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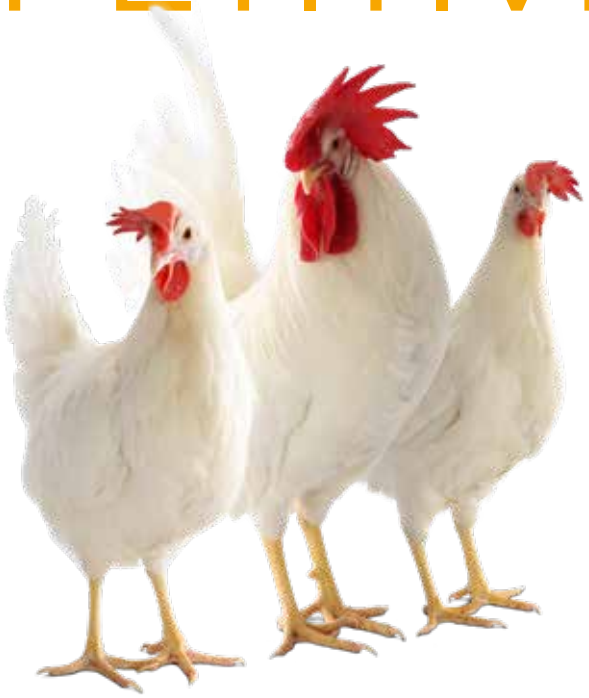
Management Guide

Parent Stock

BREEDING FOR SUCCESS … TOGETHER

LOHMANN BREEDERS

LOHMANN OFFERS A WIDE RANGE OF COMPETITIVE



LOHMANN BROWN-CLASSIC

LOHMANN BROWN-LITE

LOHMANN LSL-CLASSIC

LOHMANN LSL-LITE

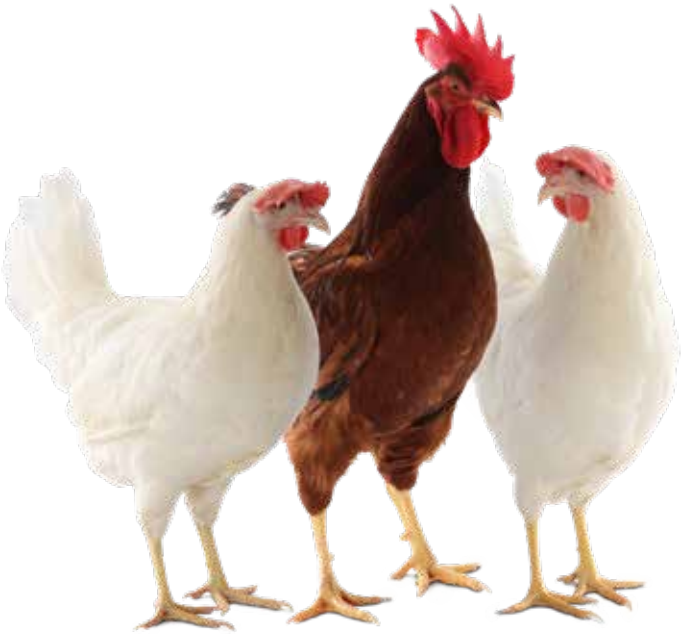
LOHMANN BROWN-EXTRA

LOHMANN TRADITION

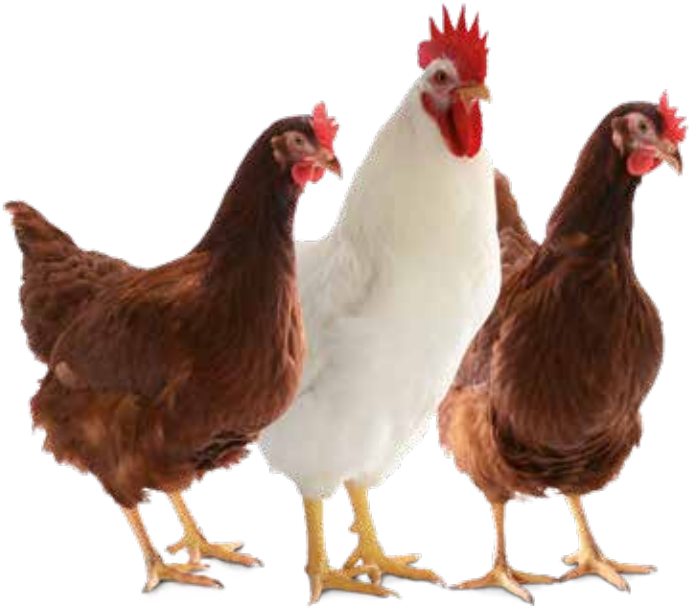
LOHMANN LSL-EXTRA

LOHMANN LSL-ULTRA LITE

BREEDERS



LOHMANN SANDY



LOHMANN SILVER

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CONTENT

INTRODUCTION

Spanning over 65 years, LOHMANN has been a premier breeding firm specialising in laying hens. We take pride in our genetic diversity, boasting the richest biodiversity and the broadest array of breeding lines. From the beginning, relentless research and development have been essential pillars of LOHMANN'S sustainable breeding strategy.

Every LOHMANN breed is distinctly developed to guarantee the highest calibre parent stock and layers, leading to profitable egg production. Source lines are carefully selected, and continuous genetic enhancement within pure lines ensures LOHMANN birds consistently satisfy market needs.

Peak performance at both parent and commercial levels relies on a blend of genetic potential and external factors like environmental conditions, health status, nutrition, and management. Managing these non-genetic variables is crucial to enable birds to fully express their genetic capabilities.

The ensuing guidelines in this manual are derived from scientific research findings and, most importantly, hands-on experience gathered in the field. This management programme is crafted to serve as a handbook for newcomers while also assisting seasoned poultry farmers in maximising the performance of LOHMANN breeds.

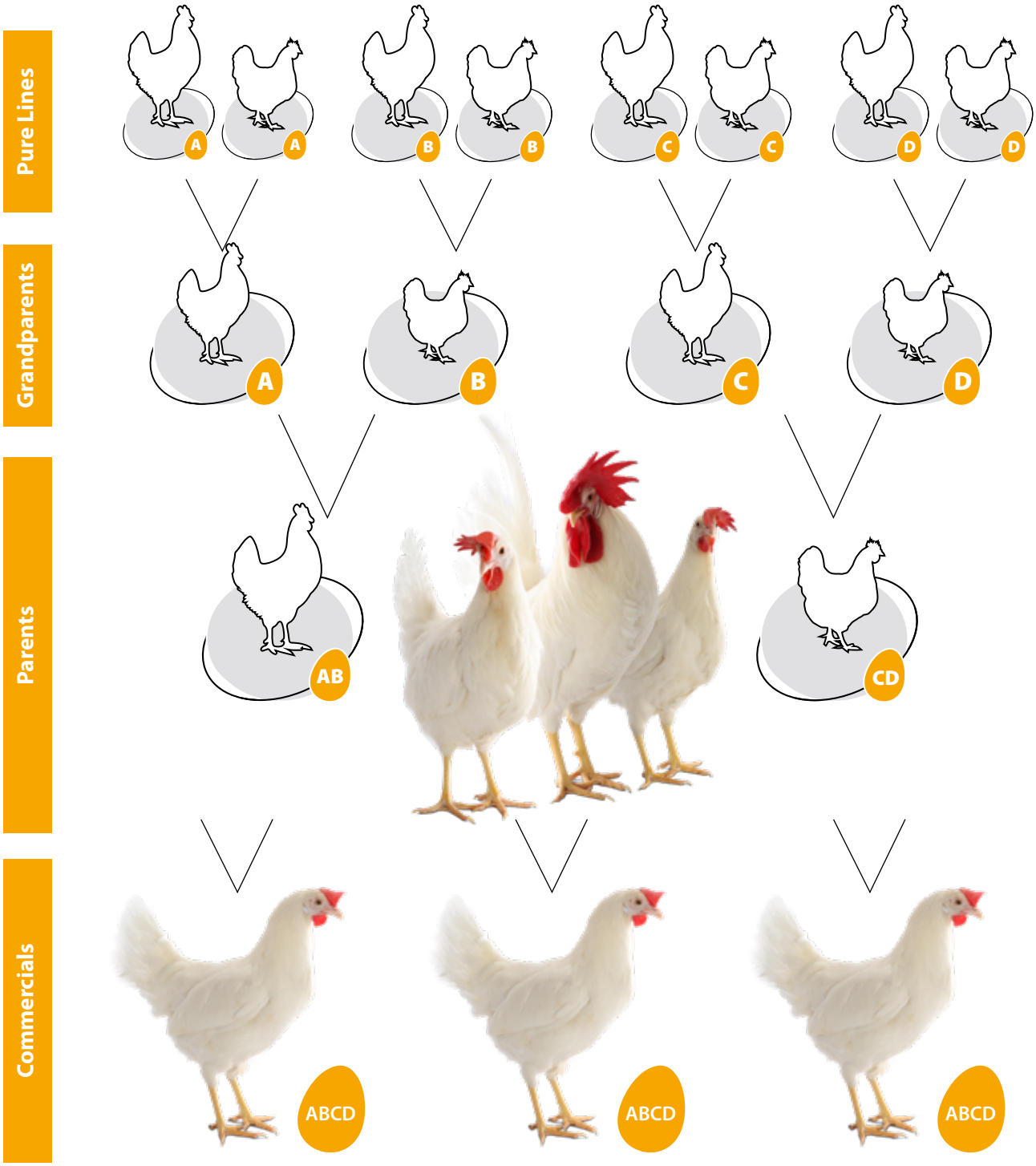
However, regional conditions may necessitate specific modifications for optimal outcomes. Please ensure compliance with the legal requirements unique to your area and country.

By adopting these management practices, farmers can achieve consistent, high-quality egg production while maximising return on investment and supporting the ongoing success of LOHMANN breeds. LOHMANN's dedication to sustainable breeding methods, animal welfare, and technological advancements ensures that farmers are equipped with the best tools and knowledge to thrive. LOHMANN breeds have consistently demonstrated success from the outset through excellent field performance and independent test results across various housing systems and climate conditions worldwide. We encourage you to maintain accurate records of your flock's performance and contact your LOHMANN BREEDERS representative for any additional information or support.

LOHMANN BREEDERS "IT'S THE EGG"

BREEDING SCHEME

LOHMANN LSL



LOHMANN
BROWN

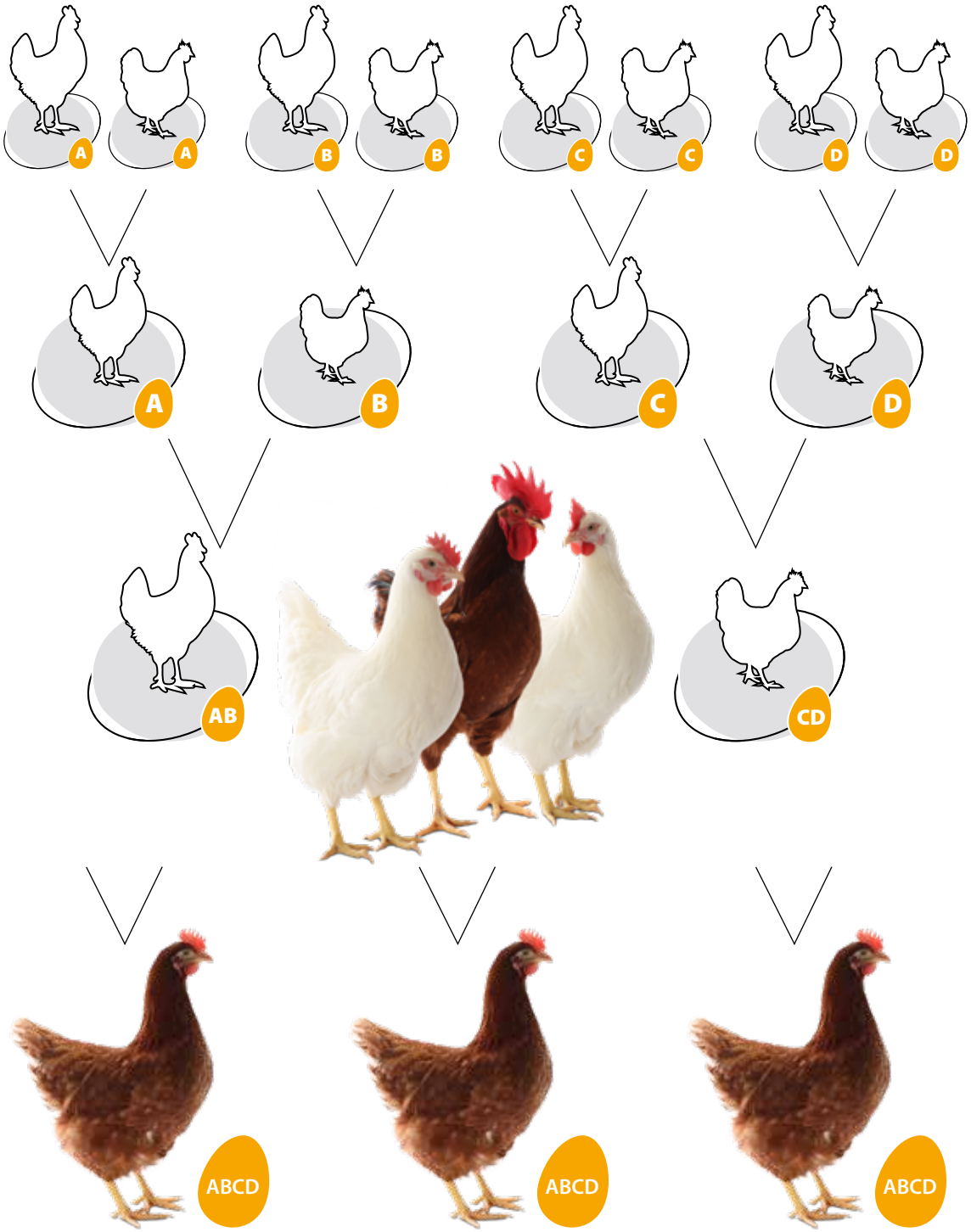
BREEDING SCHEME

Pure Lines

Grandparents

Parents

Commercials



HOUSING SYSTEMS

Selecting the appropriate housing system for parent stock is crucial for optimising bird health, productivity, and welfare. Two main systems dominate the industry: floor housing and cage housing, each possessing distinct characteristics and considerations. The choice between these systems should align with the specific goals and needs of the poultry operation, as each offers its own set of advantages and challenges.

FLOOR HOUSING SYSTEMS

This traditional approach is frequently chosen for its benefits in enhancing bird welfare and productivity. Various floor system types offer unique features:

FULL FLOOR

The most traditional floor system; litter areas allow birds to engage in natural behaviours like scratching and foraging, enhancing health and productivity. However, regular maintenance is necessary to manage biosecurity risks and prevent pathogen buildup.

AVIARY

Aviary systems provide a complex environment with multiple levels, perches, and nesting areas. By offering more space and encouraging natural behaviours, aviaries can improve bird productivity but may require more intensive management and higher labour costs.

SLAT SYSTEMS

Full Slats

This system uses raised platforms made of plastic or metal slats, allowing manure to fall through and keeping birds cleaner while reducing disease risk. Full slats excel in space efficiency and cleanliness.

Floor Houses with $^{2}/_{3}$ Slats and $^{1}/_{3}$ Litter

This hybrid system combines the benefits of both slats and litter areas. Birds are provided with two-thirds of the floor space covered with slats, which helps in maintaining cleanliness and reducing disease risk, while the remaining one-third is covered with litter, allowing birds to engage in natural behaviours like scratching and foraging. This setup aims to balance the advantages of both systems, promoting bird welfare and productivity while managing biosecurity risks effectively.

CAGE HOUSING SYSTEMS

Cage housing, where birds are kept in individual or group cages, is a more controlled environment that is often used for its efficiency in management and production. There are several types of cage systems, including family cages, single cages, and enriched cages, each offering different benefits.

FAMILY CAGES

Family cages house small groups of birds together, allowing for social interaction while still providing the benefits of cage systems such as efficient management and biosecurity. These cages are designed to balance welfare with productivity.

SINGLE CAGES

Single cages house individual birds, making it easier to monitor and manage each bird's health, feeding, and egg production. This system can be beneficial for detailed tracking and preventing disease spread among birds, thus improving overall productivity.

ENRICHED CAGES

Enriched cages are designed to improve welfare within a cage system by including features such as perches, nesting areas, and more space. These cages aim to allow birds to exhibit more natural behaviours while still maintaining the advantages of cage housing, potentially enhancing productivity.

COMPARISON AND CONSIDERATIONS

When choosing between floor and cage systems, several factors must be considered, including flock size, management capabilities, biosecurity measures, space utilisation, and local legislation.

SPACE UTILISATION

Cage & colony systems can be more efficient in relation to space utilisation, allowing more hens within the house footprint.

Floor housing generally allows for more space utilisation, with birds able to roam freely.

PRODUCTIVITY

Cage or colony systems reduce the risk of floor & system eggs impacting on productivity levels.

Floor systems encourage movement which can lead to more robust hens, therefore improving productivity levels.

The choice of system should balance short-term productivity with long-term health and productivity goals.

BIOSECURITY

Cage systems have a clear advantage in biosecurity due to reduced contact with litter and better control over hygiene.

Floor systems require stringent maintenance to manage biosecurity risks effectively.

CONCLUSION

In conclusion, selecting the appropriate parent stock housing system is a pivotal decision in poultry farming, influencing the overall health, productivity, and welfare of the birds. Both floor and cage housing systems offer their own distinct advantages and present unique challenges, making it crucial for poultry operations to carefully evaluate their specific needs and objectives.

Floor systems often foster natural behaviours and provide more space, but they require diligent maintenance to manage biosecurity risks.

On the other hand, cage systems excel in biosecurity and egg collection efficiency but may limit the expression of natural behaviours.

By understanding these trade-offs and leveraging advancements in housing design, poultry farmers can optimise both productivity and bird welfare. Ultimately, a balanced approach that considers short-term and long-term goals, alongside effective management strategies, will contribute to the sustainable and successful rearing and production of parent stock.

FROM REAR TO PRODUCTION

Ensuring that the housing system used during the rear phase matches the one used in the production phase is crucial for optimising the health and productivity of layer hen parent stock. A consistent housing environment minimises stress and promotes stable behaviour patterns, which are essential for the wellbeing of the hens.

When birds are accustomed to a particular type of housing, sudden changes can lead to disruptions in their laying performance and overall health. By maintaining the same housing system, we can ensure that hens adapt smoothly to their production environment.

REAR YOUR CHICKS IN THE RIGHT ENVIRONMENT FOR THE PRODUCTION HOUSE

FLOOR / AVIARY REARING	**CAGE + FLOOR PRODUCTION**
CAGE REARING	**CAGE PRODUCTION**

As a general rule: Any breeder flocks destined for a cage free environment in production should be reared in a cage free environment.

ALL PERIPHERAL EQUIPMENT CHICKS ARE TRAINED ON SHOULD BE THE SAME THEY WILL BE USING IN THE PRODUCTION HOUSE

NIPPLE	**NIPPLE**
CHAIN	**CHAIN**
PAN	**PAN**

If this isn't possible some alternate combinations can work.

NIPPLE	**BELL**
PAN	**CHAIN**

And some should be completely avoided!

BELL	**NIPPLE**
CHAIN	**PAN**

STOCKING DENSITY

The relationship between stocking density and the performance of our hens is something we should not ignore. Often there is a tendency to assume more hens equals more profit, but this isn't the case. In fact, this can be the exact opposite.

Higher stocking density has long reaching implications on all aspects of animal husbandry, from ventilation, behavioural responses, body weight and uniformity influences to feed competition and disease transference.

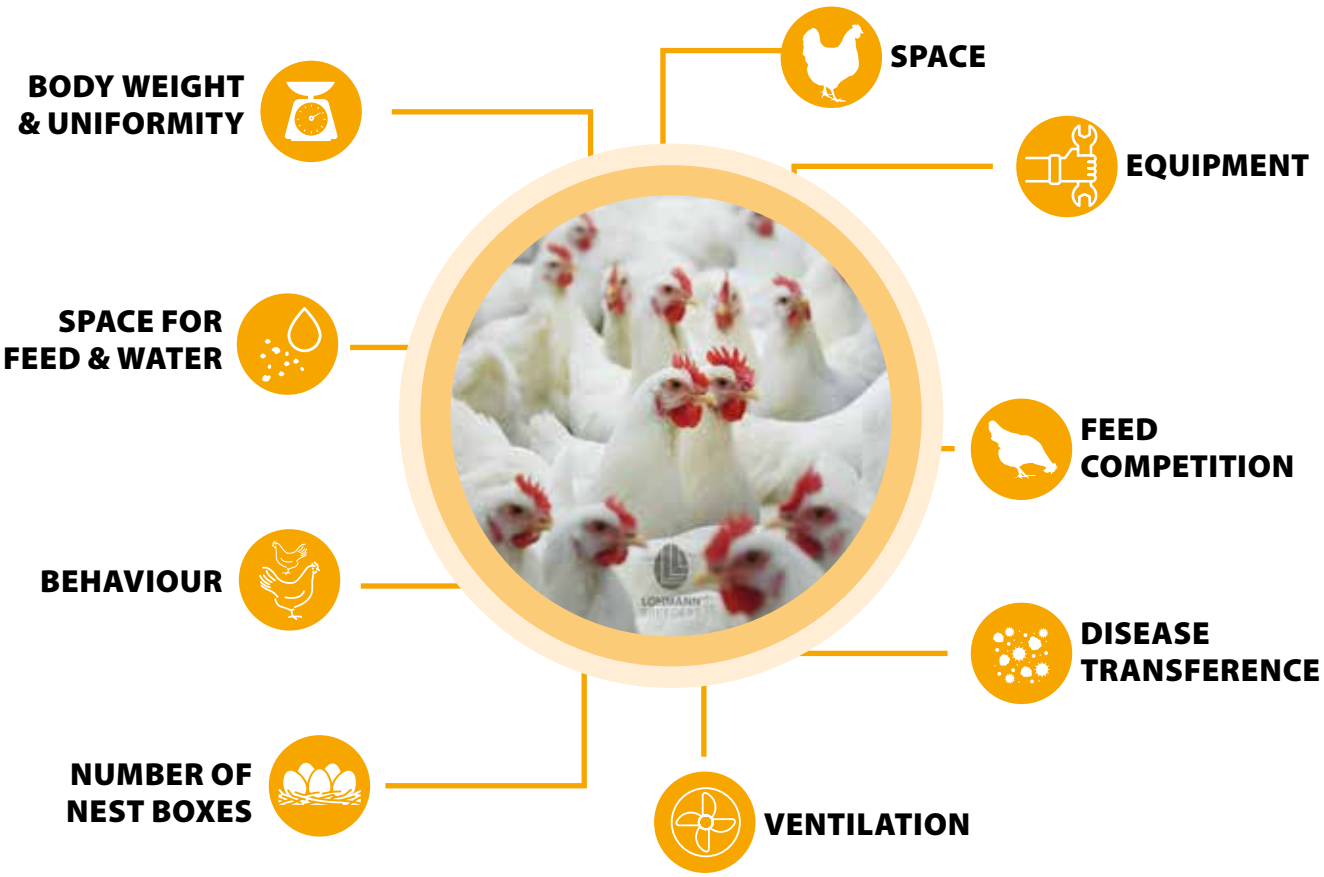
Balancing the stocking density of our hens and the equipment we provide is essential both in rear and in production. In rear, we must be mindful of the fact that our hens are continuously growing so the space available to our hens on day one is not the same as what's available at the end of rearing period. The same goes for availability of feed and water space.

As we move into production, we need to be mindful of the environmental influences and changes in requirements such as adequate nest box allocation and space to allow natural and comfort behaviours to be carried out unhindered.

As always, we should be mindful of local regulations both welfare and legislative. Alongside manufacturers recommendations based on each system and environmental influences such as hot climates.

Adhere to recognised Stocking density regulations to achieve the full genetic potential of the hens.

FACTORS THAT ARE INFLUENCED BY STOCKING DENSITY



AS A GENERAL GUIDE

Floor Systems

	Rearing		Production
	0–3 weeks	*from 3 weeks onwards*	
STOCKING DENSITY Floor Aviary	 15–20 chicks/m^2 usable space 18–20 chicks/m^2 usable space	 8–10 pullets/m^2 usable space 15–18 pullets/m^2 usable space	 6–9 birds/m^2 usable space 13–15 birds/m^2 usable space
WATER Nipple Drinker space	 12–15 chicks 0.8 cm/chick	 10–12 pullets 0.8–1 cm/chick	 8–10 birds 1 cm/chick
FEEDER SPACE	2.5–5 cm/chick	5–8 cm/pullet	10–12 cm/bird

Cage Systems

	Rearing		Production
	0–3 weeks	*from 3 weeks onwards*	
STOCKING DENSITY	200–400 cm^2	400–600/cm^2	750–800 birds/cm^2
WATER	12–15 chicks/nipple	10–12 pullets/nipple	8–10 birds/nipple
FEEDER SPACE	2.5–5 cm/chick	5–8 cm/pullet	10–12 cm/bird

Nest Space

SINGLE NEST	4–7 hens/Single Nest
GROUP NEST	100–120 hens/m^2 Group Nest

These general guidelines establish best practices, which should be adapted to align with the legal, regulatory, and specific standards of each country, region and individual requirements.

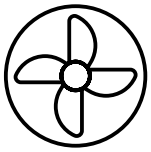
In hot climates, provide extra space, such as lower stocking density, improved ventilation, and adequate drinker and feeder access to reduce heat stress and maintain bird comfort, health, and performance.

VENTILATION

The Vital Role of Ventilation in Poultry Houses: Ensuring Health and Productivity

Maintaining an optimal environment is crucial for the health, growth, and productivity of the birds. While factors such as nutrition and biosecurity are often highlighted, the importance of proper ventilation in poultry houses cannot be overstated. Ventilation is the cornerstone of environmental management, influencing the wellbeing and performance of the flock.

WHY VENTILATION MATTERS



Regulation of Temperature
Avian species are especially vulnerable to shifts in temperature. Excessive heat can cause thermal stress, decrease feed consumption, and even prove lethal. Conversely, during colder periods, insufficient airflow may create moist, frigid environments that make birds susceptible to respiratory ailments. Effective ventilation systems stabilise indoor climates, providing a pleasant setting for the birds.

Control of Humidity
Elevated humidity can foster pathogen proliferation and result in soggy litter, facilitating disease outbreaks. Proper ventilation maintains ideal moisture levels, keeping the litter dry and lowering the chances of infections like respiratory illnesses.

Dust and Dander Control
Poultry environments can become laden with dust, with minute particles impacting both the birds and caretakers. Mechanical ventilation systems aid in diminishing dust buildup, thereby elevating overall air purity. Fresher air reduces respiratory complications and boosts the flock's respiratory wellbeing.

