

LOHMANN LSL-EXTRA

LAYERS



MANAGEMENT GUIDE CAGE HOUSING

BREEDING FOR SUCCESS ... TOGETHER



LOHMANN
TIERZUCHT

CONTENTS

3 Introduction

4 Top Performance by Systematic Selection

5 Breeding Scheme

6 Performance Data

7 Housing Chicks

- 7 General Recommendations
- 7 Cage Systems
- 7 Floor Systems
- 8 Body Temperature of the Chicks

9 Environment

10 Vaccination

- 10 General Recommendations
- 10 Vaccination Methods
- 10 Special Recommendations
- 11 Example of a Vaccination Programme

12 Beak Treatment

13 Nutrition

- 13 General
- 13 Ad Libitum Feed Supply
- 13 Feed Consumption
- 13 Rearing
- 14 Crude Fibre

- 15 Body weight Development and Feed Consumption
- 17 Correct Use of Pre-Layer Feed
- 17 Laying Period
- 18 Nutrition and Egg Weight
- 18 Supplements
- 20 Recommended Nutrient Levels

23 Lighting

- 23 General
- 23 Intermittent Lighting Programme for Day Old Chicks
- 24 Lighting Programme for Closed Houses
- 26 Lighting Programme for Open Houses

28 General Recommendations

- 28 Hygiene
- 28 Daily Control
- 28 Water Supply
- 29 Grit
- 29 Litter (Non Cage Housing)
- 29 Egg Quality and Egg Collection
- 29 Nests (Non Cage Housing)
- 30 Stocking Density
- 30 Equipment Requirements

31 General Information

- 31 Body Weight Development
- 33 Growth and Body Weight Development Curve
- 35 Performance Goals
- 38 Egg Grading
- 39 Egg Production Curve

INTRODUCTION

Why should you study this management guide?

Most people who are involved in commercial egg production, have seen management guides for different strains of layers before and may think “if you have seen one, you’ve seen them all”. Others take the contents more seriously and expect frequent updates to find specific data which apply to the current gen-

eration of layers and current management practices. Newcomers in the business may need more detailed explanations than can be presented in this compact format.

We hope that each reader will find some useful information, to confirm proven management practices or to stimulate improvements.



TOP PERFORMANCE BY SYSTEMATIC SELECTION



LOHMANN TIERZUCHT – the right partner for progressive, successful poultry management.

In recent decades, advanced methods have significantly improved breeding quality. Due to the development of powerful electronic data processing systems, it has become possible to put the theory of selection systematically into practice – thus turning modern quantitative genetics into reality.

From very early on, LOHMANN TIERZUCHT used these new techniques and can therefore offer an extensive range of experience and know-how. A highly qualified team of specialists guarantees prompt utilization of the latest research results. The market's changing demands can therefore be met quickly and effectively.

Moreover, nationally and internationally, LOHMANN TIERZUCHT is ranked as first class for questions on poultry health, which is one of the decisive factors for performance and profitability.

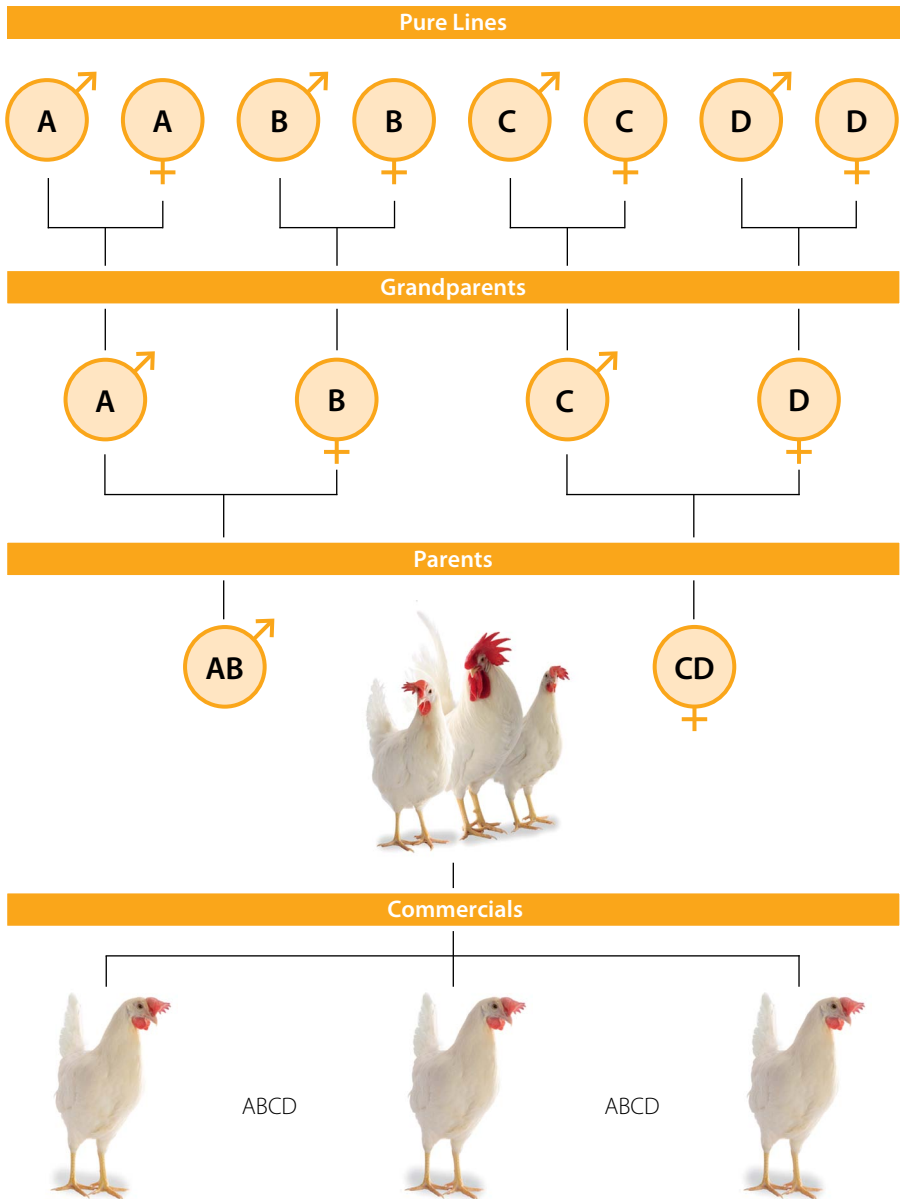
Intensive research in our own Veterinary Laboratory, besides increasing resistance to diseases by genetic means and ensuring the strictest conditions of hygiene, is fundamental to the quality of LOHMANN TIERZUCHT products.

In addition, LOHMANN TIERZUCHT also provides expert advice on all questions of feed, nutrition and technical service.

Practice profits from this extensive expertise in all aspects of poultry management. With LOHMANN TIERZUCHT products, eggs are produced in top quality and at competitive costs.

Results of performance comparisons in the field and in independent institutes are proof of this success. LOHMANN TIERZUCHT products are often the winners and are always among the few at the top, worldwide.

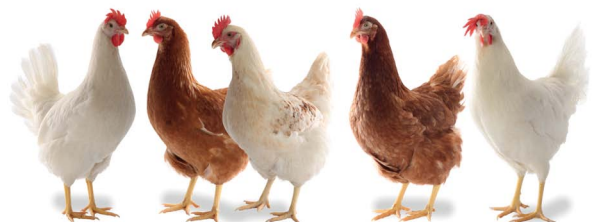
BREEDING SCHEME



PERFORMANCE DATA

LOHMANN LSL-EXTRA Layer

Egg Production	Age at 50% production	140–150 days
	Peak production	93–95%
	Eggs per Hen Housed	
	in 12 months of lay	313–318 (316)
	in 14 months of lay	355–360 (358)
	in 17 months of lay	423–428 (426)
	Eggs Mass per Hen Housed	
	in 12 months of lay	20.0–20.5 kg (20.25 kg)
	in 14 months of lay	23.0–23.5 kg (23.10 kg)
	in 17 months of lay	27.5–28.5 kg (27.89 kg)
Average Egg Weight	in 12 months of lay	63.5–64.5 g (64.0 g)
	in 14 months of lay	66.2–64.7 g (64.5 g)
	in 17 months of lay	65.0–66.0 g (65.5 g)
Egg Characteristics	Shell colour	attractive white
	Shell breaking strength	> 40 Newton
Feed Consumption	1 st –20 th week	7.5–8.0 kg
	Production	107–117 g/day
	Feed conversion	2.0–2.05 kg/kg egg mass
Body Weight	at 20 weeks	1.44–1.56 kg
	at the end of production	1.85–1.95 kg
Liveability	Rearing	97–98%
	Laying period	86–89%



HOUSING CHICKS

General Recommendations

- › Before bringing in the chicks, check that everything is in good working order.
- › Warm up the house in good time up to 35–36 °C. In summer start heating at least 24 hours and in winter at least 48 hours before the chicks arrive. When the right temperature has been achieved, supply minimum ventilation. This will avoid temperature differences within the house.
- › Maintain the recommended temperatures (35–36 °C) during the first 48–72 hours.
- › Relative humidity should be at least 60%.
- › The right height of the drinkers must be adjusted to allow the chicks to drink water without difficulty.
- › Reduce the water pressure of the nipples in order to enable the chicks to find water easily.
- › Keep drinking water temperature between 20–25 °C by temporarily flushing the nipple drinker lines or renewing the water in the chick fountains.
- › Follow the recommended lighting programmes (refer to page 23).

