MANAGEMENT-GUIDE

for Laying Hens in Deep Litter, Aviary and Free-Range Systems

LOHMANN
TIERZUCHT

PRODUCTS OF LOHMANN TIERZUCHT

- **LOHMANN LSL-CLASSIC**
- **LOHMANN BROWN-CLASSIC**
- **LOHMANN LSL-LITE**
- **LOHMANN BROWN-LITE**
- **LOHMANN LSL-EXTRA**
- **LOHMANN TRADITION**
- **LOHMANN SANDY**
- **LOHMANN SILVER**

Increasing world wide concentration and growing competition in the poultry industry requires efficient layers to satisfy specific market requirements.

Lohmann Tierzucht offers a wider range of high quality layer strains "bred in Germany" to meet these demands.

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

LOHMANN LSL-LITE and **LOHMANN BROWN-LITE** are two new products, designed for markets which prefer smaller eggs and measure efficiency in g feed per egg. For markets requiring more XL-size eggs **LOHMANN LSL-EXTRA** and **LOHMANN BROWN-EXTRA** are the ideal white and brown layers.

LOHMANN TRADITION, a new brown egg layer with high early egg weight is being developed mainly for alternative management systems.

LOHMANN SILVER is a predominately white feathering layer for the production of uniform brown eggs with reduced egg weight. Her special advantage is the excellent feathering.

LOHMANN SANDY is a white feathering layer for the production of creme coloured eggs. The pullet has an outstanding food conversion.

Lohmann LSL hens, too, adapt well to non-cage systems and usually do not require beak trimming.

CONTENTS

1. INTRODUCTION

The management guide for keeping laying hens in deep litter, aviary and free-range systems draws on results of scientific studies and, most importantly, practical experiences in the field. Implementing the recommendations will help farmers to unlock the full genetic potential of Lohmann breeding products. This management programme for keeping laying hens in deep litter, aviary and free-range systems is intended as a guide for newcomers while at the same time assisting experienced poultry men with a view to optimising their work with Lohmann breeding products.

2. LOHMANN BREEDING PRODUCTS

The trend towards keeping laying hens in deep litter, aviary and free-range systems has been observed for many years in some countries. Organic farms operating in accordance with the rules of their respective associations are gaining market shares. Brown-shelled eggs are currently predominant in this market segment.

LOHMANN BROWN is a prolific layer of medium-weight eggs with top quality shells.

LOHMANN TRADITION is a new line bred especially for this segment. This hen is characterised by docile behaviour and a rapidly rising egg weight with uniform shell colour and strength. She also has a slightly higher feed intake capacity.

LOHMANN LSL is a white-egg layer and as such highly suitable for deep litter, aviary and free-range management. Her special traits are docility, good plumage and large egg numbers of medium weight.

LOHMANN SILVER is a predominately white feathering layer for the production of uniform brown eggs with reduced egg weight. Her special advantage is the excellent feathering.

3. LAYING PERIOD

Deep litter or aviary housing is only recommended for pullets that have been reared under the same management system. This ensures that the birds get used to their environment quickly and that the move to the layer farms does not cause stress which might result in production losses.

3.1 Design of laying houses

The construction of deep litter and aviary housing, with additional outdoor facilities in the case of free-range systems, must meet different and often higher standards than cage housing.

As litter is almost always used in these systems, a uniform house climate with optimal air exchange is extremely important. It is the only way to guarantee dry litter, minimal concentrations of harmful gases and production of clean eggs.

The facilities within the building, especially in aviaries, must be designed for maximum comfort and must allow the hens to express their natural behaviour patterns. A division of the space into separate functional areas for foraging, feeding and drinking, egg-laying and resting exerts a calming influence on the hens. This can have a positive effect on the number of clean nest eggs. The building must be designed with the ultimate objective of achieving 100 % nest eggs. Dark corners in the littered area encourage hens to lay eggs on the floor and should therefore be avoided. Floor eggs cannot be marketed as A-grade merchandise and reduce farm income.

If the deep litter house or aviary is combined with an free range, the building should be positioned in the north/south direction. This avoids the two side walls heating up at different rates and differences in the amount of light entering the two halves of the building when the pop-holes are open.

The design of the building and its installations should be user-friendly to allow easy servicing.

