Management Guide

Alternative Systems

NEW
Printed but interactive!

Management Recommendations

for Barn, Aviary & Free-Range Systems

BREEDING FOR SUCCESS … TOGETHER

LOHMANN
BREEDERS

LOHMA
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❯ *The mainstream products are* **LOHMANN LSL-CLASSIC** *and* **LOHMANN BROWN-CLASSIC,** *well known for their efficient production of quality white and brown eggs, respectively.*

PERFORMANCE DATA LOHMANN BROWN-CLASSIC

PERFORMANCE DATA LOHMANN LSL-CLASSIC

❯ *For markets requiring more XL-size eggs* **LOHMANN BROWN-EXTRA** *is the ideal brown layer.*

PERFORMANCE DATA LOHMANN BROWN-EXTRA

❯ **LOHMANN TRADITION,** *a brown egg layer with high early egg weight was developed mainly for markets requiring an even larger egg size.*

PERFORMANCE DATA LOHMANN TRADITION

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❯ **LOHMANN SANDY** *is a white feathering layer for the production of cream coloured eggs. The layer has an outstanding feed conversion and robustness.*

PERFORMANCE DATA LOHMANN SANDY

PDF

❯ **LOHMANN LSL-LITE** *and* **LOHMANN BROWN-LITE** *are two products which have been designed for markets which prefer smaller eggs and measure efficiency in g feed per egg.*

❯ **LOHMANN LSL-LITE EUROPE** *Focused on European cage free markets for a balanced medium egg profile.*

PERFORMANCE DATA LOHMANN LSL-LITE

PDF

PERFORMANCE DATA LOHMANN BROWN-LITE

PDF

PERFORMANCE DATA LOHMANN LSL-LITE EUROPE

PDF

Content

Introduction

There has been a distinct movement towards alternative housing throughout the EU since 2011. This trend shows no signs of abating as the demand for so called alternative systems, barn & free range, continues to gain pace not only in the European Union but across many continents.

As this trend continues to grow, so to do the options we face when deciding on house design and the equipment we use within our chosen system.
New technologies are being introduced to the market on a regular basis and manufacturers are constantly looking to improve upon their current offerings.

Whichever system you choose it is imperative that not only do you consider your contractual requirements but also the local legislation and welfare standards for your country.
External factors such as availability of land, access to amenities and infrastructure, site positioning etc. also need to be considered.

The management practices within these systems raise their own challenges within the production cycle, particularly in rear so its highly recommended you gain some practical insight into what is involved by taking a good look around a well-managed and successful operation.

The following recommendations are based on results of scientific studies and most importantly, practical experience gained in the field. This management program is intended to be used as a guide for newcomers and at the same time, assist experienced poultry farmers in optimizing the performance of LOHMANN products in alternative systems.

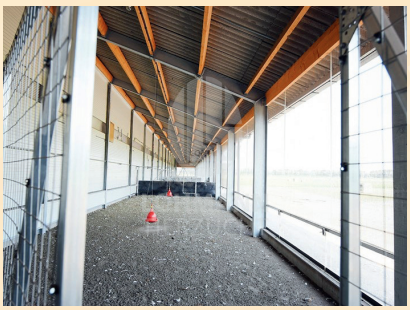
Due to their robust nature, the LOHMANN breeds have proved themselves to be extremely well suited to alternative systems.

Housing systems

Barn systems

Barn systems allow the the birds free movement throughout the house.
The systems themselves can vary considerably in design and layout depending on the type of building. They can range from a basic single level floor system, to a classic setup which consists of a dropping pit covered with either wooden, wire mesh or plastic slats.

This raised area generally takes up two thirds of the floor space. (Please take note of your own regulatory requirements).
A litter/scratching area then makes up the additional area which gives the hens room to move and exhibit natural behaviour.
In systems where this is not feasible many people adopt a winter garden system which offers a similar solution. The laying nests, feeders and drinkers are positioned on the slatted area and should provide adequate accessibility to all hens within the system. Rails or other elevated perching facilities should be provided as resting places for the hens. The availability and design of the perching is often also governed by legislation.



Aviary systems

Aviary systems can vary greatly in design however all consist of raised tiers which offer a greater usable surface area than a conventional floor system.

Hens have access throughout the system and are encouraged to explore by the careful positioning of the feeders and drinkers. Strategically placed perches and ramps encourage and allow movement between tiers.

Lighting systems are designed to mimic sunrise and sunset and promote movement throughout the tiers and should follow a sequential pattern of roof to ground in the morning and the reverse in the evening.

Due to the nature of the environment close attention should be made to the management recommendations for the system you choose.

Free range systems

Free range defines itself as a system where the hens have access to outdoor spaces.

Internally both floor and aviary systems can be adopted.
However, you must provide access areas often called pop holes which allow the birds freedom to roam outdoors during daylight hours. Dependent on local legislation, the access times, distance to the pop holes, size of the pop holes and allocated area per bird externally will be heavily regulated.

While commercially free range systems may bring their own advantages, they do bring with them their own management challenges alongside increased disease and bio security risks.

The fundamentals of rearing and production remain the same for alternative as they do in conventional housing, however we need to remember that there are subtle differences that need to be considered.

Hens are destined to jump, perch and climb to access food water and nest boxes. They should be exposed to this from an early age. Studies have shown that access to perching by four weeks of age can reduce the risk of aggressive pecking later in the production cycle.

Birds kept in alternative systems spend a lot of time on the floor or outside which allows negative foraging to occur. They need to be trained to eat effectively.

Hens have increased exposure to external pressures and challenges. Having a healthy metabolism and good frame development is essential.

Pullet rearing & Equipment for alternative systems

Pullets destined for alternative housing systems should be reared in similar systems to the destination house, or at the very least in systems that provide similar furniture.

The more closely the growing facility resembles the future production system, the easier it will be for the pullets to settle down in their new environment after transfer.

This not only applies to the house design but also the equipment within the house.

Floor

Floor rearing systems should consist of a well littered, climate controlled, evenly illuminated shed which, in addition to the standard feeders and drinkers, also provides slightly raised roosting places. These should be a mix of perching bars and raised slatted flooring.

Ideally a winch system consisting of a slatted area and nipple drinkers should be provided to help encourage exploratory behaviour. It is vital that within these systems, the birds have access to rails and perches before 5 weeks of age to help the training process.

Floor system

Encourage movement !

However, it is important to remember that to successfully rear birds in alternative aviary systems you need a whole new perspective on management practices!

Aviary systems

Multitier aviary systems though similar in principle will often differ in design dependant on the manufacturer.

The systems themselves comprise of metal or plastic slats and carefully positioned drinkers and feeders, all designed to encourage movement and natural behaviour throughout the system.

Early movement and feed training are two important management strategies in these systems.

Lighting is also very important within an aviary rearing system as this will play a vital role in encouraging birds to use all the levels effectively.

There are many positives in adapting to alternative aviary rearing systems:

- *Many production facilities are already converting to aviary to allow more birds per house footprint.*
- *The systems are designed to encourage natural movement behaviour*
- *The design allows birds to perch, roost and explore!*
- *Early training and movement can give the birds an optimum start in life.*
- *Allowing the birds to explore from an early age encourages uptakes and strong healthy pullets.*
- *Matching facilities eases stress during the transition period.*
- *Ensure when moving chicks from tier to tier a portion of the chick paper is moved with them to assist in coccidial replication. Chicks should only be moved after the first replication (15 – 16 days).*

Aviary system

Feeding & Drinking

Modern aviary systems generally use nipple drinkers for both rearing and production. There are also other variations of nipple systems each offering their own solution available on the market. A 360° nipple is the preferred option.
It is worth considering that early feed training is easier to accomplish in a chain feeder. Matching the feeding system in rear with that in the laying house will ease the transition period allowing for optimum early uptake.

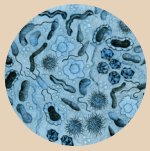
While it is not always possible to have identical house furniture you should always think of how easy it will be for the hens to take to the new equipment. This is particularly the case for feeding and drinker systems.

Nipple

Chain

Nipple

Chain



Biosecurity

Good biosecurity should be practised at all times and not just during a disease outbreak.

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.

As an egg producer within the human food chain you have a responsibility to adhere to strict biosecure measures and therefore biosecurity planning should be an essential part of your farm strategy.

What are the benefits of good biosecurity to you?

- *Helps restrict the risk of infection of diseases to your premises.*
- *Reduces the risk of zoonotic disease becoming established*
- *Restricts the spread of disease on and off your site.*
- *Reduces the risk of challenges to your flock which can impact productivity.*
- *Cuts potential costs of disease treatment which can improve profitability.*

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

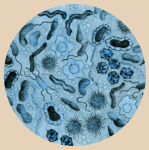
Restrict and control the vehicle and visitor movement on and off your farm both internal and external.

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.

Infectious diseases can be spread farm-to-farm and flock-to-flock!

A written biosecurity plan is advisable to not only look at potential risk areas on your site but also the risk from outside sources. Please consult your veterinarian and the LOHMANN Technical Service Team for more information on a hygiene concept.



Air-borne fomites

Diseased or carrier birds

Contaminated vehicles

Contaminated premises

Egg transmission

Shoes and clothing of visitors who move from flock-to-flock/ site-to-site

Carcasses of dead birds that have not been disposed of properly

Impure water, such as surface drainage water

Insects

Rodents, wild animals and free-flying birds

Actions & Planning

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

Biosecurity Guide & Plan

PDF

Early Management

House preparation prior to the chicks arrival

Empty house

A full terminal cleanout should have been undertaken.

Temperature

Heat the facility to 35–36°C (95–96.8°F). This temperature should be maintained for the first 48–72 hours.

Summer / Winter

In summer, start with this 24 hours beforehand and in winter, 48 hours before the chicks arrive.

Ventilation

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

Air humidity

should be at a minimum of 60 % (3 days + add temp/humidity table).

Equipment

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

Feed & Water

Ensure that feed and water has been distributed evenly throughout the house.

Drinkers

The height of the drinkers must be set at the correct height for the new flock.

Water temperature

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

Water pressure

should be lowered to allow water droplets to form on the nipple-drinkers which will help the chicks to find the water.

Drinkers

You may need to change the water in the bell drinkers and/or flush the nipple lines to assist with this.

Lighting

Ensure adequate lighting levels are set in the house. Try and ensure the light spread is as even as possible.

