 09-07-2019	Shipment	Driver	Carrier	Customer
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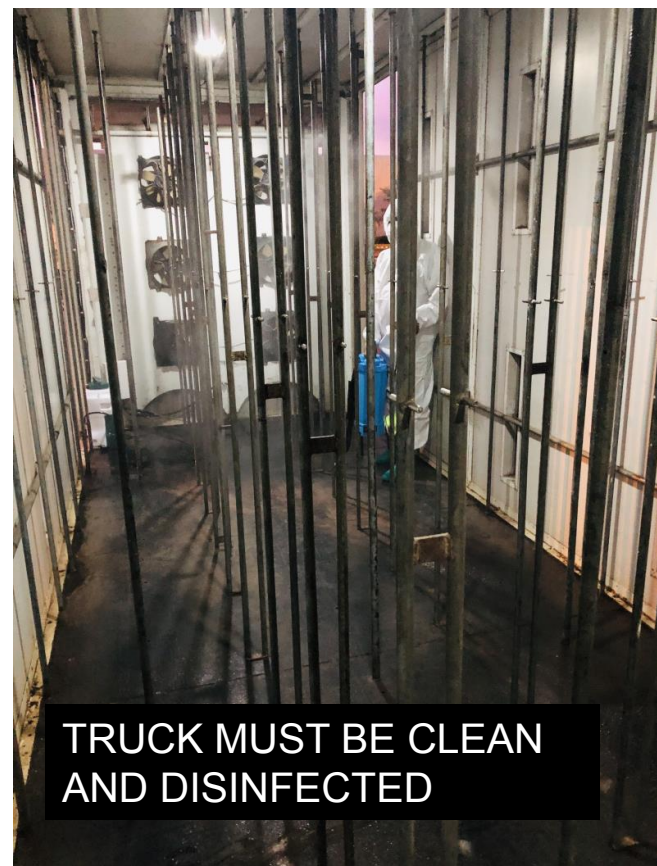
Managing Directors: Javier Ramirez Villaescusa  
 Tax ID No. 68/207/03981 - VAT ID No. DE 189 148 615 - Registered Office: Cuxhaven, Amtsgericht Tostedt, Reg-No. HRB 110334  
 Bank details: Commerzbank Oldenburg, IBAN: DE90 2804 0046 0409 4553 00, SWIFT Code: COBADEFF 286

**Pre-Placement**





# Transport



Source: H&N



Source: H&N

Pre-Placement

# Transport



GOOD SET-UP  
CLEAN TRAILER  
OPTIMAL VENTILATION  
TEMPERATURE CONTROL

Source: H&N



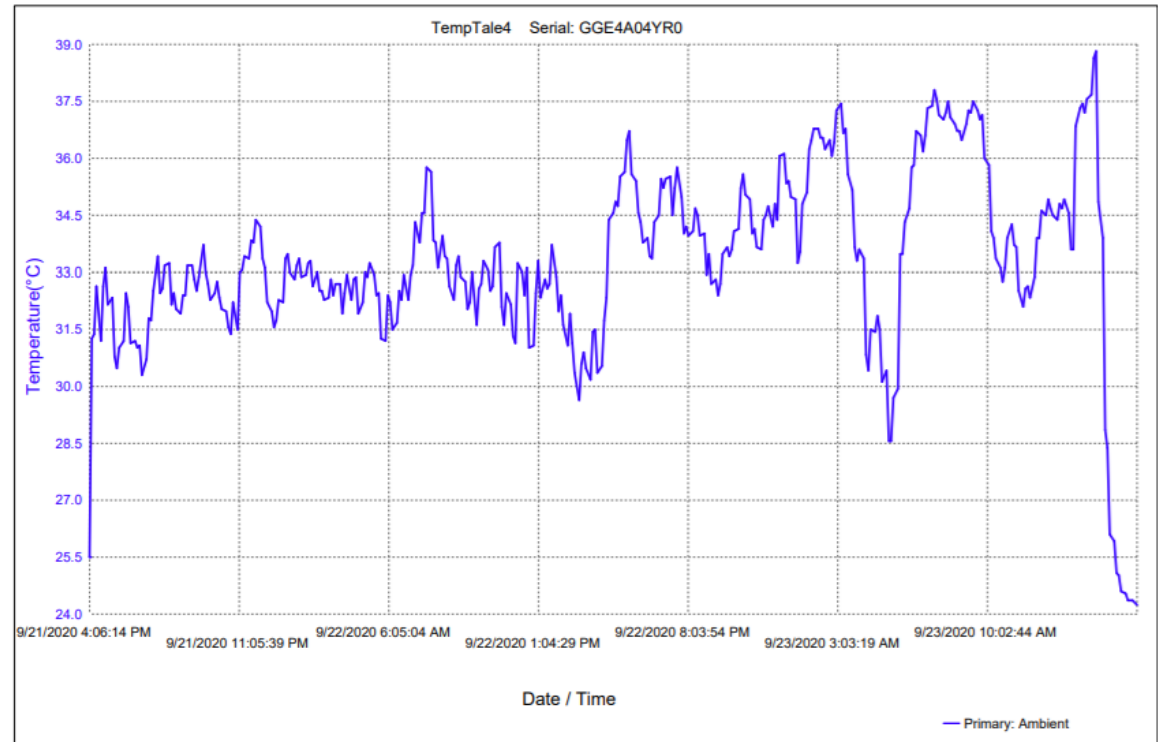
NOT OPTIMAL

Source: H&N

Pre-Placement

# Transport: Temperature control

Pre-Placement



# Transport: Density



Source: H&N



Pre-Placement

Source: H&N

# Check behavior and vent temperature

Pre-Placement



Source: H&N

- Optimal circumstances DOC will lose 1 to 2 gram of BW per 24h
- Panting + high temperatures **5 to 10 grams** of BW (water) in 24 h
  - Truck temperature
  - Check behavior at arrival
  - Measure vent temperature at arrival (40-41,1°C 104-106°F).



Source: H&N

# Check behaviour and vent temperature

- Under optimal circumstances, day-old chicks will lose approximately 1 to 2 gram of body weight per 24 hours, due to moisture loss by normal breathing.
- Too high temperatures and with panting, will result in a significant weight loss and a significant dehydration.
- Under extreme situations, day-old chicks can lose 5 to 10 grams of body weight (water) in 24 hours.



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# PLACEMENT

# Chick Housing

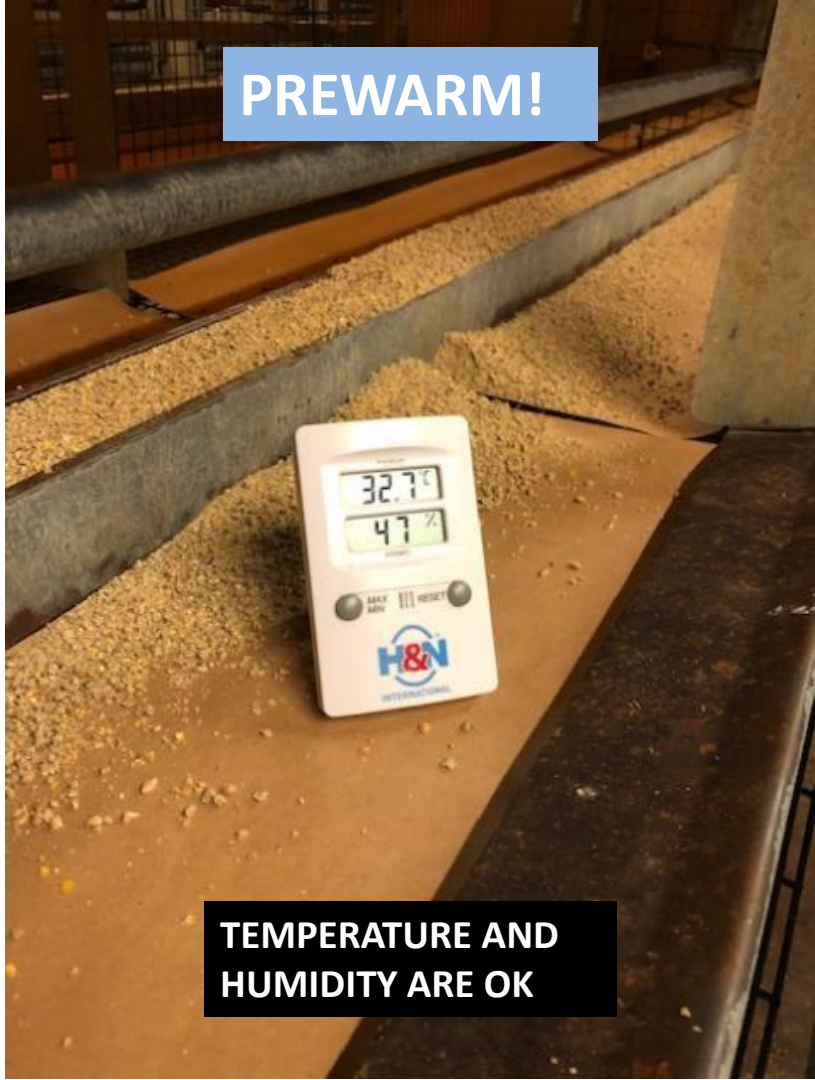
1. Request information from the hatchery: flock source, age for the breeders, body weight at hatchery, etc.
2. Check the status of the birds in the truck
3. Unloading the birds: fast and gently (trained crew).
4. Chick Quality and Body Weight
5. Report to hatchery
6. **FEED-BACK OF INFO**