3.2 Deep litter system

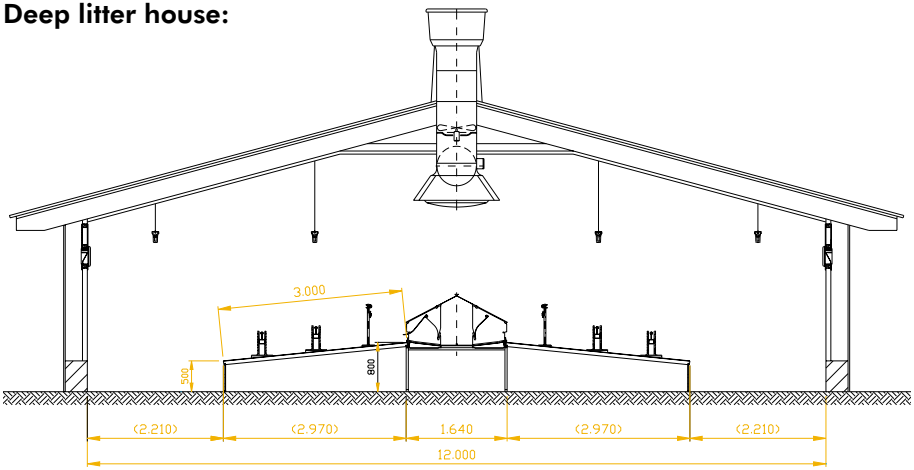
In the classic deep litter system for laying hens the building is divided into a littered foraging area and a raised (by about 1/2 metre) feeding, drinking and nesting area above a droppings pit. This area is usually covered with wooden or plastic slats and the nests are easily accessible. Drinkers and feeders are positioned on the perforated floor in front of the nests, with drinkers mounted at a distance of 30 to 50 cm directly in front of the entrance to the nest.

In order to ensure good dispersion of the hens across the building and to provide resting areas, perches or rails can be provided, which should be installed above the perforated floor.

The littered scratching area takes up about one-third of the total floor space, but can be replaced completely by perforated flooring in a modified variant. In this case it is recommended to provide an additional outdoor area where the birds can express their natural behaviours such as scratching and dust-bathing.

Deep litter systems can vary considerably in design detail depending on the type of building. The drawing on page 4 shows one such variant.

Deep litter house:

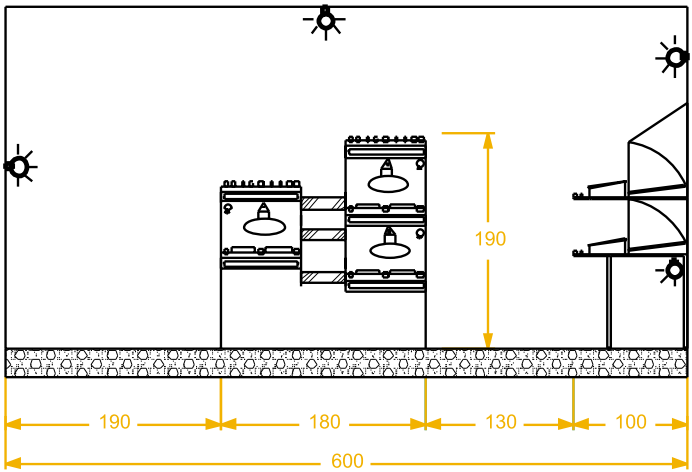


Your pullet supplier can provide information about the advantages and disadvantages of other deep litter systems.

3.3 Aviary system

Aviary systems for the laying period are now supplied by several manufacturers. In addition to the furniture found in grower facilities, the layer variants feature automatic nests with integral alighting rails. For hens reared in a aviary the move to the new facility does not involve any special adjustment. The birds readily accept the automatic nests and the proportion of floor eggs remains low.

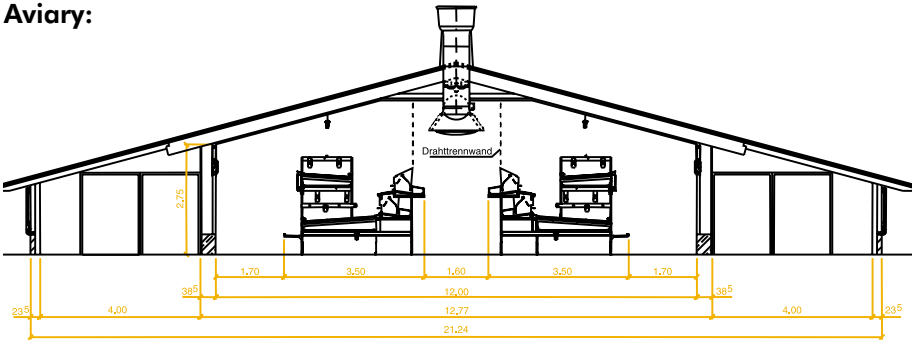
Aviary:



Your pullet supplier can provide information about the advantages and disadvantages of other aviary systems.