Placement

Placement of the flock is an important factor in early adaptation to the house allowing the chicks to find feed and water.

Additional feeders such as feeding bowls/pan feeders should be placed within the house to help achieve a balanced intake of feed throughout the flock for the first few days.

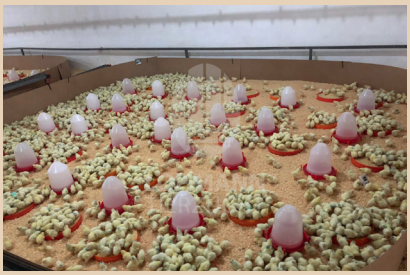
Ensuring an even temperature spread throughout the house will encourage good movement and utilisation of the feeders and drinkers.

The house should have already been warmed up to 35 – 36°C (95 – 96.8°F) Where this isn't possible 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.

If the chicks are housed in sheds equipped with dropping pits, it is advisable to place chick paper over the slatted areas on which drinkers, feeders and the chick bowls (if used for a few days) are placed.

In most cases people will already be using chick paper as part of their coccidiosis vaccination and feed management strategy.

Ensure you use a good quality paper relevant to your operation.



- *After arrival of the chicks, place them close to water and feed.*
- *Measure the temperature in the chick guards at the height of the chicks.*
- *Dip the beak of some chicks into the water and activate the nipple-drinkers. This motivates the birds to drink. After finding the water, chicks will soon start to eat. This takes at least 2 – 3 hours.*
- *Do not distribute the litter until the floor reaches the recommended temperature. As suitable litter, one can use wood shavings, cellulose pellets or straw. More information can be found in the litter section of the manual.*

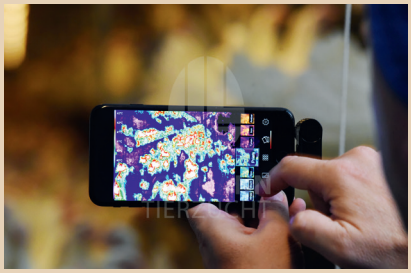
Placement – Aviary

- *There are many different aviary rearing systems and you should always refer to the management guidelines for your system.*
- *The principles however are the same.*
- *Ensure the house has been correctly set up and all equipment tested.*
- *Encouraging exploratory behaviour through the system helps train the birds to jump and fly.*
- *Maintain an optimal environment with adequate temperature and humidity levels.*
- *Ensure the lighting program encourages movement throughout the whole system in line with management guidelines.*
- *Familiarisation with perches will aid the bird when moved to the layer house.*

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. The house should have already been pre-warmed to 35–36 degrees prior to housing and now the ambient temperature needs to be monitored and maintained.

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. To do this, we can use a simple modern ear thermometer.



How to adjust the house temperature

Take random sample of temperatures from different parts of the house to create an overall picture of the environment.

Cloacal recording sheets

Use the same method you use when weighing chicks.

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.

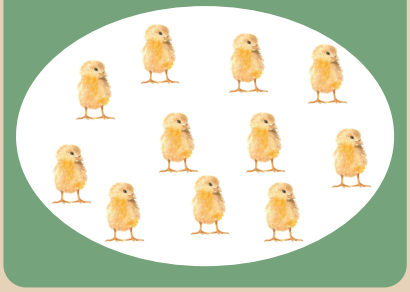
For example, increase the house temperature by 0.5°C (0.9°F) if the average body temperature of the chicks is 39.5°C (103.1°F).

There are also many external factors which could have a negative effect on the body temperature of the chicks:

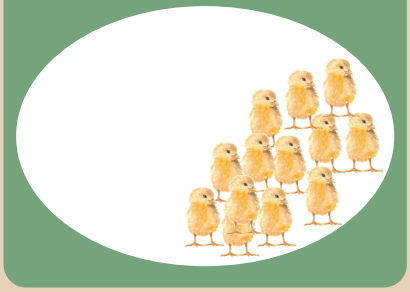
- *Insufficient air distribution in the house*
- *Low humidity level (low heat transfer capacity of the air)*
- *Failing to pre-warm the house at the right time*

Always pay close attention to your birds.
Their behaviour is often the best indicator of their well-being:

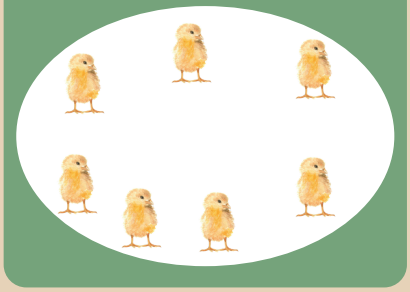
If the chicks are evenly spread out and moving freely, temperature and ventilation is acceptable.



If the chicks are crowding together or avoiding certain areas within the house, temperature is too low or there is a draft.



If the chicks are laying on the floor with their wings spread out and gasping for air, temperature is too high.



Humidity

Humidity levels are also important and work in relation to the temperature to obtain an optimum environment.
For efficient coccidial replication a relative humidity of 60 % is recommended for the first two weeks.
For floor systems a litter humidity level of 35 % should be maintained where possible.

The relative humidity level inside the house should be at about 60 – 70 % for the first week

Early Lighting program

When the day-old chicks arrive on the farm, some will continue to sleep after the journey from the hatchery, while others will search for food and water.
An intermittent lighting program fits well with this irregular behaviour as not only does it help to synchronise the chick's behaviour and encourage the search for feed and water. It also allows you to obtain a better overall impression of the flock.

Intermittent lighting program PDF

Example for Slow step-down lighting program PDF

Graphs for lux intensity PDF

LOHMANN advise implementing an intermittent lighting program from day one for up to 7 – 10 days and then switch to your regular step-down program.

Early Learning

Regardless of which system you are using early management is critical to ensure excellent acclimatization to the surroundings. This will be reflected in the uptake of feed and water and its relation to development. Training for alternative systems should start in rear and continue into lay. There is a direct correlation between the imprinting of behavioral patterns in rear and their relation to the production period. Studies have shown that access to perching by 4 weeks of age can have a positive impact on pecking behaviour later in the production period. Birds destined for alternative production houses should be trained to move, perch and jump from an early age.
This preparation period allows for a smooth transition and familiarisation with the set up they will face.

Two important rules

Feed

Training with phase feeding not only allows better uptake of feed but can prevent unnecessary foraging behaviour. As we allow movement outside the system, birds will naturally forage.

Movement

Allowing the birds to be released from the system at a young age gives them time to find their feet and explore the system thus developing perching and jumping capabilities ready for the production facility.

Monitoring & Profiling

Data recording should be part of the everyday management practices in alternative systems. This should begin on the day of placement in the rearing facility.

Hens in alternative systems are exposed to many vectors that can impact on development and productivity therefore we must use everything in our arsenal to assist us should a challenge occur.

Collecting and analysing daily data is the key to detecting and resolving any management issues that may arise.

All sites should create their own monitoring programs. These can be as simple as paper records or utilising latest technologies that can record and benchmark data such as those LOHMANN have available.

Monitoring programs should cover not only the obvious such as feed and water consumptions, bodyweights and production data, but also anything that may influence development and production such as internal and external temperature recordings and humidity levels. The more data that is available to you the easier it will be to carry out any investigations into issues arising in the flock.

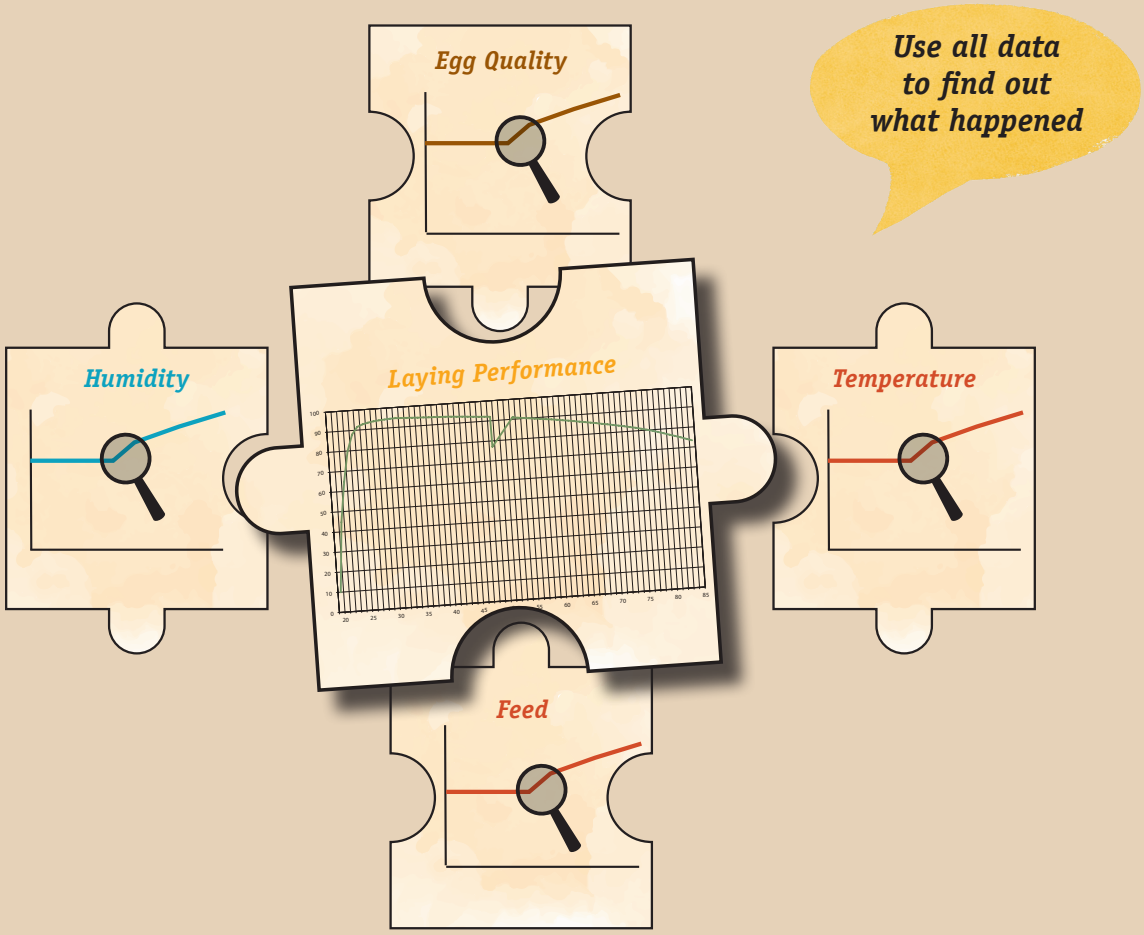
Investigative analysis is the art of identifying trends and processes of cause and effect.