Cage Systems

- › Adjust the cage floors and feeding grids according to the manufacturer's instructions.
- › Place sheets of paper on the cage floor for the first days and distribute a bit of feed on this paper. The papers must be removed by day 7.

- › Unload all chick boxes and distribute them in the house. Remove all lids and place them on the top of the boxes.
- › Quickly place the chicks near feeders and drinkers. Distribute the chicks evenly among the cages starting at the far end of the house.
- › Trigger nipples/water cups to encourage birds to drink.

Floor Systems

- › Before arrival of the chicks, litter should be spread only after heating the house, when the floor has reached the optimum temperature. Softwood shavings or straw make suitable litter.
- › After arrival, place chicks under brooders as soon as possible.
- › Measure the brooder temperature by placing the thermometer 8 cm inside the outer edge of the brooder and 8 cm above the litter.
- › Dip the beaks of a few chicks into water and trigger nipple or water cups to help them start drinking. When drinking water has been found by all chicks (this will take approx. 2–3 hours), they will start to eat.
- › Supply the chicks with additional feeding bowls to ensure a better feed intake in the first few days.
- › Chicks should be fully feathered before brooding equipment has to be removed.

Body Temperature of the Chicks

The body temperature of housed chicks is a very useful indicator to adjust house temperature in an optimum way. A simple tool to measure the body temperature of day old chicks is usage of modern ear thermometers, known from human medicine. The correct application to measure the body temperature is just to touch the cloaca gently with the thermometer probe. The optimal body temperature of the chicks is about 40 to 41 °C.

Obtain samples of the chicks distributed in different parts of the house in order to have reliable results. Proceed in a way you normally do while weighing chicks/pullets to check their uniformity. Collect the information, calculate the average and adjust house temperature accordingly to achieve optimal chick temperatures. For example increase the house temperature by 0.5 °C, if the average body temperature of the chicks is 39.5 °C.

Besides house temperature, there are other factors which could affect the body temperature of the chicks negatively:

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

After a few hours, check whether the chicks have settled down well. The chicks behaviour is the best indicator of their well-being:

- > If the chicks are evenly spread out and moving freely, temperature and ventilation are all right.
- > If the chicks are crowding together or avoiding certain areas within the house, temperature is too low or there is a draught.
- > If the chicks are lying about on the floor with outspread wings and gasping for air, temperature is too high.



At first signs that the chicks are not feeling well determine the reason, correct the situation and check more frequently.

ENVIRONMENT

Environmental conditions have an effect on the well-being and performance of the birds. Important environmental factors are temperature, humidity and level of toxic gases in the air. The optimal temperature depends on the age of the birds. The following table is a guide to the correct temperature at bird level. As

mentioned before, the birds behaviour is the best indicator for correct temperature.

Always reduce temperature gradually, and avoid sudden changes.

If the ventilation system is used to regulate temperature, take care that the necessary fresh air is supplied.

Table 1: Desired Temperatures at Bird Level Dependent on Age

Age	Temperature °C
Day 1–2 *	35–36
Day 3–4	33–34
Day 5–7	31–32
Week 2	28–29
Week 3	26–27
Week 4	22–24
From Week 5	18–20

** Body temperatures of 40–41 °C are the optimum for the chicks.*

The relative humidity inside the house should be about 60–70 %.

The air quality should meet the following minimum requirements:

Table 2: Minimum Air Quality Requirements

O ₂	over	20%
CO ₂	under	0.3%
CO	under	40 ppm
NH ₃	under	20 ppm
H ₂ S	under	5 ppm

VACCINATION

General Recommendations

Vaccination is an important way of preventing diseases. Different regional epidemic situations require suitably adapted vaccination programmes. Therefore, please be guided, by the advice of your local veterinarian and poultry health service. Only healthy flocks should be vaccinated. Check the expiration date of the vaccine. The vaccine must not be used after this date. Keep records of all vaccinations and vaccine serial numbers.

Vaccination Methods

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

Drinking Water Vaccinations are not labour intensive but must be carried out with the greatest care to be effective. The water used for preparing the vaccine solution must not contain any disinfectants. During the growing period, the birds should be without water for approximately 2 hours prior to vaccination. During hot weather reduce this time accordingly. The amount of vaccine solution should be calculated for complete consumption within 2–4 hours. When vaccinating with live vaccines, add 2 g of skim milk powder per litre of water or canned milk in order to protect the virus titre, if no water stabilisator is available.

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

Special Recommendations

Marek Re-Vaccinations have proved to be successful after long transportation and in areas with high infection risk. Consult your veterinarian and the LOHMANN Veterinary Laboratory for further information.

Mycoplasmosis Vaccinations are only advisable if the farm cannot be kept free of mycoplasmosis. Infections with virulent mycoplasma species during the production period lead to performance depression. The best performance is achieved by flocks which are kept free of mycoplasmosis and are not vaccinated.

Vaccination against Coccidiosis is the most reliable method in the floor rearing to develop immunity against this disease. Never use coccidiostats in the feed when pullets are vaccinated.

Applying Vitamins in the first two to three days after vaccination can help to reduce stress and prevent undesired reactions. To what extent depends on the specific situation on each farm.

VACCINATION

Table 3: Example of a Vaccination Programme for LOHMANN LSL-EXTRA 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 Commercial 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 6–14 weeks
EDS		●	SC – IM	Vaccination before transfer

DW: Drinking Water

WW: Wing Web

SP: Spray

IM: Intramuscular Injection

ED: Eye Drop

SC: Subcutaneous Injection

Vaccination against Coccidiosis is optional for floor rearing systems

** 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. Depending on infectious pressure, birds are vaccinated with inactivated vaccine during the rearing and/or prior onset of lay for booster the immunity. Revaccination with live ND and/or IB every 6–8 weeks during production period is beneficial in order to improve the local immunity.*

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

BEAK TREATMENT

Beak treatment is not necessary under optimal conditions. In practice, it is widely used in environmental controlled and light-tight facilities, as an efficient precaution against cannibalism and feather pecking. Such behaviour may develop at any age as a result of excessive light intensity, unbalanced feed, poor ventilation, overstocking or boredom.

Especially in floor management and/or open houses with uncontrollable light intensity, we recommend beak treatment subject to local animal welfare regulations. A very gentle and highly recommended method of beak treatment is the infrared treatment of the upper and lower beak by means of a special technique, performed shortly after chicks hatch. This procedure can already be done in the hatchery under very hygienic conditions by specially trained personnel. Another method of beak treatment is to treat the beaks with a hot blade.

Observe the following precautions for a conventional beak treatment:

- › Use only equipment and blades in perfect working order; adjust the blade temperature so that cauterisation is guaranteed and the beak is not damaged.
 - › Adjust temperature and duration of the treatment according to the chicks beak size, strength and quality.
 - › Do not feed for 12 hours before treating.
 - › Offer free feeding immediately after treating.
 - › Increase the level of feed in the troughs.
 - › Increase the temperature in the house for a few days after treating.
 - › For 3–5 days after beak treating provide an extra hour of light and supply feed in the late evening or at night.
 - › Giving vitamins via the drinking water can also help to alleviate stress.
- › Treat only healthy, unstressed birds, at the age of 7–10 days.
 - › Allow only experienced personnel to do the work.
 - › Work slowly and carefully.

NUTRITION

General

To get the best out of the genetic performance potential of LOHMANN LSL-EXTRA layers, feeding them with a good structured mash feed with full nutritive value is a must. Such nutrition can best be guaranteed by a complete feed adapted to the performance potential. Our feeding recommendations concentrate on the essential nutrients and are designed to cover the requirements for the best performance in every stage of development.

Ad Libitum Feed Supply

LOHMANN Layers and their breeders are specialised birds selected for a high egg production. Because of their high turnover rates “feed into food”, they have a big demand for nutrients. Layers in full production convert roughly one third of the consumed nutrients into eggs. There is no danger in wasting feed by supplying feed ad libitum, because the hens can adjust their intake to the nutrient density of the feed. But there is a real danger in restricting birds in feed intake. An under-supply of nutrients will harm the birds. They lose production and once exhausted, they easily can run into a health problem.

Feed Consumption

Feed consumption is mainly affected by:

- › Body weight
- › Performance
- › House temperature: Low temperature increases the maintenance requirement for energy.
- › Condition of feathering: Poor feathering

condition due to management mistakes or malnutrition increases the maintenance requirement for energy.

- › Feed texture: Coarse texture increases while fine texture decreases feed intake.
- › Energy level: The higher the energy level of the feed, the lower the feed intake and vice versa.
- › Nutrient imbalances: The hen will try to compensate for any nutrient deficits by increasing feed consumption especially in the latest age of production.