# Chick Housing

- Check vent or rectal temperature in the birds in the truck
- Move them quickly into the house. Avoid heat and cold and drafts or direct sunlight.
- Assess chick quality – Must be warm and active. No high mortality in boxes.
- Check birds quality, take body weight after placement
- Conduct necropsy of mortality.
- 2<sup>nd</sup> check rectal or vent temperature a couple of hours after placement – adjust temperature

Placement



PREWARM!

TEMPERATURE AND HUMIDITY ARE OK

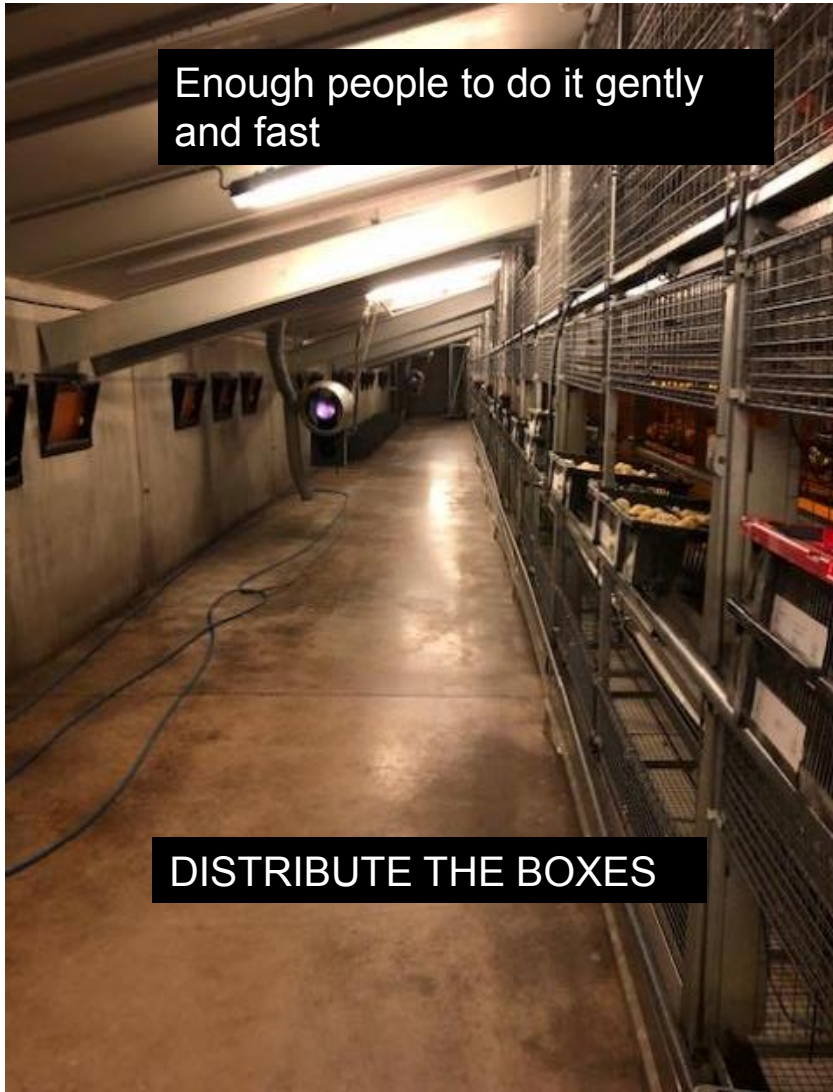
Source: H&N





Fast and gently  
unload the  
boxes and  
distribute them  
along the  
house

Source: H&N



Enough people to do it gently  
and fast

DISTRIBUTE THE BOXES

Source: H&N



Placement

# Chick quality control: samples

Placement



Source: H&N

- Example:
  1. Bacteriology
  2. Serology

# Chick quality control: Body weight and uniformity

Placement



H&N International

- Body weight at placement (individual)
- Uniformity and CV
- 100 birds per flock
- One of the component of chick quality.

# Quality control: Quality evaluation

Placement



Source: H&N

- Check:
  - a. Behavior
  - b. “Feather” quality
  - c. Navel quality.
  - d. Belly quality.
  - e. Leg quality.
  - f. Beak and eyes.

# Chick quality: quality score

- Pasgar score
- Tona score
- Chick length
- Own method

**Key point:** have a procedure in place.



Placement

# Leg quality

Placement



- Incubation problems
  - a) High humidity during incubation
  - b) High temperature



# Navel quality

Placement



- Flock age
- Egg storage
- Incubation conditions



# Beak

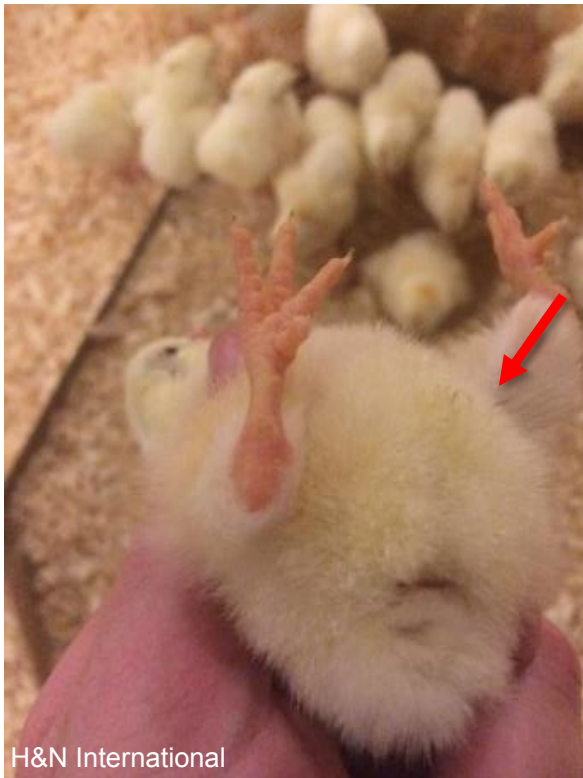
Placement



Boerjan, 2014

- Excess of light.
- Stress (high temperature) inside hatchers, chick holding room and/or transport.

# Belly quality



- Big, hard belly
- Incubation conditions:
  - Too high humidity and/or temperature during incubation.
- Risk of omphalitis and high 7d mortality.

# Belly quality

Placement



- The belly of day-old chicks must be soft and smooth.
- Bloated, stiff and hard bellies are signs of a badly absorbed yolk. This often leads to problems during brooding and results in a higher first week mortality rate.
- Causes for big and hard bellies in layer type chicks might be due to both insufficient water loss and too high temperatures during the incubation process. A hard belly is also a sign for a yolk sack infection.