The ability to use the data compiled in this way is beneficial not only for the current flock but also to help identify trends from flock to flock.

Data recording sheets

PDF

Example of investigative analysis



Measuring Crop Fill

Crop measuring is an excellent tool in ascertaining the feeding behaviour of a new flock. The first two days of 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.

Step 1

Select a random chick in the house.

Step 2

Gently feel the crop. You should feel a round full sac.

Step 3

Mark on a simple table if you can feel a small round lump in the crop.

Step 4

Repeat this step on 50 birds throughout the house.

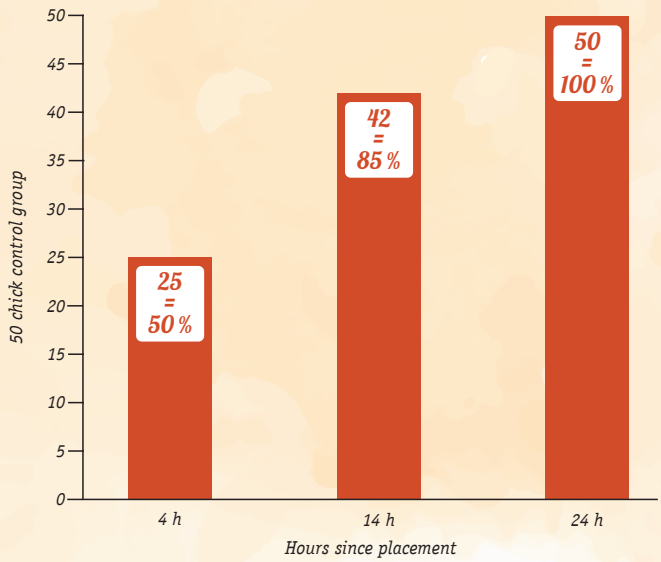
This should then be recorded into your monitoring records for the start of your production profile.
As the hours progress you should notice more and more chicks have feed in the crops. By 24 hours you should find all birds have taken to the feed and it is evident in the crops. Putting the effort into crop checking now will pay dividends later in the flock.

If you find any that don't seem to be taking to the food – dip the beaks in water and place them near the food and water source.

Crop Fill measurement is not only a useful tool for those first few days but also for the life of the flock as you implement changes into your feeding patterns. More information can be found in the nutrition section.

Example of Recording Crop Fill

Number of chicks with full crops



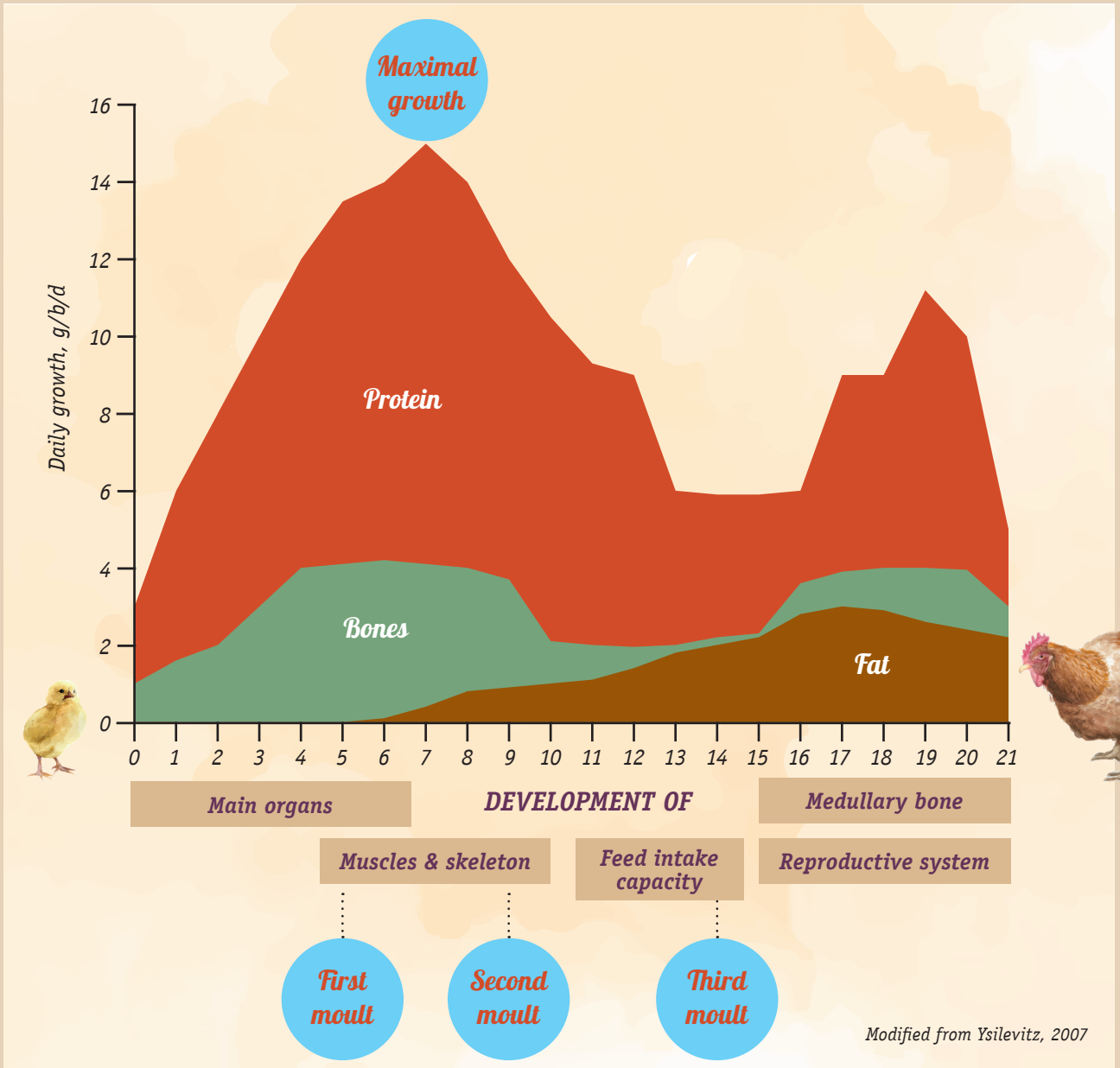
Stocking density

The stocking density rules can differ from country to country. Higher stocking densities while allowing more birds on the same footprint can often lead to decreased uniformity and development due to increased competition and reduced utilisation of the facilities.
Therefore, careful consideration must be taken when stocking your house!

Please ensure the stocking density is compliant to the animal welfare regulations valid for the country where the chicks/pullets are housed.

Development

There are many factors to consider in the development of a healthy chick. An understanding of the developmental stages and their correlation to dietary requirements and the relation to performance is a crucial tool in your decision-making arsenal.



Modified from Ysilevitz, 2007

Body weight/ Uniformity & Development

Monitoring the weight and uniformity of a flock is extremely important when assessing the developmental progress.

Body weight monitoring should begin in rear and continue throughout the production period.
It has been proven that reaching and maintaining body weight targets at crucial trigger points can and will have a bearing on flock performance throughout their lifetime.

Bird weighing

Many decisions you may make as a producer will be determined by the progress of the growth curve and the uniformity of the flock.
Decisions on diet changes should be driven by bodyweight, while the decision to stimulate while governed by your commercial requirements will also be heavily influenced by body weight and uniformity. Chicks and pullets should therefore be weighed weekly starting from week one, this allows you to identify any deviation from target to act accordingly and in good time. Always weigh the flocks at the same time as mealtimes can influence body weight.

Body weight tables

Uniformity

Uniformity can be used as a tool to demonstrate whether all birds within the flock have been supplied with an equal amount of equally nutritious feed, it also helps to predict the laying performance of a reared flock.
The highest uniformity can generally be observed at the age of 15–16 weeks.

There can sometimes be a slight drop in the uniformity levels at this point due to the onset of sexual maturity.
However, having a good average body weight leading up to this point will limit any impact.

Calculation examples Body weight & Uniformity

PDF

Factors which influence flock uniformity:

- *Stocking density*
- *Feed structure (avoiding selective feed intake)*
- *Trough length and height*
- *Availability of water*
- *Stress factors (diseases, vaccination)*
- *Age of the flock when uniformity is measured*
- *Weighing method: the more birds you weigh, the more accurate the calculated uniformity will be*
- *Movement and management within the system*

Feathering

Growing pullets change their plumage several times.

There can sometimes be a slight decrease in the body weight development at this stage as the attention moves to re-feathering.

Stage 1

Replacing the day old down with the first full coat. Usually completed by 5 weeks of age.

Stage 2

Around 8 to 9 weeks a further re-feathering will occur. An increase in feathers on the floor will be seen.

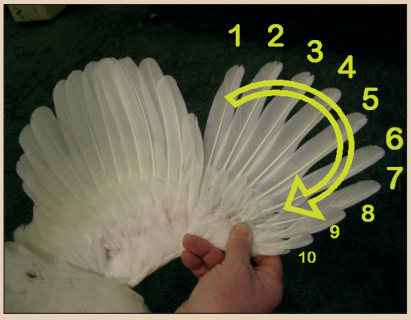
Stage 3

The final stage is usually completed by 16 weeks of age. There will be a complete change of plumage where the flight feathers will have been replaced.

A poor development of feather growth at 13 weeks is often an indicator of inadequate weight development and/or lack of flock uniformity. If this occurs then it should be addressed as a matter of urgency.