Rearing

A balanced and nutritious diet during the rearing stage is essential to enable the chick to develop into a mature pullet. Chicks and pullets should be fed a coarse diet (for particle sizes see table on page 14) of a meal-type consistency. 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. A diet with an extremely fine consistency reduces the feed intake of the birds and can result in a lacking supply of certain nutrients. If pelletising of feed is inevitable for hygienic reasons the pellets should be crumbled to the recommended consistency. During the different growth phases of chicks and pullets, qualitatively different feed varieties should be used in which the nutrient content meets the birds changing needs. The diets are matched to the nutrient requirement and weight development at each stage of growth. The use of chick starter is recommended if the standard body-weight is not

Table 4: Recommended Particle-Size Distribution for Chick Starter, Grower, Developer and Layer Feed (MASH)

Sieve Size	Passing Part	Sieve Size Interval	Part of Interval
0.5 mm	19%	0–0.5 mm	19%
1.0 mm	40%	0.51–1.0 mm	21%
1.5 mm	75%	1.01–1.5 mm	35%
2.0 mm	90%	1.51–2.0 mm	15%
2.5 mm	100%	> 2 mm	10%*
			100%

* Individual Particles not bigger than: 3 mm in chick superstarter-/starter diets 5 mm in grower, developer and layer

reached by feeding grower feed or if the daily feed intake is expected to be low. The switch to developer should only be made when the standard body weight has been reached. A reduced nutrient density and an increased content of crude fibre (5–6 %) during this phase is beneficial for improving eating capacity. The pre-layer diet has about twice the calcium content of developer as well as higher levels of protein and amino acids. Feeding such a diet for about 10 days prior to the planned start of lay is therefore beneficial. This diet improves flock uniformity by providing a better nutrient supply to late maturing birds and by enabling early maturing birds to obtain sufficient calcium for eggshell production of the first eggs.

Crude Fibre

Crude fibre, sometimes described as insoluble NSP*, may not have nutritional values for poultry, but it does have other benefits for a healthy and stable digestive physiology. Used in the second half of the rearing period, it can positively influence the development of the digestive tract,

the crop size and the appetite of pullets. This is beneficial for young layers, especially at the start of production, when the appetite of the birds is sometimes not sufficient enough to meet their nutrient demands. The tool has been proven to be very beneficial under varying feeding situations in a lot of countries. This is the reason for the implementation of a minimum recommendation of crude fibre (5–6%) in the developer feed for LOHMANN layers. Cereals and their by-products (e.g. bran) or oil seed by-products (e.g. meal of sunflowers or rapeseed), can be used as a source of crude fibre. DDGS** can be used as a source of crude fibre as well. Other raw materials, which are rich of crude fibre, may be used if available, but only as long as their inclusion does not reduce the energy level of the diet. With a classical corn-soy diet, the recommended crude fibre content can hardly be achieved. In such cases, other feed ingredients must be used. For advice, please contact the technical service department at LOHMANN TIERZUCHT.

* Non-Starch Polysaccharides

** Dried Distillers Grains with Solubles

NUTRITION

Table 5: Body Weight Development and Feed Consumption with Standard Lighting Programme of LOHMANN LSL-EXTRA Pullets/Layers

Age in Weeks	Body Weight (g)		kJ** Bird/Day	Feed Consumption***		Feed*
	Average	Range		g/Bird/Day	Cumulative	
1	75	71–79	120	10	70	Grower / Starter
2	120	114–127	204	17	189	
3	200	190–211	276	23	350	
4	275	261–290	331	29	553	
5	360	342–380	399	35	798	
6	458	435–483	456	40	1078	
7	565	537–596	502	44	1386	
8	666	633–703	547	48	1722	
9	767	729–809	593	52	2086	
10	863	820–910	638	56	2478	Developer
11	946	899–998	684	60	2898	
12	1021	970–1077	730	64	3346	
13	1085	1031–1145	764	67	3815	
14	1144	1087–1207	798	70	4305	
15	1197	1137–1263	832	73	4816	
16	1245	1183–1313	866	76	5348	
17	1295	1230–1366	901	79	5901	Pre-Layer
18	1348	1281–1422	946	83	6482	
19	1410	1340–1488	1003	88	7098	
20	1478	1404–1559	1072	94	7756	

Due to starvation before and during transport, weight losses up to 15% of body weight may occur.

* The basis for switching between diet types is the hens' body weight development. The correct time for changing the diet is determined not by age but by body weight. Chicks and pullets should therefore be weighed at regular intervals.

** 1 kcal = 4.187 kJ

*** Chicks / Pullets at all times should be supplied ad libitum with feed. The numbers are rough guidelines how much feed chicks/pullets eat. Never limit feed intake to this numbers!

Table 6: Recommendations for Nutrient Levels for LOHMANN LSL-EXTRA Pullets/Layers

Diet type*		Starter**	Grower	Developer	Pre-Layer
Nutrient		Week 1–3	Week 1–8	Week 9–16	Week 17–5 % prod.
Metabol. Energy	kcal	2900	2750–2800	2750 – 2800	2750–2800
	MJ	12.00	11.40	11.40	11.40
Crude Protein	%	20.00	18.50	14.50	17.50
Methionine	%	0.48	0.40	0.34	0.36
Dig. Methionine	%	0.39	0.33	0.28	0.29
Meth./Cystine	%	0.83	0.70	0.60	0.68
Dig. M/C	%	0.68	0.57	0.50	0.56
Lysine	%	1.20	1.00	0.65	0.85
Dig. Lysine	%	0.98	0.82	0.53	0.70
Valine	%	0.89	0.75	0.53	0.64
Dig. Valine	%	0.76	0.64	0.46	0.55
Tryptophan	%	0.23	0.21	0.16	0.20
Dig. Tryptophan	%	0.19	0.17	0.13	0.16
Threonine	%	0.80	0.70	0.50	0.60
Dig. Threonine	%	0.65	0.57	0.40	0.49
Isoleucine	%	0.83	0.75	0.60	0.74
Dig. Isoleucine	%	0.68	0.62	0.50	0.61
Calcium	%	1.05	1.00	0.90	2.00
Phosphor, total	%	0.75	0.70	0.58	0.65
Phosphor, avail.	%	0.48	0.45	0.37	0.45
Sodium	%	0.18	0.17	0.16	0.16
Chloride	%	0.20	0.19	0.16	0.16
Linoleic Acid	%	2.00	1.40	1.00	1.00

* The basis for switching between diet types is the hens' body weight development. The correct time for changing the diet is determined not by age, but by body weight. Chicks and pullets, should therefore be weighed at regular intervals.

** Chicks should be fed starter feed, if the standard body weight is not reached by feeding chick grower or if the daily feed intake is expected to be low.

NUTRITION

Correct Use of Pre-Layer Feed

Pre-layer feed should be used for a short period of time before a flock starts being supplied with phase 1 layer feed. This leads to a smooth transition from the developer feed (low calcium and low nutrient density) to a diet with high calcium and nutrient levels. It helps to avoid the often reduced appetite/daily feed intake during early production. Typically, pre-layer feed contains about 2.0–2.5% calcium. This is too much for a typical feed for rearing but not enough for a bird starting to produce eggs. From a nutritional point of view, it's therefore considered a compromise and never as "optimal" feed. Nevertheless, it's worthwhile to use pre-layer feed for a short period of time. Correct use can enhance the uniformity of a pullet flock. It's especially beneficial for flocks with very low uniformity and also aids the development of Ca-metabolism in medullar bones. Since pre-layer feed is a compromise feed for the short transition period, it cannot supply a bird in full lay sufficiently. Therefore, it cannot be used when feed logistics and correct timing do not work.

Please consider the following recommendations while using pre-layer feed:

- Start using pre-layer feed dependent on to the birds sexual maturity, age and their standard body weights.
- Use pre-layer feed for about 10 days with a maximum of 1 kg per bird.

➤ The wrong way to use pre-layer feed is either to start using it too early and/or use it too long.

For example if the onset of lay is scheduled for the 19th weeks of age, you may start feeding the birds with pre-layer feed only after they are 17 weeks old.

In case of an earlier or later production, adjust this schedule accordingly.

Laying Period

Aiming at an optimal start of production with feed intake around 90–100 g/day, it is recommendable to use a phase 1 feed with 11.6 ME MJ/kg for a duration of 5–6 weeks. At around 26 weeks a normal phase-feeding programme with 11.4 ME MJ/kg should be introduced. The basis for the feed formulation in terms of nutrient and mineral content in each phase is the daily nutrient requirement and actual feed consumption.

The diet for phase 1 is designed to cover the requirement for maximum egg mass.

The recommended nutrient allowances shown in the tables 9–11 (phase 1–3) assume a dietary energy concentration of 11.4 MJ/kg (2725 kcal) metabolisable energy, a house temperature of 20 °C and good plumage.