The drawing below shows an example of a aviary with access to a so called wintergarden, a littered outdoor area without feeders and drinkers. This serves as a transitional area leading to the open-air run provided by free-range systems.

Aviary:



Your pullet supplier can provide information about the advantages and disadvantages of other aviary systems.

3.4 Housing of pullets

The move from the grower to the layer facility should be handled with care but speedily. Capture, transportation and vaccination are stressful to the hens. They also face the challenge of having to adapt to a different environment. Feeders and drinkers have to be found and a new ranking order established. Gentle rehousing and careful habituation of the flock to the new management system are crucial for good production results.

It is recommended that pullets from alternative rearing systems are moved to the production facility in good time before the anticipated start of lay. This allows the birds to familiarise themselves with the new environment before they start to lay.

Feeding and drinking facilities should be located so that the birds are evenly dispersed across the building. Feed, and especially water, should be easy to find by the hens. After arrival in the new building the light should be left full on for about two hours so that the hens can find their way around. Drinkers must be adjusted prior to housing so that the hens notice them immediately and drink straight away. It is normal for pullets to lose weight after transportation and rehousing. It is therefore important that they have immediate access to feed and water.

3.5 Litter

The type and quality of the litter are of major importance for the birds and the house climate. Straw must be clean and free of mould. Wheat straw is preferable to barley or oat straw. Barley straw contains awn residues which can cause injury to the hens, and oat straw does not absorb sufficient moisture. The straw should not be chopped but should be put down as long straw. Splicing improves moisture absorbency. Long straw has the added advantage of encouraging the hens to forage in the litter material. This stimulates the birds' natural investigative and feeding behaviours, thus reducing behavioural problems.

Wood shavings are a good litter material provided they are dust-free and come from softwood varieties that have not been chemically treated. Minimum particle sizes of ≥1 cm are recommended.

3.6 House climate

Accurate control of the ventilation system is essential to guarantee an even house climate. Draughts as well as stuffy or stale air are injurious to health. Dust and excessive concentrations of harmful gases damage the birds' respiratory organs and impair their immunocompetence. Poorly operated ventilation equipment is often the cause of problems in the flock. The following minimum requirements for house air should be maintained:

O_2	over 16 %
CO_2	under 0,3 %
CO	under 40 ppm
NH_3	under 20 ppm
H_2S	under 5 ppm

Equipment recommended for deep litter and aviary systems are as follows:

3.7 Equipment needed / Minimum technical requirements*

Daylength	Min. 8 hours with an average indoor light intensity of 10 Lux
Darkness	Min. 6 hours or natural dark phase
Feeding place	10 cm trough space / bird
Drinking place	100 birds / circular drinking trough; 10 birds / nipple
Distances	Max. 8 metres to feeder/drinker
Nest boxes	5 hens / individual nest; in communal nests 120 hens / m^2
Proportion of litter	At least 33 % of the floor area
Droppings box	Deep enough to hold the droppings from one batch
Perches	15 cm / hen; perches 4 cm wide; distance between perches 30 cm
Pop-holes to exterior	One pop-hole / 600 hens Minimum size: 45 cm high x 2 m wide
Duration of access to outside run	Pop-holes open for at least 8 hours

* complies with EU regulations

3.8 Stocking density

The stocking density depends on the housing system. In deep litter systems stocking densities of up to 7 birds / m^2 of floor space are acceptable.

Stocking rates of aviaries should follow the recommendations of the manufacturer of the system concerned. Densities of up to 25 hens / m^2 of usable room space are possible. These stocking densities are only realistic however if the provision of feeding and drinking systems complies with the regulations for technical equipment.

3.9 Grit

Provision of insoluble grit for free access feeding from circular troughs is recommended. This stimulates digestion and improves feed intake capacity. The following are reference values for the granulation and the amount of grit to be supplied:

Once a month 3 g/hen (4 - 6 mm granulation)

3.10 Nutrition

The genetic production potential of Lohmann breeding products can only be realised with a highly nutritious diet. Along with the lighting programme and adequate body-weight development, feeding is the third and crucial factor in capturing the full genetic performance potential.

The best way of ensuring proper nutrition is the use of a phase feeding system matched to the level of production.

The following points need to be considered when formulating diets for laying hens kept in deep litter, aviary and free-range systems:

- The energy requirement of deep litter or free-range hens is higher because of their greater activity level.
- The plumage of hens kept under alternative systems is sometimes in poorer condition. This creates an additional energy requirement.
- Raw materials which adversely affect faecal consistency should not be used.