- *Check body weights and uniformity*
- *Check feed and water – quality and consumptions*
- *Look for viral or bacterial infections (coccidiosis is a common cause of growth depressions)*

Wings of pullet at about 18 weeks of age



Production house transfer

Preparation for transfer

Cleanout & Disinfection

- *A full terminal cleanout should have been undertaken.*
- *Regulatory swabbing completed, and clean out efficiency should also be tested. This can be done by ATP Swabbing.*

Check Shed

- *Ensure all equipment has been tested. Lighting patterns initiated and ventilation set for the current climate.*
- *Water lines should have been cleaned, disinfected and tested, ready to offer an immediate fresh supply of water.*
- *Feed should be available and meet the nutritional requirements as laid out by LOHMANN.*
- *Birds should always be given time to adapt to the production facility before the commencement of the laying cycle, ideally at week 17.*
- *Ensure the light hours and type of light source of the rearing and production facility match.*

Transfer

- *The transfer itself should be carried out quickly and efficiently. Aim to move the birds together in one day and you have adequate and trained staff available.*

Continuation of the Monitoring program in production

*Your monitoring program should **continue** on day one of housing in the production facility.*
The most effective monitoring tool is observation. Watch and listen to your flock and they will guide you through any issues.

- *There can often be some loss of body weight in transfer (around 10–12 %). This is not uncommon and quickly regained through a smooth and effective transfer.*
- *It is recommended to begin your weight monitoring program on housing, recording weight gain and evenness.*
- *Walk the birds regularly in the early days – this not only helps create movement patterns but allows you to interact with the flock.*
- *Begin monitoring of feed, water, temperatures and record your findings.*
  Pay close attention to the feed levels and usage within the system.
- *Record shed and egg room temperatures and adjust where necessary*
- *Check the clocks/control panel regularly to ensure they are working correctly and consistently.*

Monitoring record sheets

Environmental conditions

Obtaining and maintaining the desired house temperature and environment is an important factor in influencing the well-being and performance of the birds.

Three main areas to focus on are:
Temperature & Humidity levels
Dust & Toxic gas

Ventilation

There are now numerous types of ventilation systems on the market – ***positive, negative and tunnel ventilation*** *to name but a few.*

Positive pressure systems

These use mechanical fans to push air into the building and out through strategically placed air outlets. This movement of air creates a positive pressure and can be designed to move air over the birds and help keep litter areas dry.

Tunnel ventilation

An option widely used in hot climates where air movement is paramount. Air is drawn in often through a cooling area at one end of the shed. Large exhaust fans in the gable end of the house will draw the air straight through and over the birds ensuring there is consistent air movement.

Negative pressure systems

These are a combination of open air inlets and mechanical fans. When the mechanical fans are operational they create a partial vacuum of negative pressure which will pulls in air from the inlets and expels it out through the fan mechanism. In poor weather conditions this can exacerbate poor litter conditions by pulling in cold damp air. In free range systems the systems can be less effective once the pop holes are open.

Natural ventilation

Natural ventilation is simply allowing an adequate air supply into the building which is controlled by the external weather conditions. In most cases an air distribution system will be used internally to create an even airflow. The prevailing wind direction, house orientation and location of the site itself will all influence the airflow into the building. Naturally ventilated systems can be difficult to manage in extreme temperatures.

Regardless of which system you have the aim is always the same:

To maintain a stable suitable optimum environment for your flock

To do this there are only two points to consider:
Air Quality and Air Temperature

The best indicator for correct temperature is to observe the behaviour of the chicks!

Air quality

- *Reduce dust and noxious gas levels.*
- *Water leaks, poor litter quality, excessive build-up of dirt, health status, house condition and weather ingress all affect the air quality within the house.*
- *Poor air quality affects not only the general environment but also affects the bird's respiratory system which will have implications on production capability and liveability.*

Air temperature

- *While the hens can adapt to varying temperatures where possible, we need to reduce temperature dips and spikes.*
- *A stable temperature between 18 – 22 °C should be aimed for on housing in the production facility.*
- *Humidity can be difficult to control in open houses and particularly those with pop holes and negative ventilation. A relative humidity between 60 – 70 % for the first period of development is desirable.*

If problems in the ventilation of the barn or aviary houses occur, it is advisable to consult a specialist.

Negative influences

Plumage condition

Plumage condition plays a big part in adaptation to weather conditions in alternative systems and should be considered when making changes to ventilation and nutrition.

Low temperatures

Low temperatures can lead to increased consumption to maintain energy and maintenance levels within the hen.

Draughts

Draughts can be very detrimental to the birds and lead to an increase in mortality, smothering and floor eggs. Draughts should be avoided and air flow at bird level carefully monitored.

Well-designed winter gardens and wind protection devices can be used to reduce the impact of draughts in houses with open pop holes.

High temperatures

High temperatures above 28 °C begin to put additional strain on the metabolism of the laying hen. When these situations are unavoidable additional ventilation should be implemented and air flow carefully monitored supplying electrolytes for a short period can also be beneficial.

Laying hens are very resilient and can adapt to most weather conditions however when these become extreme extra measures should be taken.

Table of temperatures at different levels

PDF

Toxic gases & Dust

These are especially harmful for young chicks and will affect their health and well-being.

Minimum Air Quality Requirements

O_2	over	20 %
CO_2	under	0.3 %
CO	under	40 ppm
NH_3	under	20 ppm
H_2S	under	5 ppm

Production Management

Litter

Litter has many uses within the poultry house.
Not only does it help promote natural behaviours such as dust bathing and foraging it is also beneficial in absorbing moisture and in open houses it helps to reduce the spread of external contaminants to the raised areas. However, with these benefits there can also be negatives when the litter is not managed correctly, such as increased dust levels, increased moisture levels and increased ammonia levels.
It can also become a breeding ground for bacteria and mould.
Therefore, it's imperative to choose the correct substrate for your house and conditions and manage it accordingly.

Some options available

Bark mulch & Wood chips

- *Readily available.*
- *Larger particles can take longer to break down and absorb too much moisture becoming mouldy.*
- *High risk of contaminated particles.*

Wood shavings

- *Generally easy to source with good absorbency.*
- *Soft woods should be used to prevent risk of splintering.*
- *Too fine a shaving can result in caking when wet.*

Straw

- *Variety of options available: Wheat, Rye, Barley. Some are more absorbent than others.*
- *Should be chopped to 2.5 cm.*
- *Can provide enrichment when presented as bales within the unit.*

Sand or gravel

- *Reduced risk of bacterial growth*
- *Encourages dust bathing*
- *Can encourage gorging*
- *Hazardous to equipment*

Cellulose pellets

- *Dust Free*
- *Absorbent and free draining*
- *Often contains a disinfectant element*
- *Can be expensive*

Regardless of the litter material used, it is essential that it should always be clean from contaminants!

Litter management & maintenance

Litter should be sometimes distributed after the hens have been housed and be spread by the hens themselves if possible.

It is sometimes beneficial to add a drying/bacterial agent to the floor prior to the distribution of the litter to help reduce early moisture levels and bacterial burden.

Once in place the litter should be managed to ensure it remains dry and friable.

This will prevent moisture and bacterial build up and allow the birds to exhibit natural behaviours.

Electronic equipment such as moisture meters can be used to monitor the litter however the best pieces of equipment are your eyes and nose!

- *Grade the quality of your litter as you walk the house – is it friable?*
- *Does it move when you walk it?*
- *Areas such as those close to the external doors in free range systems can become poached due to the ingress of inclement weather – as part of your weekly routines, break these areas up before they become a problem.*
- *Some people separate the litter area into sections and turn these regularly with the aid of rotovators or hand tools. Many aviary systems now come with floor scrapers which keep those areas friable.*
- *Add further litter material where necessary. Don't make it too comfortable or you can unwittingly encourage floor eggs.*
- *Monitor the ventilation in the house ensuring good air movement over the litter area.*
- *Encourage the birds to break up capped areas of litter by adding either a scattering of grain or grit.*
- *Hen Grit comes in many forms and can have an additional benefit of assisting in crop and gizzard development.*

Good Litter

Bad Litter

Nest box & Floor egg management

Laying nests should be designed and positioned in such a way that they are easily accessible to the hens, in a central location in the barn.
The management of nest boxes can differ between systems and you should always refer to your supplier's guidelines.
However, the principles of nest box management remain the same:

- *Lighting should be sufficient enough to draw the birds to the boxes but not enough to prevent them from feeling comfortable to lay inside them.*
- *Early training is important to allow the birds to become accustomed to the boxes and identify them as a safe place to lay.*
- *Dark spots away from the nest boxes should be avoided to prevent creating attractive areas to lay.*
- *There should be sufficient nest space according to your local regulations and the breed.*
  Single nests:
  1 Nest (26 x 30 cm) / 4 hens
  Group nests:
  120 hens / m²
- *Be conscious of your floor walks, moving birds out of corners and towards the boxes.*
- *In aviary systems walk the flock at lights out in the first few days, ensuring all birds are on the system and manually moving those preferring to stay on the floor.*
- *Always collect your floor eggs! One egg laid and not collected will encourage others to lay in the wrong places.*
- *Monitor your floor egg collection times, numbers and location. This will help to identify and rectify any management issues.*
- *Use a good substrate in the nest. This will provide comfort, prevent dirty eggs and reduce the potential for damage by ensuring good roll off onto the conveyor on automatic nests.*
- *Nest box lights, if used, should only be on for a few hours a day before the main lights switch on. Prolonging the use of nest box lights can lead to issues with pecking etc. Once you have your floor eggs under control its advisable to discontinue the use of nest box lights altogether.*
- *Try not to disturb the birds during the laying period. Think carefully about feeding times and floor walk routines. It can be quite easy to draw birds out the nest box areas at the wrong time. Adversely this can have a positive effect if you have nest box smothering.*
- *Recognize the connection between house management and nest box management. Many factors can affect nest box behaviour such as draughts, lighting and litter. Observe, record and monitor any issues to give you the best chance of resolution should any issues arise.*

Free range management

Allowing access to the pasture/range brings with it many challenges. While this may appear daunting, being aware of potential issues and adopting a pro-active mindset will help you achieve excellent performance.
Birds that have been reared in a full or partial aviary environment will find their feet quicker in the production facility than those reared solely on the floor.

Range | Pasture area

There are many challenges with free range flocks, with one big challenge being the outdoor space.
The amount and position of land should be provided as per your legislative requirements.
This often governs the amount per sqm per hen or in some cases total acreage. In some countries, you will also have to adhere to manure management plans regarding phosphorous and nitrogen levels.
Time and effort should be taken when introducing your flock to the outside area to allow for an adequate training period allowing for good utilization of the land but also to train the birds to leave and return at the required times and within the desired area.