Ammonia and Gas Removal
Poultry bedding generates ammonia, which can ascend to dangerous concentrations if not adequately controlled. High ammonia levels can harm the birds' respiratory systems, weakening their immunity and hindering growth. Ventilation mechanisms efficiently extract ammonia and other noxious gases, enhancing air quality and avian health.

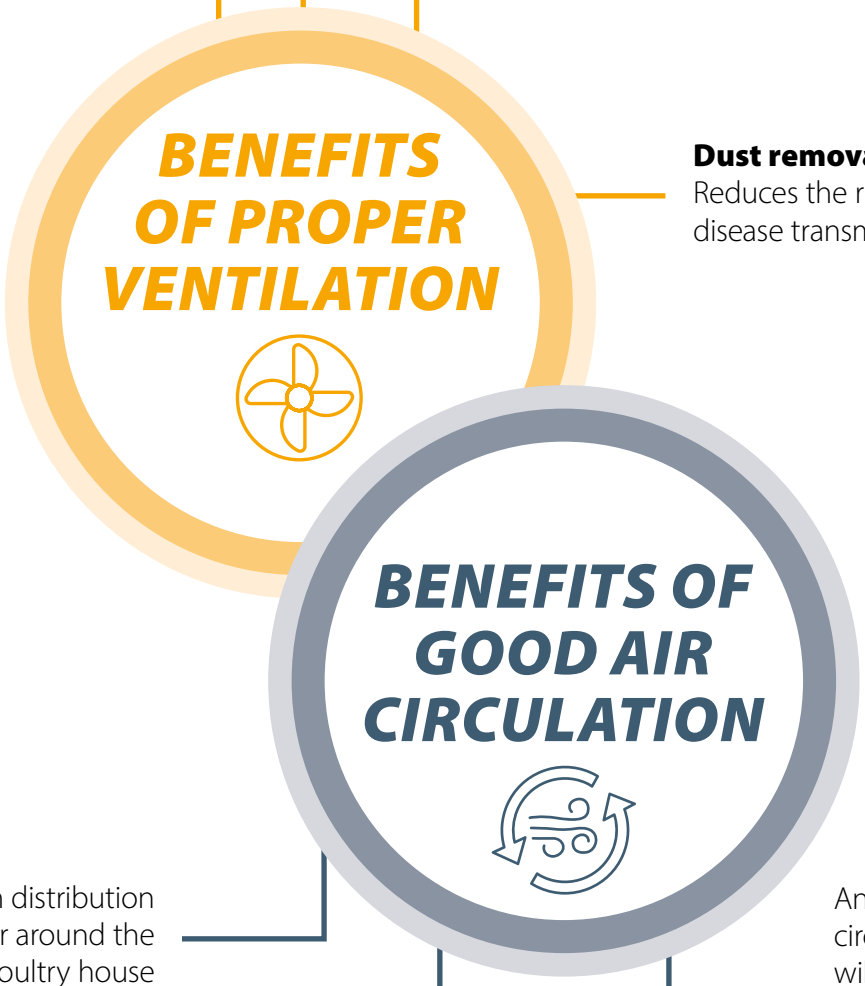
Ventilation at a glance

Gas removal
Eliminates harmful gases like ammonia which can lead to health issues within the flock.

Fresh air supply
Ensures a continuous supply of oxygen.

Moisture removal
Helps maintain dry litter and prevents respiratory issues.

Dust removal
Reduces the risk of disease transmission.



Ensures even distribution of fresh air around the poultry house

Air movement and circulation can remove Airborne viral diseases from the environment

An effective circulation system will mix warm air from higher levels with cooler air from lower levels to create a more balanced environment.

Methods of Ventilation

Natural Ventilation

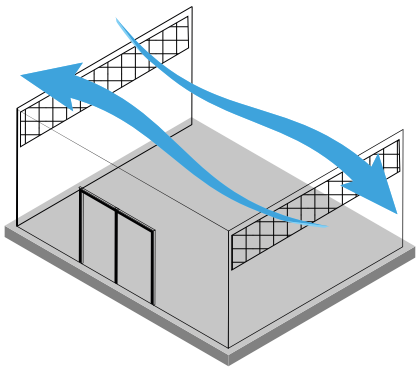
Relies on the innate movement of air through deliberately positioned openings in the poultry house. Although economical, it may offer limited control and might not deliver sufficient ventilation under extreme climatic conditions.

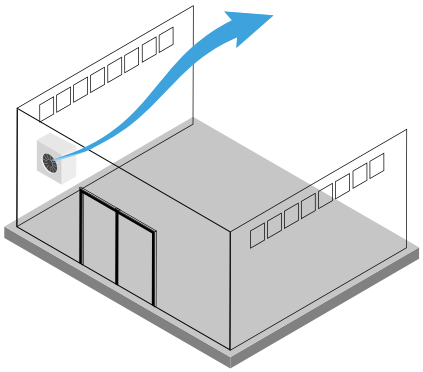
Mechanical Ventilation

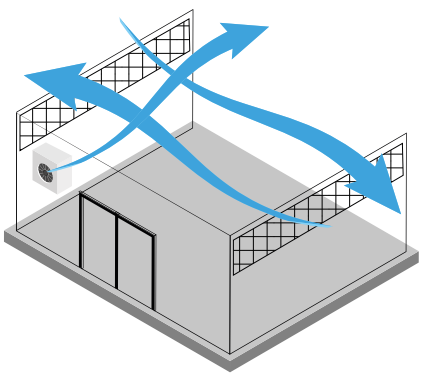
Uses fans and ventilators to manage air quality and temperature. This approach provides more accurate regulation of environmental parameters, essential for upholding uniform standards in large-scale poultry operations.

Hybrid Systems

Merge both natural and mechanical ventilation techniques to fine-tune conditions according to seasonal changes and specific needs.







Common problems with inefficient Ventilation

POOR VENTILATION
Can lead to E. coli, respiratory diseases, poor feed intake, ammonia blindness, poor egg quality and reduced production.

EXCESSIVE VENTILATION
Can cause E. coli, respiratory diseases, nervousness, crowding, and poor litter quality.

UNEVEN VENTILATION
Can result in E. coli, respiratory disease, poor feed intake, floor eggs, nervousness, crowding, and poor litter quality.

Designing a ventilation system requires careful consideration. Factors such as the size of the house, the number of birds, and local climate conditions influence design decisions. Regular maintenance is also critical to ensure the systems function correctly, involving periodic checks and cleaning of fans, inlets, and other components.

VENTILATION MANAGEMENT TIPS

MONITOR AIR QUALITY
While we can utilise modern technology to keep a close eye on attributes such as ammonia levels and CO_2, we shouldn't underestimate the best tool at our disposal; our own senses. Our eyes and ears are our first alert to issues within the poultry house.

DON'T BE AFRAID TO ADJUST THE VENTILATION RATES
While modern systems are equipped with built in sensors to adjust and regulate ventilation, factors such as bird numbers and activity levels often aren't taken into account. Work closely with your equipment suppliers, so you understand how to operate your system effectively.

ENSURE EVEN AIR DISTRIBUTION
The collaboration of air inlets and outlets should be working together effectively to provide a balanced airflow throughout your house. Remember that the equipment within the house can redivert airflow.

AVOID DRAUGHTS
Ensure air movement doesn't create air pockets that can potentially influence negative behaviour within your flock, such as huddling or restricted movement.

REGULAR MAINTENANCE
Keep the equipment clean and in good working order throughout the rearing and production cycles. Make sure the equipment is tested and reset between every flock cycle.

Minimum Ventilation rates

Requirement
0.4 m^3/hour/kg live bird

Purpose
Ensures a basic level of air exchange to maintain air quality.

Required capacity

4 m^3/hour/kg live bird

Purpose
Provides sufficient air movement to maintain optimal conditions, especially during periods of high activity or temperature extremes.

Air quality levels

Ammonia (NH_3):
Maximum 20 ppm

Carbon Dioxide (CO_2):
Maximum 2500 ppm

PERCHING

Perching is an instinctive behaviour for birds, primarily serving as a method of predator avoidance during rest, a way to establish social hierarchy, and as part of their normal roosting habits. In their natural environment, birds, including chickens, perch at night to escape ground-dwelling predators. Additionally, perching provides hens with a sense of security and comfort, allowing them to perform natural behaviours that contribute to their physiological and psychological health.

Perching should be provided from the rearing period through to production. Certain skills must be developed to use perching efficiently, so access at an early age is essential. Allowing young chicks to learn these skills by four weeks of age will benefit them throughout their lives. Failing to do so can have long-term adverse effects on behaviours such as floor eggs and pecking later in life.

BENEFITS OF PERCHING

Natural Behaviour Expression

Allowing hens to perch satisfies their natural behavioural needs. This opportunity for expression minimises stress, leading to healthier birds and an overall increase in wellbeing.

Bone Health

Perching helps enhance bone strength. Research has demonstrated that hens with regular access to perches have stronger, denser bones compared to those deprived of perching opportunities. This is particularly crucial in layers, where bone strength can be compromised due to continuous calcium depletion for eggshell production.

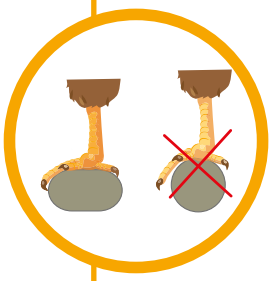
Social Structure

Perches help establish a social hierarchy within the flock. By allowing dominant hens to claim higher perches, it reduces aggressive interactions on the ground, as pecking order disputes decrease. This is particularly important in breeder flocks.

Implementing Effective Perching Systems

Modern aviary systems are designed with perching in mind and adhere to regulatory advice to fulfil all requirements. However, those breeding on floor systems may need to provide additional raised perching for the benefit of the hens.

Several factors need consideration to ensure effectiveness:



Material

Using durable materials that can be easily cleaned and sanitised is vital to maintaining hygiene and preventing disease.

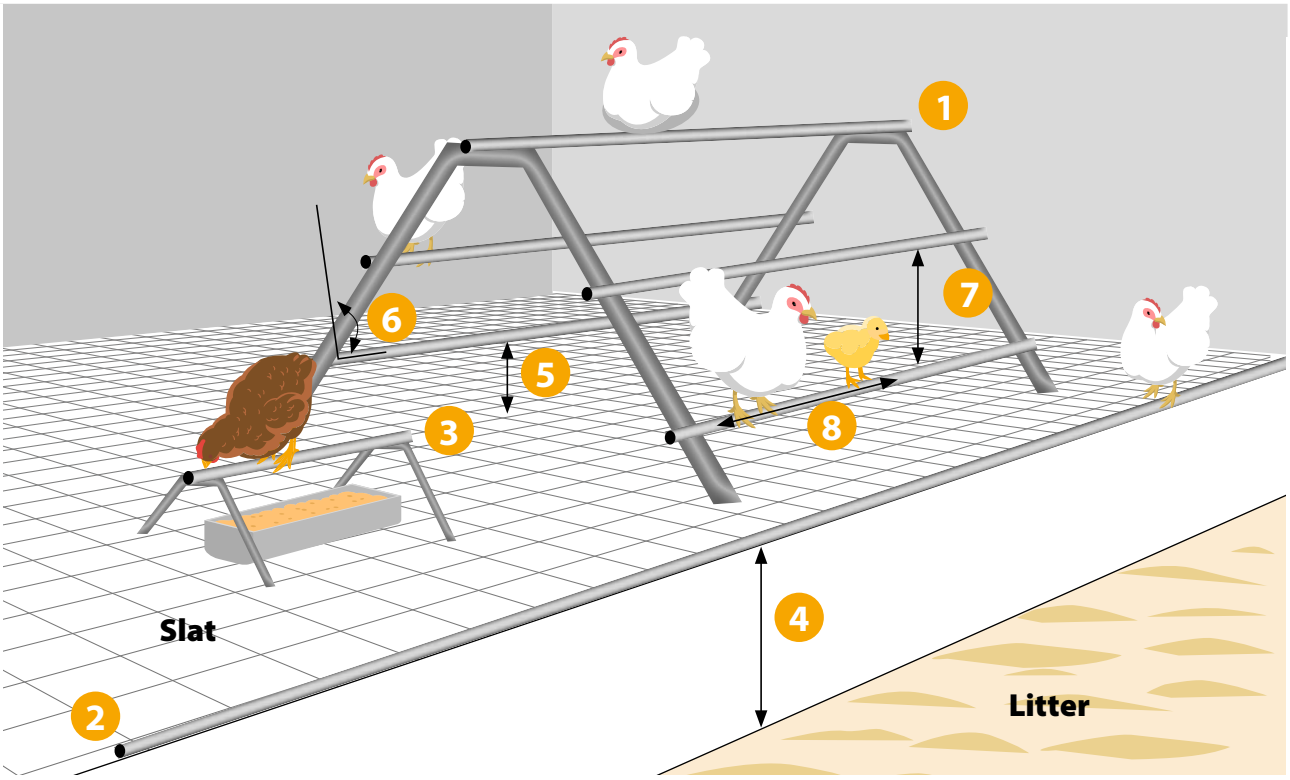
Positioning

Perches need to be positioned strategically to avoid blocking access to resources such as food and water, and they should be stable to prevent tipping. In some countries, there are strict rules ranging from the height of the perch to distances from the walls. Always check your local regulatory bodies when installing perching.

Perch Design

The design of perches is crucial. They should be comfortable and adequately sized for the chickens. Rough-surfaced, flat or oval-shaped perches are preferred over round ones to prevent foot injuries.

Positioning of Perches



1 **A-Frame Perches** can be provided on the slats or even in the scratch/litter area. However, in breeder flocks, ensure you aren't impeding movement during mating time. Using shorter sections of A-frame allows for easy movement within the house, as they tend to be more lightweight and easier to move.

2 **Edge of slat:** Hens must be able to wrap their toes around.

3 **Over Feed Tracks:** Perches should be positioned at a height to prevent birds from perching on the edge of the track to avoid soiling the feed.

4 Minimum height 45 cm

5 At least 45 cm and not more than 60 cm from the slats to the first perch (floor systems).

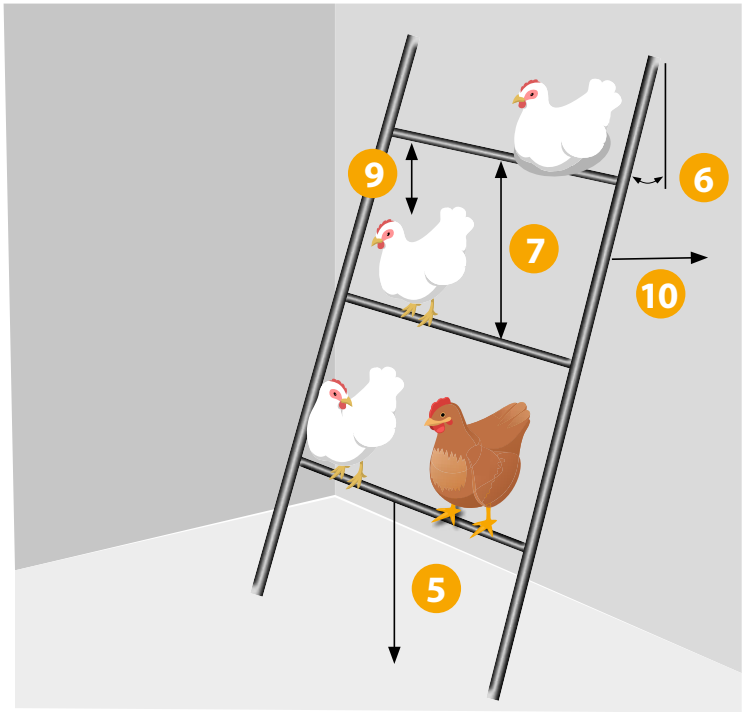
6 Angles between perches less than 45°

7 Horizontal distance of 30 cm

8 Rearing: 5–8 cm per pullet raised perching / Production: 15 cm per hen raised perching

9 At least 45 cm clear space above the perch to allow the hens to stand in a normal upright manner.

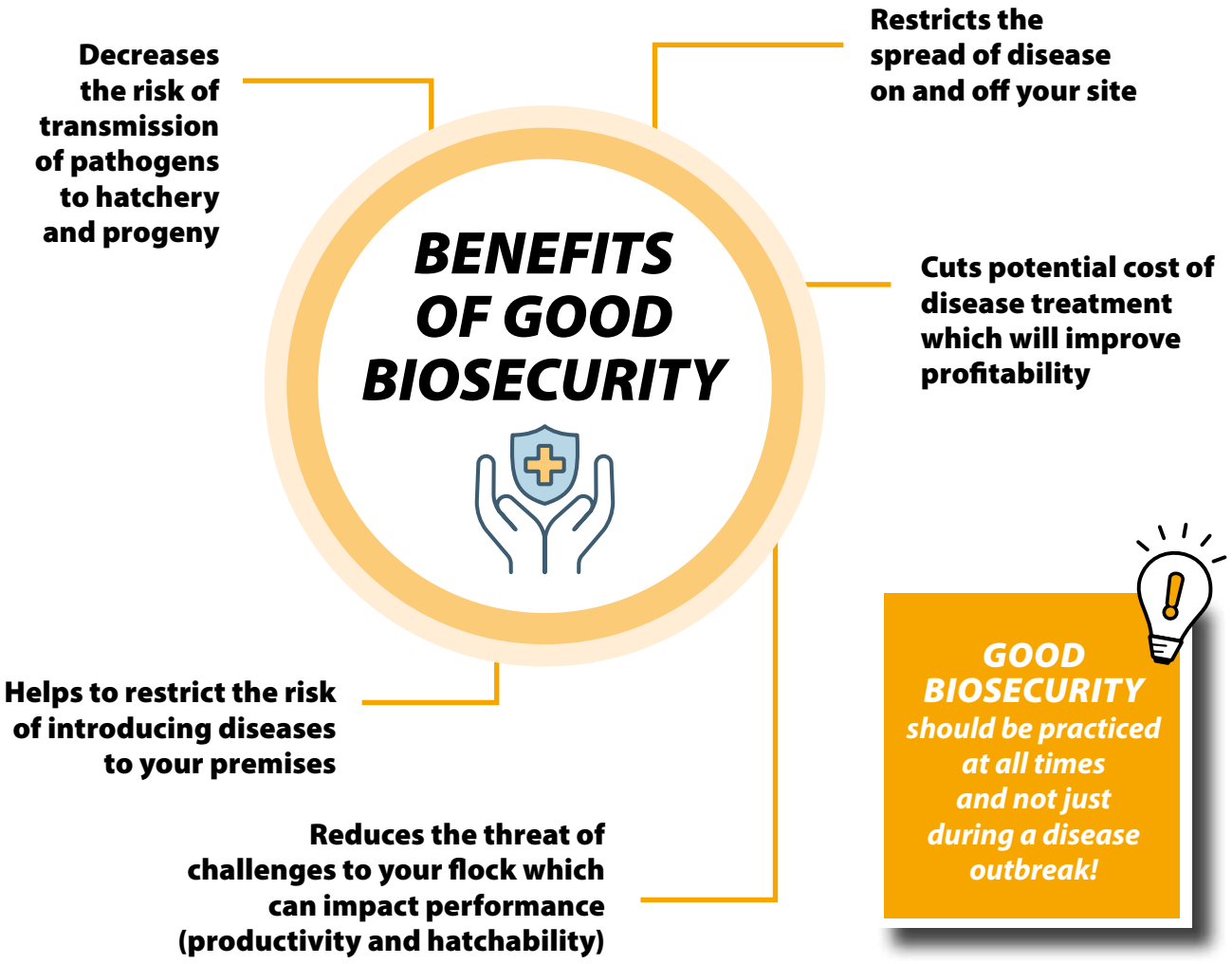
10 Distance from a wall at least 20 cm.



BIOSECURITY

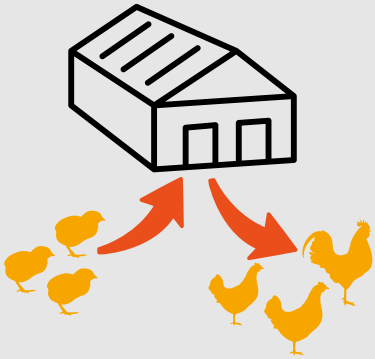
On breeder level, we do not only have the responsibility to keep our own birds healthy to ensure an excellent development in rearing and a profitable production. Various diseases can be transmitted vertically from breeders to their progeny. Therefore, a strict sanitary control on parent stock level is the basis to control these diseases also in commercial layers.

Only a healthy parent stock flock can produce high-quality hatching eggs, free from pathogens, to promote the development of the embryo into a first quality chick. Biosecurity programmes are fundamental to maintain the health status of our birds. Biosecurity means taking steps to ensure good hygiene practices are in place so the risk of an occurrence or spreading of a disease from or to your premises is limited. Therefore, biosecurity planning should be an essential part of your farm strategy.



3 MAJOR COMPONENTS OF BIOSECURITY

ALL-IN / ALL-OUT

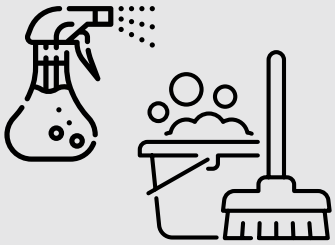


Implementing a system whereby the farm has a complete period with no hens onsite during cleanout and disinfection period and only stocking single age groups will drastically reduce the disease pressure.

TRAFFIC CONTROL

Restrict and control the vehicle and visitor movement on and off your farm, both internal and external.

SANITATION



The disinfection of materials, people, and equipment entering and on the farm. It refers also to cleaning and disinfection procedures of poultry facilities during the service period.

The core element of biosecurity programmes often involves transforming the perspective on what is considered clean versus dirty and acting accordingly. Understanding the rationale behind specific biosecurity measures on a farm can greatly aid in convincing staff to follow these guidelines.

Biosecurity protocols should be straightforward, easy to understand, mutually accepted, and regularly assessed. Implementing biosecurity is the most affordable and efficient method for disease management. The challenge lies not in the implementation of a biosecurity programme but in sustaining it over time. Continuous training may help to keep your personnel motivated.

TOOL**BOX**
Biosecurity

A WRITTEN BIOSECURITY PLAN ***should not only consider potential risk areas on your site but also the risk from outside sources.***

Please consult your veterinarian and the LOHMANN BREEDERS Technical Service Team for more information.

BIOSECURITY PROGRAMMES

The core element of biosecurity programmes often involves transforming the perspective on what is considered clean versus dirty and acting accordingly. Understanding the rationale behind specific biosecurity measures on a farm can greatly aid in convincing staff to follow these guidelines.

WHAT SHOULD I DO ?

- **Biosecurity protocols ...**
  ... should be straightforward, easy to understand, mutually accepted, and regularly assessed.
- **Implementing biosecurity ...**
  ... is the most affordable and efficient method for disease management.
- **The challenge ...**
  ... lies not in the implementation of a biosecurity programme but in sustaining it over time.
- **Continuous training ...**
  ... may help to keep your personnel motivated.

Create physical barriers to divide dirty and clean areas. Change shoes and clothes when entering the farm.

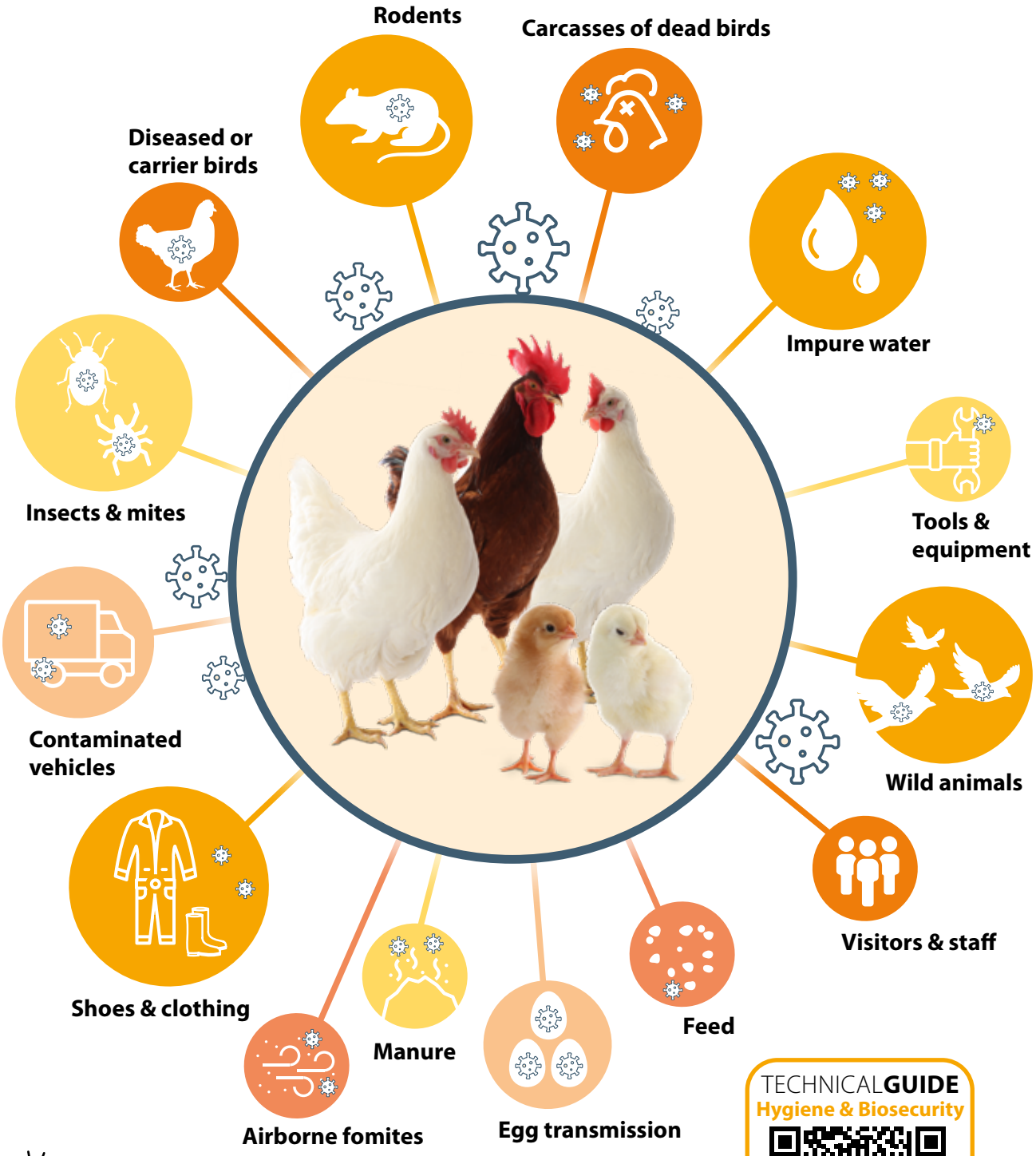
Wash and disinfect your hands properly.