3.11 Pre-lay diet

For pullets reared in deep litter or aviary systems the provision of a pre-lay diet is recommended. The pre-lay diet has twice the calcium content of pullet feed and higher levels of protein, amino acids and phosphorus. Feeding such a diet for about 14 days prior to the start of lay is beneficial. It improves flock uniformity by enabling early maturing birds to obtain sufficient calcium for eggshell production and by providing a better nutrient supply for late maturing birds.

Recommended nutrient allowances for brown egg layers*

Period of use		Developer 9. - 16. Wk.	Pre-Lay 17. Wk. - 5 % Prod.	Start Lay 5 % Prod. - ~28. Wk.
Metabolisable energy	kcal	2750 - 2800	2750 - 2800	2800
Minimum	MJ	11.4	11.4	11.6
Crude protein	%	14.5	17.5	18.0
Methionine	%	0.33	0.36	0.40
Methionine/Cystin	%	0.57	0.68	0.73
Dig. M/C	%	0.47	0.56	0.60
Lysine	%	0.65	0.85	0.80
Dig. Lysine	%	0.53	0.70	0.66
Tryptophan	%	0.16	0.20	0.18
Threonine	%	0.50	0.60	0.59
Calcium	%	0.90	2.00	3.50
Phosphorus, total	%	0.58	0.65	0.55
Phosph., available	%	0.37	0.45	0.40
Sodium	%	0.16	0.16	0.15
Chlorine	%	0.16	0.16	0.15
Linoleic acid	%	1.00	1.00	2.00

* These recommendations are intended for LOHMANN BROWN, LOHMANN SILVER and LOHMANN TRADITION. Allowances for LOHMANN LSL may be found in the management programme for that product.

On reaching about 5 % production, the diet should be switched to the first layer feed, as otherwise the early laying hens will experience calcium deficiency.

3.12 Layer feed

The nutrient requirement of laying hens depends on the daily egg mass produced by them. This is calculated by multiplying the egg production per hen in the flock by the average weight of the eggs laid in that week.

Example: daily egg mass - LOHMANN BROWN - week 30:
93.9 % production per HD x 61.3 g = 57.6 g egg mass per day

Assuming an adequate feed intake, the most efficient way of meeting the hens' nutrient requirement is by phase feeding. The recommended nutrient allowances at different daily feed intakes may be found in the tables below:

Recommended nutrients per kg feed at different rates of consumption
Phase 1 (about 29 to about 45 weeks of age over 57.5 g egg mass/day)*

Nutrient	Requirement per hen/day	Content at a daily feed consumption of 105 g	110 g	115 g	120 g
Crude protein	19.60	18.70 %	17.80 %	17.00 %	16.30 %
Methionine	0.44	0.42 %	0.40 %	0.38 %	0.36 %
Meth./Cyst.	0.80	0.76 %	0.73 %	0.70 %	0.67 %
Dig. M/C	0.66	0.63 %	0.60 %	0.57 %	0.55 %
Lysine	0.87	0.83 %	0.79 %	0.76 %	0.73 %
Dig. Lysin	0.71	0.68 %	0.65 %	0.62 %	0.59 %
Tryptophan	0.21	0.20 %	0.19 %	0.18 %	0.18 %
Threonine	0.64	0.61 %	0.58 %	0.56 %	0.53 %
Calcium	4.10	3.90 %	3.75 %	3.60 %	3.45 %
Phosph., total	0.60	0.57 %	0.55 %	0.52 %	0.50 %
Phosph., avail.	0.40	0.40 %	0.38 %	0.36 %	0.35 %
Sodium	0.17	0.16 %	0.15 %	0.15 %	0.14 %
Chlorine	0.17	0.16 %	0.15 %	0.15 %	0.14 %
Linoleic acid	2.00	1.90 %	1.80 %	1.75 %	1.70 %

* These recommendations are intended for LOHMANN BROWN, LOHMANN SILVER and LOHMANN TRADITION. Allowances for LOHMANN LSL may be found in the management programme for that product.