Under these conditions the daily feed consumption of LOHMANN LSL-EXTRA is expected to be 105–115 g/day. The feed formulations for phases 2–3 cater for the reduced

requirement for organic nutrients and the increasing requirement for calcium as the hens age. **The time for switching diets is determined more by the level of production and the need for calcium rather than by age.**

Every 10 weeks throughout the laying period the composition of the diet should be adapted to the level of production and the hens' nutrient requirement. **Major changes in the raw material composition of the various phase diets or marked changes in feed consistency should be avoided.**

Nutrition and Egg Weight

Within certain limits egg weight can be adapted to farm specific requirements by adjusting rations. The following nutritional factors should be noted:

- > Growing
 - > Feeding for higher body weight/frame size increases the egg weight throughout the whole laying period.
- > Feed composition
 - > crude protein and methionine
 - > linoleic acid
- > Feeding technique
 - > feed texture
 - > feeding time
 - > feed level in troughs
 - > controlled feeding
 - > frequency of feeding

By stimulating feed intake egg weight can be increased and limited by controlled feeding. In the case of appropriate house construction, there's the possibility to adjust the house temperature in the opposite direction of desired egg weight and feed intake.

Contact your LOHMANN TIERZUCHT specialists for specific programmes with recommendations for nutrition and management adjusted to your conditions and requirements.

Supplements

Supplements ensure the necessary supply of essential vitamins, trace elements and substances such as anti-oxidants or carotenoids. Suitable supplementation can compensate for the varying contents of raw materials and safeguard the supply of all necessary nutrients.

Remark: Vitamin C is synthesised by poultry normally. This vitamin is not considered as essential, but in some circumstances, like heat stress or hot climate, it may be important / beneficial to add 100–200 mg/kg complete feed during production period.

NUTRITION

Table 7: Recommended Micro-Nutrient Specification

Supplements per kg Feed		Starter/Grower	Developer	Pre-Layer/Layer
Vitamin A*	I.U.	10000	10000	10000
Vitamin D ₃	I.U.	2000	2000	2500
Vitamin E	mg	20–30***	20–30***	15–30***
Vitamin K ₃	mg	3****	3****	3****
Vitamin B ₁	mg	1	1	1
Vitamin B ₂	mg	6	6	4
Vitamin B ₆	mg	3	3	3
Vitamin B ₁₂	mcg	20	20	25
Pantothenic Acid	mg	8	8	10
Nicotinic Acid	mg	30	30	30
Folic Acid	mg	1.0	1.0	0.5
Biotin	mcg	50	50	50
Cholin	mg	300	300	400
Antioxydant	mg	100–150***	100–150***	100–150***
Cocciidiostat		as required	as required	–
Manganese**	mg	100	100	100
Zinc**	mg	60	60	60
Iron	mg	25	25	25
Copper**	mg	5	5	5
Iodine	mg	0.5	0.5	0.5
Selenium**	mg	0.2	0.2	0.2

* Higher level might be possible according to local state and national regulations.

** So called “organic sources” should be considered with higher bioavailability.

*** according to fat addition

**** double in case of heat treated feed

Table 8: Continuous Supply of Fine and Coarse Limestone (Recommended Relation in Feed)

Feed type	Fine Limestone 0–0.5 mm	Coarse Limestone* 1.5–3.5 mm
Layer Phase 1	30%	70%
Layer Phase 2	25%	75%
Layer Phase 3	15%	85%

* can be partly replaced by oyster shells

Table 9: Recommended Nutrient Levels for LOHMANN LSL-EXTRA Layers in Phase 1 per kg of Feed for Different Daily Feed Consumptions

Approx. week 19–45*

Nutrient		Requirement g/Hen/Day	Daily Feed Consumption			
			105 g	110 g	115 g	120 g
Protein	%	18.50	17.62	16.82	16.09	15.42
Calcium**	%	4.10	3.90	3.73	3.57	3.42
Phosphorus***	%	0.60	0.57	0.55	0.52	0.50
Av. Phosphorus	%	0.42	0.40	0.38	0.37	0.35
Sodium	%	0.18	0.17	0.16	0.16	0.15
Chlorine	%	0.18	0.17	0.16	0.16	0.15
Lysine	%	0.87	0.82	0.79	0.75	0.72
Dig. Lysine	%	0.71	0.68	0.65	0.62	0.59
Methionine	%	0.44	0.42	0.40	0.38	0.37
Dig. Methionine	%	0.36	0.34	0.33	0.31	0.30
Meth./Cyst.	%	0.80	0.76	0.73	0.69	0.67
Dig. M/C	%	0.66	0.62	0.60	0.57	0.55
Arginine	%	0.91	0.87	0.83	0.80	0.76
Dig. Arginine	%	0.75	0.71	0.68	0.65	0.63
Valine	%	0.74	0.71	0.67	0.64	0.62
Dig. Valine	%	0.63	0.60	0.57	0.55	0.53
Tryptophan	%	0.18	0.17	0.17	0.16	0.15
Dig. Tryptophan	%	0.15	0.14	0.14	0.13	0.13
Threonine	%	0.61	0.58	0.55	0.53	0.51
Dig. Threonine	%	0.50	0.48	0.45	0.43	0.42
Isoleucine	%	0.70	0.66	0.63	0.60	0.58
Dig. Isoleucine	%	0.57	0.54	0.52	0.50	0.48
Linoleic Acid	%	2.20	2.10	2.00	1.91	1.83

* Until the maximum daily egg mass is reached, please refer to table 17.

** Please refer to table 8 about relation of fine and coarse limestone.

*** without phytase

NUTRITION

Table 10: Recommended Nutrient Levels for LOHMANN LSL-EXTRA Layers in Phase 2 per kg of Feed for Different Daily Feed Consumptions

Approx. week 46–65*

Nutrient		Requirement g/Hen/Day	Daily Feed Consumption			
			105 g	110 g	115 g	120 g
Protein	%	17.76	16.91	16.15	15.44	14.80
Calcium**	%	4.40	4.19	4.00	3.83	3.67
Phosphorus***	%	0.58	0.55	0.52	0.50	0.48
Av. Phosphorus	%	0.40	0.38	0.37	0.35	0.34
Sodium	%	0.17	0.16	0.16	0.15	0.14
Chlorine	%	0.17	0.16	0.16	0.15	0.14
Lysine	%	0.83	0.79	0.76	0.72	0.69
Dig. Lysine	%	0.68	0.65	0.62	0.59	0.57
Methionine	%	0.42	0.40	0.38	0.37	0.35
Dig. Methionine	%	0.35	0.33	0.31	0.30	0.29
Meth./Cyst.	%	0.77	0.73	0.70	0.67	0.64
Dig. M/C	%	0.63	0.60	0.57	0.55	0.52
Arginine	%	0.88	0.84	0.80	0.76	0.73
Dig. Arginine	%	0.72	0.69	0.65	0.63	0.60
Valine	%	0.71	0.68	0.65	0.62	0.59
Dig. Valine	%	0.60	0.58	0.55	0.53	0.50
Tryptophan	%	0.18	0.17	0.16	0.15	0.15
Dig. Tryptophan	%	0.14	0.14	0.13	0.13	0.12
Threonine	%	0.59	0.56	0.53	0.51	0.49
Dig. Threonine	%	0.48	0.46	0.44	0.42	0.40
Isoleucine	%	0.67	0.64	0.61	0.58	0.56
Dig. Isoleucine	%	0.55	0.52	0.50	0.48	0.46
Linoleic Acid	%	1.60	1.52	1.45	1.39	1.33

* After the maximum daily egg mass is reached, please refer to table 17.

** Please refer to table 8 about relation of fine and coarse limestone.

*** without phytase

Table 11: Recommended Nutrient Levels for LOHMANN LSL-EXTRA Layers in Phase 3 per kg of Feed for Different Daily Feed Consumptions

Approx. after week 65

Nutrient		Requirement g/Hen/Day	Daily Feed Consumption			
			105 g	110 g	115 g	120 g
Protein	%	16.84	16.03	15.30	14.64	14.03
Calcium*	%	4.50	4.29	4.09	3.91	3.75
Phosphorus**	%	0.55	0.52	0.50	0.47	0.46
Av. Phosphorus	%	0.38	0.36	0.35	0.33	0.32
Sodium	%	0.16	0.16	0.15	0.14	0.14
Chlorine	%	0.16	0.16	0.15	0.14	0.14
Lysine	%	0.79	0.75	0.72	0.69	0.66
Dig. Lysine	%	0.65	0.62	0.59	0.56	0.54
Methionine	%	0.40	0.38	0.36	0.35	0.33
Dig. Methionine	%	0.33	0.31	0.30	0.28	0.27
Meth./Cyst.	%	0.73	0.69	0.66	0.63	0.61
Dig. M/C	%	0.60	0.57	0.54	0.52	0.50
Arginine	%	0.83	0.79	0.76	0.72	0.69
Dig. Arginine	%	0.68	0.65	0.62	0.59	0.57
Valine	%	0.67	0.64	0.61	0.59	0.56
Dig Valine	%	0.57	0.55	0.52	0.50	0.48
Tryptophan	%	0.17	0.16	0.15	0.14	0.14
Dig. Tryptophan	%	0.14	0.13	0.12	0.12	0.11
Threonine	%	0.55	0.53	0.50	0.48	0.46
Dig. Threonine	%	0.46	0.43	0.41	0.40	0.38
Isoleucine	%	0.63	0.60	0.58	0.55	0.53
Dig. Isoleucine	%	0.52	0.49	0.47	0.45	0.43
Linoleic Acid	%	1.30	1.24	1.18	1.13	1.08

* Please refer to table 8 about relation of fine and coarse limestone.