A shower should be mandatory before entering the farm. It has to be clean, warm, and comfortable. Farm-specific clothing must be available for all staff and visitors.

Changes your shoes before entering the chicken house. A physical barrier and different colours of the shoes help to respect the different zones.

INFECTIOUS DISEASES

can spread from farm-to-farm and flock-to-flock!



ACTIONS & PLANNING

Creating a written "Biosecurity Plan" will help you to identify and assess risk areas, allowing you to make improvements where possible.

TECHNICAL**GUIDE**
Hygiene & Biosecurity

PEST CONTROL

Pest control includes all measures taken to prevent the introduction and spread of pathogens by vermin (esp. rodents and birds) and insects.

RODENTS

Infestations of rats or mice can negatively impact the health status of the flock. Many pathogens like *E. coli, Erysipelas* or *Pasteurella* can be passed by contact to rodents and their excretions.

Active measures

- Installing bait stations.

- Maintaining a rodent control programme.

Passive measures

- Ensure the perimeter surrounding the house is clear of grass and other organic materials.

- Maintain the structural integrity of walls.
- Ensure feed is stored in a manner that keeps it free from rodent contamination.
- Promptly remove any spilled feed.

BIRDS

It is very important to exclude other birds from entering hen houses.

- Bird-proof houses can be constructed using special netting.
- Bird's faeces are also very infectious material. Direct or indirect contact should be completely avoided.

INSECTS

- Establish an insecticide programme.
- Manure management is also very important to prevent flies.

Monitoring Flies

HOUSING & BROODING

The housing and brooding periods are among the most critical phases in the life of a breeder. Along with proper rearing to achieve a top-quality pullet, these stages form the main pillars of a successful production period.

During the first few days of life, chicks are unable to regulate their body temperature. Therefore, it is crucial to ensure the correct ambient temperature and appropriate humidity levels. Additionally, early access to water and feed, as well as proper lighting and ventilation, are essential parameters to consider during the placement and brooding of day-old chickens.

HOUSE PREPARATION

prior to the chicks arrival

EMPTY HOUSE

An empty house and all the equipment must undergo a thorough terminal cleanout and disinfection. Collect samples and verify that the microbiological results meet the required standards.

TEMPERATURE

Maintain the air temperature at 35 – 36°C (95–96.8°F) at chick level. This temperature should be kept consistent for the first 48 – 72 hours.

SUMMER / WINTER

For hot seasons, warm up the house 24 hours before the chicks arrive, and for cold seasons, start 48 hours in advance. For floor housing, begin this process before distributing the litter.

LIGHTING

Ensure that the lighting levels in the house are adequate, provided by proper light sources during operational hours. Aim for even light distribution, avoiding any shadows.

AIR HUMIDITY

Should be at a minimum level of 60%. Low humidity can lead to chick dehydration, stress, and increased risk of respiratory issues. Humidity above 80% may cause wet litter and elevated ammonia levels.

VENTILATION

After achieving the desired temperature, let the ventilation work at its minimum level. This can help prevent temperature differentials in the rearing house.

TOOL**BOX**
Housing & Brooding

FEED & WATER

Ensure that fresh, high-quality feed and water are evenly distributed throughout the house.

WATER

Water temperature
Ensure it is between the optimal 20 – 25°C (68 – 77°F).

The water pressure
should be reduced to allow droplets to form on the nipple drinkers, making it easier for the chicks to locate the water.

EQUIPMENT

Check all equipment for functionality (feeders, drinkers, heaters, lights, etc.)

DRINKERS

The drinkers should be set at an appropriate height for the new flock and adjusted according to the age of the chicks.

To maintain water quality and freshness, and to regulate water temperature, it may be necessary to change the water in the bell drinkers and/or flush the nipple lines.

PLACEMENT

Regardless of the housing system, the placement of the flock is crucial for early adaptation. It helps the chicks locate feed and water more easily.
After arrival of the chicks, place them close to water and feed.

Recommended temperature levels at housing

Always adjust the house temperature according to the chicks' body temperature and behaviour.

Air: 34 –36°C / 93.2–96.9°F

Floor/Concrete: ≥ 28°C / ≥ 82.4°F

Litter: ≥ 32°C / ≥ 89,6°F

TEMPERATURE

In the first days after hatch, the chicks are not able to regulate their own body temperature; they are dependent on an external heat source.
Ensuring an even temperature spread throughout the house will encourage good movement and utilisation of the feeders and drinkers.

House Temperature

The house should have already been pre-warmed up to 35–36°C (95– 96.8°F) prior to housing.

Chick guards can help provide a draught free environment and keep the birds within an area where the climate is optimal (and close to feed and water) in those first few days.

The ambient temperature needs to be monitored and maintained.

Body Temperature

The optimal body temperature of the chick is around 40–41°C (104–105.8°F). Checking the chick's temperature from day one is a very useful tool not only to monitor the health status but also as an indicator of the ambient environment within the house, helping you to manage your systems to obtain optimum temperature levels. A simple modern ear thermometer can be used for this purpose.

Desired Air temperatures at bird level dependent on age

Age	Cage Rearing		Floor Rearing	
	°C	°F	°C	°F
Day 1–2*	35	95	36	97
Day 3–4	33	91	34	93
Day 5–7	31	88	32	90
Week 2	28	82	29	84
Week 3	26	79	27	81
Week 4	22	72	24	75
from Week 5	18–20	64–68	18–20	64–68

**Optimal chick body temperatures range between 40–41°C (104–106°F) and serve as the most reliable reference for regulating house temperature.*

Litter

Maintain the appropriate litter / paper and floor temperature. Do not distribute the litter until the floor reaches the recommended temperature.

Suitable litter materials include wood shavings, cellulose pellets, or straw. Ensure that the litter is free from any pathogens.

For cages, it is required to use specialised chicken paper.

ADJUSTING THE HOUSE TEMPERATURE

Take random samples of chicks' body temperatures from various parts of the house to create a comprehensive overview of the environment. Use the same method you apply when weighing chicks.

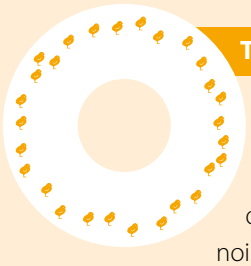
Cloacal recording sheet

PDF

When you have the readings, you need to calculate an average and record the uniformity.

Using this calculation, you can adjust the house temperature accordingly to achieve optimal chick temperatures of 40–41°C.
For example, increase the house temperature by 0.5°C (0.9°F) if the average body temperature of the chicks is 39.5°C (103.1°F).

Chicks' behaviour is THE best indicator if the housing conditions are set effectively for the chicks wellbeing.



Too high temperatures

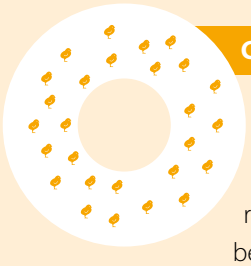
and the chicks will move away from the heat source and begin to pant while drooping their wings. Often noise levels will be low and subdued.

Draught or uneven light distribution

will make the chicks gather in specific areas often in corners. Too much variation in ventilation flow or in light distribution increases the risk of this behaviour.

Too low temperatures

and the chicks will start crowding and piling together close to a heat source. They start to express distress calls, often accompanied by a visible rigid posture.



Correct temperature

will be demonstrated by an even spread of chicks in the brooding area. The sound will be low and relaxed, and drinking and eating behaviours will be clearly seen.

EXTERNAL FACTORS WHICH COULD HAVE A NEGATIVE EFFECT ON THE BODY TEMPERATURE OF THE CHICKS:

- *Insufficient air distribution in the house*
- *Low humidity level (low heat transfer capacity of the air)*
- *Failing to pre-warm the house at the right time*

HUMIDITY

Balancing the level of humidity with the house temperature in the first few weeks is crucial to help obtain an optimum environment.
The first week, 60–70% relative humidity should be achieved.
For the second week, 60% is optimal to aid cocci replication.

ADDITIONAL FEEDERS

For the first few days, additional feeders such as bowls or pans can be placed sparingly to help achieve a balanced early intake throughout the flock.

CHICK PAPER

Suitable chick paper should be used in these first weeks.
This is not only beneficial for your feed management strategy, but also for effective cocci replication, and in cage systems it can help prevent long-term foot injuries

DRINKING

For the first 2 or 3 hours after housing, it can be beneficial to dip the beak of some chicks into the water and onto the nipples themselves. This can stimulate the motivation to drink. They will then soon find the feed after a drink.

EARLY LIGHTING PROGRAMME

Upon arrival at the farm, day-old chicks exhibit varied behaviours; some rest following their journey from the hatchery, while others immediately seek out food and water.

An intermittent lighting programme is well-suited to accommodate this irregular activity, as it promotes movement, harmonises flock behaviour, and encourages the search for feed and water resources.
Additionally, such a programme facilitates comprehensive observation of the entire flock. Periods of darkness benefit chicks by enabling sleep, supporting the establishment of circadian rhythms, and contributing positively to immune system development, growth rates, digestion, general health, and a reduction in early first-week mortality.

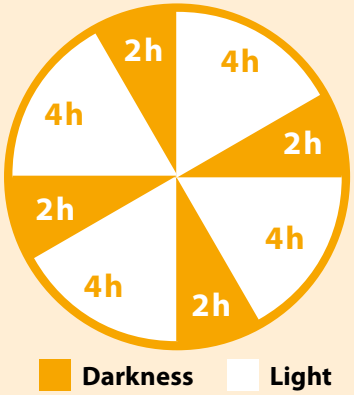
The standard schedule consists of four hours of light followed by two hours of darkness, repeated over a 24 hour window.
However in some countries this isn't possible due to legislation.

Nevertheless, the schedule can be adjusted to fit with ANY regulation, please speak to your LOHMANN advisor.

An intermittent lighting schedule should only be used up to 7 or 10 days and then you can switch to your standard step-down lighting programme.

Adherence to local regulations is imperative.

Intermittent lighting programme



MEASURING CROP FILL

Crop measuring is an excellent tool in ascertaining the feeding behaviour of any flock through rear into production. However it is of particular relevance here. The first two days of drinking and feeding are crucial, and it can often be difficult to assess the feeding behaviour due to the abundance of feed we offer in those first few days. To ensure the birds are taking to the feed, crop checking should begin on day one of housing.

A simple way to check this is to manually check the size and shape of the crops.

Select a random sample of chicks in the house.

Gently feel the crop. You should notice a round, full sac filled with water and feed.

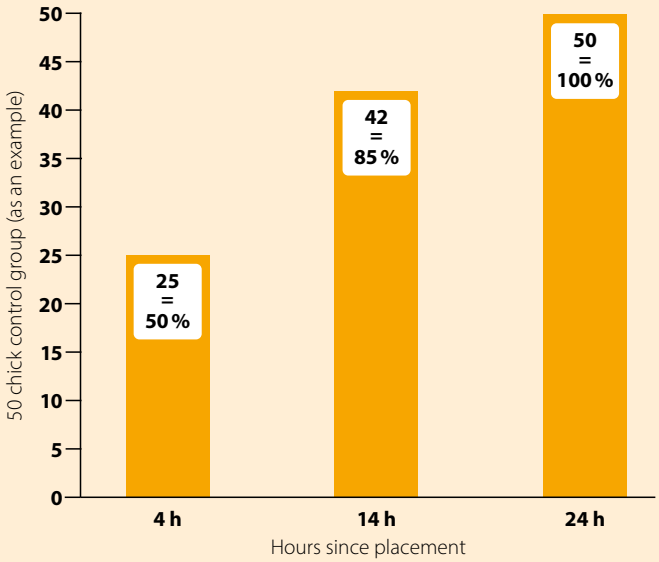
Create a simple table to record your sampling.

Repeat this procedure during first hours and days after placement throughout the house.

This information should be documented in your monitoring records. As time progresses, you should observe an increasing number of chicks with feed in their crops. By the 24-hour mark, all chicks should have taken to the water and feed, which will be evident in their crops. The effort you invest in crop checking now will yield significant benefits for the flock later on, reducing the first week mortality.

Example of Recording Crop Fill

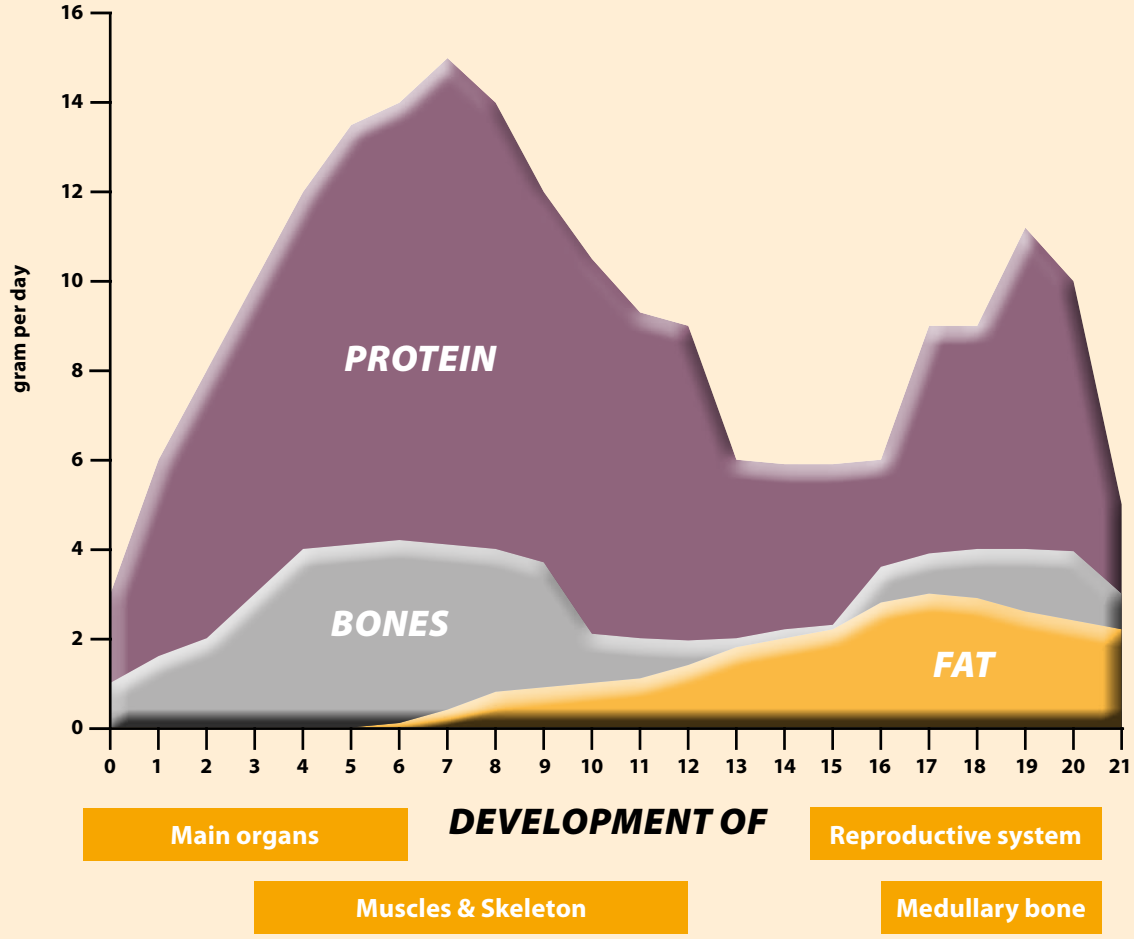
Number of chicks with full crops



If you notice any of chicks are not taking to the water and feed, gently dip their beaks in water and place them near the feed and water source. Make sure that the chicks have reached the optimal body temperature of 40–41°C.

THE IMPORTANCE OF EARLY CHICK DEVELOPMENT

Understanding early development and its dietary needs is crucial for effective management decisions during this critical phase.
By carefully creating and maintaining optimal housing and brooding conditions within the poultry house, and applying best rearing management practices, producers lay the groundwork for excellent pullet quality. This period lays the groundwork for a successful production cycle, ensuring strong reproductive performance and long-term productivity.



Week 1–3: INITIAL DEVELOPMENT

Organs form and the immune system develops rapidly in the first three weeks.

Week 3–6: SKELETAL AND MUSCULAR GROWTH

Weeks three to six focus on skeleton and muscle development. Proper weight during this time is crucial for high-quality parent stock; growth delays can reduce later performance.

Week 6–15: GROWTH DECELERATION

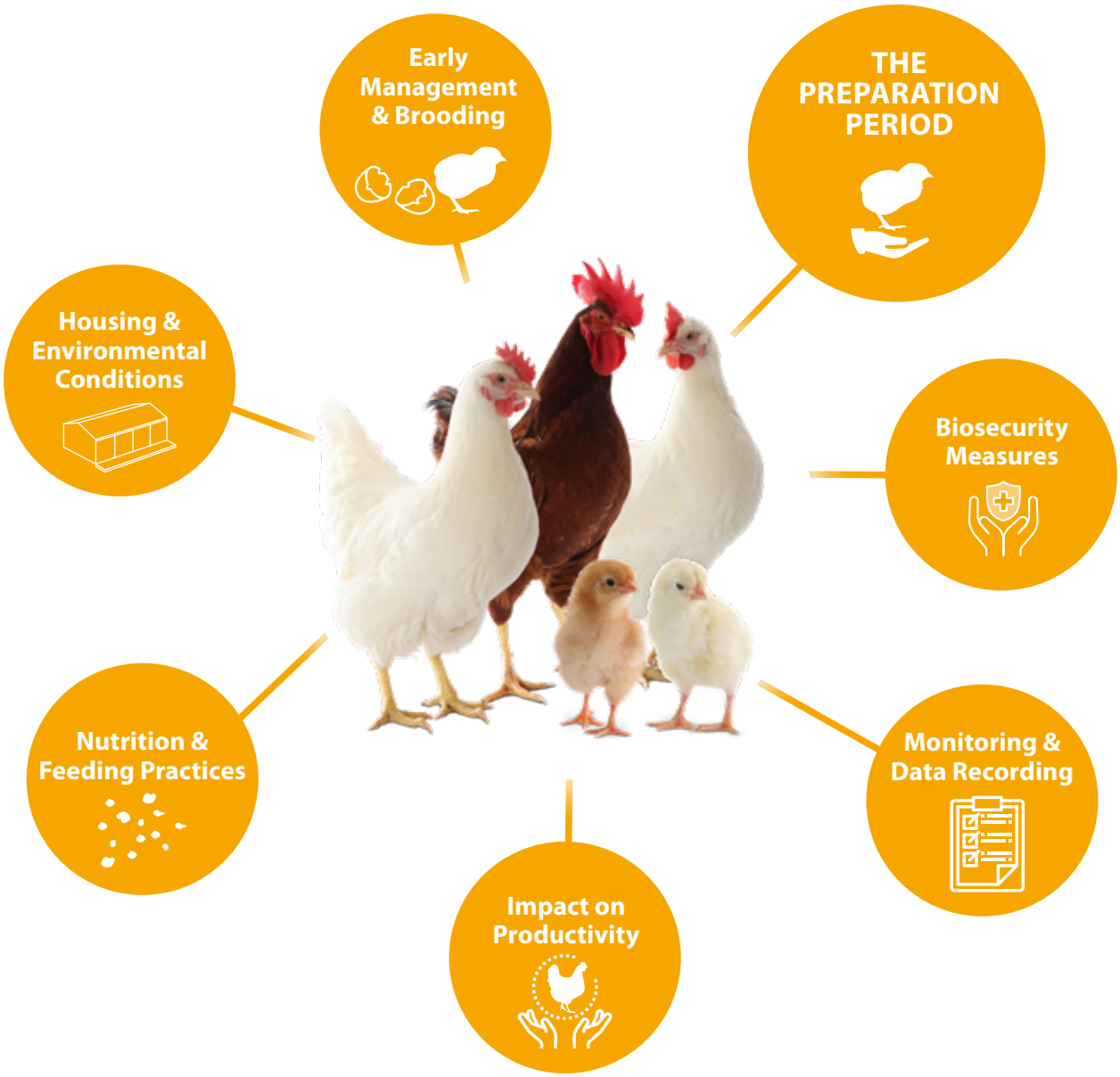
Growth slows from week six to fifteen, with increases in size and mass becoming more gradual.

Week 15 Onwards: REPRODUCTIVE MATURATION

After week fifteen, birds experience rapid reproductive organ growth and hormonal changes, leading to sexual maturity and readiness for breeding.

EARLY MANAGEMENT

The development of chicks from a young age is crucial for ensuring their productivity and overall health later in life. Proper management practices, nutrition, housing, and biosecurity measures play a significant role in achieving optimal performance and profitability in poultry farming.



THE PREPARATION PERIOD: FOUNDATION FOR LAYING HEN PERFORMANCE

Research shows that the rearing period of laying hens significantly influences both the effectiveness and the duration of their production cycle. As laying cycles become longer and management approaches, such as free-range breeding, are increasingly adopted, it becomes essential to adequately prepare flocks for upcoming challenges. LOHMANN identifies this critical stage as "THE PREPARATION PERIOD."

Immune and Digestive System Development
Special attention should be given to supporting the proper development of both the immune and digestive systems. These systems are fundamental to the bird's ability to resist disease and efficiently utilise nutrients throughout its life.

Environmental Training for Cage-Free Flocks
For breeder flocks destined for cage-free systems, environmental training should be incorporated. This helps birds adapt to the specific conditions and behaviours associated with cage-free housing, supporting welfare and long-term productivity.

DURATION AND IMPORTANCE OF THE PREPARATION PERIOD

The preparation period encompasses **the first 0 to 30 weeks of the hen's life.** Within this timeframe, hens experience several key developmental changes that form the basis for their later performance and productivity.

Developmental Growth and Skeletal Development
including skeletal health, is critical during this stage. Proper body weight gain and strong skeletal structure are vital for health and future egg production.

Nutrition
is vital for extending the production cycle of LOHMANN laying hens. Proper feeding is important throughout, especially during the late laying period when nutrient absorption and immunity drop. Hens need adequate energy for growth, feathers, and egg production, but overfeeding can harm egg quality and production rates. Achieving the right energy balance supports performance and welfare.

PARENT STOCK
DEVELOPMENT THROUGH THE PREPARATION PERIOD

STAGE 1: 0–10 WEEKS

STAGE 2: 10

EARLY DEVELOPMENT

The initial weeks are crucial for the development of organs and the immune system. Rapid growth during this period is essential to reach body weight targets and ensure good uniformity and liveability. Key management practices include maintaining optimal temperature, humidity, and lighting conditions, ensuring access to clean water and high-quality feed, and monitoring chick behaviour and crop fill to ensure proper feed and water intake.

GROWTH PHASE

During this phase, the focus shifts to skeletal and muscle development. Achieving the correct body weight and uniformity is critical.
Management practices include providing adequate feeder and drinker space, maintaining appropriate stocking densities, and implementing a lighting programme that supports growth. Feed intake training and the use of insoluble grit can help develop the digestive system and improve feed efficiency.

ONSET DEVELOPMENT

This period is characterised by the development of the reproductive system and the medullary bone, which is essential for calcium storage. Monitoring body weight and uniformity is crucial, and adjustments to feed and lighting programmes may be necessary to ensure optimal development.

Weeks of age 0 3 5 10

0–20 WEEKS

STAGE 3: 20–30 WEEKS

ONSET OF LAY

As birds approach the onset of lay, it is important to manage their environment to support continued growth and reproductive development. This includes maintaining appropriate temperatures, ventilation, and lighting conditions, as well as ensuring access to high-quality feed and water. The transition to the laying house should be managed carefully to minimise stress and support a smooth adaptation to the new environment.

PRODUCTION PERIOD

During the production period, the focus is on maintaining body weight, feed intake, and overall health to support sustained egg production. Regular monitoring of body weight, feed and water consumption, and egg production is essential. Management practices should aim to optimise the environment, including lighting, ventilation, and biosecurity measures, to ensure the health and productivity of the flock.

18 20

MALE
MANAGEMENT DURING THE PREPARATION PERIOD

STAGE 1: 0–10 WEEKS

EARLY DEVELOPMENT

Beak Treatment
A slight trimming of the beak can avoid pecking and injury to females. The age at which beak treatment is carried out must be in line with local regulations.
Too severe beak trimming can negatively impact fertility as the male might have difficulty maintaining position during mating.

Body Weight Monitoring
It is important to meet body weight standards during this period to support appropriate growth. Routine weighing helps monitor development and consistency with established standards.

Separate Rearing
In certain situations, such as on sites with a history of low early body weight, males from young breeder flocks, or non-dubbed males, it may be necessary to house males separately during the first 4 weeks. When reintroducing the males, gradual integration and observation for any negative behaviours are recommended.

STAGE 2: 10–20 WEEKS

GROWTH PHASE

Feeding
Maintaining low density, high fibre content, and an emphasis on NDF, together with appropriate feed management practices, supports the development of intake levels.

Body Weight
Male body weight is typically about 30% higher than females during this stage, supporting sexual maturity and mating readiness while maintaining agility and libido.

Uniformity
Strive to maintain high uniformity (above 85%) to promote even growth and synchronised sexual maturity within the flock. Achieving this standard facilitates effective flock management and supports optimal reproductive performance.

Weeks of age 0 10 18

ONSET DEVELOPMENT

Sexual Maturity
Monitor the development of the reproductive organs and ensure males reach sexual maturity at the same time as females. This synchronization is crucial for successful mating and fertility.

Behaviour Management
Manage aggressive behaviour by separating overly aggressive males and gradually reintroducing them to the flock. This helps prevent stress and injury to females.

STAGE 3: 20–30 WEEKS

ONSET OF LAY

Mating Ratio

Maintain an appropriate male-to-female ratio to ensure successful mating and fertility. The recommended ratio varies depending on the housing and management system but generally ranges from 8–10% on transfer, reducing to 6-7% during production.

Some modern cage free facilities use a new strategy of gradual implementation of males from a separate housing pen within the house.

Starting with fewer males initially (4–5%) and gradually increasing (6–7%) as the flock ages. This improves mating behavior, feather cover, and overall fertility.

Physical Condition

Select males with good muscle tone, body condition, and physical characteristics.

Active and reproductive males should have large, wet, and red cloacas and vents.

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STAGE 4: > 30 WEEKS

PRODUCTION PERIOD

Regular Monitoring

Continuously monitor the physical condition, body weight, uniformity, and behaviour of males. The body weight of males during production should not exceed 40% relative to that of females. Remove non-productive or unhealthy males to maintain optimal fertility and flock health.

Behavioural Observations

Observe the flock's behaviour to ensure males are evenly distributed and actively mating. Address any issues with aggression or over-mating promptly.