Phase 2 (about 46 to about 65 weeks of age ≅ over 55.5 g egg mass/day)*

Nutrient	Requirement per hen/day	Content at a daily feed consumption of 105 g	110 g	115 g	120 g
Crude protein	18.40	17.50 %	16.70 %	16.00 %	15.50 %
Methionine	0.38	0.36 %	0.35 %	0.33 %	0.32 %
Meth./Cyst.	0.71	0.68 %	0.65 %	0.62 %	0.59 %
Dig. M/C	0.59	0.56 %	0.54 %	0.51 %	0.49 %
Lysine	0.83	0.79 %	0.75 %	0.72 %	0.69 %
Dig. Lysin	0.68	0.65 %	0.62 %	0.59 %	0.57 %
Tryptophan	0.20	0.19 %	0.18 %	0.17 %	0.17 %
Threonine	0.58	0.55 %	0.53 %	0.50 %	0.48 %
Calcium	4.30	4.10 %	3.90 %	3.75 %	3.60 %
Phosph., total	0.54	0.51 %	0.49 %	0.47 %	0.45 %
Phosph., avail.	0.38	0.36 %	0.34 %	0.33 %	0.32 %
Sodium	0.17	0.16 %	0.15 %	0.15 %	0.14 %
Chlorine	0.17	0.16 %	0.15 %	0.15 %	0.14 %
Linoleic acid	1.60	1.50 %	1.45 %	1.40 %	1.35 %

from 65 weeks of age *

Nutrient	Requirement per hen/day	Content at a daily feed consumption of 105 g	110 g	115 g	120 g
Crude protein	17.80	17.00 %	16.20 %	15.50 %	15.00 %
Methionine	0.36	0.34 %	0.33 %	0.31 %	0.30 %
Meth./Cyst.	0.67	0.64 %	0.61 %	0.58 %	0.56 %
Dig. M/C	0.55	0.52 %	0.50 %	0.48 %	0.46 %
Lysine	0.78	0.74 %	0.71 %	0.68 %	0.65 %
Dig. Lysin	0.64	0.61 %	0.58 %	0.56 %	0.53 %
Tryptophan	0.19	0.18 %	0.17 %	0.17 %	0.16 %
Threonine	0.55	0.52 %	0.50 %	0.48 %	0.46 %
Calcium	4.40	4.20 %	4.00 %	3.85 %	3.70 %
Phosph., total	0.47	0.45 %	0.43 %	0.41 %	0.39 %
Phosph., avail.	0.33	0.31 %	0.30 %	0.29 %	0.27 %
Sodium	0.17	0.16 %	0.15 %	0.15 %	0.14 %
Chlorine	0.17	0.16 %	0.15 %	0.15 %	0.14 %
Linoleic acid	1.20	1.15 %	1.10 %	1.05 %	1.00 %

* These recommendations are intended for LOHMANN BROWN, LOHMANN SILVER and LOHMANN TRADITION. Allowances for LOHMANN LSL may be found in the management programme for that product.

If the hens are unable to cover their energy requirement from the amount of feed consumed, the energy content of the ration must be increased.

3.13 Water quality

Along with the provision of a first-class diet for optimal nutrition, special attention must be paid to the quality of the drinking water. This should be of potable quality, free of bacterial contamination and with at least the following specifications:

• Colourless, odourless and sediment-free		**Note:**
• pH:	6-8	acidic water damages vaccines and medication
• Nitrate content	max. 50 mg / litre	
• Nitrite content	max. 0.05 mg / litre	
• Ammonia content	max. 0.5 mg litre	
• Sulphate concentration (SO_4)	< 100 ppm	
• Iron content	max. 1 mg / litre	
• Phosphate content (PO_4)	max. 2 mg / litre	
• Manganese content	max. 1 mg / litre	
• Common salt content (NaCl)	< 330 mg / litre	
• Total salt content	0-1000 ppm very good 1000-3000 ppm acceptable 3000-4000 ppm poor (liquid excrement) >4000 ppm dangerous (renal damage)	

3.14 Flock control

In the early days after housing the foundations are laid for the behaviour of the flock during the 12-month laying period. Special attention to detail during the first two weeks after moving the flock to an alternative production system will pay ample dividends later.

Every morning at dawn a thorough tour of inspection is necessary. This should comprise checks for the proper functioning of

- drinkers
- feeders
- and lighting installations;

the house climate should be checked and the condition of the flock and the hens' behaviour assessed.

Immediately after the start of lay multiple inspections are recommended to gather any floor eggs. This helps the hens to get used to the staff while at the same time rapidly reducing the proportion of floor eggs.

Hens who never seem to visit the nest areas tend to produce floor eggs. These birds should be moved by the attendants in the direction of the nests. Corners, dark and warm places in the littered area and other parts of the house that are attractive for floor egg layers should be avoided. This can be accomplished in practice by installing partitions, electric fences and additional ventilation holes in these parts of the building.