** without phytase

LIGHTING

General

The lighting programme controls the onset of lay and affects the performance. Within certain limits, performance can be adapted to farm specific requirements by adjusting the lighting programme. Easiest to follow are the lighting programmes in closed houses without the effect of natural daylight.

In these, the hours of light and light intensity can be adjusted to changing needs.

Rearing birds in closed houses and producing eggs in light-tight houses enable the producer to maximize performance. Follow the lighting programme which is recommended for this type of housing system and commercial variety. For open or brown-out houses (houses with incidence of daylight), a tailor made programme has to be developed which reflects the season and geographical location where the pullets are being reared and stimulated to lay.

In general, the lighting programme should follow the basic principles:

- › **Never increase hours of light during the rearing period until planned stimulation starts.**
- › **Never decrease hours of light during the production period.**
- › **Always keep in mind that natural daylight can influence the lighting programme in open or brown-out houses.**

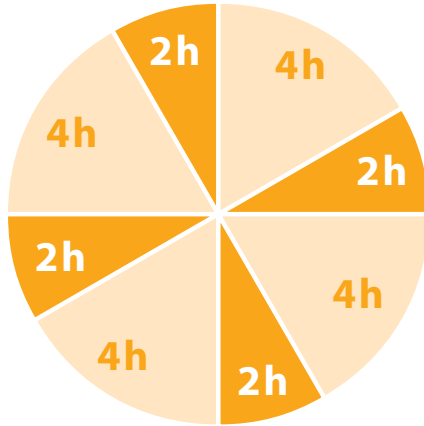
Intermittent Lighting Programme for Day Old Chicks

When the day old chicks arrive on the farm, they have already been intensively handled in the hatchery and often have a long transport to their final destination. Common practice is to give them 24 hours of light to help them recover in the first 2 or 3 days after arrival and to provide them enough time to eat and drink. In practice, it can be observed that after arrival and housing, some chicks continue to sleep whereas others start to look for feed and water. The activity of the flock will always be irregular. Especially in this phase, poultry men have difficulties interpreting the chicks behaviour and their condition.

There is a practically proven principle in splitting the day into phases of resting and activity using a special designed intermittent lighting programme. The aim is to synchronize the chicks' activities. The farmer gets a better impression of the flocks condition and the birds are encouraged by the groups behaviour to search for water and feed.

Therefore, LOHMANN TIERZUCHT advises to give chicks a rest after they arrive at the rearing farm and then start with four hours of light followed by two hours of darkness.

Lighting Programme after Arrival



darkness
 light

This programme can be used for up to 7 or 10 days after arrival, then switch to the regular step down lighting programme. The usage of the following lighting program brings about the following advantages:

- > The chicks will rest and/or sleep at the same time. This means that the behaviour of the chicks will be synchronized.
- > Weak chicks will be stimulated by stronger ones to move as well as to eat and drink.
- > The behaviour of the flock is more uniform and the judgement of the birds is made easier.
- > Mortality will decrease.

Lighting Programme for Closed Houses

To which extent lighting hours are reduced during the growing period and the time when stimulation begins by increasing the lighting hours are means by which performance can be adjusted to specific farm requirements. The following Standard Lighting Programme is designed as an example for a quick start into production.

The light intensity measured in watt/m², lumen, foot candle or lux depends on the used light source. Giving advice concerning this measurement would rather irritate than help layer farmers.

Therefore the light intensity is just given in lux unit in the following table.

LIGHTING

Table 12: Lighting Programme for Windowless Houses for LOHMANN LSL-EXTRA Pullets/Layers

Age (Weeks)	Hours of Light (Standard)	Light Intensity (Lux)*
Day 1-2 **	24	20–40
Day 3-6**	16	20–30
2	14	10–20
3	13	10–20
4	12	4–6
5	11	4–6
6	10	4–6
7	9	4–6
8	8	4–6
9	8	4–6
10	8	4–6
11	8	4–6
12	8	4–6
13	8	4–6
14	8	4–6
15	8	4–6
16	8	4–6
17	8	4–6
18	8	10–15
19	9	10–15
20	10	10–15
21	11	10–15
22	12	10–15
23	13	10–15
24	14	10–15
25 ***	14	10–15

* $Lux = Lumen/m^2$

** or run an intermittent Lighting Programme

*** until the end of production

Lighting Programme for Open Houses

The principle for windowless houses **“Do not increase the hours of light during rearing period and do not reduce hours of light during production period”** also applies to “open” housing.

The effect of the natural daylight must be considered when designing lighting programmes, if natural light enters the building throughout the day or if the hens have free access to open-air runs.

For example in Central Europe the natural day length 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.

If flocks are moved to an open production house with windows that cannot be darkened, the lighting programme must be adjusted to the natural day length at the time of rehousing.

We distinguish between two variants:

1. Production starts as the natural day length decreases.
2. Production starts as the natural day length increases.

In both variations the lighting programme at 17 weeks of age should be set to a lighting period of at least 10 hours, taking the natural day length into account, and to be increased by 1 hour every week to 14 hours until 21 weeks of age.

Never switch on the artificial light before 04.00 o'clock in the morning (CE time).

During the spring months the lighting programme is affected by the increase of natural day length and gradually extends to about 17 hours. When the natural day length begins to decrease in Central Europe from July, the 17-hour light period should be kept constantly until the end of the production period.

This example can be accomplished in Central Europe very simply as follows:

- > 04.00* o'clock in the morning: lights on – dimmer switch off at $\geq 50\text{--}60$ Lux.
- > Dimmer switch on at $\leq 50\text{--}60$ Lux – 21.00* o'clock in the evening lights off.

* Central European time

These times 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.

LIGHTING

As already mentioned, the lighting programme described here is just an example adjusted to Central European time.

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.

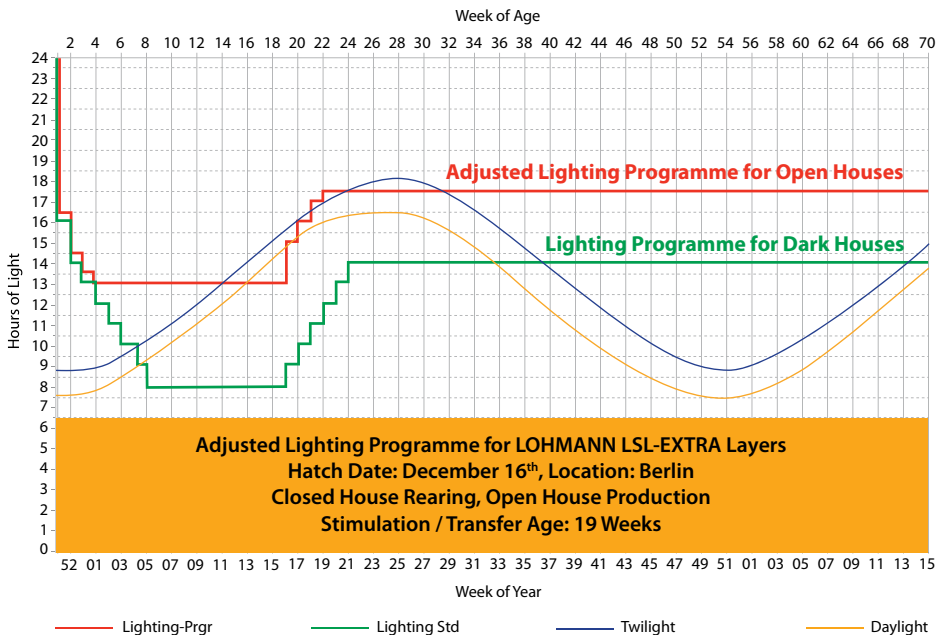
The times for darkening the room or opening the windows are determined by the

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.

Contact your LOHMANN TIERZUCHT specialists for specific lighting programmes adjusted to your location, conditions and requirements.

An example of a lighting programme for LOHMANN LSL-EXTRA Layers adjusted to location, condition and requirements by LOHMANN TIERZUCHT lighting programme tool



GENERAL RECOMMENDATIONS

Hygiene

- › Set up the farm at a safe distance from other poultry houses and fence in.
- › Keep birds of only one age group and no other poultry on the farm.
- › Allow no visitors to enter the farm.
- › Wear only the farm's own protective clothing within the farm area and also provide clothing for veterinarians, service and maintenance workers, and consultants.
- › Disinfect boots before entering the houses.
- › Use bulk feed if possible. Do not allow the truck driver to enter the houses.
- › Safeguard the houses against wild birds and vermin. Keep rats and mice under constant control.
- › Dispose of dead birds hygienically. Follow local laws and regulations.

Daily Control

Check at least once daily:

- › Health status
- › Temperature
- › Ventilation
- › Feed and water consumption
- › Lighting
- › Mortality

When assessing the state of health, do not just go by the general impression and mortality rate, but also take note of feed and water consumption as well as the texture of droppings.