30

KEY STAGES OF **SEXUAL ORGAN DEVELOPMENT IN MALES**

STAGE 1: 0–10 WEEKS

EARLY DEVELOPMENT

Organ Development

During the first few weeks, the primary focus is on the development of vital organs and the immune system. The reproductive organs begin to form, but they are not yet functional.

Testicular Development and Fertility Potential

Between weeks 1 and 8, Sertoli cells – vital for future sperm production – rapidly multiply, with the most critical fertility window occurring from weeks 6 to 8, after which their proliferation stops. The final Sertoli cell count determines adult sperm output.

STAGE 2: 10–20 WEEKS

GROWTH PHASE

Body weight Monitoring

Regular monitoring of body weight and uniformity is essential to ensure proper development. Underweight males may experience delayed development of their reproductive organs.

Weeks of age 0 — 10 — 18

ONSET DEVELOPMENT

Organ Development

Testicular enlargement commences gradually. Although spermatogenesis has not yet started, the physiological foundation for hormonal activation is being established.

Nutrition and Feeding

Adequate nutrition and consistent conditions between 2–12 weeks are important for Sertoli cell development. Overfeeding or exposure to stress during this period may result in long-term reductions in fertility.

Link between Body weight and Fertility

Body weight & Sexual Maturity
Proper body weight is crucial for the development of the reproductive organs and achieving sexual maturity at the right time. Underweight males may have delayed sexual maturity and reduced fertility.

Muscle Tone & Condition
Males with good muscle tone and body condition are more likely to be active and successful in mating. Overweight or underweight males may have difficulty maintaining position during mating, leading to reduced fertility.

Behaviour & Activity
Active and reproductive males should have large, wet, and red cloacas and vents. Regular monitoring and selection of males based on physical condition and reproductive activity are essential for maintaining optimal fertility.

STAGE 3: 20–30 WEEKS

ONSET OF LAY

Hormonal Activation & Rapid Growth
Exposure to light leads to a rapid increase in testis size, resulting in a 6–10 times enlargement within three weeks and the start of sperm production. Matching light stimulation with body condition and skeletal maturity supports an effective hormonal response; maintaining uniform body weight helps achieve consistent flock outcomes. By 28–30 weeks, testes typically reach maximum weight and semen maturity.

Physical Condition
Males should have good muscle tone and body condition to support successful mating. Overweight or underweight males may have difficulty maintaining position during mating, leading to reduced fertility. Any reduction in the growth rate during this period may impair testicular development, compromise early fertility, and adversely affect long-term reproductive potential.

20

STAGE 4: > 30 WEEKS

PRODUCTION PERIOD

Maintaining Fertility
During the production period, it is essential to maintain the health and condition of the males to ensure sustained fertility. Regular monitoring and selection of males based on physical condition and reproductive activity are necessary.

Body weight
Maintain male body weight within set limits: avoid overweight males and keep the male-to-female weight difference below 40%.
Large weight differences can cause aggressive male behaviour and issues like feather loss in females. If males lose weight during production, check feeding program.

Behavioural Observations
Active and reproductive males should have large, wet, and red cloacas and vents. Observing these characteristics helps in identifying males that are successfully contributing to fertility.

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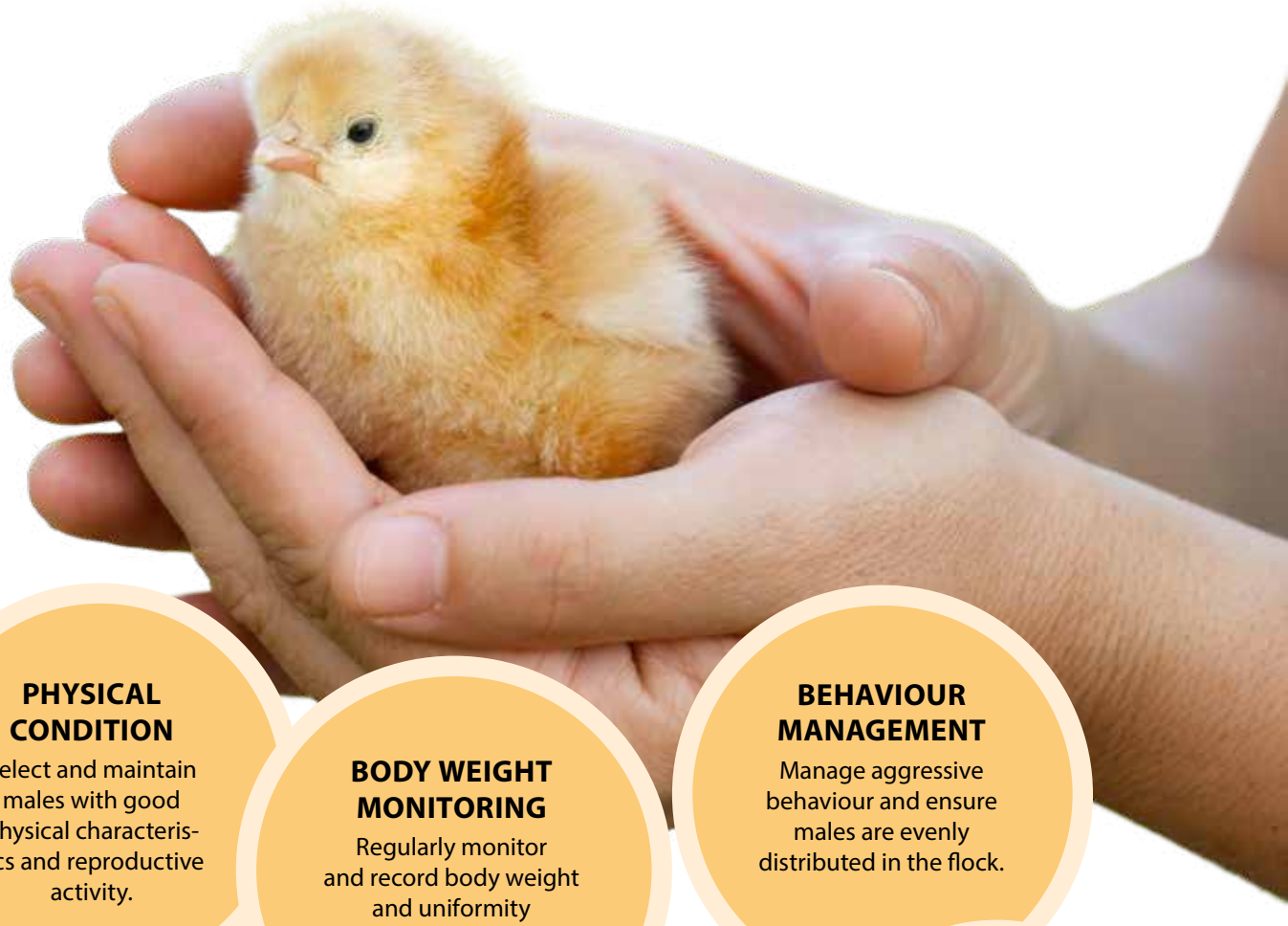
KEY MANAGEMENT PRACTICES



PHYSICAL CONDITION
Select and maintain males with good physical characteristics and reproductive activity.

BODY WEIGHT MONITORING
Regularly monitor and record body weight and uniformity to ensure proper development.

BEHAVIOUR MANAGEMENT
Manage aggressive behaviour and ensure males are evenly distributed in the flock.

MATING RATIO
Maintain an appropriate male-to-female ratio for successful mating.

BEAK TREATMENT
Perform beak treatment early to prevent pecking injuries.

FEEDING PROGRAMME
Provide a diet that supports growth and reproductive development.

TOOL**BOX**
Chick Quality


LOHMANN
BREEDERS

FEATHERING

Feathering in young hens is a fascinating process that is crucial for their overall development and health. Feathers provide insulation, protection, and are vital for their ability to regulate body temperature.

Understanding the stages of feathering, and the factors that influence this process, can help poultry keepers ensure their young hens thrive.

INITIAL FEATHERING
(0–5 WEEKS)

COMPLETE MOULTING

The first complete moulting occurs between 1 to 6 weeks of age. During this period, chicks replace their down feathers with their first full coat of feathers.

FEATHER DEVELOPMENT

Proper feather development is essential for temperature regulation and overall health. Ensure optimal environmental conditions and nutrition to support this stage.

FIRST PARTIAL MOULTING
(7–9 WEEKS)

FEATHER REPLACEMENT

A partial moulting occurs around 7 to 9 weeks, where some feathers are replaced. This stage is crucial for continued growth and development.

MONITORING

Observe feather condition to ensure proper development and address any issues that may arise.

KEY POINTS

FEATHERING AND MOULTING
Feathering involves both complete and partial moulting stages, which are critical for the bird's development and health.

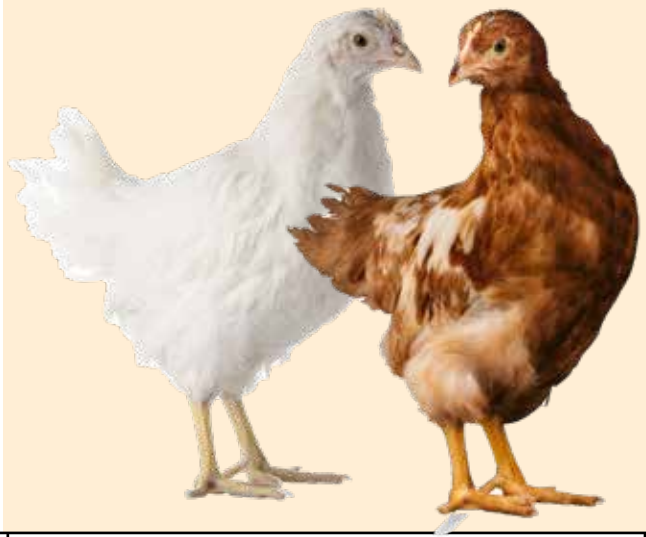
MONITORING
Regularly monitor feather condition to ensure proper development and address any issues promptly.

ENVIRONMENTAL AND NUTRITIONAL SUPPORT
Provide optimal environmental conditions and nutrition to support feather development and overall health.

SECOND PARTIAL MOULTING
(12–16 WEEKS)

FURTHER FEATHER REPLACEMENT
Another partial moulting occurs between 12 to 16 weeks. This stage involves the replacement of more feathers, contributing to the bird's overall feather quality.

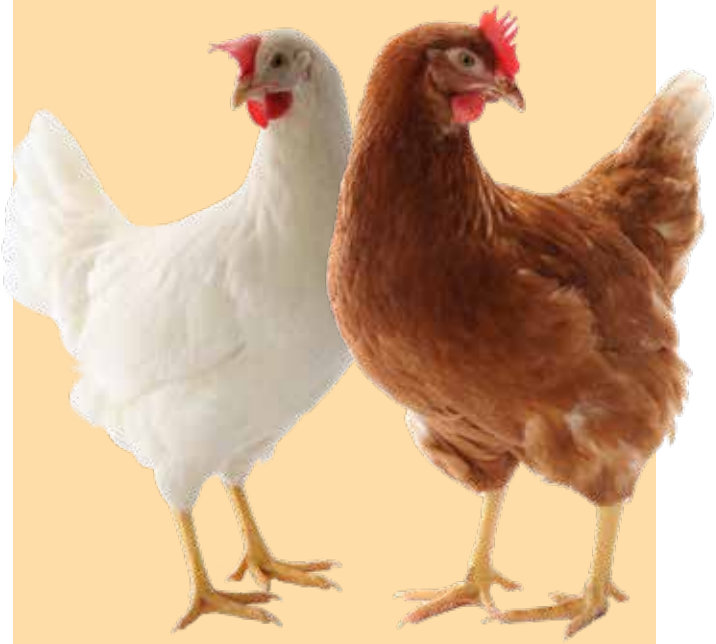
HEALTH INDICATORS
Feather condition during this stage can indicate the bird's health and development. Address any nutritional or environmental issues promptly.



FINAL FEATHERING
(20–22 WEEKS)

STIFF TAIL FEATHERS
The final stage of feathering occurs around 20 to 22 weeks, where the stiff tail feathers are grown. This stage marks the completion of the bird's feather development

PREPARATION FOR LAY
Proper feathering is essential for the onset of lay and overall reproductive health. Ensure birds are well-prepared for this transition.



12 16 20 22

Stressors affecting Moulting

Several stressors can impair the moulting process in birds, affecting their feather development and overall health. Here are some key stressors that can negatively impact the moulting process.

NUTRITIONAL DEFICIENCIES

Protein & Amino Acids

Inadequate levels of protein and essential amino acids can impair feather growth and quality.

Vitamins & Minerals

Deficiencies in vitamins (such as Vitamin A, D, and E) and minerals (such as calcium and phosphorus) can negatively affect feather development.

Ensure birds receive a balanced diet with adequate protein, vitamins, and minerals to support feather growth.

ENVIRONMENTAL FACTORS

Temperature Extremes

Both high and low temperatures can stress birds, leading to poor feathering and delayed moulting.

Humidity Levels

Inappropriate humidity levels can affect feather quality and the overall health of the birds.

Ventilation

Poor ventilation can lead to respiratory issues and stress, impacting the moulting process.

Maintain optimal temperature, humidity, and ventilation conditions to reduce stress.

LIGHTING CONDITIONS

Inconsistent Lighting

Sudden changes in lighting duration or intensity can disrupt the moulting cycle.

Inadequate Lighting

Insufficient light can affect the bird's ability to regulate its biological processes, including moulting.

Provide consistent and appropriate lighting conditions to support the moulting cycle.

HEALTH ISSUES

Diseases

Infections and diseases can weaken birds, making it difficult for them to undergo a healthy moulting process.

Parasites

External parasites like mites and lice can damage feathers and cause stress, impairing moulting.

Regularly monitor and address health issues and parasite infestations to ensure birds are healthy during moulting.

BEHAVIOURAL STRESS

Aggression & Pecking

Aggressive behaviour and pecking within the flock can damage feathers and cause stress.

Overcrowding

High stocking densities can lead to competition for resources, stress, and poor feathering.

Manage flock behaviour to reduce aggression and stress, and provide adequate space for movement and perching.

BODY WEIGHT AND UNIFORMITY

Maintaining optimal body weight and uniformity is crucial for health, productivity, and overall welfare. Proper management of these aspects ensures optimal performance.

UNDERSTANDING BODY WEIGHT AND UNIFORMITY

SOME BASIC POINTS

Body weight refers to the mass of the hens at various stages of their development, while uniformity indicates the consistency of body weight across a flock. Achieving and maintaining target body weights and high uniformity levels are essential for several reasons:

HEALTH & WELFARE

Proper body weight management helps prevent health issues such as prolapse, which can be caused by overweight or underweight hens. Uniformity ensures that all birds receive adequate nutrition and care, reducing stress and competition within the flock.

PRODUCTIVITY

Consistent body weight and uniformity are linked to better egg production rates. Hens that meet their target body weights at crucial stages are more likely to have higher and more consistent egg production.

FEED EFFICIENCY

Uniform flocks are easier to manage in terms of feeding, as they have similar nutritional requirements. This reduces feed wastage and ensures that all birds are adequately nourished.

TOOL**BOX**
Prolapse in layers

ACHIEVING OPTIMAL BODY WEIGHT AND UNIFORMITY

To achieve optimal body weight and uniformity, several management practices must be implemented:

MONITORING & WEIGHING

Regular weighing of hens is crucial to track their growth and ensure they meet target body weights. This should start from the rearing period and continue throughout the production cycle.

LIGHTING PROGRAMMES

Proper lighting programmes help synchronise the hens' behaviour and promote uniform growth. This includes intermittent lighting during the brooding period and step-down programmes as the birds mature.

NUTRITION

Providing a balanced diet tailored to the hens' developmental stages is essential. This includes adjusting feed formulations to meet the specific needs of the birds at different ages.

HOUSING & EQUIPMENT

Ensuring that the housing systems and equipment are designed to promote uniform access to feed and water is vital. This includes providing adequate space, perches, and nesting areas.

METHODS FOR EVALUATING BODY WEIGHT AND UNIFORMITY

Maintaining optimal body weight and uniformity is crucial for health, productivity, and overall welfare. Proper management of these aspects ensures optimal performance.

WEIGHING PROTOCOL

Weigh a **minimum of 100 birds** for a representative sample.

Weigh birds **weekly until 30 weeks of age, then monthly.**

Weigh birds **at the same time, preferably in the afternoon.**

BODY WEIGHT RECORDING

Mean body weight:
Calculate the average body weight of the flock.

Uniformity:
Determine the percentage of birds within ± 10% of the mean body weight. Aim for **at least** 85% uniformity.

Coefficient of Variation (CV):
Calculate the CV, with a target of below 8%.

EXAMPLE

- **Weigh 100 birds and place marker in correct section.**
- **Calculate average body weight:**
  100 pullets weighed a total of 90.800 g
  90.800 g divided by 100 birds = 908 g / bird
- **Determine the uniformity:**
  908 g x 10% = 91 g
  908 g + 91 g = 999 g –> upper value
  908 g – 91 g = 817 g –> lower value
  85 birds weighed within the 817 g – 999 g range
  85 divided by 100 times 100
  = 85 % uniformity

Example of calculating body weight and uniformity

PDF

BODY WEIGHT TABLES

FOR BODY WEIGHT TABLES download and print the PDF file from our website.

LOHMANN LB-CLASSIC

LOHMANN LB-LITE

LOHMANN LSL-CLASSIC

LOHMANN LSL-LITE

LOHMANN SANDY

LOHMANN LB-EXTRA

LOHMANN TRADITION

LOHMANN LSL-EXTRA

LOHMANN LSL-ULTRA LITE

LOHMANN SILVER

CORRECTIVE MEASURES

IN REAR
Are there enough light hours in the day? Can you manipulate your lighting programme?

FEEDER AND DRINKER SPACE
Ensure adequate space to prevent competition and ensure uniform access.

FEED QUALITY & DISTRIBUTION
Use high-quality feed and ensure even distribution to avoid fine particle accumulation.

FEED DISTRIBUTION PROGRAMME
Is it effective? Use daily crop checking when handling the hens. Is Twin feeding necessary?

ENVIRONMENTAL CONDITIONS
Maintain optimal temperature, humidity, and ventilation to support uniform growth.

MAIN AREAS OF FOCUS

BODY WEIGHT DEVELOPMENT

Early Growth

Focus on achieving target body weight by 5 weeks of age. This period is crucial for organ and immune system development.

Skeletal and Muscular Growth

From 3 to 6 weeks, ensure proper skeletal and muscular development.

Uniform Growth

Maintain consistent growth from 6 to 15 weeks, focusing on body composition and frame size.

UNIFORMITY

Consistent Management

Ensure uniform access to feed and water, and maintain consistent environmental conditions.

Regular Monitoring

Weekly weighing and body weight recording to track growth and uniformity.

Corrective Actions

Address any deviations in body weight or uniformity promptly through management adjustments.

By focusing on these areas and following these guidelines, you can achieve optimal body weight and uniformity in your flock, leading to better overall performance and productivity. If you have any specific questions or need further details, feel free to ask!

GUIDELINES FOR REARING AND PRODUCTION

REARING PERIOD

Starter Feed

High-density diet with highly digestible raw materials for the first 5 weeks.

Grower Feed

Medium-density diet from 6 to 10 weeks to support skeletal and muscular growth.

Developer Feed

Low-density diet from 11 to 17 weeks to develop feed intake capacity.

PRODUCTION PERIOD

Feed Management

Distribute feed rapidly and ensure feeders are emptied daily to avoid fine particle accumulation.

Water Management

Ensure clean, fresh water is always available, with adequate drinker space.

Lighting Program

Use a step-down lighting programme during rearing and a consistent lighting programme during production to control sexual maturity and stimulate feed intake.

ENVIRONMENTAL MANAGEMENT

Ventilation

Ensure proper air exchange to maintain air quality and prevent respiratory issues.

Temperature Control

Maintain optimal temperatures to support feed intake and growth.

Litter Management

Keep litter dry and friable to prevent caking and support bird health.

FEEDING

Feeding plays a crucial role in both rearing and production stages, impacting various aspects of poultry health and productivity.

REARING STAGE

During the rearing stage, the focus is on developing the immune system, body weight, and uniformity. Proper feeding helps in imprinting future productivity and behavioural instincts. It is essential to provide balanced meals and meet particle demands to support gut health and overall development.

COLLABORATION BETWEEN STAGES

The collaboration between rearing and production is significant. The preparation period (0–30 weeks) which includes immune system development, feed training, and intake development, sets the foundation for future productivity. Ensuring a smooth transition from rearing to production helps in maintaining uniformity and achieving higher production peaks.

PRODUCTION STAGE

In the production stage, feeding impacts egg mass, peak lay, and overall health. Maintaining a balanced feeding programme is crucial to ensure that hens receive the necessary nutrients to sustain production and cope with stress. Feeding to an empty trough and promoting satiety are important strategies to ensure all hens eat a balanced meal.

FEED TRAINING

Feed training is a crucial part of the preparation period for poultry, and it involves several key aspects to ensure the birds develop proper feeding habits and intake capacity.

1 **Feed Training Begins**
Feed training starts early in the rearing stage and is essential for developing the birds' intake capacity and feeding patterns. This period is crucial for imprinting future productivity and behavioural instincts.

2 **Intake Development**
During feed training, the focus is on developing the birds' intake capacity. This involves ensuring that the birds learn to eat balanced meals and meet their nutritional requirements. Proper intake development supports gut health and overall growth.

3 **Feed Pattern Imprinting**
This process involves teaching the birds to follow a specific feeding pattern that will be used later in production. It helps in maintaining uniformity and achieving higher production peaks. The feeding programme should be balanced and designed to reduce selective eating.

4 **Stimulation based on Body Weight and Uniformity**
Feed training includes stimulating the birds based on their body weight and uniformity to ensure they receive the necessary nutrients for optimal growth and development. This helps in achieving a balanced production profile.

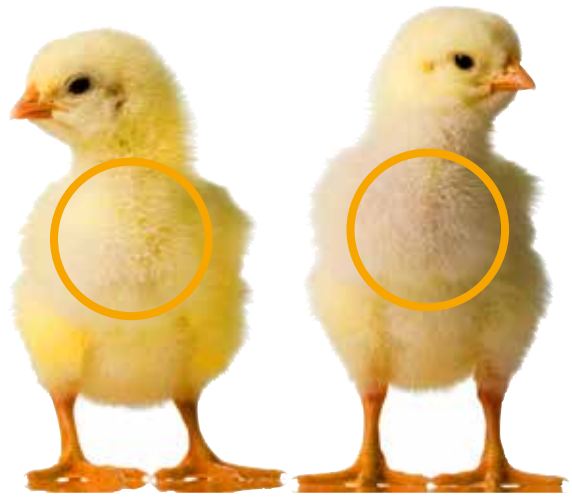
5 **Monitoring and Adjustments**
Regular monitoring of body weight, uniformity, and crop checking are essential during feed training. Adjustments to the feeding programme may be needed based on visual signs and the birds' development.

CROP CHECKING

Crop checking is an essential part of feed training in poultry management. It involves physically examining the crop, which is a part of the bird's digestive system where food is stored before digestion.

WHY SHOULD I DO IT ?

- **Monitoring Intake**
  Crop checking helps in monitoring the birds' intake capacity and ensuring they are consuming the right amount of feed. This is crucial for developing proper feeding habits and ensuring that the birds are meeting their nutritional requirements
- **Evaluating Feeding Program**
  Regular crop checking allows for the evaluation of the efficacy of the feeding program. By checking the crop, you can determine if the birds are eating balanced meals and if the feeding programme needs any adjustments
- **Balancing Feed Delivery**
  Crop checking helps in balancing the feed delivery based on each bird's requirements. It ensures that all birds are receiving a balanced meal and reduces the ability for selective eating
- **Supporting Growth & Development**
  Continued crop checking through important developmental stages is a useful tool in evaluating uptake of the feed which in turn helps you support the growth and development of the chicks, allowing you to make any necessary changes to your feed and feeding routine.



WHEN SHOULD I DO IT ?

- **The first 24 hours**
  It's very important that the chicks take to the feed and water as early as possible. By 24 hours, most of the chicks should have food in their crops.
- **During the rearing stage**
  Crop checking should be done regularly to monitor intake development and ensure that the birds are consuming balanced meals. This helps in maintaining uniformity and achieving higher production peaks.
- **During the preparation period**
  Regular crop checking is essential to gauge the efficacy of the feeding program. It helps you balance the feeding program, making adjustments if necessary to ensure the hens are utilising the feeding regime effectively.

WHAT AM I LOOKING FOR ?

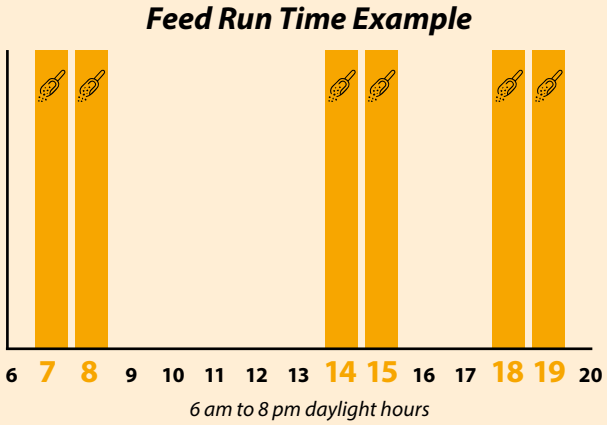
- **Full Crop**
  A full crop indicates that the bird has consumed enough feed. It should feel soft and pliable, not hard or empty.
- **Uniformity**
  Checking the uniformity of crop fill across the flock is important. Ideally, all birds should have a similar crop fill, indicating that they are all eating a balanced meal.
- **Consistency**
  The consistency of the crop contents can provide insights into the type of feed consumed. It should be a mix of different feed particles, not just fines or large particles.
- **Timing**
  Crop checking should be done at specific times, such as after feeding, to gauge the efficacy of the feeding programme and ensure that all birds have had the opportunity to eat.

FEEDING CONCEPTS

CONCEPT OF TWIN FEEDING

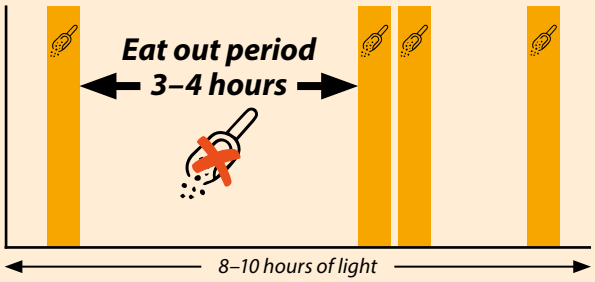
Twin feeding involves providing feed in blocks or intervals, ensuring that hens consume a balanced meal. This method helps in promoting intake and maintaining uniformity among the flock.