3.15 Training the birds

A functioning management system for laying hens in deep litter housing or aviaries requires that the birds utilise the raised perforated floors and the perches. This minimises the amount of droppings deposited in the littered foraging area and encourages frequent use of the nests. Early training is therefore indispensable. This applies particularly to pullets reared in pure floor systems, who are unfamiliar with droppings pits. In such cases temporary closure of the scratching area by blocking access to it has proved effective. Once the flock has become accustomed to its surroundings the partition can be removed, allowing the hens to roam freely all over the building.

In deep litter and aviary systems light sources are installed above the littered area and also above the droppings pit and the perches. To assist hen training, the light is switched off in stages at the end of the day: for the last half hour only the light at the droppings pit and the perches remain lit. This forces all hens to move towards the droppings pit or the resting areas of the aviary during the last 30 minutes. In the early days after housing of the flock an inspection should be made at this time in order to move manually any hens still remaining in the scratching area. Failure to do this considerably increases the likelihood of floor eggs and the risk that these birds will consume no more water or food that day.

Floor eggs can be prevented by considering the following in the design of the building and the management of young flocks:

- Draughty nests bother the hens during egg laying and should therefore be avoided.
- The entrance to the nest must be clearly visible to the hens.
- At the beginning of the laying period the litter depth should not exceed 2 cm. Light-coloured litter is preferable to dark.
- Feeders and drinkers should not be more than 2 to 3 metres away from the nest boxes. Drinking water in the vicinity of the nests entices the birds into this area.
- Feeders and drinkers should be positioned in such a way that they do not create attractive areas for egg-laying underneath.
- Nest boxes should be easily accessible to the hens, preferably by positioning them in a central location in the room.
- If nest boxes are mounted on the droppings pit the perforated floor should slant towards the nest at an angle of about 7°. This increases the hens' motivation to deposit eggs in the nest.

- If alighting rails are installed in front of the nests, these should incorporate barriers every two metres to stop the hens from parading in front of the nests and blocking access to the nest.
- Pullets should not be moved to the production facility before 17 weeks of age.
- The nest boxes must be opened 10 to 14 days before the start of lay.
- Hens should not be disturbed during egg laying - avoid feeding at this time if possible.
- Floor eggs should be gathered quickly, if necessary several times a day.
- If floor eggs still occur, increasing the daylength by adding an extra hour of light at the beginning of the day is often an effective remedy.

3.16 Behavioural problems

Watch closely for any signs of abnormal behaviour such as feather pecking or cannibalism. A sudden outbreak without changes in the lighting regime can have a variety of reasons. If these vices occur, check the following:

- **Feed consistency** - do not feed very finely ground meal-type rations or pelleted feed. Both encourage abnormal behaviour.
- **Protein/amino acid content of the diet** - deficiencies cause problems.
- **Supply of calcium and sodium** - deficiency makes the birds irritable.
- **Nutritional and health status of the flock** - bodyweight, uniformity, signs of disease
- **Stocking density** - overcrowded housing or insufficient feeders and drinkers cause excitability in the flock.
- **House climate** - temperature, humidity, air exchange rate or pollution by dust and/or harmful gases.
- **Light intensity / light source** - excessive light intensity, flickering lights (fluorescent tubes or energy-saving bulbs emitting light at too low a frequency) or light outside the red spectrum cause distress to the birds.
- **Ecto- and endoparasites** - infected birds are restless and develop diarrhoea.

3.17 Lighting

If natural light enters the building throughout the day or if the hens have free access to covered outdoor areas or runs, the effect of the natural daylight must be considered when designing lighting programmes. Bear in mind that in central Europe the natural daylength increases in the course of the calendar year to about 17 hours until late June and then shortens to about 8 hours until late December.

The principle for windowless houses **"Do not increase the light period during rearing and do not reduce the light period during production"** also applies to "open" housing, but it is essential to consider the natural daylength.

If flocks are moved to production housing with windows that cannot be darkened or into which light enters through ventilation shafts (stray light), or if the hens have free access to covered outdoor areas or runs, the lighting programme must be adjusted to the natural daylength at the time of rehousing. We distinguish between two variants:

1. Production starts as the natural daylength decreases
2. Production starts as the natural daylength increases

In both variant 1 and variant 2 the lighting programme at 17 weeks of age should be set to a light period of at least 10 hours, taking the natural daylength into account, and increased by one hour every week to 14 hours at 21 weeks of age. **Never switch on the artificial light before 04.00 hours (CE summer time)**. During the spring months the lighting programme is affected by the increase in the natural daylength and gradually extended to about 17 hours. When the natural daylength begins to decrease from July, the 17-hour light period should be kept constant until the end of the production period. This can be accomplished very simply as follows:

- 04.00* hours: lights on - dimmer switch off at ≥ 50-60 Lux.
- Dimmer switch on at ≤ 50-60 Lux - 21.00* hours lights off.