**GOOD CHICK QUALITY  
MEANS NOTHING  
IF YOU MISS OUT  
ON THE FOLLOWING ...**

**When planning the number of chicks to house in rearing house:**

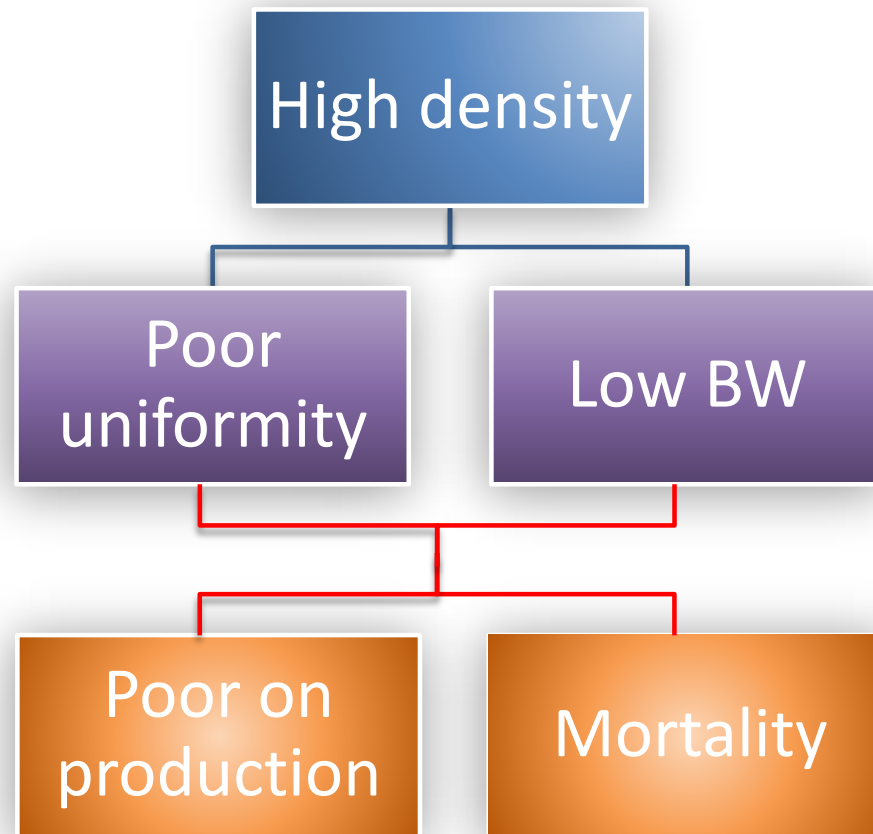
**IT IS CRITICAL** TO FOLLOW THE  
MANAGEMENT GUIDE DENSITY  
RECOMMENDATIONS

Placement

# Follow densities recommendations from the management guide

Age	Floor space		Feeder space		Drinker Space	
	Cage	Floor	Cage	Floor	Cage	Floor
0 – 3 weeks	140 cm <sup>2</sup> /bird	21 birds/m <sup>2</sup>	2.5 cm/bird	4 cm/bird 60 birds/pan	1.25 trough cm/bird 16 birds/nipple	1.4 trough cm/bird 16 birds/nipple 100 birds/fontain
3 – 16 weeks	285 cm <sup>2</sup> /bird	16 birds/m <sup>2</sup>	5 cm/bird	8 cm/bird 30 birds/pan	2.5 trough cm/bird 8 birds/nipple	2.5 trough cm/bird 8 birds/nipple 75 birds/fontain

# Risks if you **don't follow** densities recommendations from the management guide







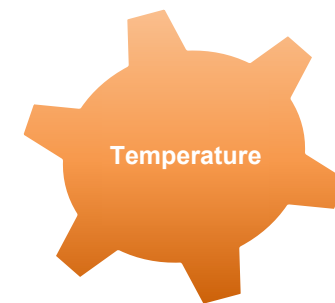
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# Temperature

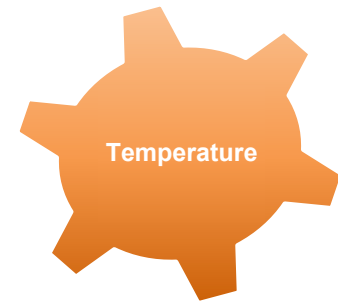
# Vent Temperature



H&N International

**DOC:** 39,7-40,5°C (103,5-105°F)  
**5d:** 40-41,1°C (104-106°F)

- **Adjust environmental temperature accordingly to body temperature**



# First step is Prewarming



15.2 °C  
59.0 °F



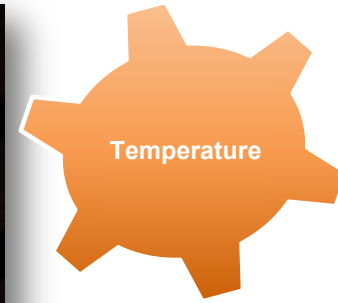
17.0 °C  
62.6 °F



18.8 °C  
64.4 °F



37.0 °C  
98.6 °F



Temperature



35.4 °C  
95.0 °F

H&N International





**Air 35 - 36°C**  
**95 - 96.8°F**



**Floor/Concrete ≥ 28°C**  
**≥ 82.4 °F**



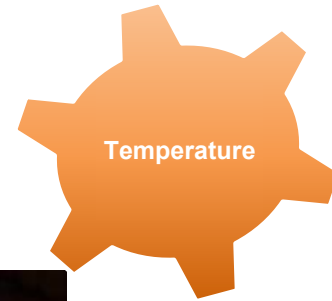
**40° C**  
**104 °F**



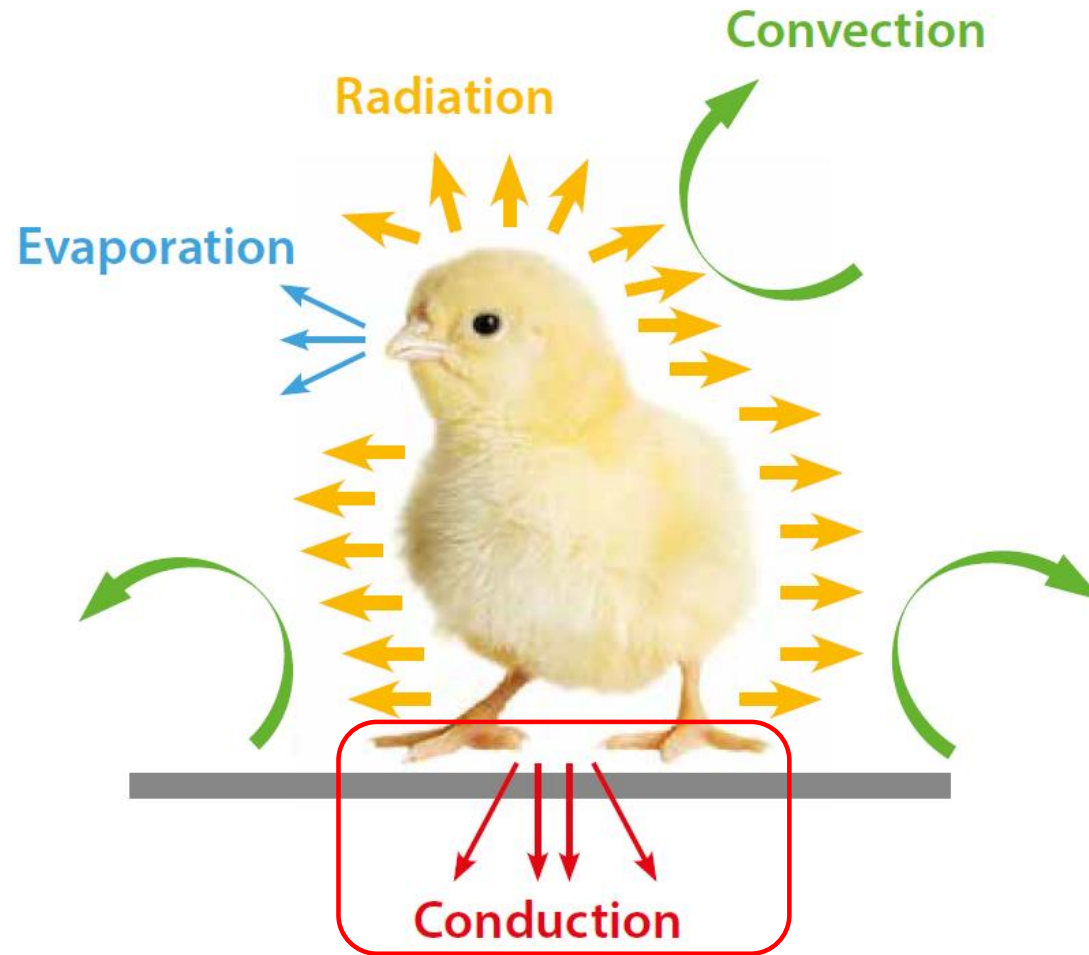
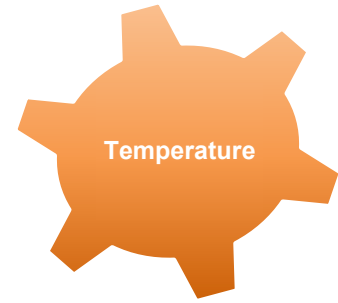
**Litter ≥ 30° C**  
**86.0 °F**