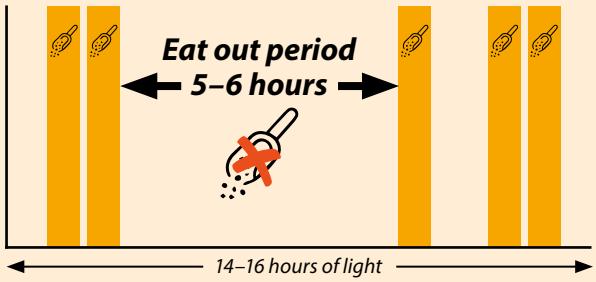
- Twin feeds can be used at any point in the day.
- They should be placed strategically within your feeding program. For example, in hot climates they are most beneficial at the beginning and the end of the day.
- Monitor the efficacy of your twin feed by measuring uniformity. If it is stationary or improving then it is effective. If uniformity continues to decline after implementation then review your feeding programme with your LOHMANN advisor.



FEEDING TO AN EMPTY TROUGH

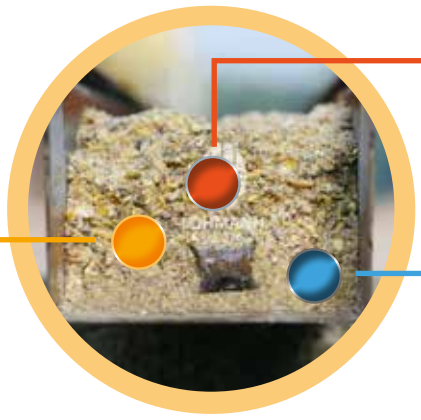
This is a common concept which simply means that at least once a day, the hens should consume all the feed in the trough before the next feeding. This encourages hens to eat all parts of the feed, including the less palatable bits, ensuring a balanced intake. This is achieved by having one large gap at some point in the day where the feeders don't run.





PROTEIN / INSOLUBLE FIBRE

Mid coarse particles: 1–2.5 mm



STARCH

Coarse particles: > 2.5 mm

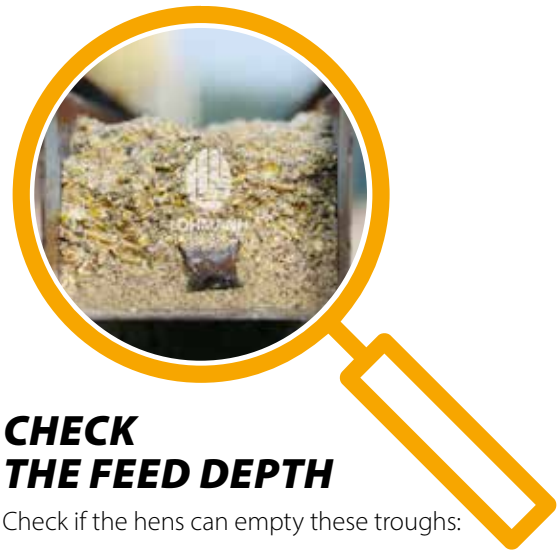
CALCIUM / PHOSPHORUS / TRACE MINERALS / VITAMINS

Fine particles: 0.5–1 mm

For a balanced diet, our hens should consume food from all three of these sections each day. Hens are skilled foragers, so effective management is needed to support this behaviour.

MONITORING & ADJUSTMENTS

CHECK THE CROP



CHECK THE FEED DEPTH

Check if the hens can empty these troughs:



- Meet in the middle and balance your feed delivery timings to help ensure an adequate uptake of essential amino acids & nutrients by ALL the hens.
- From 8 weeks of age until the end of production there should always be an eating out period.
- This also helps to deliver a balanced nutritional meal to ALL the hens and ensures old food is cleared out the feed tracks.

CHECK THE BEHAVIOUR

Adjustments may be needed based on the birds' development and visual signs.

IMPORTANCE OF SATIETY

Satiety, or the feeling of fullness, is crucial for hens both in rear and production. It impacts their behaviour, reducing boredom, stress, and negative behaviours.

THE ART OF BALANCED FEEDING

How we feed is just as important as what we feed for our laying hens.
Balanced feeding practices promote the distribution of essential nutrients like protein, calcium, and vitamins. By ensuring balanced feeding, you create the conditions necessary for laying hens to achieve optimal health and egg production. It is the method of feeding – regularity, accessibility, and presentation – that establishes the framework for delivering the nutrients effectively.
By combining balanced feeding techniques with high-quality feed, laying hens can achieve peak productivity and maintain long-term health.

LIGHTING

Lighting is a critical factor in poultry production, influencing bird behaviour and overall wellbeing, health, growth, bone formation, movement and foraging, circadian rhythms, sexual maturity, and egg production, as well as mate identification and reproduction. It's important to note that hens have a highly developed visual system, which differs significantly from human vision.

GENERAL

Lighting programmes implemented for breeders are designed to fulfil distinct objectives throughout both rearing and production phases.

The lighting schedule regulates the growth and body weight development besides onset of lay and significantly influences laying performance and egg weight during the production period.

Encouraging Growth & Sexual Maturity

Lighting promotes early development, increases feed and water intake, supports growth, and helps regulate sexual maturity in birds, leading to improved laying performance.

Reducing Stress

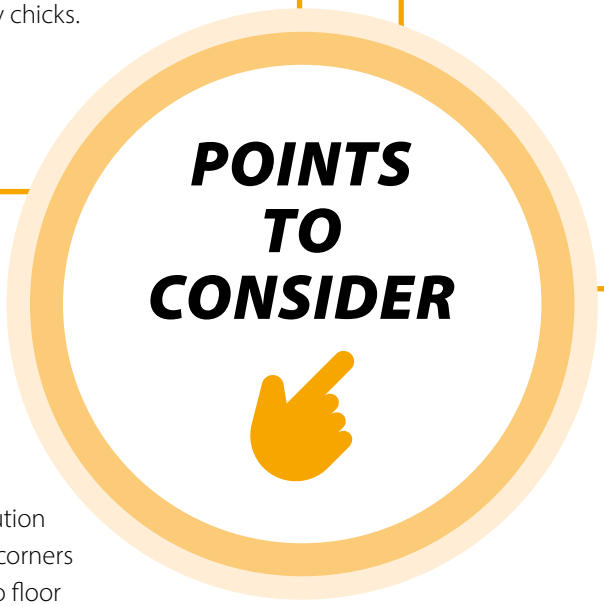
A suitable light climate can significantly reduce stress in parent stock, leading to better wellbeing and performance. Stress can negatively impact feed conversion, mortality rates, and egg production.

Enhancing Egg Uniformity & Nesting Behaviour

Effective lighting management not only influences laying behaviour by encouraging birds to use nests – thereby reducing floor eggs – but also supports improved egg uniformity and weight for optimal breeder performance.

It is crucial for breeder flocks to achieve a proper increase in egg size from the start of lay to maximise the percentage of hatching eggs of suitable weight, which will produce high-quality chicks.

Never increase the hours of light during the growing period until the planned stimulation. Additionally, never reduce the length of the lighting day during the laying period.



Proper light placement is crucial in poultry systems. It's essential to have independent and dimmable controls. A well-positioned lighting system that provides even light distribution at bird level can eliminate dark corners and shadows, which can lead to floor eggs and undesirable behaviour.

Ensure that daylight hours are consistent between the rearing house and the production facility when transferring birds.

LIGHT SOURCES IN POULTRY HOUSES

A wide range of lighting options is available for use in poultry houses, from traditional incandescent bulbs to advanced LED (light-emitting diode) systems. Each type of lighting presents distinct advantages and disadvantages, making it important to select the most suitable option based on the specific needs of the flock and the housing environment.

In recent years, **LED lamps** have become increasingly prevalent in poultry facilities. Their popularity can be attributed to their extended lifespan, significant energy efficiency, and reliable performance. These features make LEDs a favourable choice for modern poultry operations seeking both cost-effectiveness and consistent lighting quality.

It is vital to remember that **poultry have unique visual capabilities,** which means that not all light sources are appropriate for them. Research has shown that different colours within the light spectrum can affect chickens in various ways, underscoring the need for careful selection of lighting systems.

When choosing a light source, it is essential to purchase from reputable manufacturers who supply comprehensive specifications. The ideal light source should possess a broad spectrum that closely replicates natural daylight, supporting the welfare and productivity of the birds. Additionally, it is highly recommended to use flicker-free lighting with a colour rendering index (CRI) greater than 90%, as this ensures optimal visual conditions for the flock.

LIGHTING PROGRAMME

In general, lighting programmes must be designed and adjusted to suit your breed, housing system, management, nutrition, body weight, and local needs and requirements.
This is why LOHMANN recommends that every lighting programme be tailored individually.

Adjusting lighting hours during the growing period and timing the start of light stimulation can be tailored to meet specific farm requirements.

For breeders, a gradual reduction in lighting hours (slow step-down) and delayed stimulation can help achieve the desired hatching egg weight and ensure long-term laying persistency.

INDIVIDUAL LIGHTING PROGRAM

Light stimulation should be based always on body weight and uniformity rather than age, as premature stimulation or insufficient body weight can lead to poor performance, including reduced peak and persistency, higher mortality, and poor eggshell quality.

Early light stimulation can adversely affect the size of the eggs.

LOHMANN have created a geographical lighting calculator to help you formulate your specific lighting programme for your region. This can be a very useful tool in creating a programme that meets all your requirements.

LOHMANN Lighting programme tool

TAILOR-MADE LIGHTING PROGRAMMES

When designing a lighting programme for breeders, it is important to take into account a variety of factors to ensure the best results for your flock. These include:

- your geographical location and the natural changes in day length throughout the year,
- the type of rearing unit in use – whether it is a light-controlled, semi-dark, or open house environment,
- the current season and whether the days are lengthening or shortening,
- the date of hatch in relation to the natural day length at the point when the flock is expected to reach the target body weight for light stimulation and the onset of lay.

It is also crucial to determine which scenario applies to your facility: whether you are moving birds from a dark rearing house to a dark, semi-dark, or open laying house, or from a semi-dark or open rearing environment to a dark, semi-dark, or open laying house.

Identifying the scenario will help tailor the lighting programme to your specific situation.

NATURAL DAY LENGTH at different latitudes at northern and southern hemisphere

PDF

LIGHTING MANAGEMENT IN DIFFERENT HOUSE TYPES

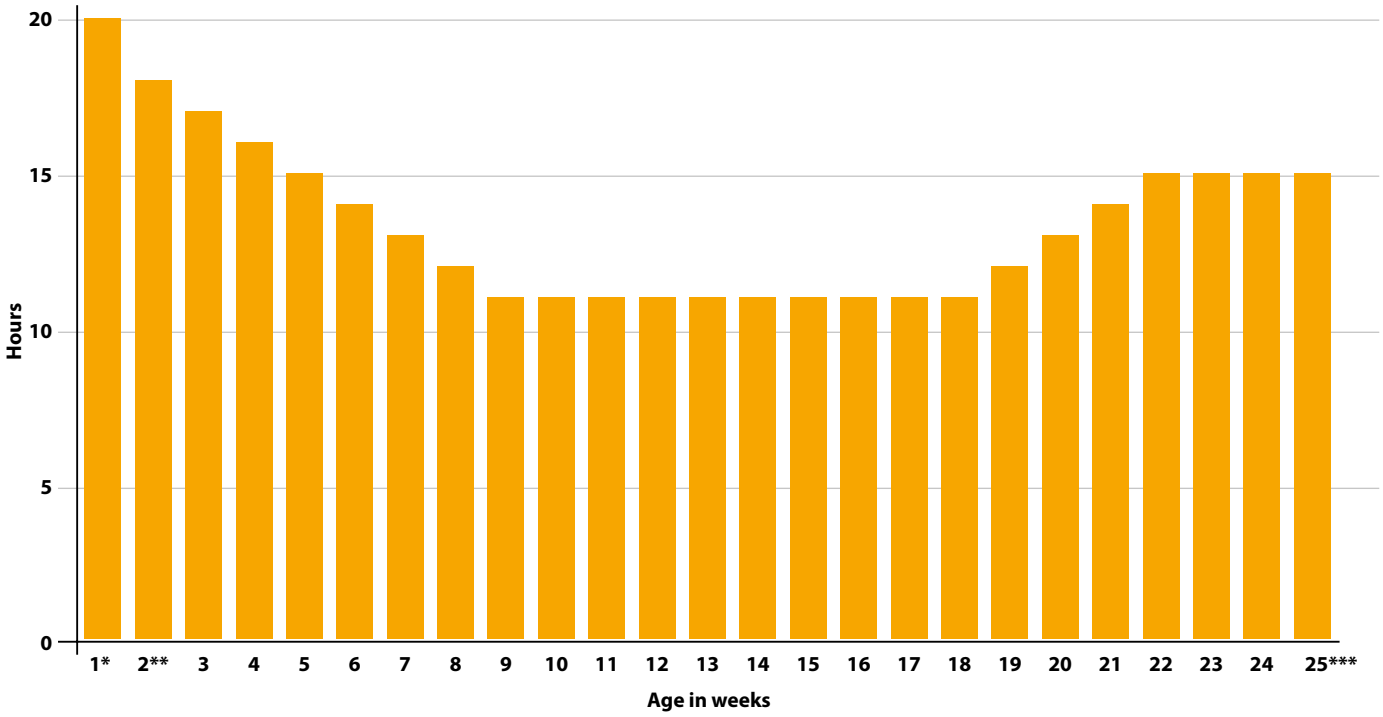
CLOSED HOUSES

In closed houses, lighting management is generally more straightforward, as the absence of natural light allows for complete control over the artificial lighting programme. This enables precise adjustments to meet the flock's particular needs. However, it is essential to prevent any unwanted external light from entering, as this could disrupt the established lighting schedule, reduce efficiency, and potentially lead to behavioural issues such as feather pecking.

SEMI-DARK OR OPEN HOUSE FACILITIES

In semi-dark or open house facilities, where natural daylight has an impact on the flock, it is vital to create a customised lighting programme that takes into account the specific time of year and the geographical location of the unit. The lighting requirements in such houses are influenced by factors including geography, house type, and commercial objectives. As each situation can be unique, any guidance provided should be considered as a starting point, with programmes adapted as necessary to suit the particular circumstances of each operation.

***AN EXAMPLE** of a lighting programme for Breeders*



** Implement an Intermittent Lighting Programme consisting of 16 hours of light (divided into 4 intervals of 4 hours each) and 8 hours of darkness (divided into 4 intervals of 2 hours each). If this schedule is not feasible, provide 20 hours of continuous light.*

*** Implement an Intermittent Lighting Programme consisting of 16 hours of light (divided into 2 intervals of 8 hours each) and 8 hours of darkness (divided into 2 intervals of 4 hours each). If this schedule is not feasible, provide 18 hours of continuous light. Further details can be found in the chapter on housing.*

**** It is possible to increase the duration of light exposure to a maximum of 16 hours per day. However, it is generally accepted that providing 14 hours of light is sufficient to support optimal production.*

LIGHT STIMULATION GUIDELINES FOR WHITE AND BROWN BREEDERS

When implementing a lighting programme for breeders, it is important to consider the specific female body weight and egg production milestones that indicate readiness for light stimulation.

For white breeders, light stimulation should be applied once the females have reached a body weight of 1.3 kilograms.

For brown breeders, the recommended threshold for light stimulation is a body weight of 1.5 kilograms.

Monitoring these key indicators ensures that the birds are physiologically prepared for light stimulation, which supports optimal laying performance and flock management.

ADJUSTING LIGHTING PROGRAMMES FOR BODY WEIGHT AND EGG SIZE

In situations where the birds' body weights fall below the target or when a larger hatching egg size is desired, it is advisable to adopt a slower step-down approach in the lighting schedule. This gradual reduction in light exposure allows the flock additional time to increase their feed intake, supporting both weight gain and the development of optimal egg size.

Alternatively, the initiation of light stimulation may be postponed, ensuring that the birds are physiologically ready before advancing the lighting programme.

This methodical adjustment helps to align the flock's development with production objectives, promoting better overall outcomes in both body weight and hatching egg quality.

LIGHT INTENSITY

Light intensity plays a crucial role in stimulating birds, directly influencing their activity levels, mating behaviours, pecking tendencies, and feather loss.

1 **Early Days**
In the early days, high light intensity encourages chicks to explore their surroundings and quickly find water and feed. During the initial stages of rearing, it's important to keep the flock active, so early stimulation is essential.

2 **Preparation for Production**
This should be followed by a gradual reduction to a more relaxed light level, preparing the birds for the production house. In general, higher light intensity makes birds more active; however, excessively bright lighting can lead to increased nervousness, raising the risk of vent pecking and mortality, especially when birds are housed at high stocking densities.

3 **Dimming**
Having a lighting system with dimming capabilities allows for better behavioural control within poultry houses and helps prevent birds from laying floor eggs in dark areas. Dimming can also be used to reduce the likelihood of pecking and cannibalism as the birds mature.

4 **Production**
In production, it is common to lower lux levels later in the laying period to calm the flock and help minimise aggressive pecking. Once lights have been dimmed during laying, they should not be increased again for the duration of this period.

TOOL**BOX**
Vision of Poultry

Graphs for Lux levels
PDF

VISION OF POULTRY

We must always keep in mind that birds perceive light differently from humans, while the parameters commonly used to measure and analyse light are primarily based on human vision rather than avian vision. For instance, using lux as a unit for light intensity may not be always appropriate, as light intensity can vary according to the specifications of the light source, such as type, spectrum and frequency. In general, hens' perception of light is far greater than ours so any changes should be minimal and gradual.

NUTRITION OF **PULLETS & BREEDERS**

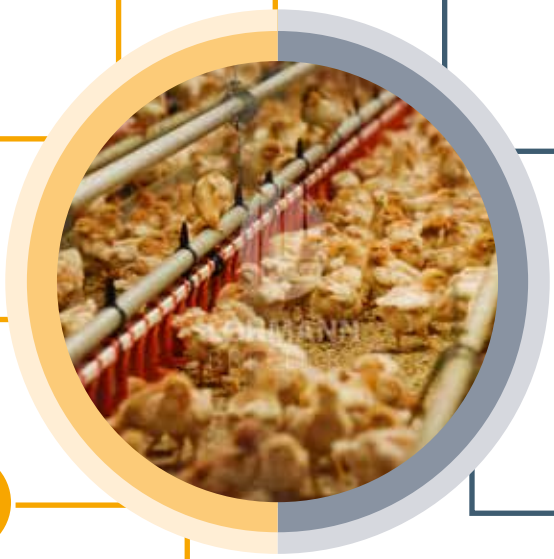
Through feeding, we must provide breeders with nutrient levels that meet the demands of maintenance, growth and reproductive potential, and ensure their wellbeing and health. LOHMANN Parent Stocks can express their full potential with a wide variety of formulations that differ in ingredient composition based on geographical availability and raw material costs.

Production cannot be considered in isolation but also requires proper management, optimal health, and nutrition. The preparation period for breeders (from 0 to 30 weeks) will play a decisive role in their reproductive performance. Finally, the goal of nutrition is to optimise hatchability and, therefore, obtain the maximum number of quality pullets while maximising the return on diet costs.

PREPARATION PERIOD

GOALS OF THE PREPARATION PERIOD

- Uniformity (> 85%)
- Adequate Live Weight
- Digestive System Development
- Optimal Body Composition
- Adequate Feed Intake Capacity
- Robust Immunity



MANAGEMENT PRACTICES

- Providing an Appropriate Environment
- Balanced Nutrition
- Constant Monitoring of the Health of the Birds

Due to genetic selection, today's breeder hens are characterised by great productivity over a longer period. This makes the preparation period, which spans from the first day of life to week 30, even more important.

THE FIRST 5 WEEKS: THE BASIS

DEVELOPMENT OF THE PULLET

The live weight and uniformity will indicate how effective our management, health, and nutritional choices are during this phase. During both the preparation period and in production, monitoring body weight and uniformity will be a key factor in decision-making.

REACHING THE RECOMMENDED LIVE WEIGHT

for each line is crucial, because there is a high correlation between live weight at 5 weeks and productive parameters such as the number of eggs, viability, and persistence.

THE MAIN ORGANS

will be developing, such as the liver, lungs, heart, and digestive system, which are fundamental for the hen's productive life.

It is important to note that nutrition has a limited capacity to solve problems due to inadequate management and/or health.

5–10 WEEKS: FRAME DEVELOPMENT

DEVELOPMENT OF THE PULLET

Muscle growth reaches its peak, and skeletal development in the pullet continues.

LIVE WEIGHT OF THE PULLET

This stage represents the peak of daily weight gain. The diet must deliver the appropriate nutrient levels (mg per bird per day) to effectively support this growth phase.

STRUCTURE-SIZE OF THE PULLET

By approximately 11 weeks of age, 90% of a bird's structural size is established, making this developmental stage especially critical given the extended production cycles of modern laying hens.

It's important to bear in mind that change in feeding phase should be based on the birds' body weight and uniformity, not on age (see feed specifications for preparation period).

10–16/17 WEEKS: GUT & FEED INTAKE DEVELOPMENT

LIVE WEIGHT OF THE PULLET

Growth curves show that this phase involves reduced average daily gain and therefore lower nutrient requirements.

FEED INTAKE CAPACITY

Pullets aged 16 to 17 weeks are expected to have developed sufficient consumption capacity to accommodate the transition period and initiate egg production successfully.

At the end of this period, it is important for the pullet to reach the correct body weight or slightly above according to the standards. However, it is also crucial to achieve the correct body composition and uniformity at the time of light stimulation.

TILL 30 WEEKS: END OF PREPARATION PERIOD

DEVELOPMENT OF STRUCTURAL BONE

Structural bone develops until weeks 15–16, after which production begins depending on the lighting programme.

THE FIRST 5 WEEKS: THE BASIS

FEED

- **Feeding programs,** which include both nutrient levels and the microstructure and presentation of the feed, must be flexible to adapt to raw materials' quality, the environmental conditions, health status, and management (e.g., beak treatment, housing conditions, etc.).
- **A homogeneous mash feed** is highly recommended.
- The use of **crumbled or micropelleted feed** can potentially improve consumption and, in turn, growth and uniformity of the pullets.
- **Finely ground raw materials** that are then crumbled may compromise physiology as they do not stimulate the gizzard's main function (grinding) and antiperistalsis. A coarser grinding and then crumb would be a compromise solution, however.

Crumbled feed

Micropelleted feed

TOOLBOX
Feed presentation

PROTEIN

Proteins are essential for muscle growth and tissue repair in pullets.

- Once energy needs are met, the **protein level** of the diet will be the main driver of development and growth, including skeletal development.
- During the first weeks, a **starter feed including 19–21 % crude protein** content is recommended.
- **Choose high-quality and digestible protein sources.**
- Include in the diet any **additive/supplement that may support digestibility.**
- **The balance between the amino acids that make up proteins is crucial.** An imbalance can limit protein synthesis, affect behaviour, and reduce growth.
- **Supplementing with synthetic amino acids** can help achieve optimal levels and reduce diet costs.
- It's also advisable the inclusion of **moderate levels of insoluble fibre** to support gut development and intake.

TOOLBOX
Digestive system of laying hens

TOOLBOX
Gut health in pullets & laying hens

5–10 WEEKS: FRAME DEVELOPMENT

NUTRIENTS

To maintain a highly reproductive hen, adequate skeletal development during the preparation period is important.

- **Consider the levels of calcium, phosphorus, vitamin D, and the contributions of phytase** (if it is incorporated into the diet) to ensure an adequate and balanced supply of each of them in each phase.
- **It is recommended to maintain the balance between calcium and phosphorus,** based on the proportion found in hydroxyapatite, the bone structure. Practically, we can consider a ratio of 2.1 Ca/available P or 2.2 Ca/digestible P. However, these ratios can be influenced by the consumption and availability of minerals.
- The nutrient level of this feeding phase will again be conditioned by management and environmental factors that will significantly influence the pullets' consumption.

With a lower-than-expected consumption, we will inevitably have to increase nutrient levels in feed, especially the level of protein/digestible amino acids. But it's not always the best solution.

10–16 / 17 WEEKS: GUT & FEED INTAKE DEVELOPMENT

FEED

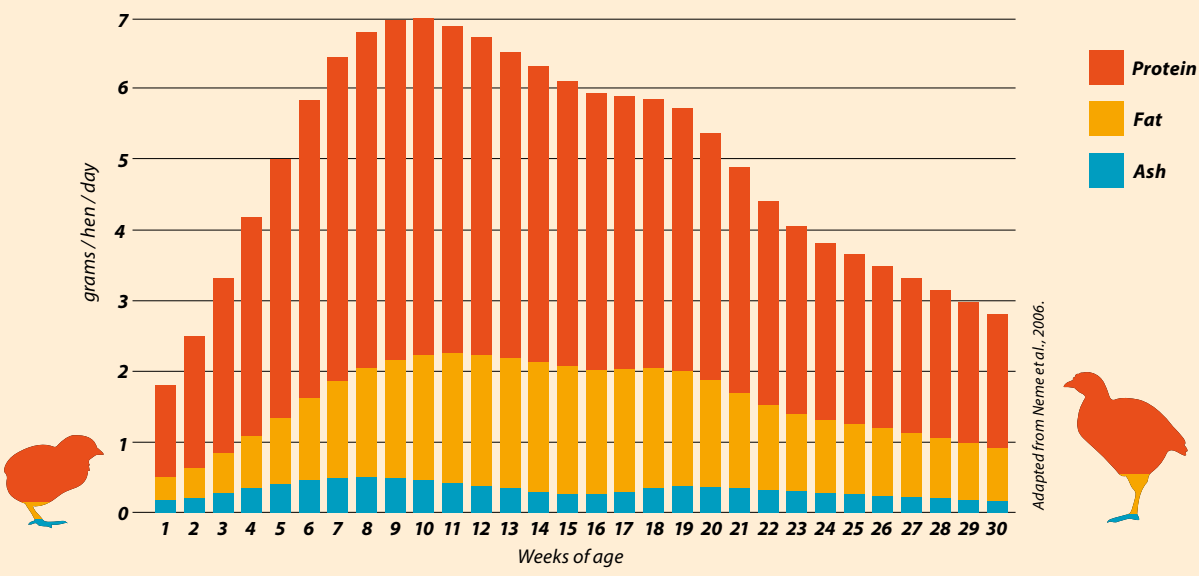
- **Use feeds moderate in energy** (≤ 2750 kcal/kg) which, in addition to promoting consumption, allow the incorporation of fibrous raw materials that stimulate the development and capacity of the digestive system.
- To support this, it's advisable to **include a minimum of insoluble fibre** into the diet (Neutral Detergent Fibre ≥ 14.5 %).
- **During the transfer of birds from the rearing house to the laying house,** it is also crucial to minimise changes in the structure (both macro and micro) of the feed. A sudden change in structure, from coarse (> 2.36 mm ø) to fine (< 0.60 mm ø), can cause a reduction in consumption of up to 28%, that may lead to weight loss and affect onset of lay and later performance.