* Central European summer time

These times can and should be varied depending on the condition of the flocks, the start of lay (production, egg size) and the facilities in the building.

If for operational reasons a different diurnal rhythm from the one described above is applied, it should not differ too much from the dawn/dusk times stated above, having regard to the diurnal rhythm of the hens.

If the birds are driven indoors before the end of the natural day and if the building can be darkened completely, the lighting programme for windowless laying houses should be applied:

Lighting programme for light tight laying houses

	Light in hours		Light intensity	
Age in weeks	LSL	LB/LT/LS	W/m^2	Lux
17	8	10	1* - 2	4 - 6* / 5 - 7
18	8	11	3	10 - 15
19	9	12	3	10 - 15
20	10	13	3	10 - 15
21	11	14	3	10 - 15
22	12	14	3	10 - 15
23	13	14	3	10 - 15
24	14	14	3	10 - 15
25**	14 -16	14 - 16	3	10 - 15

* lower intensity for LSL hens ** to the end of production

The times for darkening the room or opening the windows are determined by the lighting programme. It is important to follow the correct sequence: in the evening close the windows first, then switch off the light; in the morning switch on the light first, then open the windows.

3.18 Drinking

Drinkers should be positioned in the vicinity of the nests. This encourages the hens to drink when entering the nest boxes.

Nipple drinkers are preferable to round drinkers for hygienic reasons. If round drinkers are used they should be cleaned at least once a week.

Repeated disinfection of the waterers during the production period helps to reduce the microbial burden.

3.19 Feeding

For young flocks feeders should be operated hourly the first three hours of the light period. During the remainder of the day three-hourly feeding is desirable in order to stimulate feed intake.

Technical facilities permitting (trough, chain feeder), the feeders should be emptied completely by the hens once every morning. This prevents selective feeding and maintains the birds' ability to eat large portions.

When a flock has become accustomed to its surroundings and the feed intake matches the physiological requirement, the number of feedings can be reduced.

It is important to ensure that the hens have sufficient food and enough time to eat it before the end of the day so that adequate nutrients for egg formation are available during the night.

If calcium supplements are to be administered, the last feeding of the day is the best time to do this in order to support nocturnal egg shell formation.

3.20 Vaccinations

The pullets supplied by the multiplier farm will have been immunised by vaccinations against bacterial and viral infections during the rearing period. While laying hens in cage systems are almost completely protected by such vaccinations, the infection pressure is many times greater for birds in deep litter or aviary systems. Regular booster vaccinations against IB and ND are therefore recommended for laying hens in alternative production systems. Vaccination intervals are determined by the infection pressure and the choice of vaccine depends on the locally occurring field strains.

Some strains of coliform bacteria and Pasteurella can occur and develop in a very narrow geographic area. In such cases it may be necessary to design highly specific vaccines for use during the rearing phase in preparation for the laying period.

The veterinary laboratory of Lohmann Tierzucht provides valuable practical assistance in this area, working in close collaboration with local poultry veterinarians.

3.21 Parasites

Roundworms and threadworms occur in chickens and are transmitted via the droppings. If worm infestation is suspected a bulk faecal sample should be taken and sent for analysis to a veterinary laboratory. If necessary the flock may have to be wormed.

Red fowl mites are a major problem in alternative egg production systems. They damage health and reduce the productivity of flocks. Infestation causes restlessness among the hens with undesirable consequences such as feather pecking resulting in loss of feathers, cannibalism and depressed production.

It is therefore advisable to keep the flock under constant observation. The infestation can be controlled by catching mites in mite traps. Common hiding places of the parasites are:

- corners of nest boxes
- the feet of feeding chains, trough connectors
- crossbars of perches
- dropping box trays
- corners of walls.

If mites are present and their numbers are growing, treatment with a suitable insecticide or miticide must be carried out. Insecticides should be applied in the evening as mites are active at night. It is important that the treatment reaches all hiding places of the mites. All eggs should be removed from the house prior to application.

3.22 Nest boxes

Depending on the age of the flock at rehousing, closable nests should be closed for the first 3 - 5 days after housing. Nests should be opened before dawn and closed one hour before dusk. Nests usually remain closed at night. This prevents hens from staying in the nest during the night and soiling it or becoming broody.