**41° C**  
**105.8 °F**

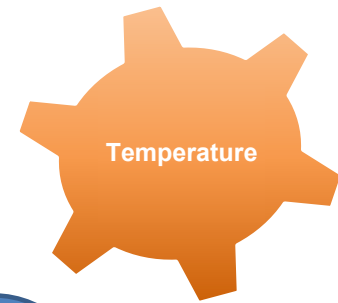


# Thermoregulation



# Recommendations

- Place in the hottest areas or cages:
  - a. Smallest chicks.
  - b. Chicks from young breeders (<35 wks.)
  - c. Youngest chicks (flocks arriving over several days).



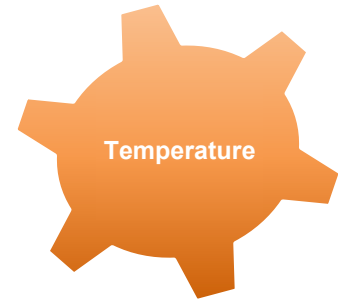
Correct temperature: chicks will be well distributed and active

Low temperature: chicks will group together and sound stressed

High Temperature: chicks will group in the coldest places, are inactive and pant.

ALSO RISK OF PASTED VENTS





# Effect of low temperature

- When chicks hatched, the following systems not fully activated:

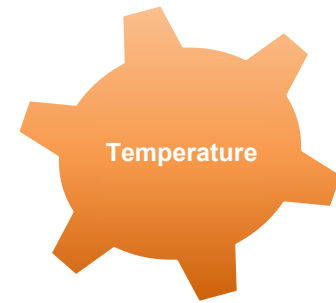
- a) Immune System. ↓
- b) Digestive system. ↓
- c) Thermoregulatory system ↓

Low Temperature !

- High 7d mortality and poor BW and uniformity

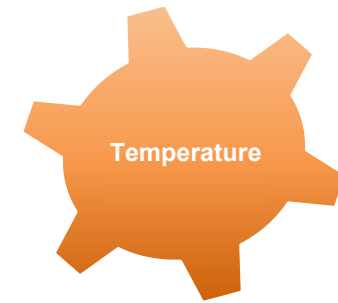


# Effects of low temperature

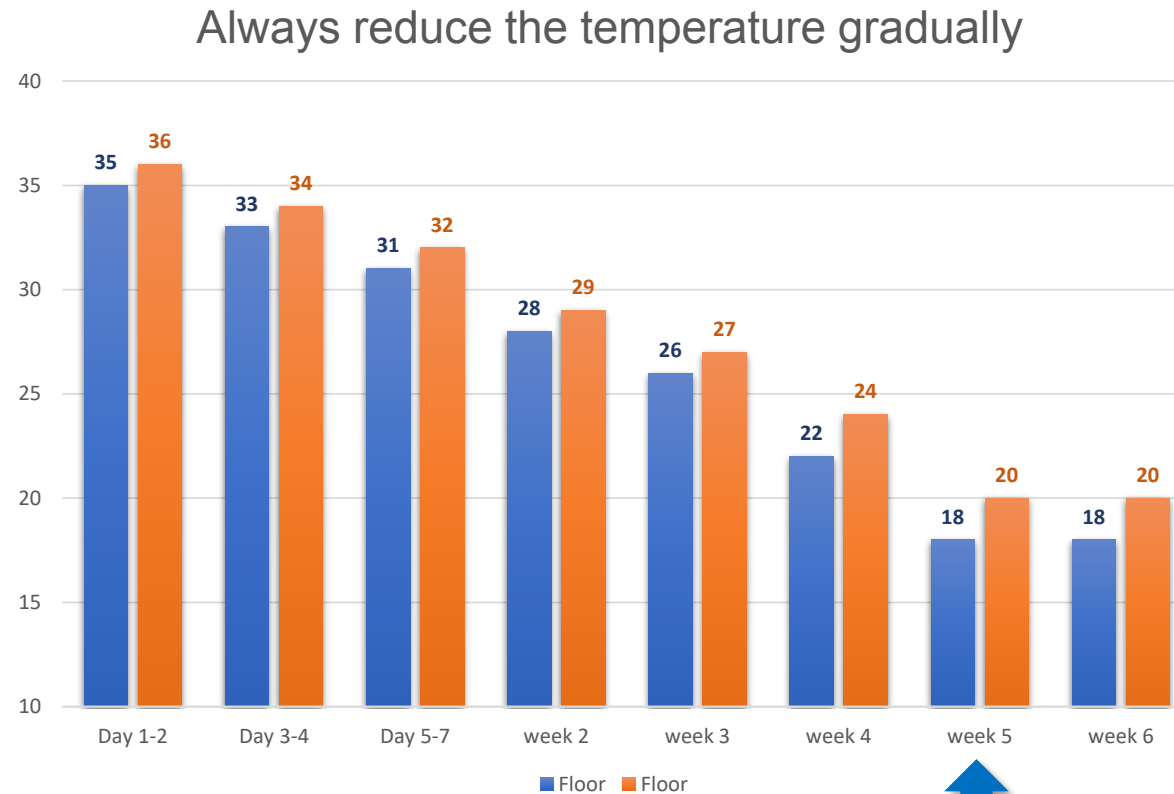


1. Chicks are losing heat more quickly due to:
  - Higher metabolic body size.
  - Higher body temperature than adult bird.
  - Lack of feathers.
2. Hypothalamus is not completely functional yet. When chicks hatched, the following systems not activated:
  - Immune System.
  - Digestive system.
  - Thermoregulatory system.
3. Low body temperature delays the maturation of above-mentioned three systems and make chick more susceptible to different infections.
4. A chicken is poikilotherm for first 4-6 days and then becomes homeotherm. The chicks from mature flock become homeotherm earlier than the chicks from younger flocks.
5. As the chicken grows, its downy coat is replaced by feathers, and the brooding temperature can be gradually reduced, until supplementary heat is discontinued at about 3–4 weeks

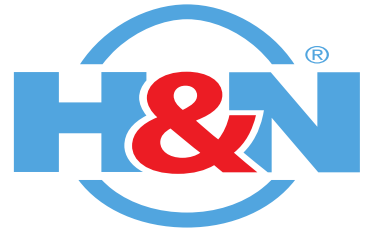
# Gradual reduction of temperature



- Always consider:
  - a) Body weight and uniformity
  - b) Feed intake
  - c) Behavior
  - d) **Vent temperature**



Schouren, 2019.