The use of shades and external enrichment can be a great tool in encouraging birds out onto the range and to ensure full utilization of the area around them.
Trees and shrubs are often planted in the range and in some countries, are part of the legislative requirements. They can also help to encourage movement and foraging behaviour.
While these are beneficial it is also important to maintain the surrounding areas, and monitor the availability of any enrichment that may have an adverse effect on the birds. There can also be an adverse effect from misdirected foraging and grass eating.
Your training program is paramount in teaching the birds where to forage and where to eat a fully nutritious meal.

Pop holes

The area immediately outside the pop holes will generally be the most used and can often become poached, especially in inclement weather. There are options available to help manage this area:

Adding additional stone *immediately outside the pop holes will act as a natural door mat and provide an element of natural drainage.*

Creating paddock areas*, where you divide the outside area into separate sections which can be rotated every 6–8 weeks. This option allows constant regrowth and can be a benefit in worm control.*

Building a veranda area *which allows the birds to walk on an additional wire mesh before entering the litter/scratch area.*
Some people choose to use winter gardens. Which is essentially a covered area immediately outside the pop holes providing shelter from weather conditions and a barrier between the internal and external environments.

As you can imagine, having open pop holes can affect the internal temperature and humidity levels as cold damp air is pulled into the house.
This will also impede the quality of your litter, particularly in the areas closest to the pop holes.
The impact can often be lessened by good range management and the use of pop hole shutters which, while not restricting external access can help reduce the impact of the external environment.
Be careful on the angle you set on the shutters as they can cause issues with hens becoming trapped!
If leaving wide open, ensure they are snug to the side of the shed.

Fencing

Fencing requirements while assisting in predator control are also sometimes used to govern external movement of the flock alongside external enrichment such as trees or shades.
Where possible a good quality six strand wire or netting should be used around the perimeter. This should be dug well into the ground.

Dust bathing & Wing flapping

Both are examples of natural comfort behaviour.
Dust bathing is well documented in having a positive benefit for hens. It's classed as a high priority maintenance behaviour which can help support good feather condition and dislodge any unwelcome parasites.

Reducing the opportunity to exhibit these natural behaviours may cause increased stress in the hen and therefore should be encouraged by keeping a litter of excellent friable quality.
Dust baths are often used in addition to the litter to provide a separate calm dust bathing area.

These are often dual purpose as they can be filled with a diatomaceous powder as the substrate which can be beneficial in reducing any potential risk, such as the poultry red mite.

Enrichment

There is no doubt that introducing environmental enrichment to the flock can have a beneficial effect on the hen's wellbeing when used correctly.

Introducing the enrichment at different stages during the hen's life will help entertain the flock and reduce any undesired behaviour.

There are many options available such as pecking blocks or Lucerne bales which are often hung in hay nets.

Pecking behaviour

It is part of the natural behaviour of hens to demonstrate exploratory pecking of their surroundings.
However undue stress can turn this natural behaviour into more aggressive pecking.
Negative pecking behaviour once started can be difficult to control.

Some studies have found evidence of this behaviour as early as four weeks old.
Being aware of trigger factors can help improve the productivity of the flock and prevent the onset of injurious pecking.

Beak treatment
The treatment must be done in accordance to the animal welfare regulations valid for the country where the chicks, pullets and layers are housed.

Some examples of stresses

House climate
Temperature, humidity, air exchange rate or pollution by dust and / or harmful gases

Parasites
Infested birds can be restless and become agitated

Stocking density
Overcrowding or insufficient feeders and drinkers causing anxiety in the flock

Nutritional condition & Health status of the flock
Body weight, uniformity, signs of diseases

Deficiencies within the ration
such as protein & amino acids can have a bearing on pecking behaviour

Equipment issues
Unnecessary noises, broken equipment

Management
Rearing and production

Light intensity / Light source
Excessive light intensity, flickering light (low frequency fluorescent tubes or energy-saving bulbs emitting light at a very low frequency)

External factors
Issues outside the house, transport, farm equipment, staff rooms

Feed consistency
Ensure the composition of the ration is acceptable. Too fine can encourage selective eating and a nutritional imbalance leading to pecking behaviour. Pelleted feed can also have the same effect by reducing the time spent at the pecking troughs

Perches

Perching is essential for birds reared and housed in alternative systems. It has been demonstrated that providing access to perches before four weeks of age reduces the likelihood of injurious pecking. Perching not only allows roosting birds to exhibit natural behaviour and remove themselves at certain times from the activity within the house. It also assists in movement training and improved utilisation of the house system.

Aviary systems are designed with integrated perching; however, you should always ensure this is easily accessible.

Lighting

Lighting is an important aspect of poultry production.
Not only is it used to promote movement within systems stimulating sunrise and sunset, movement between different tiers and perching and nest box usage. It also plays a key part in maximizing production, reducing stress and helping regulate natural responses.

There are many choices now available from incandescent lighting through to modern LED systems.
Each bring with them their own benefits and drawbacks.

***Light placement** should never be underestimated. Whichever light you have in your house it needs to be conducive to movement throughout your system so independent and dimmable controls are vital.*
Having a well positioned system providing even light distribution at bird level will eliminate dark corners and shadowing which can both lead to floor/system eggs and undesirable behaviour.

Incandescent light

- *An incandescent light source offering flexibility over light positioning.*
- *The lights however are very inefficient as they produce more heat than light.*
- *Can be prone to damage as not suited for a harsh environment.*

Compact fluorescent light

- *A robust light source often supplied as compact or Linear.*
- *More energy efficient than Incandescent Light.*
- *Contain mercury which will limit future availability.*

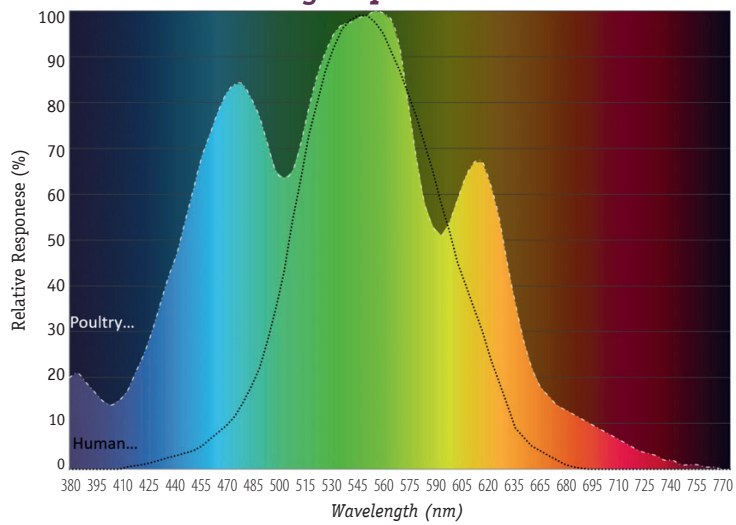
High Pressure Sodium

- *Further Improvements on energy efficiency, though often an expensive option with limited dimming capacity and reliance on regulatory ballasts.*

LED – Light Emitting Diode

- *An efficient lighting system often housed in waterproof and shatterproof housing making it more suitable to the poultry environment.*
- *Long life span offering energy savings and high-performance levels.*
- *Can be expensive and with lots of options in the market, not all are suitable for poultry.*

Light spectrum



Vision of Poultry

PDF

MANAGEMENT TOOL BOX by LOHMANN

Crucial points to consider in the management of laying hens, the choice of light sources and the design of lighting programs:

- *Always match daylight hours between the rearing house and production facility.*
- *Ensure your lighting system is optimum for your production system.*
- *Eliminate any unnecessary dark areas and shadowing.*
- *Use dimming or step-down facilities to encourage bird movement.*
- *Design a lighting program with market and local conditions in mind.*
- *Never reduce the lighting day length in the laying period.*
- *Reduce light ingress in open houses as much as possible to prevent early stimulation.*

Lighting program

Lighting program for your market

Understanding the influence your lighting program in rear will have on your required egg profile and requirements for the laying flock will help devise your lighting program.

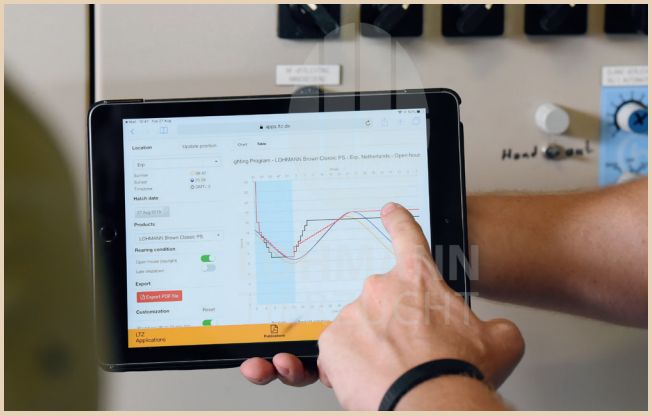
Lighting programs while influenced by geographical location, house type and commercial requirements are often specific to the individual, and any suggestions offered should be used as a guide only.