BODY COMPOSITION

Body composition will be influenced by the density of the feed and the level of protein during this phase.

- Any attempt to recover live weight from 11 weeks onwards through nutritional modification could improve feed conversion but could adversely affect the amount of body fat deposition: **greater fat accumulation during this period will negatively impact the productivity of the flock.**

Lohmann Brown Classic constituents' weekly growth



TILL 30 WEEKS: END OF PREPARATION PERIOD

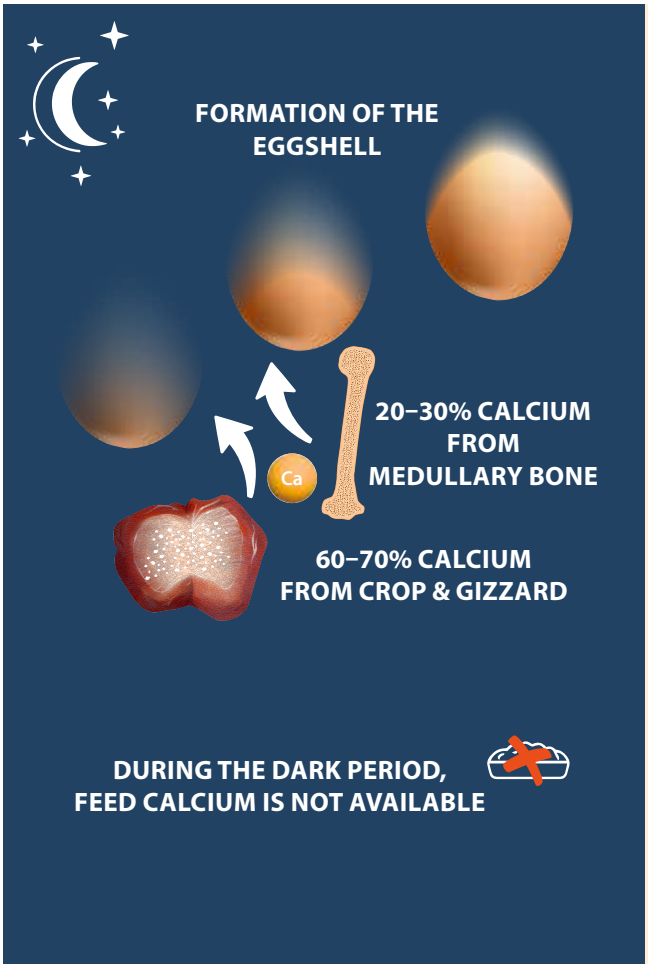
MEDULLARY BONES

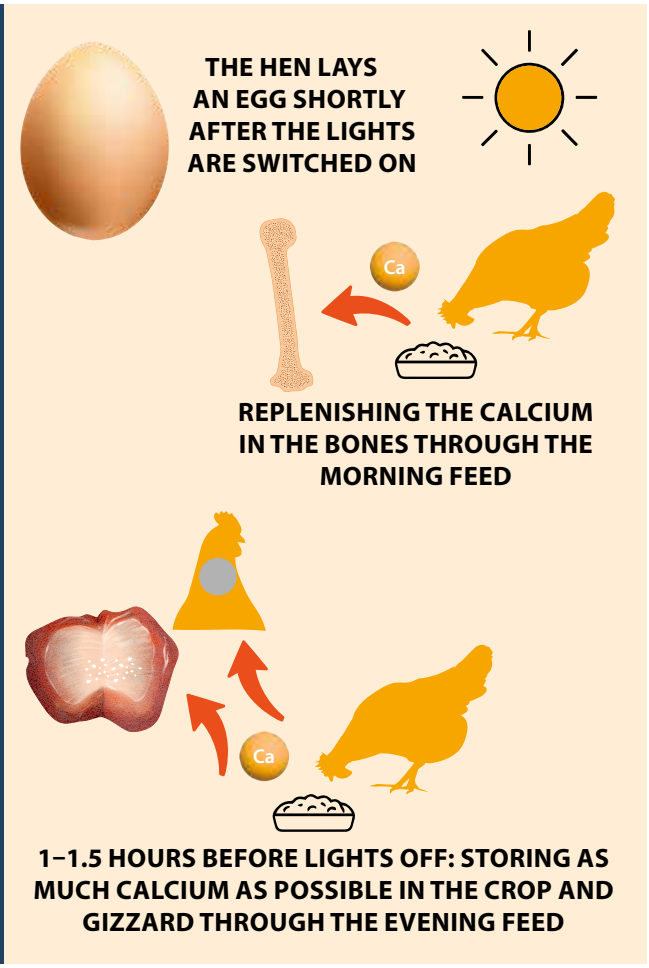
Structural bone development continues until weeks 15–16, after which production begins, depending on the lighting programme. From this moment, a **hormonal change** (oestrogens) occurs, leading to the **development of the reproductive system** and a particular type of **bone called "medullary"** (mainly in the tibia and femur) while the **demand for nutrients for growth continues.**

During lay, the formation/calcification of the eggshell takes place during the dark period when feed/calcium is not available. **It is then** when the hen mobilises (resorption) between 25–30% of the calcium requirement from the medullary bone to meet the demands for shell formation.

Coarse carbonate/oyster shell (> 2 mm ø) is retained in the gizzard and, through the action of hydrochloric acid, dissolves, providing a flow of calcium to the intestine during the night when no feed is available.

This process emphasises the importance of good bone / skeletal development. The growth of the calcium warehouse.





TILL 30 WEEKS: END OF PREPARATION PERIOD

PRE-LAY DIET

At this point, we must decide what type of diet to provide to the hens:

1 A pre-lay diet, with intermediate levels of calcium (2–2.5%) and amino acids.

2 A lay diet with higher levels of calcium (3.6–3.9%) and amino acids.

It is evident that **hens show a specific appetite for calcium** (learned preference) which is generally determined by the levels of ionic calcium in the blood. On the other hand, **calcium is not very palatable.** This fact has been related to the low feed intake in diets with high calcium content. In any case, experience tells that both strategies are valid, although birds fed with feeds containing calcium levels between 3.7–3.9% show an improvement in bone and eggshell quality in the long term (De Juan et al., 2023), which has economic, welfare, and health implications.

Whether we use pre-lay or an early lay diet after the developer diet, it is recommended to **maintain a certain level of insoluble fibre** to sustain the hen's feed intake capacity during this period, when the demand for nutrients is high due to the imminent start of the production.

Recommended Nutrient levels Preparation period

PDF

CORRECT USE OF PRE-LAY DIET

From a nutritional point of view, pre-lay feed is a compromise phase-feed that contains an intermediate level of calcium allowing a smooth transition between a developer diet (low in calcium) and layer diets (high in calcium) helping to support feed intake and improving uniformity. **A maximum of 500 g per hen is recommended before production reaches the first egg.**

During this period, a blend of coarse (3–4 mm ø) and fine (1–2 mm) calcium carbonate particles is advisable. A typical ratio would be 50% coarse and 50% fine.

It's also an advisable strategy to **add 1.5–2.5 g/hen/day coarse calcium particles** 1:30–2:00 h before lights off as it supports eggshell formation during the dark hours.

Recommended inclusion levels of oystershell / coarse and fine limestone in relation to the hen's age

Particle size	0–13 weeks	from 13 weeks to	Pre-Lay	End of preparation period (till week 30)	31–55 weeks	56–70 weeks	71 weeks – end
Fine (ø 0–2 mm)*	100%	75%	50%	50%	35%	25%	15%
Coarse (ø 3–4 mm)*		25%	50%	50%	65%	75%	85%

** Fine Limestone: average 1 mm*

*** Coarse Limestone/Oystershell: less than 15% of particles < 3 mm and less than 10% > 5 mm*

VITAMINS & MINERALS

In addition to proteins, lipids, carbohydrates, minerals, and water, small amounts of organic compounds known as vitamins are required. Recommendations specify appropriate levels of these vitamins and minerals based on the feeding phase.

In many countries, the inclusion levels of these are regulated by legislation.

MINERALS ARE VITAL FOR ...

- ... various physiological functions, including enzyme activation and immune response
- ... the formation of eggshells, skeletal development, and overall reproductive success
- ... fertility, hatchability, and embryo viability

VITAMINS ARE VITAL FOR ...

- ... skeletal development, eggshell quality, immunity, and hatchability
- ... efficiency and healthy production

MINERALS

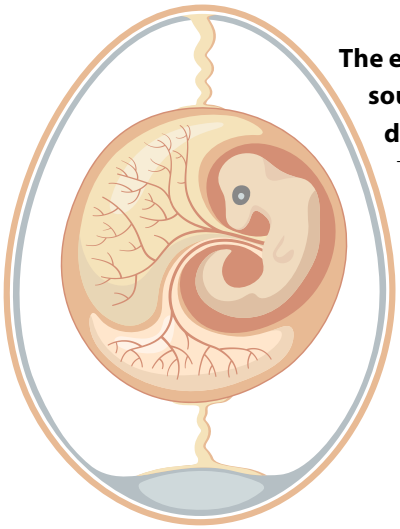
Depending on their concentration in animal tissues, minerals are classified as **macro-minerals** (Calcium, Phosphorus, Sodium, Potassium, Chlorine, and Sulphur) or **micro-minerals** (Zinc, Copper, Manganese, Iodine, Selenium, etc.).

A balanced intake of both macro and micro-minerals is essential for the optimal reproductive performance and health of breeders.

ENSURES THE WELLBEING OF THE BIRDS

CRUCIAL TO MAINTAIN LONG PRODUCTION CYCLES

CALCIUM



The eggshell is an important source of calcium for the developing embryo.

The mammillary layer, which is a major source of calcium, should be thick to provide sufficient calcium during incubation.

THE EGGSHELL

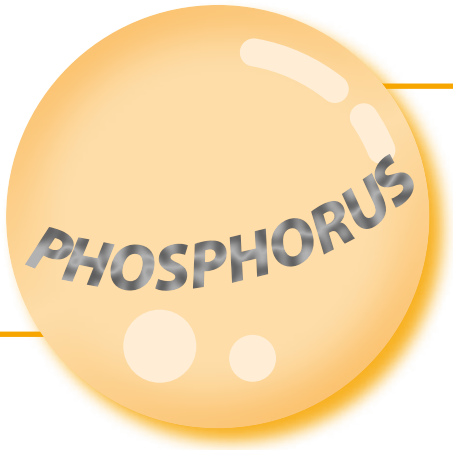
Makes up 9–10% of the egg's weight, which is composed of 95% calcium carbonate. The eggshell of an average egg contains approximately 2.3–2.5 grams of calcium.

Once in production, the calcium needed for shell formation mainly comes from the diet and the medullary bone, latter provides between 20–30% of it. The quality of the shell will depend on the amount of calcium available in the digestive tract during the night and the form in which carbonate is provided.

CALCIUM DEFICIENCY …

… during the preparation period will affect the strength and size of the bones and later will impact on shell quality, increasing the percentage of broken eggs, reducing production, and even potentially increasing bird mortality.

… during the production period, along with continuous resorption, will progressively weaken the bones, increasing susceptibility to fractures.



EGGSHELL QUALITY DEPENDS ALSO ON PHOSPHORUS

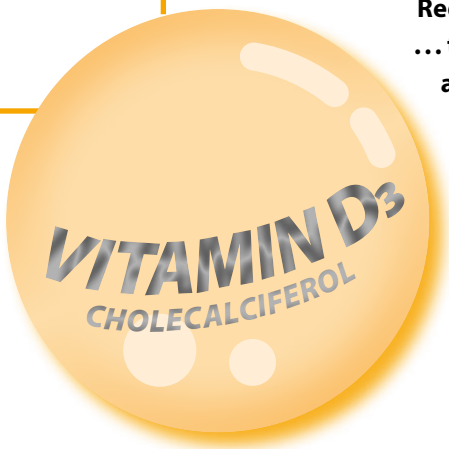
ESSENTIAL FOR MANY METABOLIC PROCESSES
(e.g. the formation and maintenance of the skeletal system)

PHOSPHORUS DEFICIENCY ...

... during preparation period may vary according to age

... during production period, are not high.* The incorporation of phytase could further reduce these levels, depending on the concentration of phytic phosphorus in the diet.

**Data suggests that no more than 220 mg of NPP (Non Phytic Phosphorous) per bird and day are necessary (Rodehutscord et al., 2023).*



1,25 $(OH)_2D_3$
(metabolite of Vitamin D)
Regulates ...
... the metabolism of calcium and phosphorus
... plasma levels of calcium and phosphorus to meet the maintenance and production needs of birds.

25 $(OH)D_3$
(metabolite of Vitamin D)

- **Is more active than vitamin D_3.**
- Can benefit **skeletal development** and **eggshell quality**.
- Has better intestinal absorption, and **higher transference rates into eggs,** which leads to **fewer skeletal disorders, better immunity,** and **improved hatchability.**
- Can be also incorporated into the diets of breeder hens.

RECOMMENDED INCLUSION LEVELS OF VITAMINS & MINERALS

during the preparation period (0–30 weeks of age)

Supplements per kg of feed		Starter, Grower & Developer		Pre-lay, End of Preparation Period & Lay	
Vitamin / Mineral	**Units**	**Recommended**	**Heat Stress**	**Recommended**	**Heat Stress**
Vitamin A[1]	I.U.	10.000	≥12.000	12.000	14.000
Vitamin D_3 (total)[1,2]	I.U.	3.000	≥ 3.500	3.000	≥ 4.000
Vitamin E	mg	40	≥ 75	100	120
Vitamin K_3 [3,6]	mg	3.0	≥ 3.5	4.0	5.0
Vitamin B_1 (Thiamine)	mg	2.5	≥ 2.0	3.0	4.0
Vitamin B_2 (Riboflavin)	mg	6.0	≥ 10	12	13
Vitamin B_6 (Pyridoxine)	mg	3.5	≥ 4.5	5.5	≥ 6
Vitamin B_{12}	mcg	20	≥ 25	30	35
Pantothenic Acid	mg	10	≥ 10	10	18
Nicotinic Acid	mg	50	≥ 50	50	55
Folic Acid	mg	1.0	2.5	2.5	3.0
Biotin	mcg	50	≥ 100	50	300
Cholin[4]	mg	300	200	400	200
Betain[5]	mg	–	≥ 200	–	≥ 400
Vitamin C	mg	–	≥ 75	–	150
Antioxydant[6]	mg	150	≥ 150	300	≥ 300
Manganese[7]	mg	100	100	80	80
Zinc[7]	mg	80	100	70	70
Iron[7]	mg	40	≥ 50	65	70
Copper[7]	mg	10	15	10	10
Iodine	mg	1.5	1.5	2.5	2.5
Selenium[7]	mg	0.25	≥ 0.35	0.3	≥ 0.35

[1]According to local regulations levels may be limited.

[2]Total = D_3 + D_3 supplied as 25-hydroxy D_3. This may be subject to supplier's recommendation and local regulations.

[3]Double in case of heat-treated feed.

[4]Due to choline chloride aggressiveness, if possible, better added directly to feed.

[5]Betain act as antioxidant and reduces oxidative stress therefore supporting heat stress situations.

[6]Increase the dosage in case of heat stress and according to fat/oil addition.

[7]The inclusion of the so called "organic trace minerals" should be considered as they reduce mineral negative interactions therefore resulting in a bioavailability.

PREMIX COMPOSITION DURING THE PREPARATION PERIOD

It is recommended to utilise vitamin-mineral premixes with an inclusion rate of at least 2 kg per ton of feed; an optimal level would be 5 kg per ton.

PRODUCTION PERIOD

WHAT IS GOING ON?

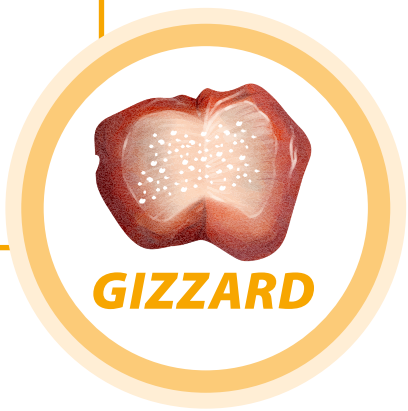
- The production period is a continuation of the preparation period.
- Once production period starts, the design of the **feeding programme** should be based on the nutrient demand (mg / bird / day; kcal / bird / day) to meet the requirements for maintenance, growth, and reproduction.
- The **nutritional recommendations** included in this guide are aimed at obtaining the highest percentage of hatchable eggs with a weight between 58–62 g, as referenced in production standards. Again, the **uniformity of the flock will play a fundamental role.**
- **Environmental conditions,** stocking density, health status etc, may require you to modify the nutritional profile.
- Since production is affected by energy, protein/amino acid levels, and body weight, it is recommended to **regularly monitor parent stock weight,** along with parameters such as feed and water intake, egg weight, and egg number during the laying period.

The effects of poor preparation later in life cannot be corrected through management and nutrition.

CROP & GIZZARD

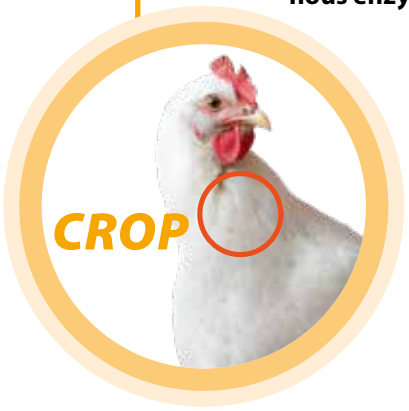
Hens consume feed to meet their nutritional needs for maintenance, growth, and egg production. Two primary organs control their feed intake capacity.

- The main role of the gizzard is the **mechanical digestive process of reducing particle size and regulating feed particle flow.**



- The consumption of a **mash diet** can contribute to a **well-developed gizzard** leading to associated benefits such as gut motility improvement, increased contact time between nutrients and enzymes and a better nutrient digestibility.

- The crop's function is related to the **storage and moistening of the feed,** while enhancing the **exogenous enzymes activity.**



The development of both the crop and gizzard depends on fibre content (structural ingredients), feed presentation, particle size distribution (its development has been proven in many studies using coarse ingredients (see feed form and presentation chapter), lighting and feeding pattern.

GRIT

Grit, composed of small stones, helps pullets and hens to grind and digest food in their gizzard, ensuring that hens get the maximum nutritional benefit from their diet. Therefore, including grit in the diet of laying hens is highly beneficial for maintaining their wellbeing and productivity.

Insoluble grit or fine gravel should be provided for free access feeding, also for fully grown laying hens.

TOOL**BOX**
Grit

FEED INTAKE

Feed usually makes up 60–75% of production costs, with energy making up 70–75% of that amount In poultry, although metabolisable energy has certain limitations, it is the most commonly used system.

Hens obtain energy from dietary nutrients, primarily carbohydrates (e.g., starch), lipids (e.g., oils and fats), and protein (NRC 1994). Hence, the need for a proper evaluation of the raw materials included in the formulation.

Hens exhibit responses to the energy content of their feed; therefore, accurately assessing their energy requirements is essential. The energy intakes are determined by the following factors:

FACTORS DETERMINING ENERGY INTAKES

Live weight of the birds (g/bird)
Higher body weight, higher energy requirement due to maintenance.

Average daily gain (g/bird/day)

Production level / daily egg mass (g mass/bird/day)
A higher performance (higher egg mass production) will require higher nutrient intake (mg of nutrient/hen/day).

Environmental temperature
Lower environmental temperatures raise energy demand for thermoregulation, while higher temperatures decrease it. Feather condition also affects this relationship.

Feed presentation and particle size
Finer particle sizes lead to lower intake, while excessively coarse particle sizes result in feed selection. See the section on feed structure and presentation.

Health status

Energy, feed density
Although today's hens are less responsive to the energy level of the diet (especially when switching to a higher energy diet), practically we can consider that higher energy feed results in lower feed intake and vice versa.

Feather condition

Nutritional Imbalances
In addition to the hen's potential and previously mentioned factors, feed intake can be affected by limited availability of nutrients in the diet. Hens may eat more to compensate for deficiencies, resulting in excess energy consumption and fat accumulation.

Implementing an effective feed distribution programme and early encouragement to feed at least once a day to an empty trough, may increase average retention time and feed-holding capacity of both the crop and gizzard therefore promoting higher feed intake capacity which will optimise the performance level of pullets and layers.

TOOL**BOX**
Feed intake in cage-free production

FEED ENERGY

From a practical point of view and as an approximation, the following reference equations are proposed for determining the metabolisable energy requirements of hens in production.

FOR WHITE HENS (Sakomura et al., 2005)

$$AMEn\ (kcal/d) = [(165.74-2.37*T) \times (BW^{0,75})] + (6.68 \times ADWG) + (2.4 \times EM)$$

FOR WHITE AND BROWN HENS (Fedna, 2018)

$$AMEn\ (kcal/d) = [(143.7-1.612*T) \times (BW^{0,75})] + (5 \times ADWG) + (2.57 \times EM)$$

AMEn = **A**pparent **M**etabolizable **E**nergy with zero **n**itrogen retention in kcal / hen / day
T = Temperature in °C
BW = live weight in kilograms / hen
ADWG = **A**verage **D**aily **W**eight **G**ain in grams / hen / day
EM = daily **E**gg **M**ass (% laying x egg weight) in grams / hen / day

Based on the obtained value and knowing the energy of the diet, the approximate feed intake of the hen can be estimated using a simple calculation:
Feed intake (g/hen/day) = energy requirements kcal / hen / day / feed AMEn kcal / kg x 10³ g / kg

Hence, the importance of correctly determining the energy of the feed, as the daily nutrient intake is referenced to the estimated consumption level.

FEED STRUCTURE AND PRESENTATION

Structure can be defined "as the size and internal binding strength of feed particles."

In nature, hens are used to selecting and recognising a wide variety of raw materials to obtain the necessary nutrient levels to meet their physiological and nutritional needs. However, in addition to preference based on composition, these preferences are determined by the structure of the feed (macro- and microstructure), smell, the bird's previous experiences (social factor), and the distribution of the feed in the feeders.
All these factors are encompassed in what we call palatability and are closely related to feed intake.

Pullets and layers prefer particles that fit the size of their beak and are easy to pick up. This is why they prefer larger particles.

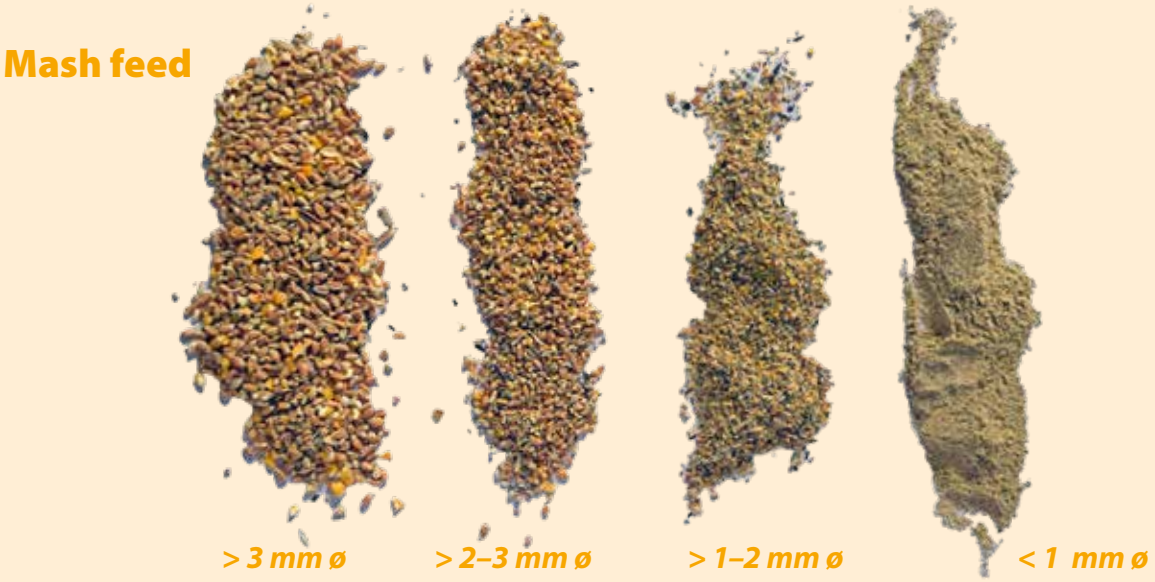
In this section, we will focus on the microstructure and macrostructure of the feed and its importance for birds.

TOOL**BOX**
Feed presentation

MICROSTRUCTURE

Particles obtained after the grinding and mixing process.

This section identifies the grinding process as an essential component



MACROSTRUCTURE

Feed presentation. Mash, muesli, pellet, crumbs, micropellet, etc.

The feed form and particle size play a critical role in determining feed intake, development of digestive organs, digestion, absorption of nutrients, intestinal health, and productive performance of poultry. However, these aspects are often overlooked in laying hen nutrition.

Recent studies have shown that manipulating feed structure can improve health and performance in poultry.

Particle size recommendations

PDF

Digestive Disruption
Hens' digestive systems adapt to the physical form of their feed. A sudden change from mash to pellets or vice versa can affect their digestion, leading to reduced feed intake and nutrient absorption. This can result in poor growth, laying performance, and overall health.

Vaccination Efficacy
During vaccinations, it is crucial that hens are in optimal health to ensure the effectiveness of the vaccine. Any dietary change can compromise their immune response, reducing the efficacy of the vaccination.

Stress and Behaviour
Hens are creatures of habit and any change in their diet can cause stress. Stress can weaken their immune system, making them more susceptible to diseases. During transportation and vaccinations, birds are already under stress, and adding a dietary change can exacerbate the situation.

AVOID TRANSITIONING BETWEEN MASH AND PELLET FEEDS

PARTICULARLY DURING CRITICAL PERIODS SUCH AS TRANSPORTATION AND VACCINATIONS!

Transportation Challenges
During transportation, pullets and hens are subjected to various stressors such as handling, confinement, and environmental changes. A stable diet helps to reduce stress. A sudden change in feed form can lead to decreased feed consumption, further stressing the birds.

Feed Consistency
Consistency in macro- and microstructure of feed ensures that hens receive a balanced diet. Feeds may have different particle sizes and densities, which can lead to selective feeding. Pullets/hens may pick out certain components, leading to an imbalanced intake of nutrients (selective eating).

IN CONCLUSION . . .

. . . maintaining a consistent feed form and presentation is essential for the health and wellbeing of poultry, especially during critical periods such as transportation and vaccinations. Avoiding transitions between mash and pellet feeds helps in ensuring optimal digestion, reducing stress, and maintaining overall health.

FIBRE

Until several decades ago, fibre was regarded as a component of diets that was not digested or absorbed, and could be fermented in the intestine. It was also classified as an antinutritional factor and a dietary diluent.
This consideration was partly based on the chemical definition of crude fibre, which did not define its different components and their physicochemical characteristics.