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# Feed and Water



# Stocking densities

- Feeder space has a **significant impact on body weight and uniformity**

Age	Floor space		Feeder space		Drinker Space	
	Cage	Floor	Cage	Floor	Cage	Floor
0 – 3 weeks	140 cm <sup>2</sup> /bird	21 birds/m <sup>2</sup>	2.5 cm/bird	4 cm/bird 60 birds/pan	1.25 trough cm/bird 16 birds/nipple	1.4 trough cm/bird 16 birds/nipple 100 birds/fontain
3 – 16 weeks	285 cm <sup>2</sup> /bird	16 birds/m <sup>2</sup>	5 cm/bird	8 cm/bird 30 birds/pan	2.5 trough cm/bird 8 birds/nipple	2.5 trough cm/bird 8 birds/nipple 75 birds/fontain



# Feed

- Available immediately after placement.
- Correct feed structure
- Feed scattered on paper 3-5 days.
- Place abundant feed.
- Floor: Auxiliary feeders 1 per 80 to 100 chicks (depending on feeder size)

# Feed



- Abundant feed in feeders (overflow first 2 days).
- Cage brooding: paper covering 100% of the floor (nipples without drip cup, do not put paper underneath the drinker line).
- Floor brooding covering at least 50% and critical under feeder and water lines.
- Remove paper when feet can't get through the mesh (2-3 weeks)
- Best crumble feed or micro pellet first 1-2 weeks

# Feed on paper





# Water

- 360-activated nipples are preferred

\*cup drinkers or extra drinkers for first week (1/80 to 100 chicks in comfort zone).

- Reduced water pressure (follow manufacturer recommendations).
- Flush the lines and renew water in bell/cup drinker before housing chicks and then do it in a regular basis for the first week (avoid hot water!). and then in rearing (prevent biofilm).



# Water



- Trigger drinkers first 3-4 days and nipple at chick eye level.
- Target water temperature 20-25C.
- Adjust height according to bird's growth.
- Place a platform under auxiliary drinkers (floor system) during the first week
- MONITOR the daily consumption and bi-weekly static flow.

# Water Temperature



Mozafar, 2017



- Control temperature: optimal is about 18 - 22°C
- Birds **refuse to drink**, if the water temperature is too high!
- Birds do not EAT, if they do not DRINK.

# Check and adjust drinker height



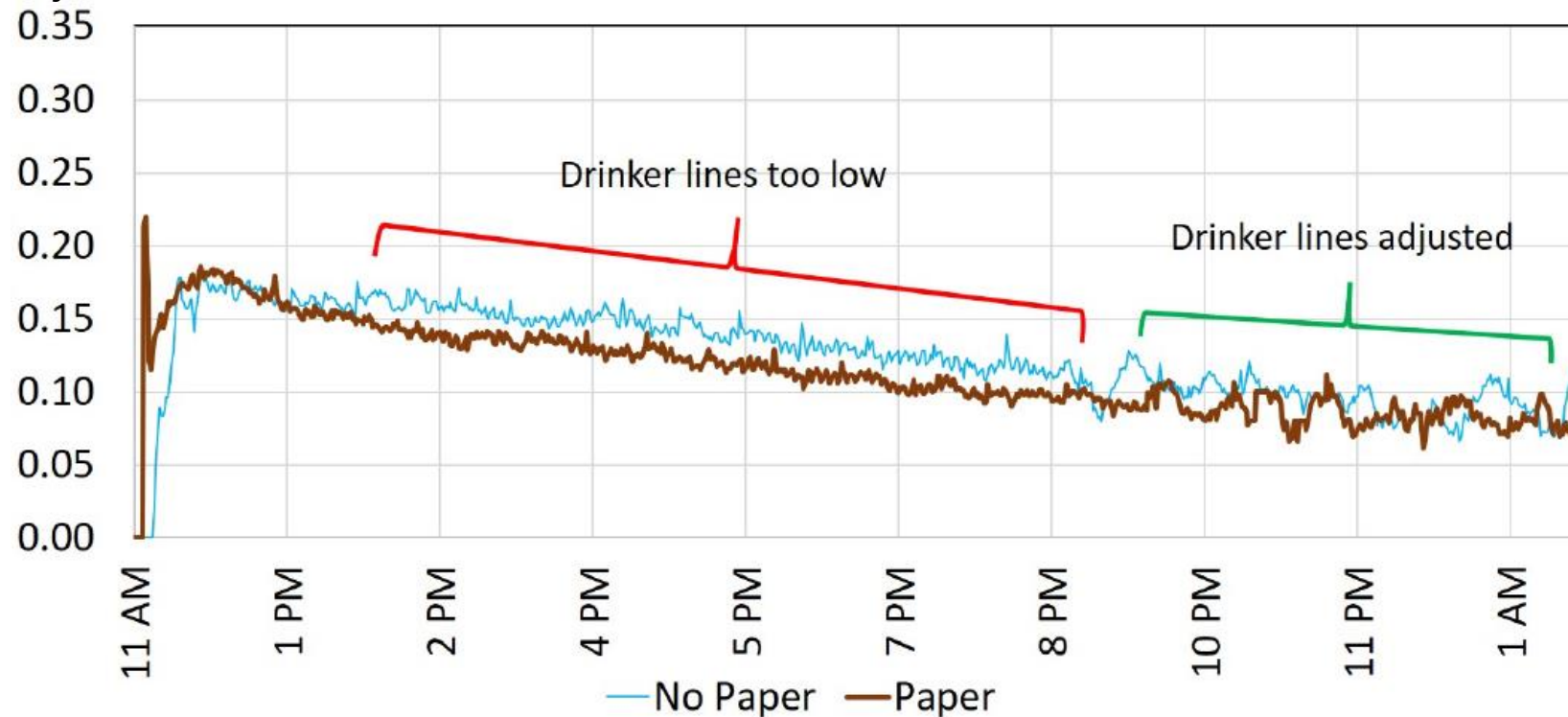
H&N International





# Drinker line height

Minute-to-minute water usage after placement and before and after drinker line height adjustment.



Czarick et al, 2019



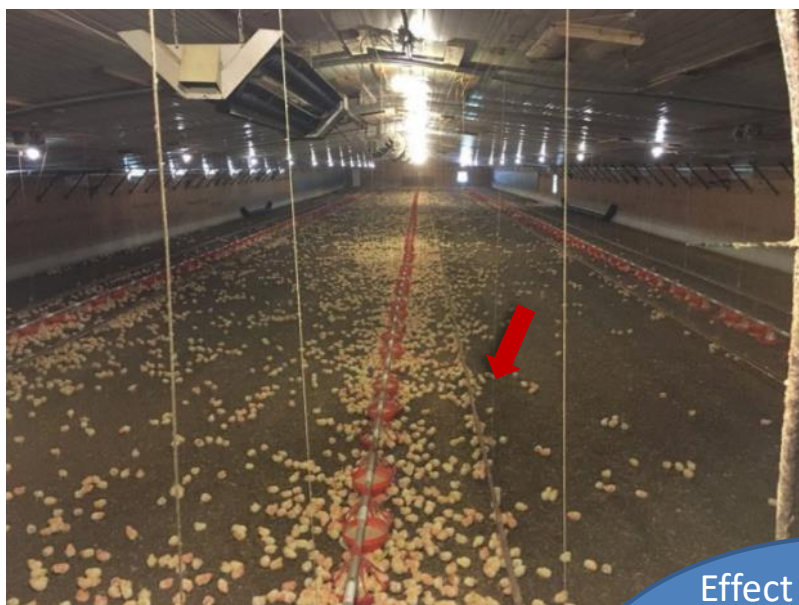
# Paper under water lines (floor)



H&N International



# Paper under drinking line (Floor)



**NO PAPER**

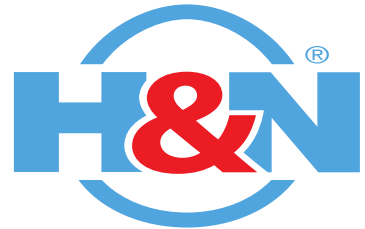


**PAPER**

Effect is for the first hours after placement after placement (2 – 4 hours)  
Important after long trips

Czarick et al, 2019





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# Brooding: Ventilation



# Ventilation

- Minimum ventilation to **control moisture and air quality.**
- **Starts pre-placement (during prewarming)**
- Keep RH below 70%
- AVOID drafts → chilling effect.
- Provide optimum air quality from the beginning.