***Closed houses** are generally easier to control in regards lighting programs as there is no natural light ingress within the house. Therefore, you have full control over the lighting program and can often manipulate it, within reason, to your needs.*

*In **open house** facilities where natural daylight will influence the flock, a tailor-made lighting program should be developed which includes the time of year and geographical location where the pullets are being reared and stimulated to lay.*

Lighting program tool

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



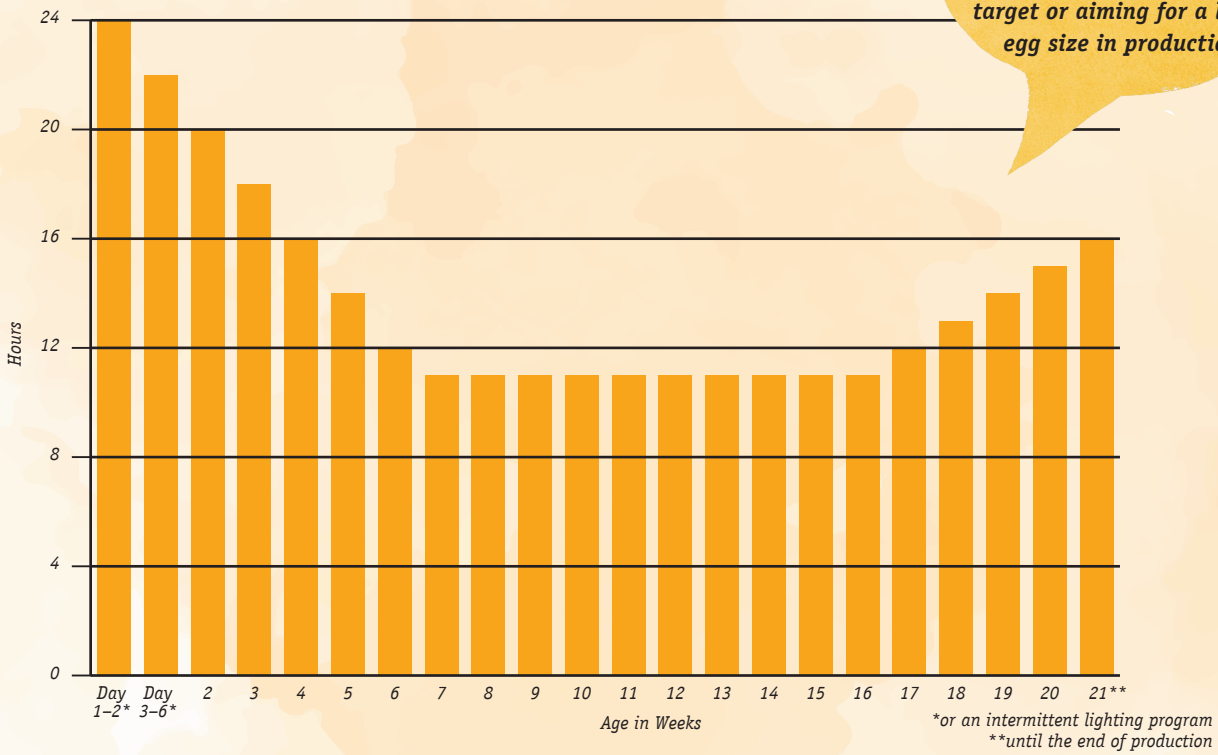
Please follow some basic principles concerning the lighting program:

- *Never increase the hours of light during the rearing period until the planned stimulation begins.*
- *Never decrease the hours of light during the production period.*

Intermittent lighting & Early light intensity

When the day-old chicks arrive on the farm, some will continue to sleep after the journey from the hatchery, while others will search for food and water.
An intermittent lighting program fits well with this irregular behaviour as not only does it help to synchronise the chick's behaviour and encourage the search for feed and water.
It also allows you to obtain a better overall impression of the flock.
LOHMANN advise implementing an intermittent lighting program from day one for up to 7–10 days and then switch to your regular step-down program.

Example of a lighting program



Light intensity

Light intensity is a key player in stimulating birds.
High lux levels will stimulate birds causing them to be more active.
Lowering intensity can have a calming effect and be a useful tool in reducing the risk of feather pecking.
In the early development stage of rearing we need the flock to be active so early stimulation is the key, followed by a gradual step down to a more relaxed level ready for the production house.
Often in production, lux levels are reduced later in lay as it offers a calming effect in the flock and can be used to reduce any potential instances of aggressive pecking.
Always remember the hen's perception of light is far greater than ours so any changes should be minimal and gradual.
Once the lights have been dimmed you should never increase them during the laying period.

Graphs for Lux Levels

PDF

Feeding & Nutrition

Pullet and layer nutrition is a continuous process ensuring diets meet all nutritional requirements.
Feeding pullets and hens in alternative systems is not only related with supplying feed nutrients but is also a compromise between feed format and presentation, feed management and equipment, stocking density and feeding space, light programs and light intensity plus environmental conditions. The interaction between these factors plus the cost of ingredients, should be considered in the decision-making process when looking at the nutrient density for each phase of the feeding programs.
From a nutritional point of view, the main difference in alternative production is a higher energy requirement due to increased movement.

Rearing

Stocking density, housing condition, temperature variation and feather cover in combination with a higher energy demand due to the bird's movement, all have a bearing on the nutritional demands of the pullet.
It is a fact that management within these systems plays a bigger role than in conventional production systems. Therefore, the nutrient supply must be adjusted accordingly in order to achieve the correct body weight development (weight and condition), uniformity and feed intake capacity.
Monitoring the pullet's body weight, from day old to at least week 32, is advisable to facilitate nutritional and management decisions according to each phase.

Starter / Pre-starter phase

Day old till week 5 is a critical period where the development of the main organs, bone and immune system take place. It's very important to achieve and maintain the target body weight during this period. Any reduction in nutrient and feed intake at this time will have a pronounced negative effect on persistence and mortality later in production.

The starter/pre-starter diet should include a relatively high energy density (≥ 2850kcal/kg; 11,90 MJ/kg). During this period, the protein/amino acid levels are relatively high due to their strong influence on early skeletal development and growth (Leeson & Summers, 1989).

Regarding feed format, micro-pellets (0–2 weeks) or crumbs (0–4 weeks) can be an option to enhance a good start to the flock, as it can encourage feed intake and ensure that all pullets have access to same nutrients.

However, it is always recommendedto feed a homogenous mash feed.

Growing phase

Between weeks 5 and 10, the emphasis is now on bone and muscle development as we head towards the full development of the skeletal frame. Therefore, it is critical to achieve the correct body weight according to our production target. Changing from the starter diet should only be considered when the body weight target is achieved.

Recommendations for Nutrient Levels for LOHMANN Pullets

PDF

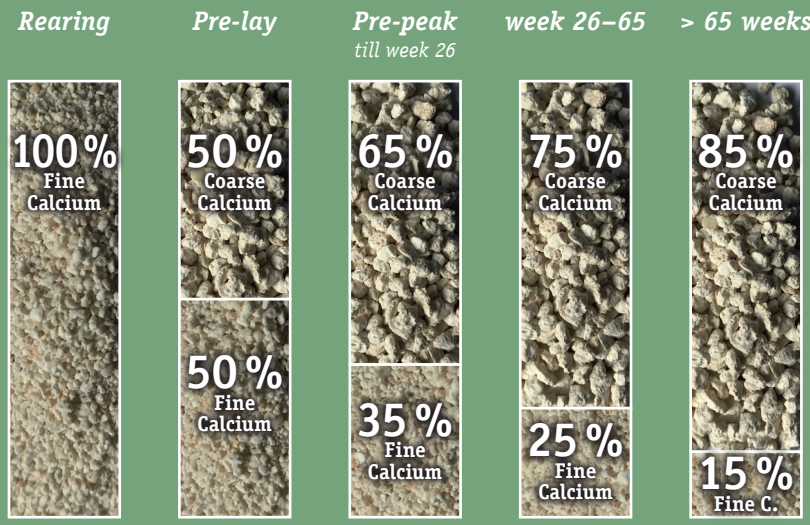
Developer phase

From week 10 till week 16, the nutrient density may be reduced due to a lower nutrient demand. During this period, gastrointestinal tract and feed intake capacity development takes place. It is essential to develop this capacity early to prepare for the onset of lay when the demand for nutrients is diverted to egg production alongside continued growth.

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 800–1000 g is recommended before production reaches 5 %. 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 50–60 % coarse and 40–50 % fine.

Calcium particles



Fine Calcium

Particle size: ø 0 – 2 mm
Fine Limestone: average 1 mm

Coarse Calcium

Particle size: ø 3 – 4 mm
less than 15 % of particles < 3 mm and less than 10 % > 5 mm

Transition period: the onset of lay

Transfer and the onset of production is a very stressful period, so it is vital that an adequate supply of nutrients is available and feed intake capacity is sufficient to meet all demands at this time.

Transfer itself brings many stresses which will put a demand on metabolism:

- *Loss of body weight at transfer (**sometimes** preceded by vaccination).*
- *Adapting to a new environment in the production house (often influenced by the set up in the rearing house).*
- *Development is still ongoing during this period with the emphasis on the reproductive organs and formation of the medullary bones.*
- *Egg production increases.*

Very often, during this period, a reduction in feed intake is seen, leading to a suboptimal nutrient supply. At this point, it is advisable to avoid any sudden changes in raw material composition or feed consistency that may further enhance the reduction in feed intake.

Even though hens can compensate to some extent the balance between nutrient requirements and feed intakes, we recommend implementing a slight increase in the nutrient density of the feed.

In some circumstances, crumb or pelleted feed can be an option to help maintain nutrient intake, bearing in mind that some of the advantages of using mash feed will be compromised, like gizzard functionality and gut health maintenance.

*Avoid increasing the number of feed distributions under low feed intake situations, as this can lead to selective eating which can lead to further nutritional imbalances. **Especially when feeding non-homogenous mash feed.***

A four-phase feeding program including starter, grower, developer and pre-lay diets is recommended.

In those situations where it has not been possible to achieve an adequate feed intake development, a pre-peak diet is advised.

This can be provided to the hens until they achieve an intake of 105 gpb/day for brown hens and 110 gpb/day for white hens.

Once this has been achieved the hens can be moved onto the diet designed for a > 59 grams daily egg mass output.

Recommendation for Nutrient Levels for Onset of Lay

Production

The main target of production is to adjust the nutrient requirements in order to optimise the egg output while maintaining body weight. Since egg output is influenced by energy, protein/amino acid levels and body weight, it's advisable to monitor the birds' weight on a regular basis as well as measuring parameters like feed and water intake, egg weight, and egg numbers.

This allows you to detect if the hens are producing to their full potential and if the nutrient specifica-tions are appropriate.

Once nutrient specifications are established, any further switch in diets should be made based on the parameters mentioned above.

To achieve the full productive potential of LOHMANN hens, maximizing feed intake is a must.

Feed intake capacity must be developed through training, which starts in rear, and by using a feed with an ***appropriate*** *nutrient density and an adequate supply of fibre alongside a homogenous feed format and feed distribution program.*

All LOHMANN breeds should be fed ad libitum. Any feed restriction will impact on productivity exacerbate any health issues and potentially lead to increased mortality.

Recommendation for Nutrient Levels for Production – BROWN HENS –

PDF

Recommendation for Nutrient Levels for Production – WHITE HENS –

PDF

Vitamin & Mineral supplements

As raw materials alone are unable to meet the vitamin and mineral requirements of the hen they should be added as supplements (premix) to the feed. These supplements are susceptible to oxidation and/or degradation, so inclusion of antioxidants may be advisable.

When manufacturing feed, it's also important to consider the inclusion rate of the supplements to guarantee an optimal distribution of all the ingredients and nutrients.

Adding the premix at a rate no less than 2 kg per tonne of feed is advisable.