Water Supply

Clean water is equally as important as good feed for top performance. Therefore fresh, clean, potable water must be available at all times for the layers and an adequate consumption must be always assured. A water meter is a very useful tool to inspect water consumption.

The optimum water temperature is about 20 °C. Furthermore feed and water intake are closely correlated. If the birds don't drink enough water for any reason, the feed intake reduces consequently.

The water to feed ratio at comfort temperature is around 1.8–2:1, but this relation increases up to 5:1 at high ambient temperatures above 30 °C. During exposure to high temperatures, birds consume less feed, but more water in an effort to cool their body down.

Check the water quality regularly, especially if you use your own water supply like well water.

For example excessive salt levels in drinking water can cause persistent damage to shell quality and hard water with high TDS* levels may cause kidney damage.

*TDS: *Total Dissolved Solids*

GENERAL RECOMMENDATIONS

Grit

Feeding grit is not a must but is recommended when rations are supplemented by grains. This stimulates the development of the crop and the gizzard during the rearing period, which in turn has a positive effect on feed intake capacity.

Table 13: Amount and Granulation of Grit Dependent on Age

Week 1–2	once a week 1 g /bird (size 1–2 mm)
Week 3–8	once a week 2 g/bird (size 3–4 mm)
From week 9	once a month 3g/bird (size 4–6 mm)

Litter (Non Cage Housing)

Only use shavings from untreated wood in order to avoid poisoning and residues in the egg.

Provide sufficient ventilation to ensure good litter condition and remove wet litter, if necessary.

Egg Quality and Egg Collection

LOHMANN LSL-EXTRA layers produce eggs of excellent quality. To preserve the quality, the following points should be observed:

- > Collect eggs at least once a day.
- > Store eggs at temperatures between 5 °C and 10 °C with a relative humidity of between 80–85%.

Storing at higher temperatures and lower humidity leads to rapid loss of weight and impairs the quality of the egg white due to an increase in gas exchange.

Nests (Non Cage Housing)

The quality of nests is also a factor which affects egg quality. Renew the litter in litter-type nests regularly and keep them clean. Provide individual nests at a rate of one nest for 4 hens. Collect floor eggs frequently to keep their rate as low as possible.

In addition to sufficient nesting space in family type nests, the following factors are important for a low rate of floor eggs:

- > Clean, dry litter or soft nest lining
- > Easy access
- > Even distribution of the nests within the barn
- > Only one type of nest in the barn

For optimum egg quality, rollaway nests in combination with slats are better than litter-type nests or family type nests.

Stocking Density

The optimal bird density/m² depends on management conditions and to which extent climate can be controlled. 6–8 birds/m² can be taken as a general guide for non-cage housing.

For cage systems, an area of 475–540 cm²/bird is recommended. Take note of deviating regulations for stocking density and declaration of eggs.

Equipment Requirements

In general, the more closely the growing house and facilities resemble the future production system, the easier it will be for the pullets to settle down in their new environment after transfer to the laying house. The following tables show the equipment requirements for rearing and production period.

Table 14: Equipment Requirement for Rearing Period

Equipment	Age in Weeks	Requirement
Chick founts	1	1 fount (4–5 l) for 100 chicks
Round drinkers	to 20	1 drinker (Ø 46 cm) for 125 birds
Linear drinkers	to 20	1 running m for 100 birds
Nipple drinkers	to 20	6–8 birds per nipple
Chick feeding trays	1–2	1 tray for 60 chicks
Cut off chick cartons	1–2	1 carton for 100 chicks
Round feeders	3–10	2 feeders (Ø 40 cm) for 100 birds
	11–20	3 feeders (Ø 40 cm) for 100 birds
Chain feeders	3–10	2.5–3.5 lin. m for 100 birds
	11–20	4.5 lin. m for 100 birds

Table 15: Equipment Requirement for Production Period

Equipment	Requirement
Round drinkers	1 drinker (Ø 46 cm) for 125 birds
Linear drinkers	1 running m for 80–100 birds
Nipple drinkers	6–8 birds per nipple
Round feeders	4 feeders (Ø 40 cm) for 100 birds
Single nests	1 nest (26 x 30 cm) for 4 birds
Chain feeders	5 lin. m for 100 birds

Further details in the LOHMANN Management Guide for floor/free range housing.

GENERAL INFORMATION

Table 16: Body Weight Development of LOHMANN LSL-EXTRA

Week 1–50

Age in Weeks	Weight Range (g)	Weight Average (g)	Age in Weeks	Weight Range (g)	Weight Average (g)
1	71–79	75	26	1637–1818	1723
2	114–127	120	27	1656–1839	1743
3	190–211	200	28	1670–1855	1758
4	261–290	275	29	1680–1865	1768
5	342–380	360	30	1686–1873	1775
6	435–483	458	31	1691–1878	1780
7	537–596	565	32	1694–1881	1783
8	633–703	666	33	1697–1884	1786
9	729–809	767	34	1700–1887	1789
10	820–910	863	35	1702–1891	1792
11	899–998	946	36	1705–1894	1795
12	970–1077	1021	37	1708–1897	1798
13	1031–1145	1085	38	1711–1900	1801
14	1087–1207	1144	39	1714–1903	1804
15	1137–1263	1197	40	1717–1906	1807
16	1183–1313	1245	41	1720–1910	1810
17	1230–1366	1295	42	1722–1913	1813
18	1281–1422	1348	43	1724–1915	1815
19	1340–1488	1410	44	1726–1917	1817
20	1404–1559	1478	45	1728–1919	1819
21	1466–1628	1543	46	1730–1921	1821
22	1513–1681	1593	47	1732–1923	1823
23	1551–1723	1633	48	1734–1925	1825
24	1585–1760	1668	49	1736–1927	1827
25	1613–1791	1698	50	1737–1929	1828

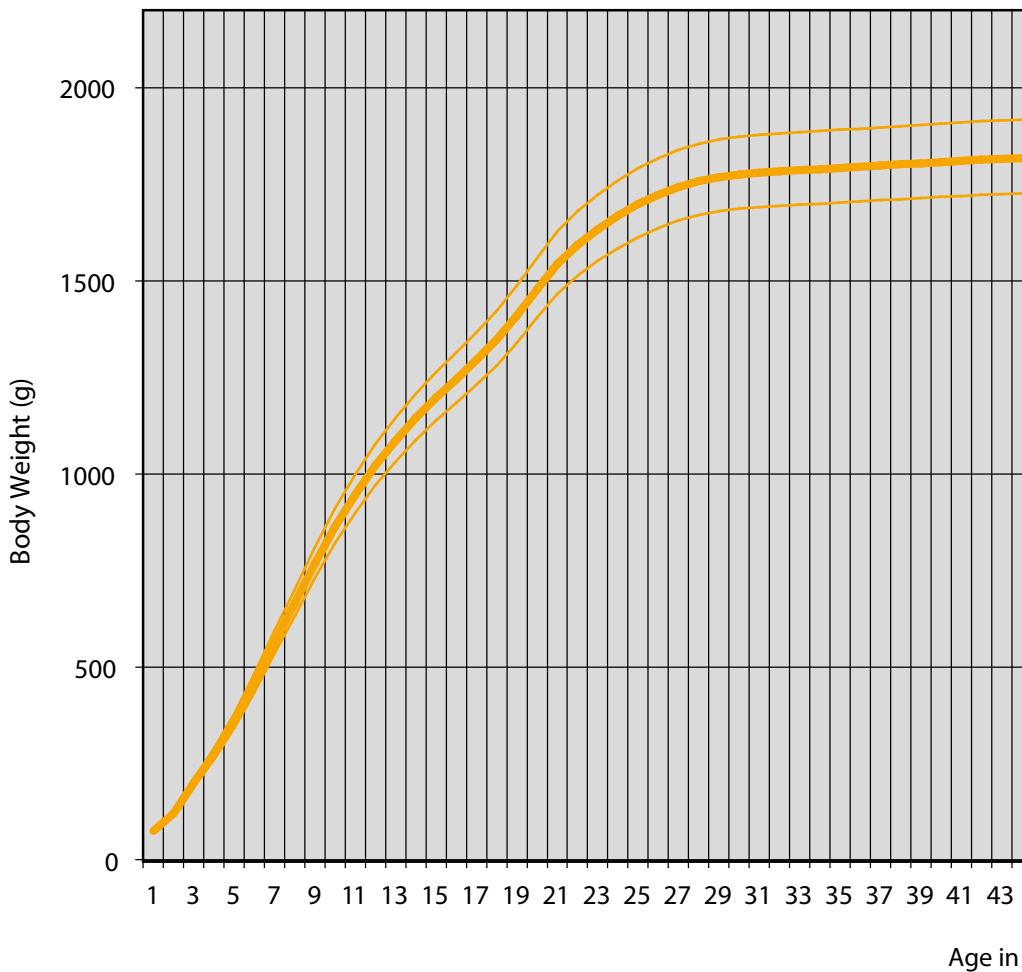
Table 16: Body Weight Development of LOHMANN LSL-EXTRA