# Ventilation



- Example of riding in a motorcycle: Mixing of the incoming outside air and the inside air prevents the cooler air from settling near the litter and chilling the birds. Inlet openings and air speed coming through the inlet is important in ensuring that air moves along the ceiling. If the inlet opens too much or if the speed of the air entering through the inlet is too low, then the cool air will fall to the floor more quickly. Not only will this cause a problem of bird chilling, but can create cool spots on the walls and floor. As warm air contacts these cooler spots condensation will form creating wet spots. These wet spots can lead to increase litter caking as well as more ammonia production.
- Circulation fans should be used to break up temperature stratification and provide a more uniform temperature throughout the poultry house. Moving the warmer air to bird level not only helps maintain bird body and floor temperatures, but also helps remove moisture from the litter.
- Fan operation is controlled by temperature to maintain the desired temperature. Some fans are operated by a timer to regulate relative humidity and maintain good air quality when the house is at the desired temperature. The house environmental controller operates the fans based on temperature and timer settings. The controllers will open air inlets located in the side walls or ceiling to ensure uniform air entry into the house. The amount the inlets open is determined by static pressure.

# Air Quality



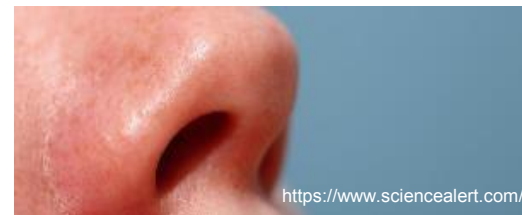
Oxygen	> 19.6%
Carbon dioxide	<0,3%/3000 ppm
Carbon monoxide	< 10 ppm
Ammonia	<10 ppm
Inspirable Dust	< 3.4 mg/m <sup>3</sup>
Relative Humidity	>< 45-65%



<https://www.safety.kiwi>



<https://frenchguiana.desertcart.com>



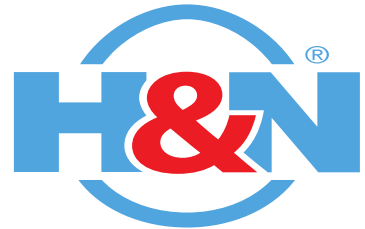
<https://www.sciencealert.com/>

# Air Quality



In addition to proper temperature regulation, air quality and ventilation needs to be considered. Ventilation distributes heat evenly throughout the house and maintains optimum air quality in the brooding area.

“Minimum ventilation” should begin with house preheating 24-48 hours prior to placement to remove waste gases and moisture. Young birds are very susceptible to drafts and air speeds as slow as 100 ft./min. (0.5 m/sec.) can create a significant wind-chill effect on day old birds. Minimum ventilation practices should be employed to circumvent inadvertent chilling up to 14 days of age.



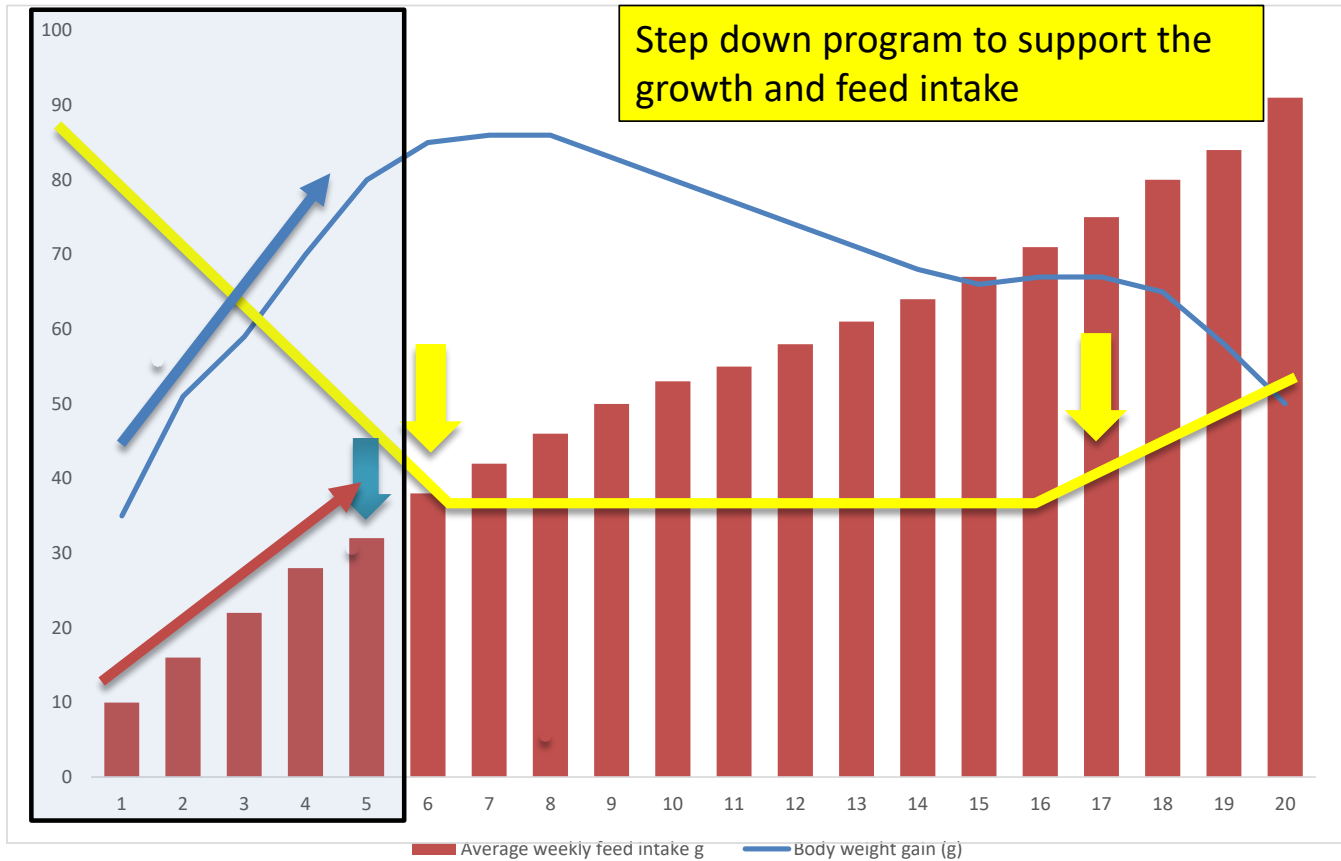
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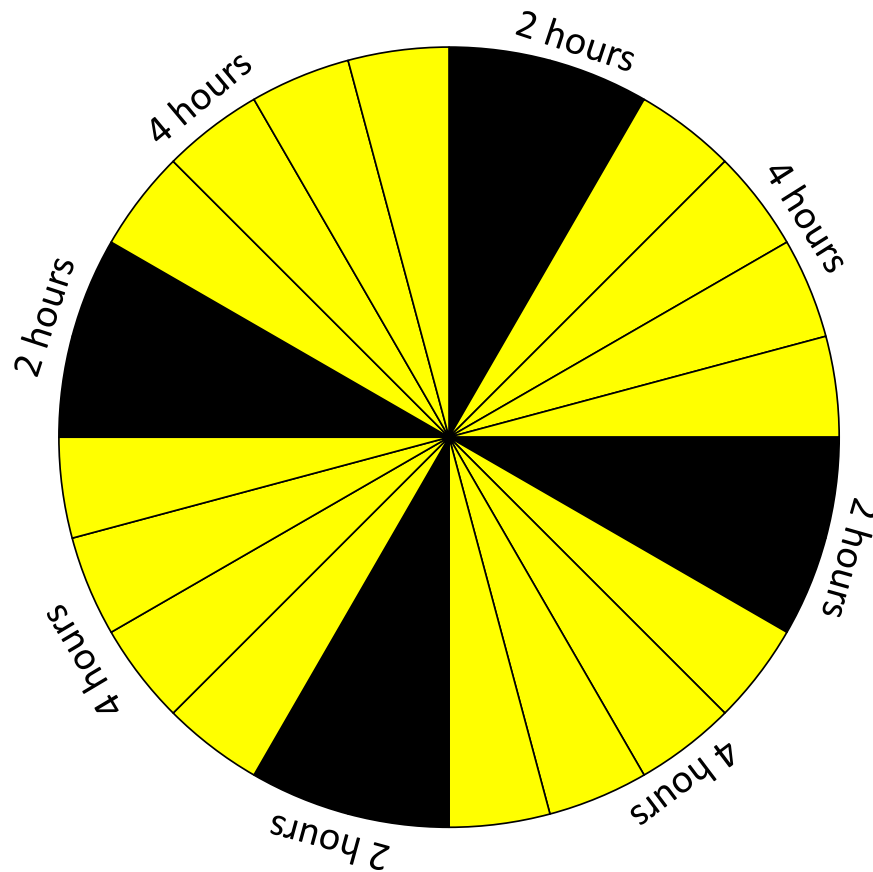