Recommended Micro-Nutrient Specification for Hens & Pullets

PDF

Grit

In nature, birds consume grit (insoluble stones) that improve the grinding activity of the gizzard.

Grit stimulates the development of the crop and the gizzard during the rearing period, which in turn has a positive effect on feed intake capacity.

Amount and Granulation of Grit dependent on age

Week	*Allowance*	*Particle size*
1 – 3	1 g/bird/week	1 – 2 mm
4 – 9	2 g/bird/week	3 – 4 mm
9 – 13	3 g/bird/week	3 – 4 mm
≥ 14	4 g/bird/week	3 – 4 mm
Lay	4 g/bird/month	3 – 4 mm

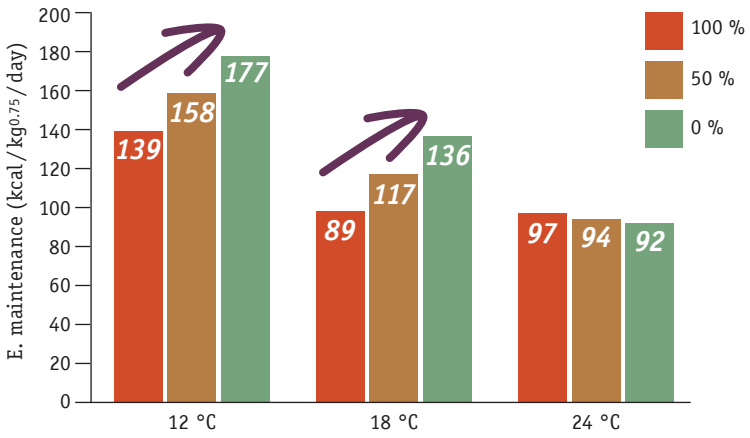
Energy

The energy requirement for hens in alternative systems are higher due to a higher level of physical activity, variable environmental and housing conditions. It can also be influenced by feather condition as poor feather condition may require higher energy intake to thermoregulate.

When daily energy intake requirement increases, hens will attempt to meet this demand by increasing feed intake.

If by any reason this can't be achieved, a production drop (due to nutrients diverted from egg production) or health problems can be expected.

Plumage condition



Source: Neme R. at al, 2005

Energy requirements in alternative systems

Barn

+ 10 %
Maintenance energy uplift

Aviary

+ 12 %
Maintenance energy uplift

Free range

+ 15 %
Maintenance energy uplift

Maintenance energy requirements in alternative systems have being calculated, under optimal management conditions, being + 10 % for floor hens and + 15 % for free range hens.

Energy becomes the most limiting nutrient for alternative egg production.

Protein | Amino acids levels & Egg weight

Protein and aminoacid levels in alternative production should be carefully considered since a higher feed intake is expected.

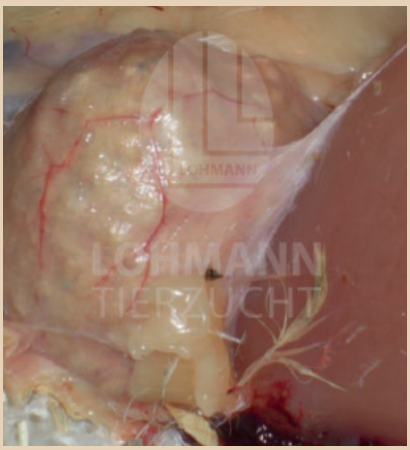
Maintaining the same protein/aminoacid levels as in a conventional system could lead to an undesirable egg size.

Therefore, when formulating the rations, the protein/energy ratio should be balanced accordingly.

Feed intake capacity development

There are two main organs directly involved in feed intake capacity. The crop and the gizzard.
The crop's function is related to the storage and moistening of the feed, while enhancing the exoge-nous enzymes activity.
The main role of the gizzard is the mechanical digestive process of reducing particle size and regulat-ing feed particle flow.
Their Functionality can be enhanced by feeding homogenous coarse mash diets:
The consumption of a mash diet can contribute to a well-developed gizzard leading to associated bene-fits such as gut motility improvement, increased contact time between nutrients and enzymes and a better nutrient digestibility.

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.
Implementing an effective feed distribution program 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 the pullet.



Crop


Gizzard

Feed form and presentation

Feed consumption of pullets and layers is influenced by feed form and presentation.
Regardless of the nutrient profile, pullets and laying hens have a marked preference for grains (easy to recognize), like most of nature they tend to refuse fine particles.

Generally, we have the option of presenting our diets in the form of mash, crumbs or pellets.


Mash


Crumb


Pellet

The target should be to get 60–70 % of particles between 1.0–2.5 mm.

Feeding coarse-medium mash diets with an adequate feed particle distribution is recommended.

The feed should be ***homogeneous*** *and have a good structure so it guarantees an even balance of coarse and fine feed particles thus improving nutrient intake capacity.*

A diet with an extremely fine consistency will reduce the feed intake of the birds and can result in a reduced supply of essential nutrients.

Adding a minimum of 1.5–2 % of some oil/fat reduces the dustiness of the feed and helps to improve feed structure and palatability.

Even more so in alternative systems, a high proportion of very fine components or a structure that is too coarse can lead to selective feed intake and an unbalanced nutrient supply leading to a decrease of flock uniformity

and may trigger undesirable behaviour (feather pecking, cannibalism, etc.).

If an adequate mash feed cannot be supplied (hygienic reasons, inappropriate equipment, etc.) diets can be supplied as quality crumbs or pellets. Pelleting and crumbs while sometimes improving daily gain and reducing wastage can increase ***nutrient*** *intake* ***but can also reduce*** *the time spent feeding. Which in alternative systems can lead to increased pecking behaviour.*

In addition, poor quality pellets or crumbs can lead to lower consumption due to the accumulation of fine particles and increased unpalatability.

Coarse calcium particles and coarse fibre particles may not be feasibly included in pellet and crumbs and due to pellet structure, a lower gizzard activity is noted when birds are fed pelleted rather than mash diets.

All these aspects alongside flock condition should be considered when making decisions about feed presentation.

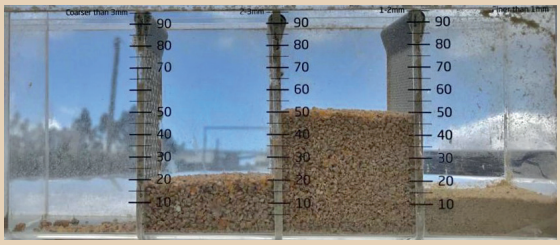
Time spending feeding for layers	Pellets (%)	Mash (%)
Eating time	11.20	21.06

Savory et al, 1974

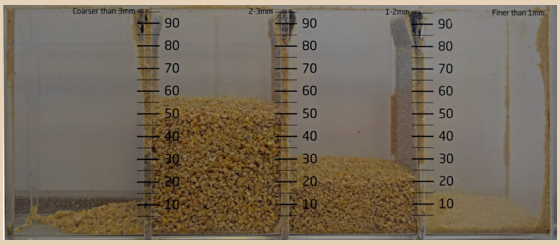
Feed particle distribution

	> 3.0 mm	3.0–2.0 mm	2.0–1.5 mm	1.5–1.0 mm	< 1.0 mm	< 0.5 mm
*Starter, %	–	≤ 20	20–30	30–40	≤ 15	≤ 5
Pullets, %	–	≤ 20	15–25	25–35	≤ 15	≤ 10
Layers, %	≤ 10	25–30	25–30	15–25	≤ 25	≤ 10

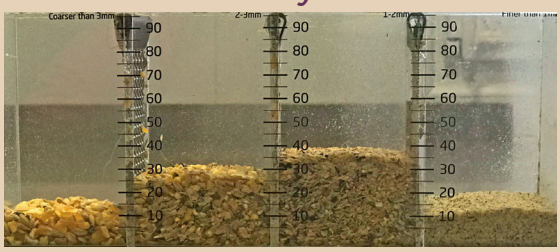
Crumbs – Starter



Crumbs – Rearing

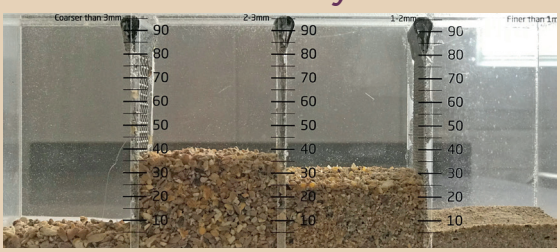


Mash Roller Mill – Lay



10 % 45 % 35 % 10 %

Mash Hammer Mill – Lay



10 % 35 % 45 % 10 %

Fibre

The modern concept of fibre defines a positive impact on the intestinal microflora, health and development depending on the physicochemical characteristics, source, duration and period of supply.
*The developer phase requires a reduced nutrient density (energy, protein and mineral) plus an increased inclusion of coarse particles of insoluble fibre (Crude Fibre: **6 – 6.5 %**; Neutral Detergent Fibre ≥ 16 %) to enhance feed intake capacity which is crucial at the onset of lay.*

To keep the positive effects of the crude fibre inclusion, it is advised to maintain a certain level throughout production.
Protein, amino acids level, minerals and fibre deficiencies, poor feed structure and sudden changes in formulation have all been associated with negative pecking behaviour. Formulating homogenous feed with appropriate quality and quantity of fibre will satiate the birds and keep them eating for longer periods which may help reduce the incidence of this undesirable behaviour.

Cereals, cereal by-products and oil seed by-products can be used as a source of crude fibre.

Cereals & Cereal by-products

PDF

Feed management

Feed management is the balance of providing a homogenous ration that meets the flock's requirements, while reducing selective eating and ensuring there is no over or restrictive feeding.
Within alternative systems birds express more natural foraging behaviour so we need to ensure that they feed effectively.
Those that use an intermittent lighting program have already begun an early learning process that encourages the chick to seek out and identify the feed source.

As the chicks continue to develop phase feeding should be introduced to encourage effective feeding.