Currently, the **concept of dietary fibre (non-starch polysaccharides + lignin)** better represents the fibre fraction than the crude fibre concept that was developed in Germany in the 19th century. Nevertheless, dietary fibre has not been extensively developed in poultry nutrition, and crude fibre remains a consideration in most feed formulations. Meanwhile, LOHMANN BREEDERS considers that neutral detergent fibre (NDF) values better represent the insoluble fibre fraction since crude fibre analysis undervalues the true value of the insoluble fibre fraction.

Nutrient Digestibility

Insoluble fibre increases the content of the gizzard and increases the retention time of the digesta, which translates into better nutrient digestibility and greater feed efficiency.

Effect on Excreta Quality

The inclusion of dietary fibre (insoluble fibres), such as oat hulls, reduces the moisture content in the faeces. This is because insoluble fibre improves digestive function and nutrient absorption, which also increases the dry matter content in the litter.

Effect on Behaviour

Diets with moderate NDF content reduce pecking, improving feather condition because pullets and hens spend more time at the feeder and experience greater satiety.

Examples of fibrous raw material

PDF

TOOL**BOX**
NDF

DIGESTIVE SYSTEM

Development of morphology and functionality of the gizzard

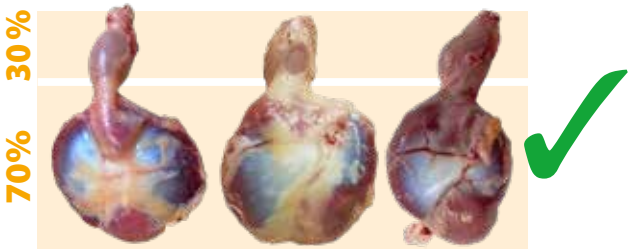
The incorporation of NDF **supports the proper functioning of the gizzard,** an organ that regulates intestinal transit, in addition to increasing its size.

Although the particle size of the feed also contributes to the muscular development of the gizzard, its impact is less than that of insoluble fibre.

Examples of a gizzard development and proportion between proventriculus and gizzard

Low feed intake capacity
Poor feed homogeneity, pelleted feed
high M. Energy, low insoluble fibre inclusion

Adequate feed intake capacity
As a consequence of low M. Energy
level & insoluble fibre inclusion + feeding pattern



AMINO ACIDS

The balance between the amino acids in the protein is fundamental.

Protein is necessary for **growth, maintenance, health, and production.**

Supplementation with synthetic amino acids will help us achieve optimal amino acid levels and even allow for a reduction in diet cost.

The **imbalance between amino acids can** cause antagonisms, limit protein synthesis, **affect behaviour, reduce growth (pullets), cause weight loss, limit production or egg size, and affect bone and shell quality.**

The **concept of ideal protein** represents this balance and proposes ratios between the different essential amino acids, assuming that the pullets and hens can synthesise the non-essential ones. Therefore, **it would not be necessary to establish a minimum protein level.**

In any case, **excess protein** not only **carries a metabolic cost** due to the need to deaminate the excess amino acids, but it also has **environmental consequences** due to the higher nitrogen content in the faeces.

Based on the ideal protein profile, the requirement for each amino acid is established in relation to digestible lysine, which is assigned a value of 100. An increase in the proportion of a specific amino acid can lead to greater egg weight, provided that the overall amino acid profile remains balanced and is not limited by another essential amino acid.

Recommended ideal protein profile ratios

AMINO ACID	PRE/STARTER	GROWER	DEVELOPER	PRE-LAY	EPP*/ CAGE-FREE	CAGES
Dig. Lysine	100	100	100	100	100	100
Dig. Methionine	52	57	54	50	54	50
Dig. M + C	80	86	85	90	92	90
Dig. Threonine	67	70	73	70	70	70
Dig. Tryptophan	21	22	23	23	23	22
Dig. Leucine	112	113	118	118	118	118
Dig. Isoleucine	72	77	80	80	80	80
Dig. Valine	82	87	90	88	90	88
Dig. Arginine	115	115	115	108	115	104

**EPP: End of Preparation Period*

EGG SIZE AND REPRODUCTION

In this section, we will discuss how nutritional factors can affect the size of the egg.

THE INFLUENCE OF EGG WEIGHT ON HATCHABILITY IN BREEDER HENS

HATCHABILITY VALUES MAY VARY 80% TO 97%, WITH THE HIGHEST RATES OBSERVED IN MEDIUM-SIZED EGGS.

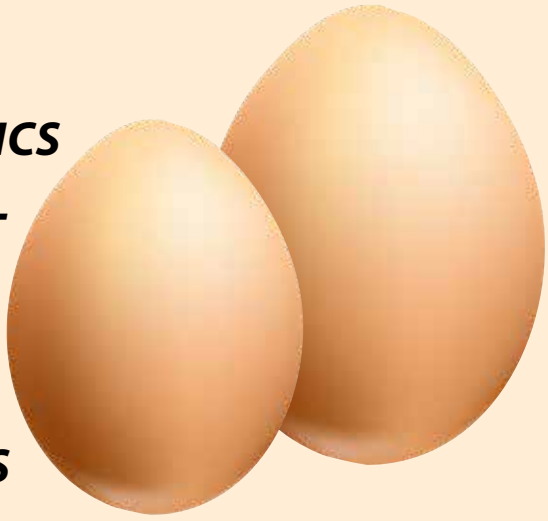
FACTORS THAT CAN AFFECT THE EGG SIZE

GENETICS

MANAGEMENT

NUTRITION

LIGHTING PROGRAMMES



MANAGING THESE FACTORS ENABLES EGG WEIGHT ADJUSTMENT TO OPTIMISE PRODUCTION.

LIGHTING PROGRAMME & EGG SIZE

In open houses, the season of the year has a significant influence on egg size. Birds reared during the summer, with more hours of light, and reaching maturity in the autumn produce larger eggs compared to those reared in winter (with fewer hours of light). In general, programmes that delay the start of laying support larger egg size and vice versa. The lighting programme (day length and intensity) therefore plays a very important role in sexual maturity and egg production.

Although this topic will be discussed in depth in the corresponding section, any increase in light hours from 14–15 weeks of age will stimulate the sexual maturity of the hens. From this moment, a rapid increase in light hours will cause an early start of production with a greater number of eggs and smaller size.

Conversely, a slow increase in light hours (higher hen weight) will delay the start of production and increase egg weight.

As a reference, every week delay in sexual maturity that has been achieved through a lighting programme result in an increase of 1.4–1.7 g in mean egg weight.

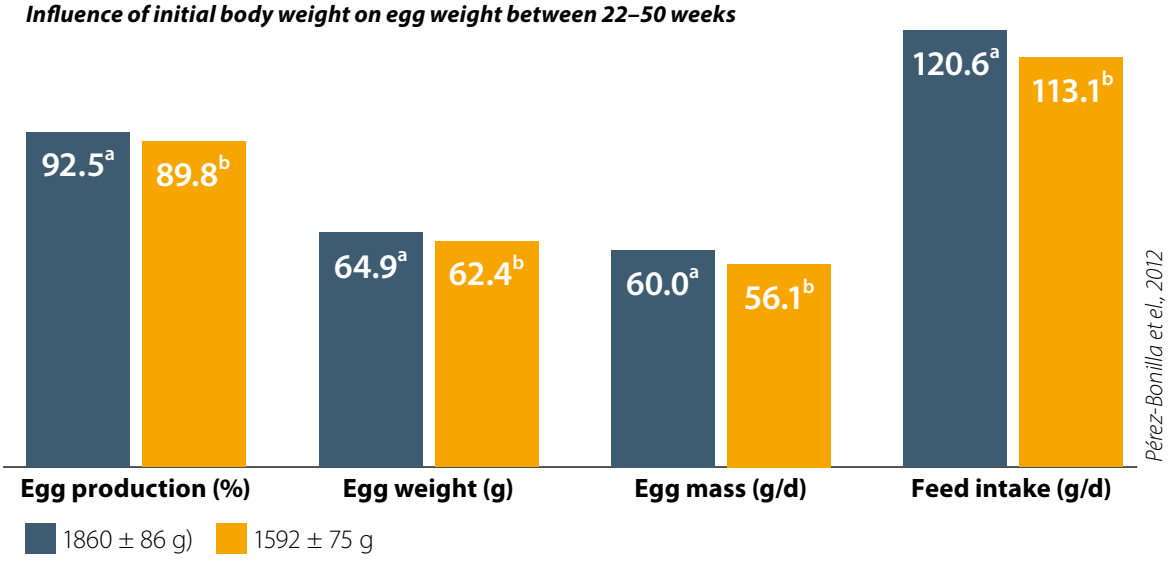
The correlation between light hours and body weight is obvious, where normally those pullets reared with a greater number of light hours have more time to consume feed and therefore achieve greater body weight … however, it relies on other factors as well (i.e: feed particle distribution-more selective eating).

BODY WEIGHT & EGG SIZE

Within each genetic line, a heavier pullet at the moment of light stimulation will produce larger eggs and less egg number and vice versa.

Therefore, using the standard curves of each line as a reference, regular measurement of pullets' body weight and uniformity (≥ 85%) is paramount to modify/rectify management and nutrition practices to achieve our target.

Influence of initial body weight on egg weight between 22–50 weeks



Values with different letters indicate significant differences (P < 0.05),
values without letters or with same letters indicate non-significant differences (P > 0.05).

NUTRITION & EGG SIZE

At the nutritional level, there are two factors that directly affect egg size: the level of amino acids intake (mg / bird / day) and the level of oil / fat (%) added to the diet.

As mentioned in the previous section, we must be flexible with feeding programmes during the preparation period to achieve the final goal of body weight, body composition, and uniformity. It is important to move feeding phases based on body weight and not flock age.

Recommended female body weight to move phase feeding

	Starter	Grower
LOHMANN Tradition	380	860
LOHMANN Brown-Extra	370	850
LOHMANN Brown-Classic	360	840
LOHMANN Brown-Lite	350	830

	Starter	Grower
LSL-Extra	360	760
LSL-Classic	340	750
LSL-Lite	330	740
LSL-Ultra	320	730

AMINO ACID INTAKE LEVELS & EGG WEIGHT

There have been many publications and studies over the last 30 years relating egg size to amino acid intake (Bregendahl et al., 2008; Lemme, 2010; Kumar et al., 2018; Spangler et al., 2019; Scappaticcio et al., 2021). In all these studies, the objective has been to establish the levels of digestible lysine (as amino acid of reference) that maximise egg production without considering egg weight, so egg mass was left out of the equation.

Regardless of the methods used, it can be practically concluded that **the requirements for digestible lysine (mg / bird / day) necessary for egg production are consistently lower compared to the intake levels needed to maximise egg size.** The latter is usually correlated with egg mass.

LEVELS OF ADDED OIL OR FAT & EGG SIZE

Historically, several nutrients have been assumed to influence egg size, such as dietary energy, linoleic acid supplementation levels, and the level of added fat / oil.

The interrelationship between them may have caused confusion when evaluating their impact on egg size. Thus, dietary energy has been correlated with improvements in production and egg size. However, the increase in energy is mostly due to the incorporation of oils or fats into the diet.

In turn, the level of oil / fat is directly related to the increase in egg weight, although its effect is confounded with the increase in linoleic acid levels in the diet when the incorporated oil is soybean oil.

From a practical point of view, the linoleic acid requirements of birds are no greater than 1.5–1.8%, so the incorporation of oils / fats into diets presents itself as a factor that positively impacts egg weigh.

As a rule, it is estimated that for every percentage of added fat / oil, egg size increases by 0.5–0.6 g

FAT & OIL

Improve the palatability of the feed, encouraging better feed intake.

Provides a **concentrated source of energy,** which is essential for maintaining **high egg production** and overall **bird health.** For reference, fats provide about 9 calories per gram, which is more than double the energy provided by carbohydrates or proteins, each of which provide about 4 calories per gram.

Aid in the **absorption of fat-soluble vitamins,** which are vital for the bird's immune function and health.

Play a protective role for the liver by **reducing the risk of fatty liver syndrome.**

IT IS RECOMMENDED ...

... to include at least 1–2% of fats or oils in the diet of laying hens. This inclusion becomes even more important during periods of heat stress, as fats provide a more efficient energy source compared to carbohydrates, helping to maintain energy levels and reduce metabolic heat production in birds.

TOOL**BOX**
Use of fat & oil in feed mixtures for laying hens

Recommendations for Preserving the Quality of Fats and Oils in Feed Mills

Storage Conditions
Store fats and oils in cool, dark, and dry conditions to minimise exposure to air, light, and high temperatures, which can accelerate oxidation.

Use of Antioxidants
Add antioxidants to fats and oils to prevent oxidation. Antioxidants help maintain the quality and nutritional value of fats and oils by inhibiting the formation of free radicals and peroxides.

Regular Quality Checks
Conduct regular quality checks to monitor the levels of oxidation and ensure that the fats and oils remain within acceptable limits. This includes testing for peroxide values and free fatty acid levels.

Proper Handling
Handle fats and oils carefully to avoid contamination and degradation. Use clean and appropriate containers and equipment to prevent exposure to contaminants.

Rotation of Stock
It is crucial to regularly rotate stock to ensure that older fats and oils are used first, thereby reducing the risk of using degraded or oxidised products. This practice is especially important during the summer, when high temperatures can accelerate the oxidation and degradation of fats and oils, compromising their quality and nutritional value.

WATER

The ideal water temperature is around 20°C. *Feed and water intake are closely linked;* **if hens do not drink enough water, their feed intake will decrease accordingly.** At around thermoneutral temperatures (18–24 °C), the water-to-feed ratio is approximately 1.8–2:1, but this ratio can increase to 5:1 at high ambient temperatures above 30 °C. **During high temperatures, hens consume less feed but more water to cool down.**

Maintaining the correct water pressure and flow rate is essential. It is crucial to pay adequate attention to the drinking system and the water itself to maintain quality. **Keeping the lines free from microbial growth,** like biofilm, is important as it allows microorganisms to survive and reduces the effectiveness of medications and supplements. **Routine checks of both the water source and the drinking lines are recommended.** To prevent biofilm buildup, it is ideal to **combine flushing with the use of cleaning products,** especially between flocks, before and after administering medications or additives, and during the first 10 days of each cycle.

Clean water is as vital as quality feed for top poultry results.
Pullets and layers should always have access to fresh, potable water, and intake must be regularly checked.

Water Quality

Regularly check water quality, especially if using your own water supply. It's advisable to test the water at least twice a year.
The reliability of any analysis hinges on the timing, location, and method of sample collection, whether it's taken at the entry point or the end of the system. It's crucial to remember that an analysis only reflects the water quality when the sample was taken and does not guarantee future quality.

Recommended levels for water quality

Element / Parameter	Recommended levels (mg / l)	Tolerable levels (mg / l)
pH	6	5–7.5
Calcium	75	70–80
Phosphorus	0.1	0.1–0.15
Sodium	250	50–300
Potassium	250	< 300
Magnesium	60	< 125
Chloride	250	200–300
Zinc	1.2–1.7	< 1.50
Copper	0.4–0.6	< 0.6
Manganese	0.05	0.04–0.05
Iron	200	0.3–5
Fluoride	1.5	< 2
Nitrate	15	< 20
Ammonia	0.50	2
Sulphate	15	150–200
Water Hardness	20–25	40

RECOMMENDED NUTRIENT LEVELS

LOHMANN breeders are known for their high reproductive capacity, which in itself demands a significant demand for nutrients. Therefore it is important to avoid any kind of feed restriction, as it may negatively affect both male and female reproduction rates, welfare, and overall health.

Ensuring consistent uniformity and adhering to body weight goals are crucial for parent stock. When evaluating breeder's performance, it is important to consider feed composition, feed form, feeding management, and overall management collectively.

Economic analysis of the entire breeder production cycle indicates that minor enhancements in breeder or chick performance can offset the costs associated with improving nutrient levels in breeder feed.

Generally, providing a high-quality diet for parent stock is economically advantageous.

Breeder flocks must be fed based on egg mass, which is calculated by multiplying the percentage of lay (the proportion of hens laying eggs) by the average egg weight (optimally between 58–61 g). This is crucial for optimising their health and productivity.

FORMULATION

- **Diets should be balanced according to the intake of digestible nutrients.**
- An excess or deficiency of any key nutrient can negatively affect the overall performance of the flock and their offspring.
- By monitoring and adjusting their diet, producers can ensure the birds receive the necessary nutrients. Proper nutrition directly impacts egg size, quality, and production efficiency.
- By prioritizing egg mass, producers can achieve the maximum reproductive potential of their birds while ensuring their health and wellbeing.
- Note that feed recommendations are based on reference body weights provided below the nutritional tables, environmental temperature (20 °C), and optimal feather condition. Any change in these will result in a change in daily energy needs and therefore in feed consumption.

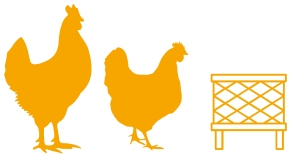
DIFFERENCE BETWEEN DIET CONCENTRATION AND NUTRIENT INTAKE

- The nutrient levels in a diet refer to the concentration of essential nutrients (typically expressed in % or ppm), such as crude protein, vitamins, and minerals, formulated to meet the specific needs of parent stock birds. These levels are calculated to ensure optimal health and productivity.
- On the other hand, nutrient intake refers to the actual amount of these nutrients (mg/hen/day) consumed by the birds, which can vary based on factors like feed intake, feed macro- and microstructure, and individual bird health.
- While the recipe provides nutrient levels, the intake determines the effectiveness of the diet in meeting the birds' nutritional requirements.

FEED RECOMMENDATIONS

- **The feed recommendations are intended for maximum reproductive performance for both, brown and white parent stock in cage and cage-free systems.**
- For more practical (and compromise) reasons than theoretical ones, it has been decided to propose common formula sets for brown and white breeders, assuming the differences in body weight that exist in favour of the former and egg mass in favour of the latter. The differences in daily consumption between brown and white breeders can vary depending on several factors, including the age and production status of the birds. In general, brown breeders tend to have a slightly higher feed consumption compared to white breeders (5–6 g/bird/day).
- Additionally, it is important to consider that the nutritional requirements of breeders can be influenced by environmental factors such as temperature and housing conditions. Ensuring optimal feed formulation and management practices can help maximise the productivity and health of both brown and white breeders. Regular monitoring and adjustments to the diet based on the specific needs of the birds can lead to better overall performance.

Reach out to your LOHMANN specialists for nutritional and management tailored programmes adjusted to your specific conditions and requirements.



FEED SPECIFICATIONS FOR BROWN & WHITE PARENT STOCK CAGE HOUSED

PDF

FEED SPECIFICATIONS FOR BROWN & WHITE PARENT STOCK CAGE-FREE HOUSED

PDF


LOHMANN
LOHMANN
BREEDERS

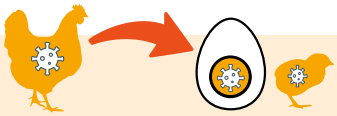
HEALTH

Breeding birds can show their full genetic potential only if they are at good health. Diseases can impact your flock's performance, affecting egg production, shell quality, and mortality rates.

A helpful tool to monitor the health of your flock is to keep track of performance and daily parameters. Before clinical signs appear, you may observe a reduced feed and water consumption or a different behaviour than normal. Such changes should encourage you and your local veterinarian to investigate deeper for any disease symptoms and perform further diagnostics.

Biosecurity should always be the first strategy to avoid the introduction and spread of diseases. A comprehensive vaccination programme may help to prevent sickness. Antibiotics are only effective to reduce mortality and clinical signs caused by bacterial infections.

VERTICAL TRANSMISSION



- Some pathogens can not only affect health and productivity of your flock, but can also be transmitted vertically, meaning from the parent stock to the progeny.
- Vertically transmitted pathogens, such as *Mycoplasma spp., Salmonella spp.* or avian leukosis virus, may interfere with embryo development and hatchability or compromise growth and later performance of commercial birds.
- A strict sanitary monitoring at selection and reproductive level is the basis to control these diseases in commercial layers. The strategy should always be to maintain parent stock free from these pathogens and regularly confirm it following a monitoring plan.
- In many cases antibiotic treatment cannot ensure a pathogen-free flock and thus cannot prevent reliably the vertical transmission of the pathogen to the progeny.

VACCINATION

- For other diseases the only option to protect the progeny against sickness in their first days of life is the transmission of antibodies from parent stock via the yolk to the commercial day-old chicks (maternal derived antibodies = MDA).
- To ensure a sufficient development of these important antibodies the vaccination programme for parent stock needs to be adapted accordingly.

PARASITES

Parasites are a common problem in laying hens. Internal parasites which are easily ingested not only damage the intestinal tract but will affect the absorption of nutrients from the feed, both can lead to a variety of issues:

- poor body weight gain and uniformity
- increased susceptibility to challenges
- loss of production
- reduced egg quality
- cannibalism and mortality

MOST COMMON WORM INFESTATIONS

Roundworm
Ascaridia galli

- the most common
- adults are easy to see
- white-yellow in colour
- about 5 – 11 cm long
- often found in the small intestine

Cecal worm
Heterakis gallinarum

- small, white, hard to see
- located in the ceca
- earthworms as a vector
- can carry *Histomonas meleagridis* which can lead to blackhead disease

Tapeworm
Raillietina spp.

- segmented, ribbon-shaped
- 1–1.5 cm or longer
- intermediate hosts (e.g. beetles) are required to complete life cycle

MONITORING AND TREATMENT

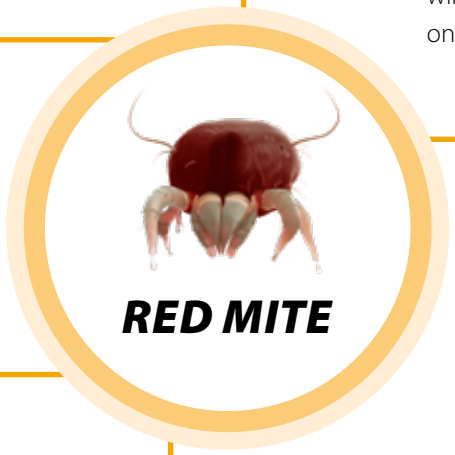
- Worm eggs are often found in litter, soil and faeces.
- Routine monitoring should be undertaken either via worm egg counts or post-mortem examination.
- To manage worm infestations effectively, you should not only treat the birds on regular bases, but ensure cleanliness, disinfection, and adequate husbandry. A regular deworming can also help to manage other parasites like *Histomonas meleagridis*.

RED MITE

Among all the ectoparasites found in poultry, mites are considered to be the most harmful ones. However, it is the poultry red mite (Dermanyssus Gallinae) in particular that has been identified as the most detrimental to laying hens. Red mites can also pose a major problem in parent stock farms, where even a small infestation can impact productivity and health status within the flock.

Often carried into the unit directly on the birds from exposure to wild birds but can also be carried in on equipment and visitors.

Utilise monitoring tools, such as mite traps, to detect the presence of mites at an early stage and initiate treatment before the mite population multiplies. If not monitored and treated effectively then numbers can soon get out of control.



Unfortunately, an ideal environment for the hens is also an ideal environment for red mite, so careful and regular monitoring is essential.

Not only will the mite increase the stress levels of the birds which can lead to feather pecking and cannibalism, they can also transmit disease and tarnish the eggs.

It is advisable you spot check for mite once a week.

Common hiding places can be:

- in corners of nest boxes
- under next box covers
- at the foot of feeding chains, trough connectors
- on crossbars of perches
- on dropping pit trays
- in the corners of walls
- inside the perches (hollow tubes)

TOOL**BOX**
Poultry mites

THERE ARE MANY TREATMENTS AVAILABLE FOR MITE, with some more effective than others. From chemical products to silica sprays and some applied through water. Some treatments can be applied when birds are present although some of the most effective treatments should take place between flocks. Always adhere to regulations within your region and use only licensed products.

COCCIDIOSIS

Coccidiosis is the most important endoparasite in poultry. If not controlled it could cause high economic losses due to enteritis and arguably mortality. Sub-clinical infections harm feed conversion and uniformity.

To ensure immunity against coccidiosis, two methods are commonly used:

VACCINATION

Vaccination is probably the best way to control coccidiosis in floor-reared breeders. Usually, chicks are vaccinated via spray already in the hatchery. Other options are applying the vaccine in the rearing farm or via spray on the feed or via drinking water.

A proper management of the vaccine during the first three to four weeks in the rearing farm is crucial to develop a strong immunity. Special focus should be on litter quality and humidity. 65% of air humidity or a minimum of 25% humidity in the litter are recommended to enable the 3–4 cycles of reinfection of the vaccine.

ANTICOCCIDIAL DRUGS

Where permitted by law, birds may be treated with anti-coccidial drugs during the first 10 weeks of life.

VACCINATION

Vaccinations are preventive measures against infectious diseases and help to keep flocks healthy and productive. The idea is to build up a protective shield during the early stages of life to protect our birds for upcoming challenges they might face in their future life in production.

Different regional epidemic situations and legal regulations require customised vaccination programs. One general vaccination programme suitable for all individual needs does not exist. Therefore, in the following we want to give general information and guidelines about how to create a vaccination program. Your local veterinarian should be consulted as they will be aware of issues within your region and availability of different vaccines.

The success of vaccination is determined essentially by the following factors:

- selection of suitable vaccines
- selection of appropriate vaccination times
- selection of suitable vaccination methods
- condition of birds to be vaccinated

TOOL**BOX**
Avian Influenza

TOOL**BOX**
Salmonella

TOOL**BOX**
Fowl Adenovirus infections

General guidelines for vaccination

- Always follow the manufacturers recommendations.
- Always use full dose.
- Check the expiration date of the vaccine.
  The vaccine must not be used after this date.
- Always keep records of all vaccinations and vaccine serial numbers.
- Only vaccinate healthy flocks.
- At least 10 days between two vaccinations against respiratory diseases (ND, IB, ILT, aMPV …).
- At least 3 weeks between live and inactivated vaccines (same pathogen) (priming and boosting).
- At least 4 weeks between two inactivated vaccines (same pathogen).
- Always respect national regulations.

Always keep records of all vaccinations and vaccine serial numbers.

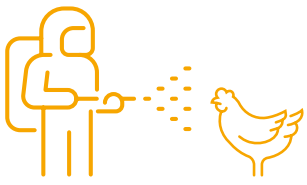
VACCINATION METHODS

DRINKING WATER VACCINATIONS

are not labour intensive but must be carried out with the greatest care to be effective. The water used for preparing the vaccine solution must not contain any disinfectants.

The amount of vaccine solution should be calculated for complete consumption within 2–4 hours. Use water stabilisers to protect live vaccines against chlorine, heavy metals or biofilms in water to ensure vaccine efficacy.