# Lighting program

# Body development

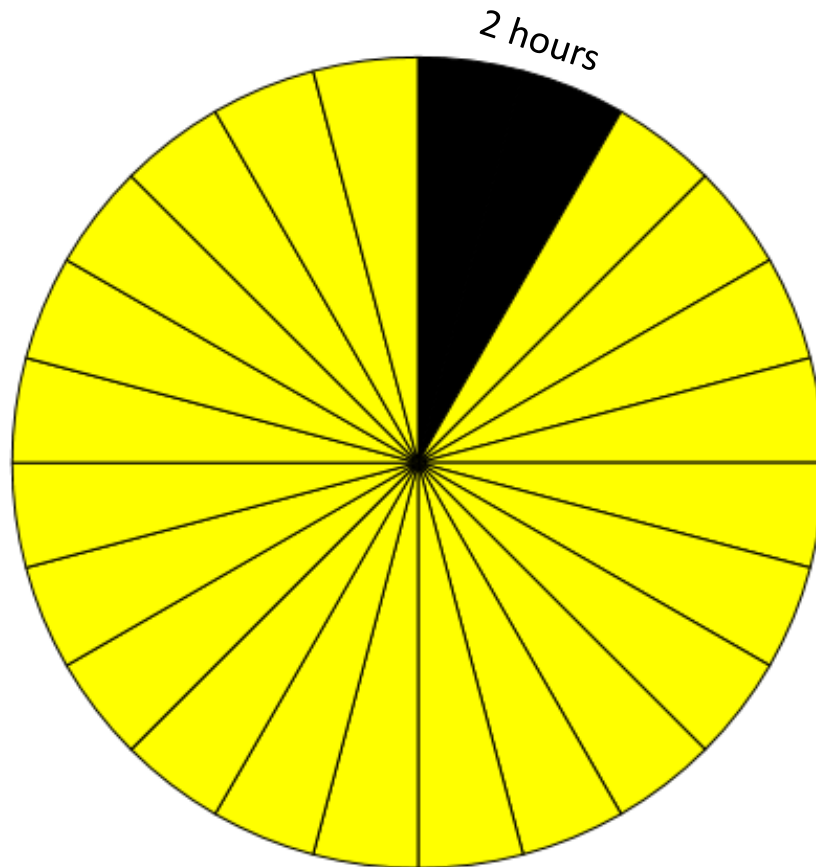


# Intermittent program



- 7-10 days
- Improve BW and uniformity
- Better livability
- Uniform behavior
- Intensity:  $> 40 \text{ lx}$
- Dark houses  $< 3 \text{ lx}$

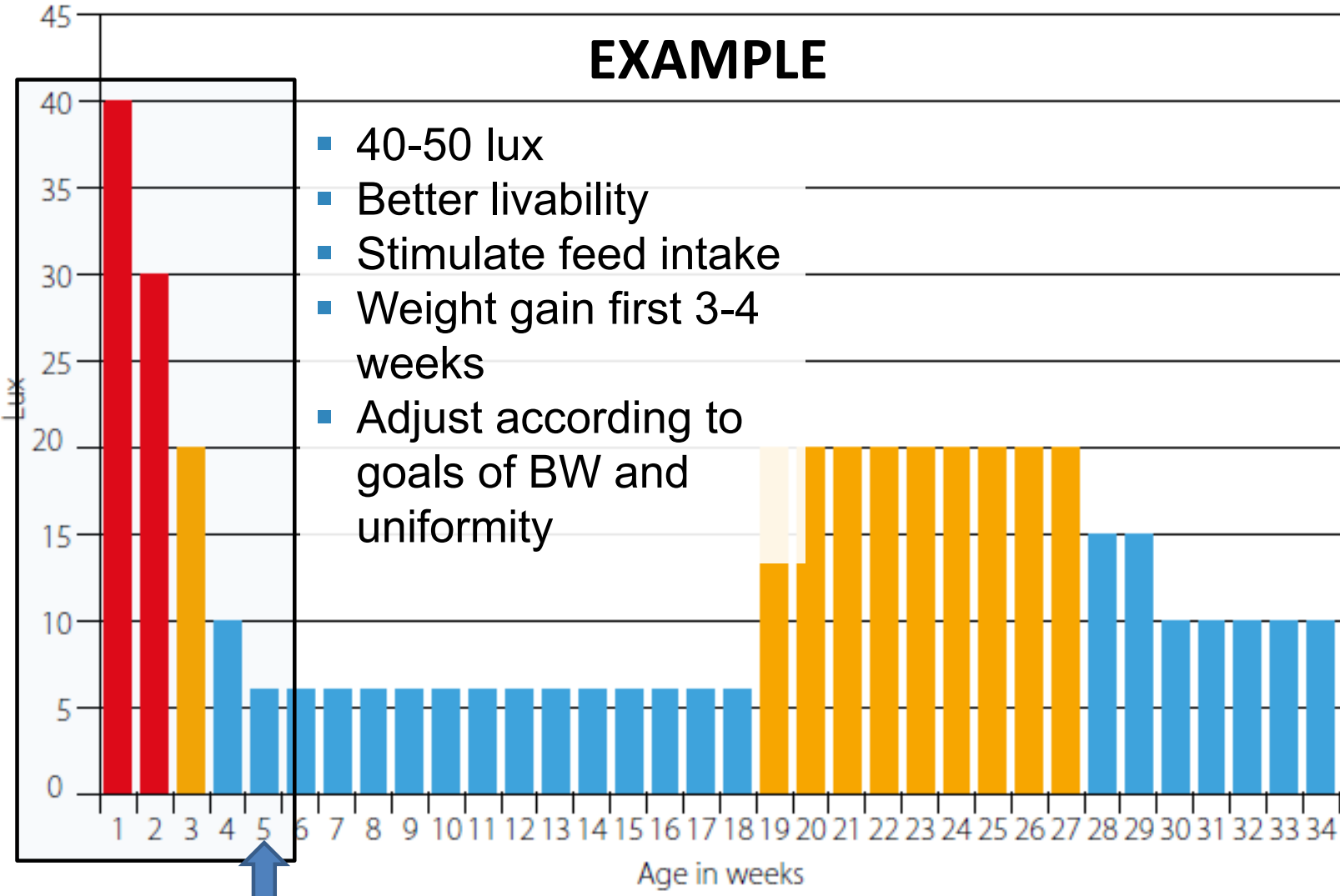
# Traditional lighting program



- 22 hours first 2-3 days
- Then 20 hours up to 7d.
- After → 2 hours per week
- Adjust according to BW and uniformity