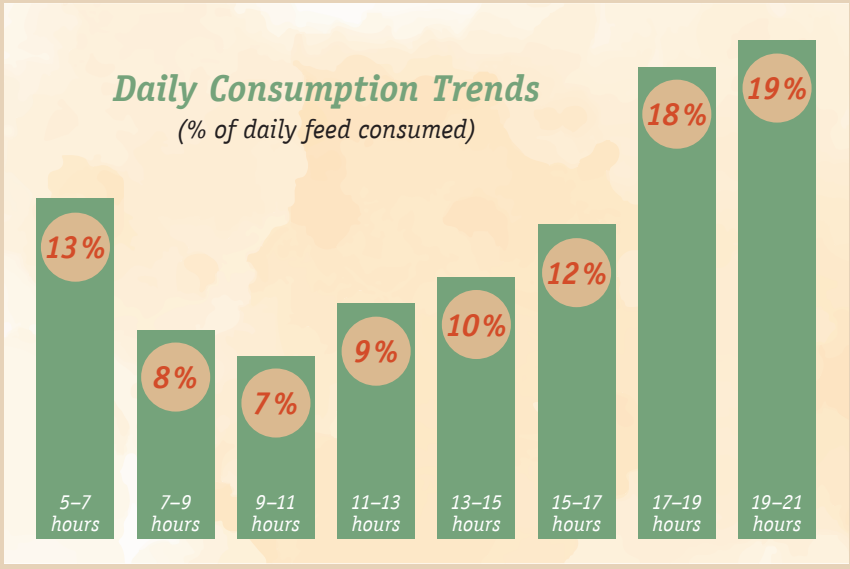
Phase feeding is important as it allows the birds to get used to eating a balanced meal rather than just the large grains they prefer.
Phase feeding should be started no later than three weeks of age to encourage good crop and stomach development.

By seven or eight weeks of age the birds should be well placed to empty the feed troughs to a desired level.
They are naturally selective eaters, and in modern feeding systems the smaller particles which contain a high proportion of the nutrients will always sink to the bottom.

Feed strategy

When devising a feed strategy, the bird's natural habits should be considered:
There is an initial drive for feed first thing in the morning, with the bulk of feed requested in the latter part of the day.

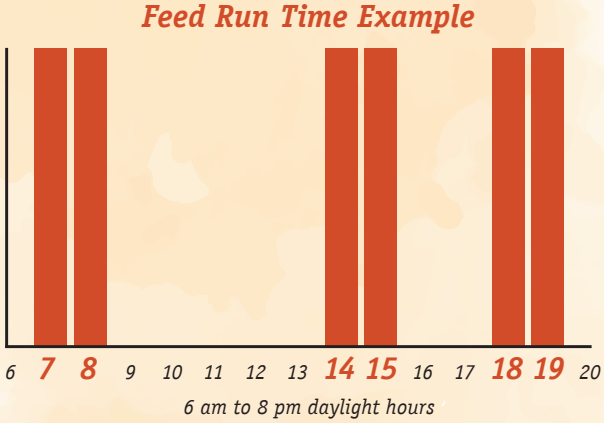
We also want the birds to clear the tracks at least once in the day. This can be subjective and we must be careful not to restrict feed as this can impact development and production.



Block/Double feeding

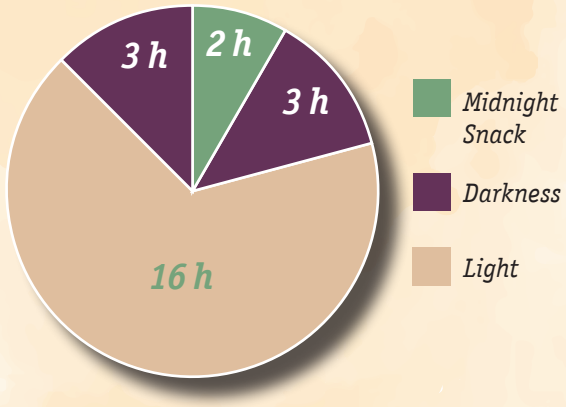
This is simply the method of running two feeds in close succession, primarily used to improve uniformity.

This is an effective tool when used correctly however care must be taken not to simply 'top up' the feed in the tracks as this can lead to selective eating.



Night time feeding

This is an additional feed that could be run during the dark period. It should only be used in extreme circumstances and not impede your regulatory bodies guidelines on available night and day hours. It can be effective when feeding in high temperatures and when body weight gain is an issue.
Follow local laws and regulation of your county.
For advice please contact your local LOHMANN technical representative.



Health

Parasites

Parasites are a common problem in free range systems.

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

- *Poor body weight gain and uniformity.*
- *Increased susceptibility to challenges.*
- *Loss of production.*
- *Cannibalism and mortality.*

Common Parasites

Roundworms: Ascaridia Galli

- *The most common.*
- *Adults are often easy to see.*
- *White-yellow in colour about 5 – 11 cm long.*
- *Often found in the small intestine.*

Cecal worm: Heterakis gallinae

- *Small, white hard to see.*
- *Will be found in the ceca.*
- *Earthworms a vector.*
- *Fairly harmless but can carry Histomonas Meleagridis which can lead to Blackhead.*

Hairworm: Capillaria

- *Lives in the small intestine and sometimes ceca.*
- *Small and hard to see.*

Monitoring

Worm eggs are often found in litter, soil and faeces.
Routine monitoring should be undertaken either via worm egg counts or Post mortem.

Chart showing monitoring

Larvae & worms program

Red Mite: Dermanyssus gallinae

Red mites can be a major problem in alternative production systems.
Often carried into the unit directly on the birds from exposure to wild birds, but can also be carried in on equipment and visitors.
A small infestation can impact productivity within the flock.
If not monitored and treated effectively then numbers can soon get out of control.
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.
Unfortunately, an ideal environment for the hens is also an ideal environment for red mite, so careful and regular monitoring is essential.

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 and*
- *inside the perches (hollow tubes)*

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.

Rodents

In free range systems, there is also an increased risk of exposure to Bacterial infections such as E. coli, Erysipelas and Pasteurella, which can lay dormant in the surrounding range area. These infections can also be passed through contact with rodents and are often identified with sites with close contact to sheep and pigs.

It is paramount bio security and rodent control is thorough and effective to help reduce the risk of infection.

Vaccination program

Vaccinations are preventive measures against infectious diseases and help to keep flocks healthy and productive.

They are only available on prescription from the attending veterinary officer. The manufacturers' directions for use must be strictly observed
Depending on the region, hens kept in alternative systems should also be vaccinated against fowl pox and especially in the case of free-range hens, against EDS (Egg Drop Syndrome) as wild waterfowl are reservoirs for the EDS virus. A combined vaccination against IB, ND, EDS and sometimes also ART should be carried out.

In alternative layer housing systems, the risk of infection is often higher due to increased exposure to potential risk vectors. Additional vaccines may be necessary for example for fowl pox and EDS. Always consult your veterinarian for advice.

As with any vaccination program, a local veterinarian should be consulted as they will be aware of issues within your region.

The success of vaccinations 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*

Example of a vaccination program for LOHMANN Layers

Disease	Occurrence		Application Methods	Remarks
	World-wide	Locally		
Marek	●		SC – IM	Day 1 – Hatchery
Newcastle *	●		DW – SP – SC – IM	Number of vaccinations according to disease pressure
Gumboro	●		DW	2 live vaccinations recommended
Infectious Bronchitis *	●		DW – SP – SC – IM	Number of vaccinations according to disease pressure
AE	●		DW – SC – WW	Vaccination of PS and Commercials is recommended
Mycoplasmosis		●	SP – ED – SC – IM	Vaccination before transfer
Fowl Pox		●	WW	Vaccination before transfer
Pasteurellosis		●	SC	2 vaccinations approx. at week 8 and 14
Infectious Coryza		●	SC	2 vaccinations approx. at week 8 and 14
Salmonella		●	DW – SP – IM	Vaccination before transfer
ILT		●	DW – ED	2 vaccinations between 6 and 14 weeks
EDS		●	SC – IM	Vaccination before transfer
Coccidiosis	●		SP – DW	1. Vaccination between day 1 – 9

DW: Drinking Water SP: Spray ED: Eye Drop WW: Wing Web IM: Intramuscular Injection SC: Subcutaneous Injection

** An implementation of early live vaccination for Newcastle Disease (ND) and Infectious Bronchitis (IB) is of high value in order to induce local protection in the respiratory system of the chicks (priming effect). The right choice of vaccine is crucial. Never vaccinate very young birds with high-virulence live vaccine. Revaccination with live ND and/or IB every 6–8 weeks during production period is beneficial in order to improve the local immunity.*

The use of inactivated ND/IB/IBD vaccine before onset of lay is recommended.

A severe vaccination program especially intramuscular injections may depress the body weight development.

Always keep records of all vaccinations and vaccine serial numbers.

Vaccination methods

Individual vaccination

Often injections or eye drops. Can be very effective but very labour intensive.

Drinking water vaccination

Easy to administer but many factors to take into consideration.

- *Quality of water available*
- *Efficacy of water system being used*
- *Water stabilisers present*

Spray vaccination

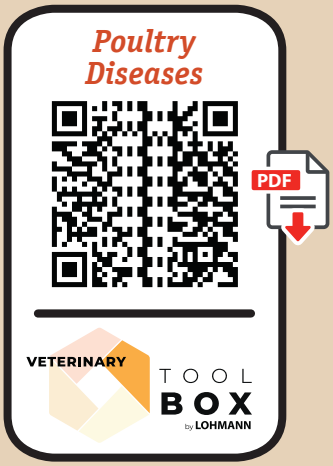
Spray vaccinations are also not very labour intensive and are highly effective, but may occasionally have side effects.

- *Labour reliant*
- *Can be difficult to ensure all birds are treated*
- *Can be disruptive to the flock during administration*

Supplementary vaccinations

The infection pressure in deep litter systems is far greater than for cage birds. Moreover, strains of coliform bacteria and Pasteurella can occur and develop in a very narrow geographical area. In such cases, it may be necessary to design autogenous vaccines for use in the rearing facility. These are vaccines devised specifically for your individual sites.

Administering vitamins/prebiotics for the first two to three days before and after vaccination can help to reduce stress and prevent undesired reactions. To what extent this need to be done depends on the specific situation on each farm.



Information

How LOHMANN is calculating the energy content of feed and raw materials (International WPSA-Formula):

ME MJ/kg = g crude protein x 0.01551
+ g crude fat x 0.03431
+ g starch x 0.01669
+ g sugar x 0.01301 (as saccharose)

ME = metabolizable energy in MJ/kg
1 kcal = 4.187 kJ

Disclaimer

The information, advices and suggestions given in this management guide should be used for guidance and educational purposes only, recognizing 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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