3.23 Outdoor run

Access to free range runs should be managed in accordance with external weather conditions. For the first three weeks after rehousing the hens should remain indoors. This gives the birds time to familiarise themselves with the facilities inside the building. Then the pop-holes should be opened. If a wintergarden is available, this should be opened initially for one week only before eventually opening the exit holes 4 to 5 weeks after rehousing. Pop-holes should only be opened after most eggs have been laid. For designing and utilising outdoor areas in free-range systems, the appropriate regulations for the marketing of free-range eggs should be observed.

Young flocks going outside for the first time need to be trained in the use of the run. The route from the house to the outside and back again must be easy to find. Food and water are only available indoors.

3.24 Range

Hens readily accept the range if the pasture area is broken up by a few trees and shrubs which provide shade and protection against predators. The area closest to the building is heavily used by the flock and the grass becomes worn. Depending on the condition of this part of the range, ground care and disinfection measures should be carried out. Pasture rotation has proved effective in practice.

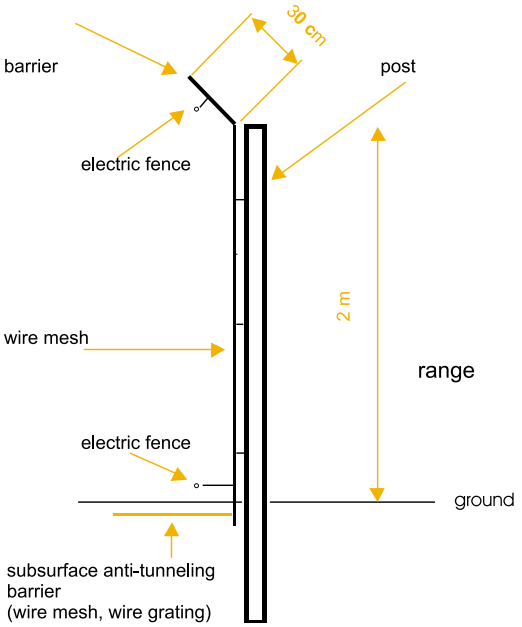
Young pullets visiting a pasture with good vegetation for the first time tend to ingest numerous plants, stones, etc. This can greatly reduce their nutrient intake capacity. Failure to consume sufficient food, especially at the time of peak production, jeopardises the hen's nutrient supply. In practice this often leads to weight loss, reduced production and increased susceptibility to disease. Young flocks should therefore be introduced gradually to the use of the free range.

It is essential to ensure that the birds consume sufficient nutrients despite the availability of pasture.

3.25 Perimeter fence

A strong fence for the range is a one-off investment that is definitely worthwhile. Runs must be protected against foxes, stray cats and dogs, polecats and martens. A two metre high fence provides a barrier against predators. An external electric fence can increase the level of protection.

Fence for free range



4. CLEANING AND DISINFECTION

As soon as the hens have been moved out, it is advisable to treat walls and ceilings with insecticides while the shed is still warm. This prevents insects of all kinds from crawling out of the litter into existing wooden structures or insulation materials as the building cools down.

All litter and manure should be removed from the building. The room should then immediately be thoroughly cleaned so that it is empty for as long as possible. The purpose of cleaning and disinfection is to eliminate pathogenic microorganisms which can jeopardise the health of the next flock to occupy the building.

4.1 Removal of litter

Litter must be removed completely and spread as far away from the hen house as possible, the recommended distance being > 1km. If this is not possible the litter should be worked into the soil before the building is cleaned. This prevents recontamination through dust and flying feathers.

4.2 Free range

The material from the outdoor area adjacent to the hen house should be disposed of and replaced at the same time as the litter.

4.3 Washing

One day before the washing operation the entire interior of the building, including walls, ceilings and the remaining furniture, should be soaked. The use of fat- and protein-dissolving substances is recommended for this purpose. The room should then be cleaned with pressure washers, starting with the ceiling and working down to the floor. The exterior of the building, including concreted outdoor areas, should also be washed down.

4.4 Drinking system

Drinkers are potential hazards unless they are included in the sanitation routine. They should therefore be cleaned and disinfected. Disinfection of water pipes can be carried out with disinfectants such as sodium hypochloride or chlorine bleach solution. Drinker lines should be thoroughly flushed out after disinfection.

4.5 Feeding equipment

All left-over feed should be removed from the farm. Cleaning and disinfection of all parts of the feeding system, including silos, is urgently recommended.

4.6 Disinfection

When the facility has been completely re-assembled, the entire building should be disinfected again.

5. CONCLUDING REMARKS

We appreciate customer feedback on which management recommendations have proved effective in practice or any deviations that have produced even better results.

We are grateful to the companies Big Dutchman, Rihs Agro, Volito and Salmet who kindly supplied information which we have used in these guidelines.

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