SPRAY VACCINATIONS

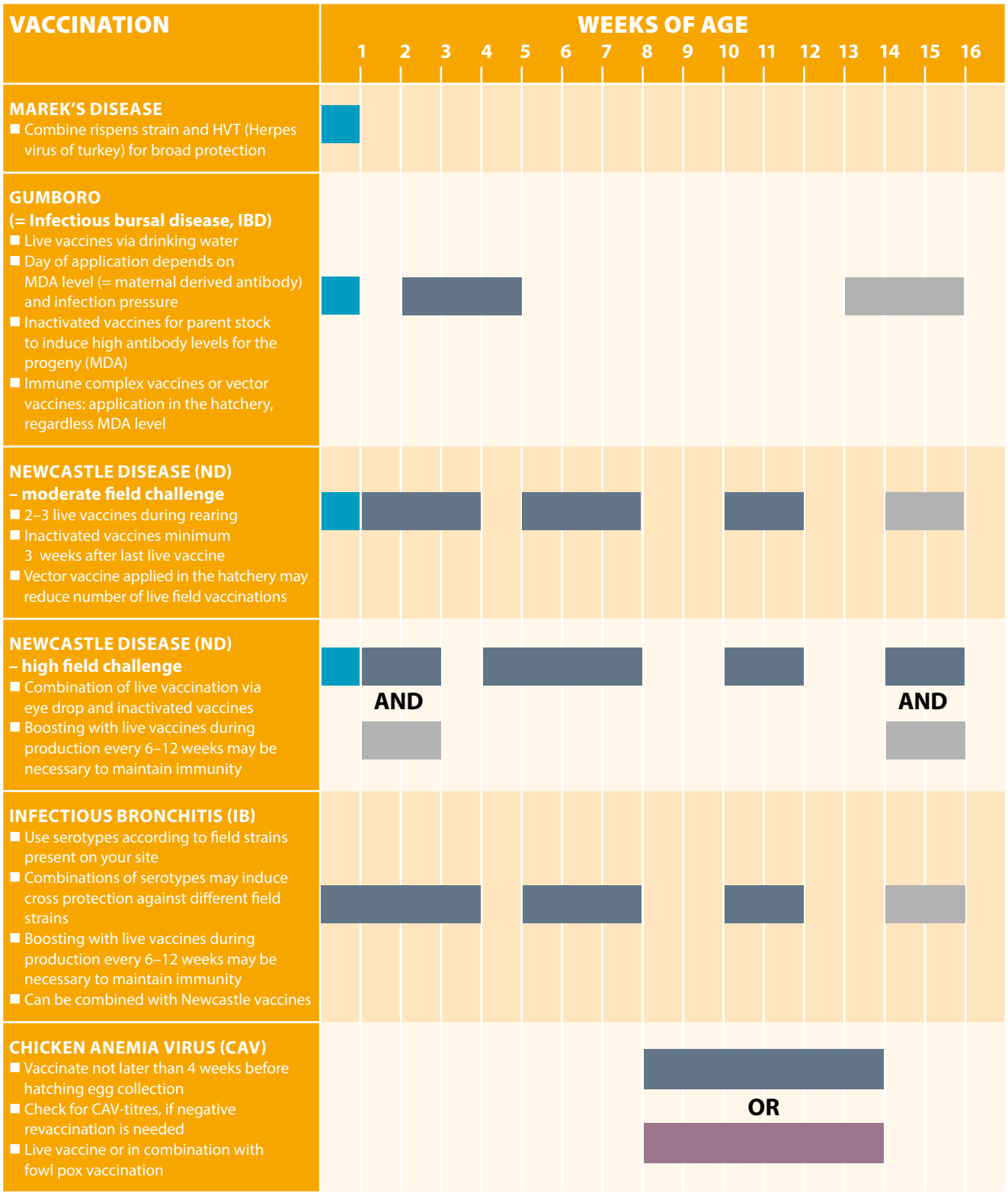


are not labour intensive and are highly effective, but may occasionally have side effects. For chicks up to the age of 3 weeks apply only coarse spray. Use distilled water for vaccination that is free of of chlorine or disinfectants.

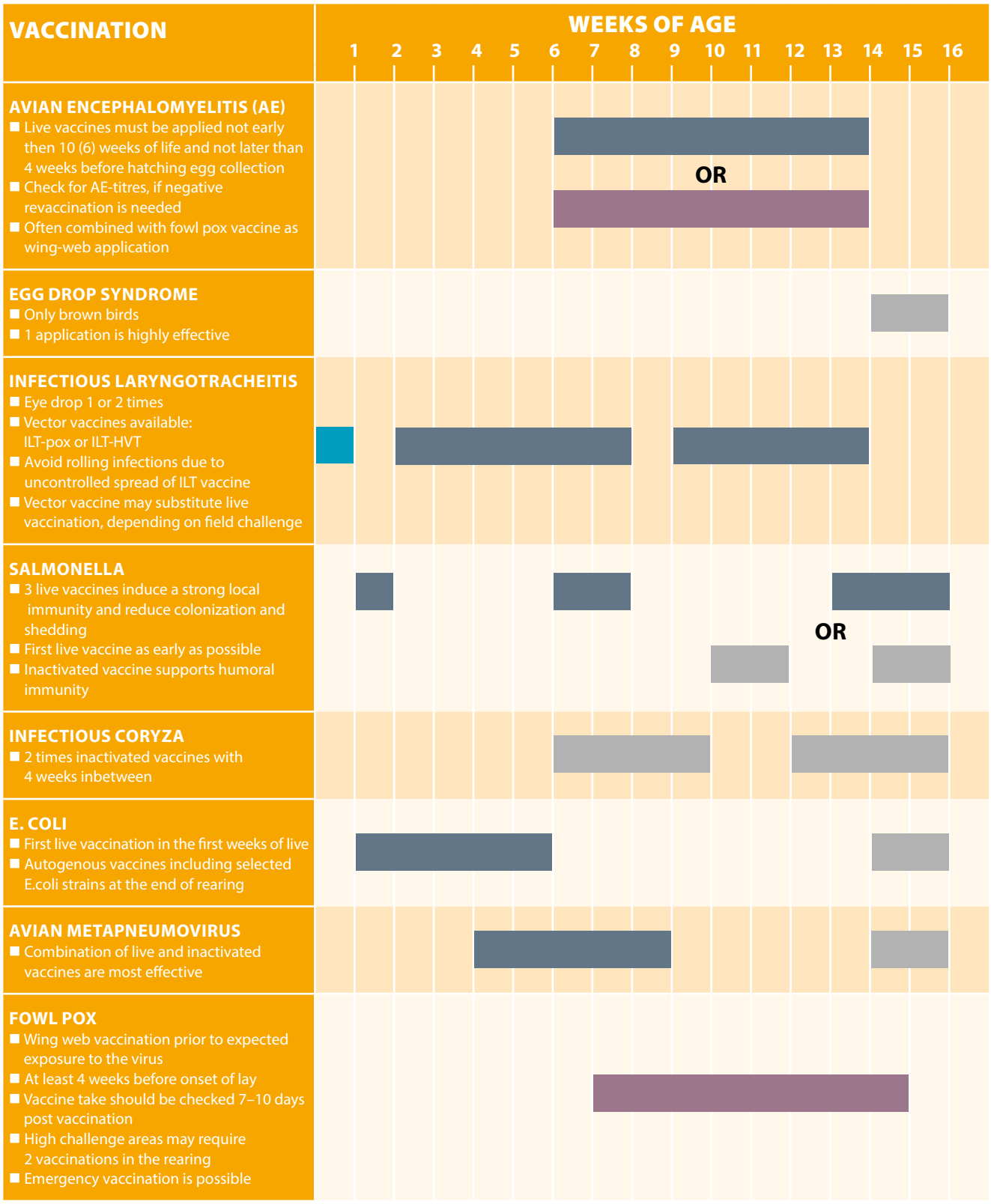
INDIVIDUAL VACCINATIONS

such as injections and eye-drops are very effective and generally well tolerated but also very labour intensive.

BREEDER VACCINE APPLICATIONS



BREEDER VACCINE APPLICATIONS



Live hatchery vaccines, given subcutanous

Live vaccines, administered by drinking water, spray or eyedrop

Live vaccines, administered via wing-web inoculation

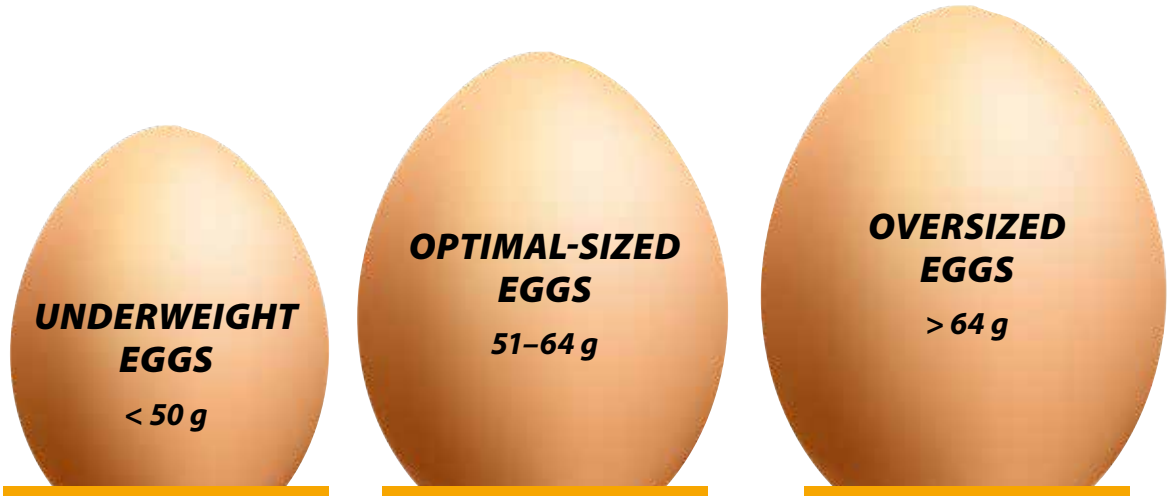
Inactivated vaccines, injected via intramuscular or subcutaneous route

HATCHING EGG **MANAGEMENT**

The quality of hatching eggs is crucial for ensuring the genetic potential of the embryos during incubation and their subsequent development as pullets and laying hens. Proper management of hatching eggs from collection to storage and transportation is essential to achieve high hatchability and excellent chick quality.

UNIFORMITY AND EGGSHELL QUALITY

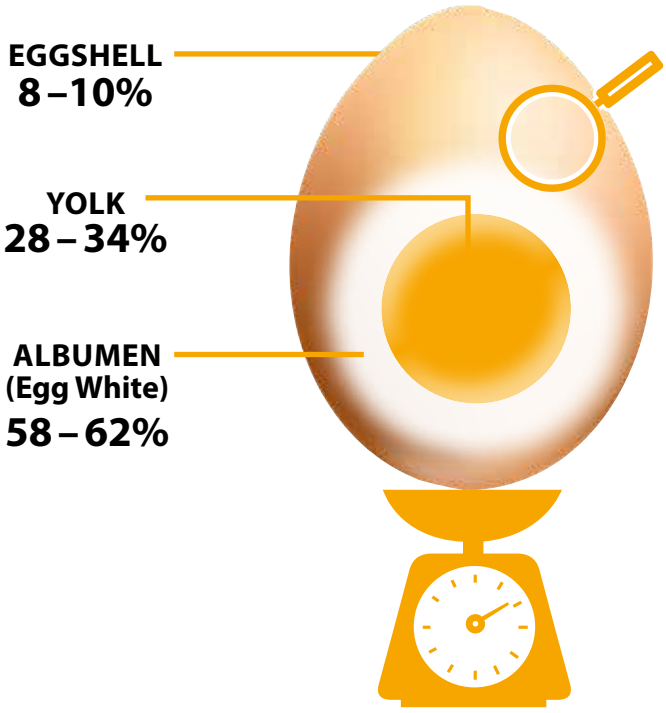
Uniformity is essential for dedicated and specific incubation programmes to achieve optimal hatchability and chick quality. To ensure this, it is crucial to maintain a uniform parent stock flock, where hens produce eggs of consistent size and roosters ensure a high fertility rate.



Tend to have lower hatch rates, poorer chick quality, and higher mortality rates.

Optimal target weight for hatching eggs, depending on the flock's age.

May present incubation challenges.



The eggshell's shape and colour should not be underestimated, as it **reflects the health status** of the flock.

Moreover, eggs with uniform shell colour exhibit consistent heat exchange and moisture loss during incubation, contributing to a **uniform hatch.**

A WELL-BALANCED DIET AND OPTIMAL FLOCK HEALTH ensure that eggs have the correct proportions of albumen, yolk, and shell. If these proportions are met, there is no shell too hard or too strong for a chick to hatch—nature provides perfect conditions.

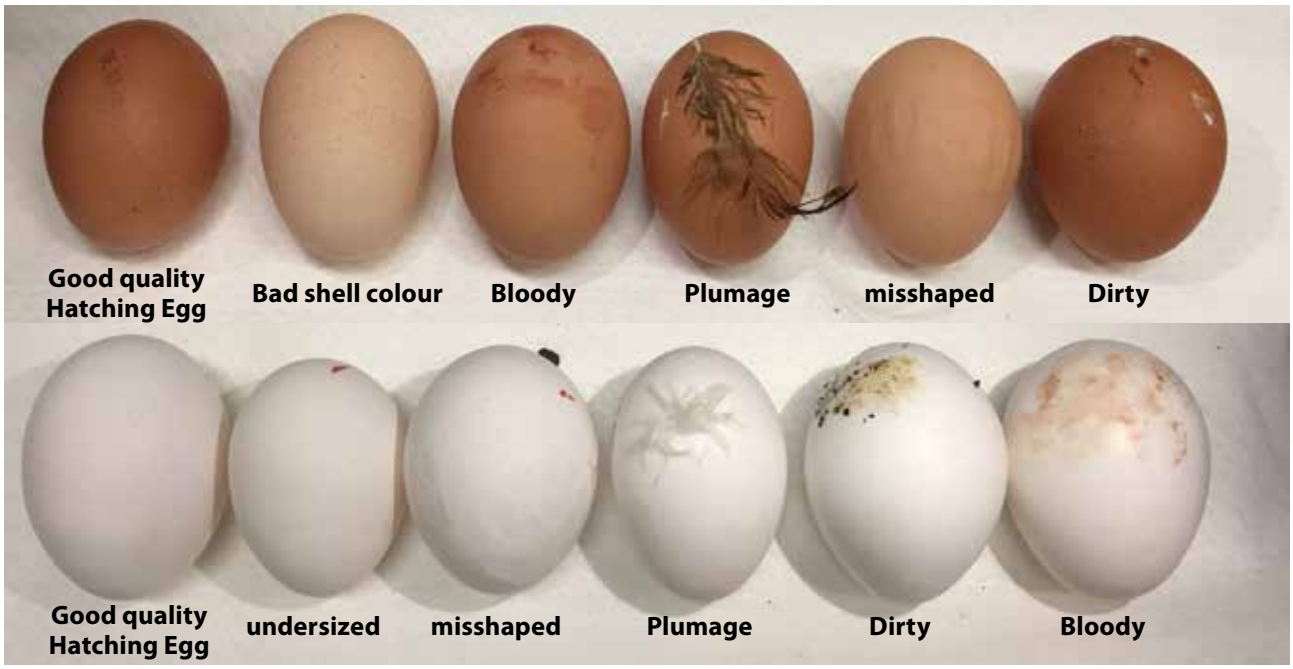
HATCHING EGG COLLECTION

It is essential to regularly maintain both the quantity and condition of nests according to the specific breed requirements.

Nests should be cleaned regularly, and the materials or mats used to make laying comfortable should be sanitized with non-toxic and odourless products. The same applies to egg conveyor belts in automatic systems.

It's important that eggs do not remain in the nests for too long. Hatching eggs should be collected frequently, at least twice daily, with more frequent collections in open houses and during hot weather conditions.

Use only clean eggs collected from nests. Eggs should be placed with the air cell up into clean trays or directly onto incubation carts.



SELECTION OF HATCHING EGGS

Making good selections and recording the reasons for discarding eggs is crucial because not all eggs are suitable for incubation.

- It is imperative that personnel responsible for egg selection adhere strictly to biosecurity measures.
- Floor eggs typically have a high probability of contamination. If considering incubating these eggs, be aware that they often lead to a high number of egg explosions, low hatchability, and higher mortality rates in day-old chicks.

This information can help identify potential issues on the farm when benchmarked against historical data.

LOHMANN BREEDERS Technical Service can assist in interpreting this data and taking prompt corrective action.

DISINFECTION OF HATCHING EGGS

The method of disinfection – whether fumigation, sprinkling, nebulisation, gasification, or immersion – depends on the regulations of each country and the list of permitted products.

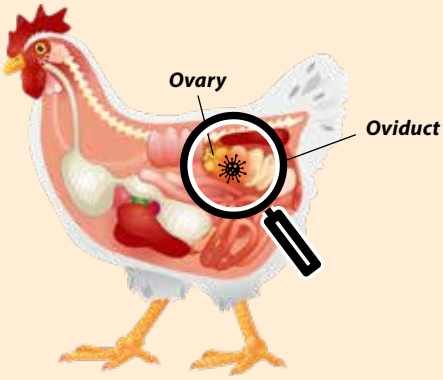
Since all disinfectant products have possible side-effects, it's important to **select one that meets your needs** and follows the manufacturer's specifications regarding dosage, timing, and application.

An Eggshell contains 7,000–17,000 microscopic pores that let air and moisture in, crucial for the embryo's development. These pores open shortly after the egg is laid, allowing bacteria, germs, and fungi to potentially penetrate. Hence, it is imperative that hatching eggs undergo disinfection shortly after they have been laid. The promptness and efficacy of this disinfection process are essential.

Regular verification of your process is crucial. One effective method involves using a swab on the surface of one undisinfected egg and one disinfected egg or rolling them in a culture medium to check for microbial growth. This approach helps ensure the effectiveness of the disinfection procedure.

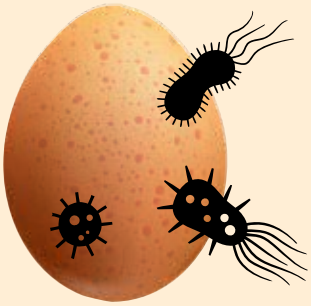
VERTICAL TRANSMISSION

Contaminated by pathogens as a result of an existing infectious disease in the ovary or oviduct.



HORIZONTAL TRANSMISSION

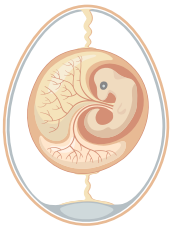
Hatching eggs can be contaminated by pathogens through penetration of the eggshell after being laid.

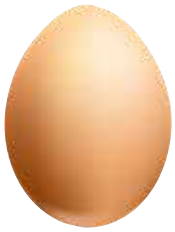


EGG STORAGE

Body temperature of the hen

41°C — 6–7 hours — 41°C — 17–21°C





24 HOURS BEFORE LAYING

The embryo's life begins, requiring rapid cellular replication at 41°C.

TIME OF DEPOSITION

Fertile eggs contain a live embryo of 30,000–55,000 cells, which we must preserve until incubation.
Avoid unstable temperatures and handle carefully to maintain cell vitality.

COOLING EGGS

Cooling eggs uniformly to 17°C – 22°C within 6–7 hours is vital.

STORAGE

Proper storage conditions include temperatures below 21°C and humidity between 60% and 75%, depending on storage time. Avoid condensation and temperature fluctuations to prevent embryo mortality.

Recommended climate conditions during egg storage

Storage Time	Temperature		Relative Humidity	Egg Position
0–4 days	21–19°C	69–64°F	75–60 %	Trays
5–7 days	18–17°C	63–61°F	78–70 %	Trays & S.P.I.D.E.S (if done – temperature fixed at 18–17°C permanently)
8–9 days	16–15°C	60–57°F	80 %	Blunt end up **but** if S.P.I.D.E.S, trays at 18–17°C
10 days or more	14–12°C	56°F	88 %	Recommended to turn eggs **but** if S.P.I.D.E.S, trays at 18–17°C

EGG WEIGHT LOSS

Another crucial point to remember is the loss of egg weight that occurs. This is a continuous process, beginning during during the period of on- farm storage, continuing into the hatchery.

TOOL**BOX**
Egg weight loss

S.P.I.D.E.S.

(Short Period Incubation During Egg Storage)

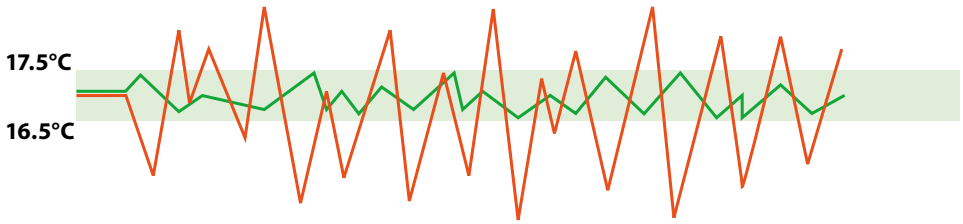
One of the most significant advancements in recent years is the use of S.P.I.D.E.S., which allows us to preserve eggs for extended periods. It's crucial to remember that inside each egg, cell replication and mortality continue. The cell replication process must always exceed mortality levels during the correct incubator set points. Therefore, we must handle them with utmost care. To optimise hatchability, employ S.P.I.D.E.S. for eggs stored over 10 days.

TRANSPORT TO THE HATCHERY

Transporting eggs to the hatchery is important and can range from simple daily trips to complex multi-farm collections.

- The primary concern is temperature – thermal shocks and significant fluctuations should be avoided. Thermal shocks exceeding 4 degrees can lead to embryonic mortality and contamination.
- During loading and transport, minimising shocks and vibrations is essential as they can affect the hatch rate and chick quality.
- Utilising dataloggers and data analysis can assist in managing these factors.

Temperature fluctuations should be minimised during transport!



IN THE HATCHERY

Upon arrival at the hatchery, continue storing the eggs at the desired temperature and humidity. Disinfection can be repeated using the same farm rules. However, it is not necessary if the on farm disinfection was effectively administered.

Communication between farms is especially important. Data from early candling (days 7–9) and egg breakouts, reflecting fertility and early mortality rates, should guide actionable steps.

A well-managed hatchery optimises **preheating and incubation timing for different egg groups** to reduce embryonic mortality and ensure a short hatching window for quality chicks.

Effective collaboration and data exchange between Parent Stock farms and hatcheries are essential for success.

Since each genetic line has distinct heat production, shell characteristics, and requirements, **tailored incubation programmes are necessary.**

MANAGEMENT**GUIDE**
HATCHERY

DISCLAIMER

The information, advice and suggestions given in this management guide should be used for guidance and educational purposes only, recognising that local environmental and disease conditions may vary and a guide cannot cover all possible circumstances. While every attempt has been made to ensure that the information presented is accurate and reliable at the time of publication, LOHMANN cannot accept responsibility for any errors, omissions, or inaccuracies in such information or management suggestions.
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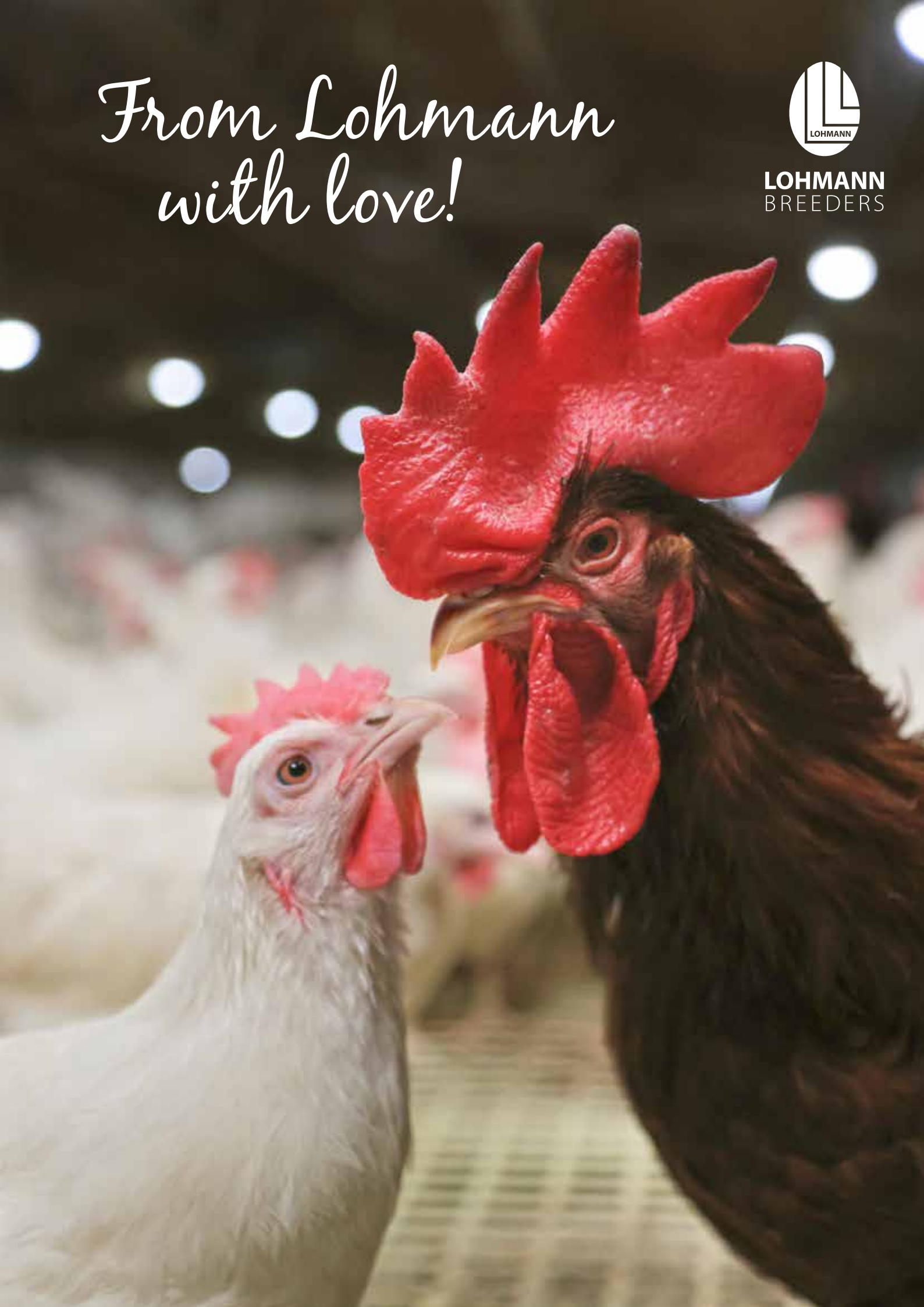
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