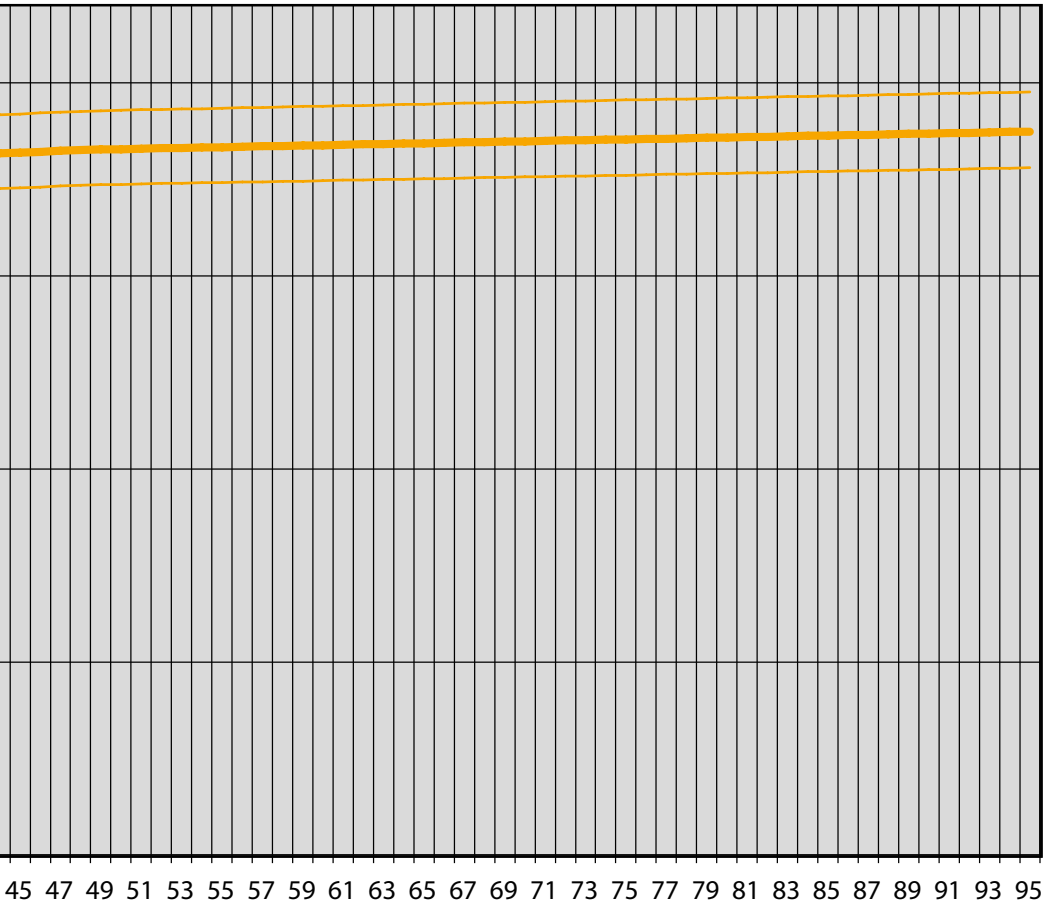
Week 51–95

Age in Weeks	Weight Range (g)	Weight Average (g)	Age in Weeks	Weight Range (g)	Weight Average (g)
51	1738–1930	1829	76	1763–1958	1856
52	1739–1931	1830	77	1764–1959	1857
53	1739–1932	1831	78	1765–1960	1858
54	1740–1933	1832	79	1766–1961	1859
55	1741–1934	1833	80	1767–1962	1860
56	1742–1935	1834	81	1768–1963	1861
57	1743–1936	1835	82	1769–1964	1862
58	1744–1937	1836	83	1770–1965	1863
59	1745–1938	1837	84	1771–1967	1864
60	1746–1939	1838	85	1772–1968	1865
61	1747–1940	1839	86	1773–1969	1866
62	1748–1941	1840	87	1774–1970	1867
63	1749–1942	1841	88	1775–1971	1868
64	1750–1943	1842	89	1776–1972	1869
65	1751–1944	1843	90	1777–1973	1870
66	1752–1945	1844	91	1777–1974	1871
67	1753–1946	1845	92	1778–1975	1872
68	1754–1948	1846	93	1779–1976	1873
69	1755–1949	1847	94	1745–1853	1799
70	1756–1950	1848	95	1746–1853	1800
71	1757–1951	1849			
72	1758–1952	1850			
73	1758–1953	1851			
74	1759–1954	1852			
75	1760–1955	1853			

GENERAL INFORMATION

Growth and Body Weight (g) Development Curve of LOHMANN LSL-EXTRA





Weeks

GENERAL INFORMATION

Table 17: Performance Goals of LOHMANN LSL-EXTRA – Week 20–44

Age in Weeks	Egg No. per H.H.	Rate of Lay %		Egg Weight g		Egg Mass g/H.D. kg/H.H	
	Cumulative	per H.H.	per H.D.	in Week	Cumulative	in Week	Cumulative
20	0.7	10.0	10.0	45.0	45.0	4.5	0.03
21	3.9	45.0	45.0	49.0	48.3	22.1	0.19
22	8.2	62.0	62.1	52.0	50.2	32.3	0.41
23	13.4	74.0	74.2	54.4	51.9	40.4	0.69
24	19.3	84.0	84.3	56.4	53.2	47.6	1.02
25	25.5	89.0	89.4	58.3	54.5	52.1	1.39
26	31.9	91.0	91.5	59.8	55.5	54.7	1.77
27	38.3	92.0	92.6	60.8	56.4	56.3	2.16
28	44.8	92.8	93.5	61.5	57.2	57.5	2.56
29	51.3	93.3	94.1	62.1	57.8	58.4	2.96
30	57.9	93.5	94.4	62.6	58.3	59.1	3.37
31	64.4	93.6	94.6	63.0	58.8	59.6	3.79
32	71.0	93.6	94.7	63.3	59.2	59.9	4.20
33	77.5	93.5	94.7	63.5	59.6	60.1	4.62
34	84.0	93.4	94.7	63.6	59.9	60.2	5.03
35	90.6	93.3	94.7	63.7	60.1	60.3	5.45
36	97.1	93.2	94.7	63.8	60.4	60.4	5.86
37	103.6	93.0	94.6	63.9	60.6	60.4	6.28
38	110.1	92.8	94.5	64.0	60.8	60.4	6.69
39	116.6	92.6	94.4	64.1	61.0	60.5	7.11
40	123.1	92.4	94.3	64.2	61.1	60.5	7.52
41	129.5	92.2	94.2	64.3	61.3	60.5	7.94
42	135.9	91.9	94.1	64.4	61.4	60.6	8.35
43	142.4	91.7	94.0	64.5	61.6	60.6	8.77
44	148.8	91.4	93.9	64.6	61.7	60.6	9.18

Table 17: Performance Goals of LOHMANN LSL-EXTRA – Week 45–70

Age in Weeks	Egg No. per H.H.	Rate of Lay %		Egg Weight g		Egg Mass g/H.D. kg/H.H	
		Cumulative	per H.H.	per H.D.	in Week	Cumulative	in Week
45	155.1	91.1	93.7	64.7	61.8	60.6	9.59
46	161.5	90.8	93.6	64.8	61.9	60.6	10.00
47	167.8	90.5	93.4	64.9	62.1	60.6	10.41
48	174.1	90.2	93.2	64.9	62.2	60.6	10.82
49	180.4	89.9	93.1	65.0	62.3	60.5	11.23
50	186.7	89.6	92.8	65.1	62.4	60.5	11.64
51	192.9	89.2	92.6	65.2	62.5	60.4	12.05
52	199.2	88.9	92.4	65.3	62.5	60.4	12.46
53	205.4	88.5	92.2	65.4	62.6	60.3	12.86
54	211.5	88.1	92.0	65.5	62.7	60.3	13.27
55	217.7	87.7	91.7	65.6	62.8	60.2	13.67
56	223.8	87.3	91.4	65.7	62.9	60.1	14.07
57	229.9	86.9	91.2	65.8	63.0	60.0	14.47
58	235.9	86.4	90.8	65.9	63.0	59.9	14.87
59	241.9	85.9	90.5	66.0	63.1	59.7	15.27
60	247.9	85.4	90.1	66.1	63.2	59.6	15.66
61	253.8	84.9	89.7	66.2	63.3	59.4	16.06
62	259.7	84.3	89.3	66.4	63.3	59.3	16.45
63	265.6	83.7	88.8	66.5	63.4	59.1	16.84
64	271.4	83.1	88.3	66.7	63.5	58.9	17.23
65	277.2	82.5	87.8	66.8	63.5	58.7	17.61
66	282.9	81.8	87.2	67.0	63.6	58.4	18.00
67	288.6	81.1	86.7	67.1	63.7	58.2	18.38
68	294.2	80.4	86.1	67.3	63.7	58.0	18.76
69	299.8	79.7	85.5	67.4	63.8	57.7	19.13
70	305.3	79.0	85.0	67.6	63.9	57.4	19.51