# EXAMPLE



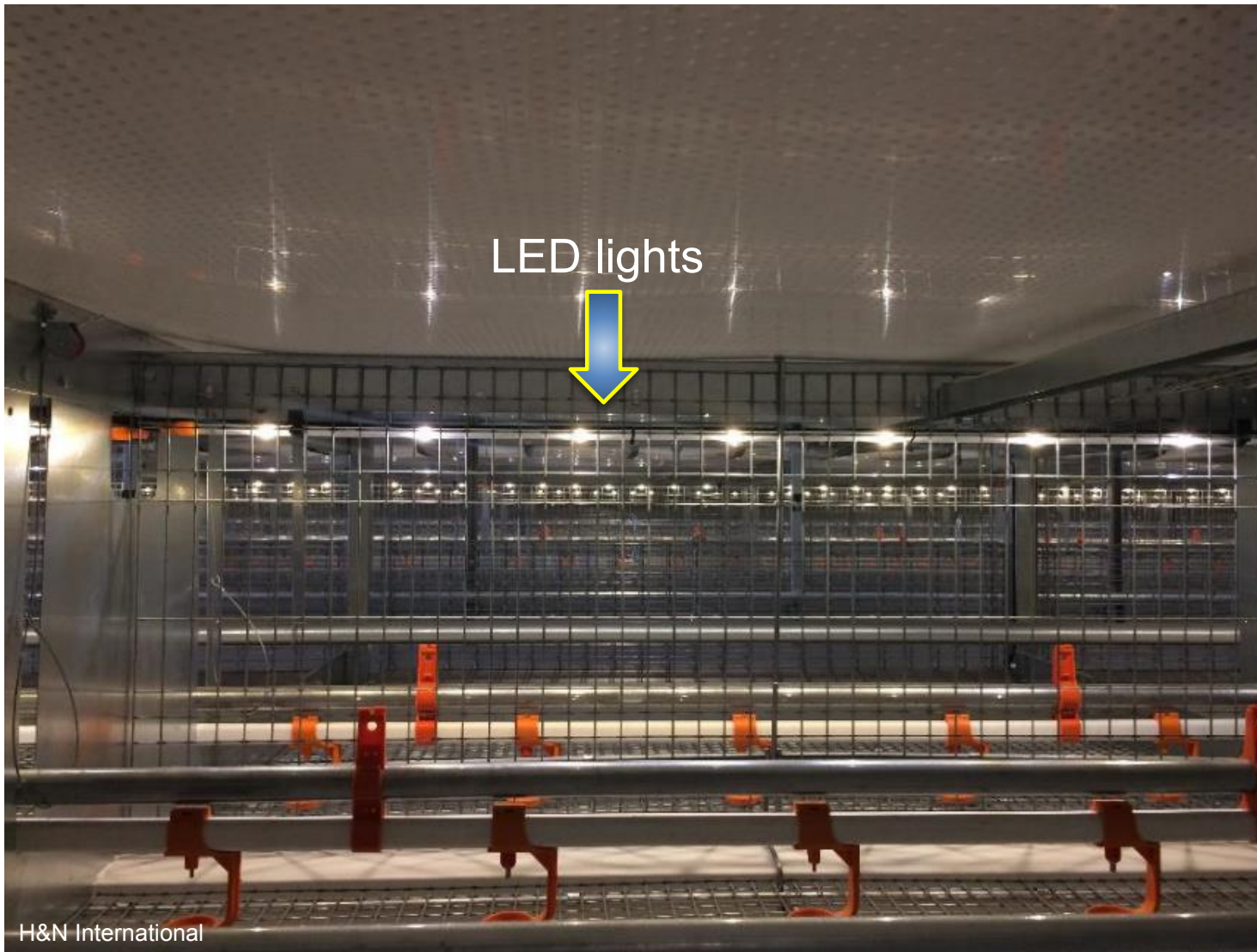
Lowest intensity





# Intensity







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**How do we know everything is going ok?**

# How do we know everything is going ok?

- Vent temperature
- Crop fill score at 24 hours
- No presence of birds with pasty vents
- BW at 7 days must be 2x the BW at placement.  
Uniformity >80%
- 7d Mortality <1%
- BW at 5<sup>th</sup> week must be at or above standard with >85%  
uniformity



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**Check list in practice**





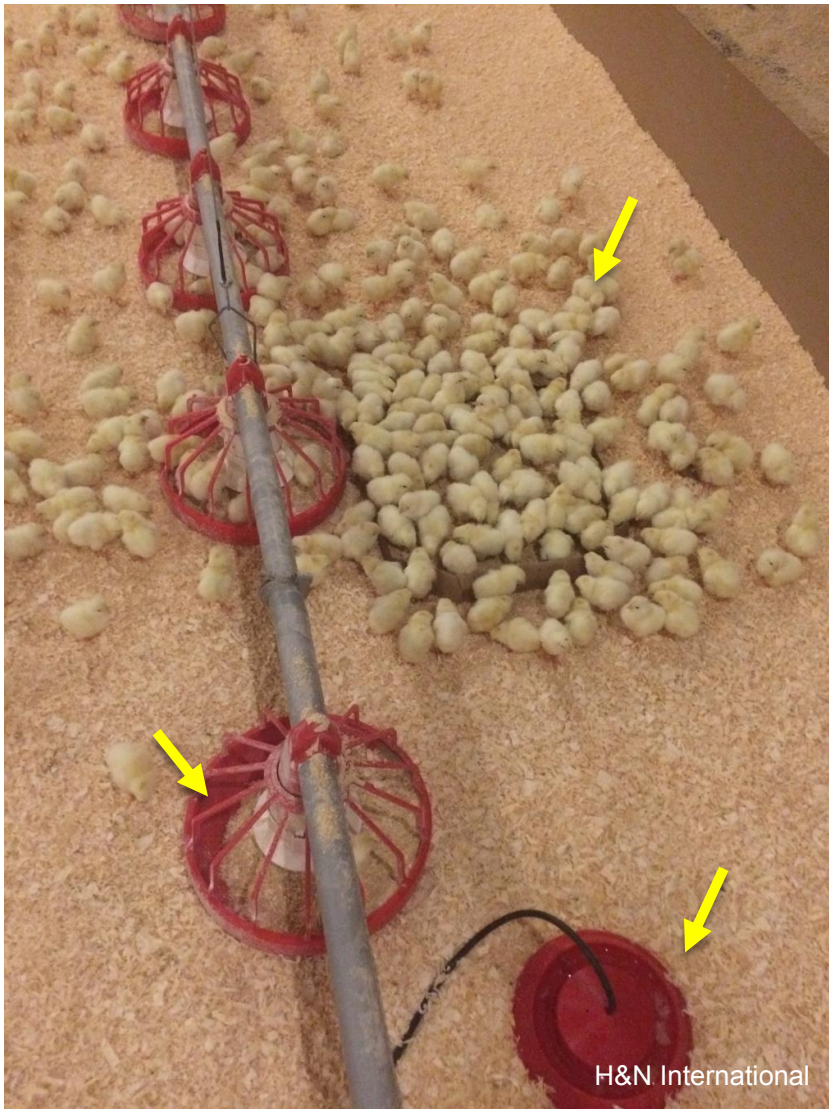
- Temperature:
  - a) Litter: 33,6° C (92.5° C)
  - b) Concrete: 28,5° C (83.3° C)
- Humidity: 63%





- No paper
- Feed: mash
- Feeder: not enough feed and wood shavings inside. Birds are not using them.
- Aux. Feeder: 433 birds/feeder
- Water: good pressure, fresh, good height.
- Aux. drinkers: not platform, wood shavings!





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- Lighting program in rearing is ok
- Intermittent first 10 days
- Light intensity lower than optimal.



H&N International



H&N International

- **Chick condition:**
  - Red hock, leg problems, big belly.
- BW at placement: 35,4g
- 66% from a young flock (<27 weeks)
- Crop fill score: 82% at 24h
- BW 7d: **62,48 g** (goal: 70,8g)
- Mortality: **5,4%**



H&N International



H&N International

# Action points for next flock

- Communication with hatchery about the chick quality
- Better light intensity (> 30 lux)
- Place paper under drinkers and feeders.
- More feed in pan feeders
- Include outside drinker line
- More auxiliary feeders
- More auxiliary drinkers



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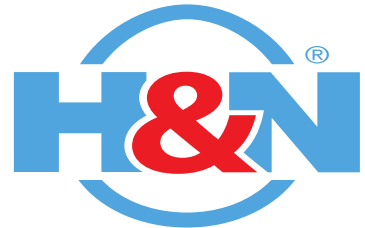


**Next flock**



- Better Chick condition.
- Paper: covering 50% approx.
- More feed in the pan feeders
- No wood shavings in pan feeders and drinkers
- More aux feeders: 154 birds/feeder.
- Light intensity: 36-40 lux
- BW at placement: 36,9 g
- Crop fill score: 100% at 12 hours
- BW 7d: 72,5 g
- Mortality: 0,98%





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# Conclusions



# Conclusion

- Brooding is the art and science of developing a chick
- Foundation of the flock's future
- Checklist helps to:
  1. Prevent problems.
  2. Identify problems
  3. Make corrections for the next flock.
  
- Create your own check list according to your conditions BUT must include all the basics things.

**Thank you for your attention!**