GENERAL INFORMATION

Table 17: Performance Goals of LOHMANN LSL-EXTRA – Week 71–95

Age in Weeks	Egg No. per H.H.	Rate of Lay %		Egg Weight g		Egg Mass g/H.D. kg/H.H	
	Cumulative	per H.H.	per H.D.	in Week	Cumulative	in Week	Cumulative
71	310.8	78.3	84.4	67.7	64.0	57.2	19.88
72	316.2	77.6	83.8	67.9	64.0	56.9	20.25
73	321.6	76.9	83.3	68.0	64.1	56.7	20.61
74	327.0	76.2	82.7	68.2	64.2	56.4	20.98
75	332.2	75.5	82.1	68.4	64.2	56.1	21.34
76	337.5	74.8	81.5	68.5	64.3	55.8	21.70
77	342.7	74.1	80.9	68.7	64.4	55.6	22.05
78	347.8	73.3	80.2	68.8	64.4	55.2	22.40
79	352.9	72.5	79.5	69.0	64.5	54.8	22.75
80	357.9	71.7	78.8	69.1	64.5	54.4	23.10
81	362.8	70.8	78.0	69.3	64.6	54.0	23.44
82	367.7	70.0	77.2	69.4	64.7	53.6	23.78
83	372.6	69.1	76.5	69.6	64.7	53.2	24.12
84	377.4	68.3	75.7	69.7	64.8	52.8	24.45
85	382.1	67.4	74.9	69.9	64.9	52.3	24.78
86	386.7	66.6	74.1	70.0	64.9	51.9	25.11
87	391.3	65.7	73.4	70.2	65.0	51.5	25.43
88	395.9	64.9	72.6	70.3	65.0	51.0	25.75
89	400.3	64.0	71.8	70.5	65.1	50.6	26.07
90	404.8	63.2	71.0	70.6	65.2	50.1	26.38
91	409.1	62.3	70.2	70.8	65.2	49.7	26.69
92	413.4	61.5	69.4	70.9	65.3	49.2	26.99
93	417.7	60.6	68.6	71.1	65.3	48.7	27.29
94	421.9	59.8	67.8	71.2	65.4	48.2	27.59
95	426.0	58.9	67.0	71.4	65.5	47.8	27.89

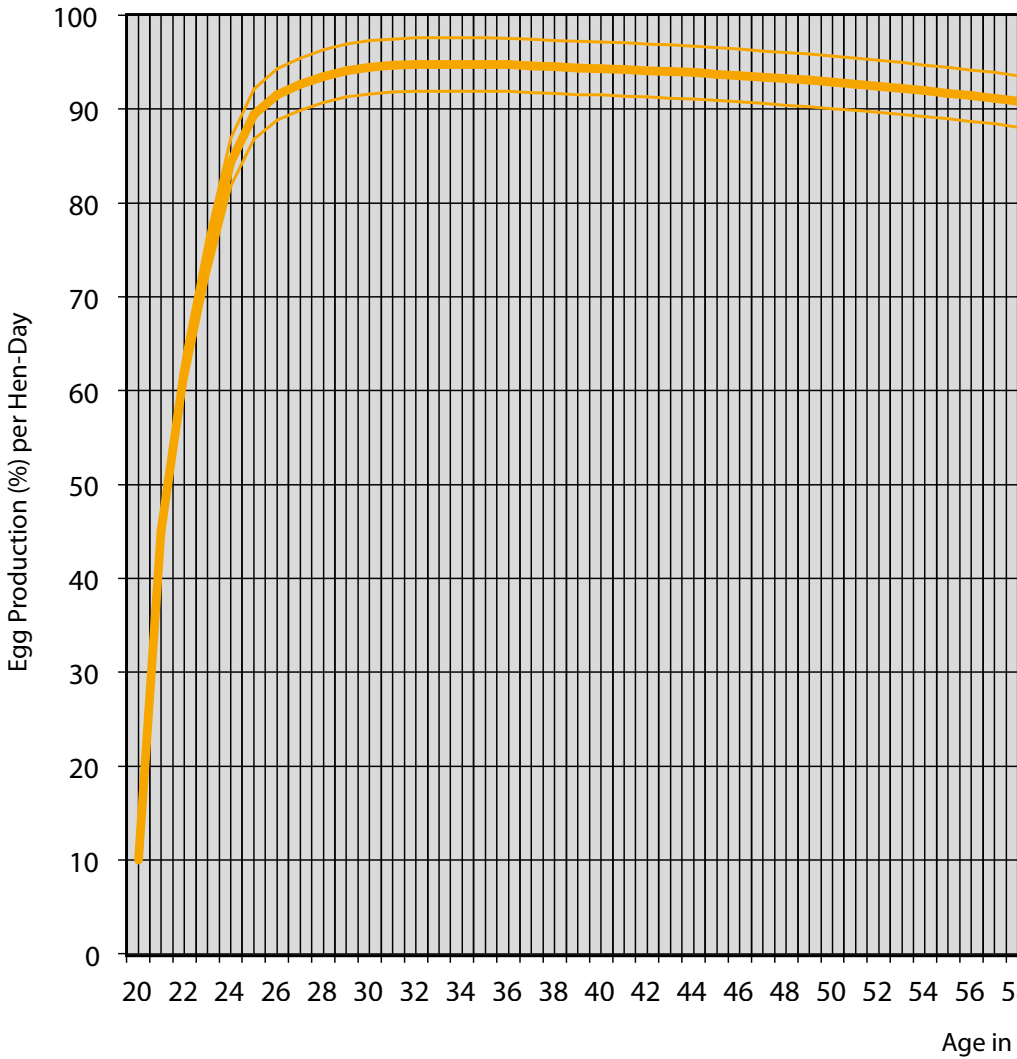
Table 18: Egg Grading for LOHMANN LSL-EXTRA

Expected Egg Grades (%) for Different Egg Weights* Depending on Average Egg Weight				
Egg Weight (g) (Flock Average)	S	M	L	XL
	Below 53 g	53–63 g	63–73 g	Above 73 g
46	98.5	1.5	0.0	0.0
48	93.2	6.8	0.0	0.0
50	80.4	19.6	0.0	0.0
51	71.2	28.8	0.0	0.0
52	60.8	39.1	0.1	0.0
53	50.0	49.6	0.4	0.0
54	39.6	59.5	0.9	0.0
55	30.2	67.9	1.9	0.0
56	22.2	74.0	3.8	0.0
57	15.8	77.5	6.7	0.0
58	10.9	78.2	10.9	0.0
59	7.4	76.0	16.6	0.0
60	4.8	71.5	23.6	0.1
62	1.9	57.2	40.3	0.6
64	0.7	40.5	56.6	2.2
66	0.2	25.6	67.7	6.5
68	0.1	14.6	70.6	14.7
70	0.0	7.6	65.3	27.0
72	0.0	3.7	54.1	42.2
Week**	Expected Egg Grades (%) of Total Produced Eggs* Depending on Flock Age***			
60	4.7	41.2	51.3	2.7
65	4.2	39.3	53.2	3.3
70	3.9	37.4	54.7	4.0
75	3.6	35.6	56.0	4.9
80	3.3	33.9	56.9	5.9
85	3.1	32.4	57.5	7.0
90	3.0	31.0	57.9	8.2
95	2.8	29.7	58.0	9.5

* Excluding double-yolk eggs ** Cumulative up to Week *** According to the given standard

GENERAL INFORMATION

Egg Production Curve for LOHMANN LSL-EXTRA Layers





INFORMATION

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

$$\begin{aligned}
 \text{ME MJ/kg} = & \text{ g crude protein} \times 0.01551 \\
 & + \text{ g crude fat} \times 0.03431 \\
 & + \text{ g crude starch} \times 0.01669 \\
 & + \text{ g sugar} \times 0.01301 \text{ (as Saccharose)}
 \end{aligned}$$

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



Consultation and diagnostics in all questions of poultry health through:

Veterinary-Laboratory

- > Diagnostics
- > Quality Control
- > Research and Development

Veterinary-Laboratory

Abschnede 64 | 27472 Cuxhaven | Germany
 Phone +49 (0) 4721 707-244 | Fax +49 (0) 4721 707-267
 Email vetlab@ltz.de | www.ltz.de

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 TIERZUCHT cannot accept responsibility for any errors, omissions or inaccuracies in such information or management suggestions.

Further, LOHMANN TIERZUCHT does not warrant or make any representations or guarantees regarding the use, validity, accuracy, or reliability of, or flock performance or productivity resulting from the use of, or otherwise respecting, such information or management suggestions. In no event LOHMANN TIERZUCHT be liable for any special, indirect or consequential damages or special damages whatsoever arising out of or in connection with the use of the information or management suggestions containing in this management guide.

LOHMANN TIERZUCHT GmbH
Am Seedeich 9–11 | 27472 Cuxhaven | Germany
P. O. Box 460 | 27454 Cuxhaven | Germany
Phone +49 (0) 47 21/505-0 | Telefax +49 (0) 47 21/505-222
Email info@ltz.de | www.ltz.de

09/16



LOHMANN
TIERZUCHT

BREEDING FOR SUCCESS ... TOGETHER