LOHMANN BROWN
LOHMANN LSL

Parent Stock

MANAGEMENT GUIDE

BREEDING FOR SUCCESS … TOGETHER

LOHMANN TIERZUCHT

CONTENTS

INTRODUCTION

LOHMANN LSL and LOHMANN BROWN parent stock are bred to produce high-performance layers for profitable egg production. The source lines are carefully selected for combining ability.

Each parent flock is a significant investment. To maximise return on investment, good management practices are required. This guide contains management recommen-dations based on comprehensive international experience. Local conditions may require specific adaptations of management practices to achieve optimal results.

Genetic selection within the pure lines is a continuing process to assure that LOHMANN LSL and LOHMANN BROWN parents and commercial layers meet market requirements and produce more profit than other strains.

Egg quality at the parent and commercial level depends on a combination of genetic potential and non-genetic factors (health, nutrition, light, temperature, air quality, -technical environment). It pays to control the non-genetic variables in order to help the birds express their genetic potential.

We trust that our management recommendations in this guide for LOHMANN LSL and LOHMANN BROWN parent stock will help to improve your technical results from flock to flock. Keep accurate records and contact your area representative of LOHMANN TIERZUCHT for more detailed information.

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.

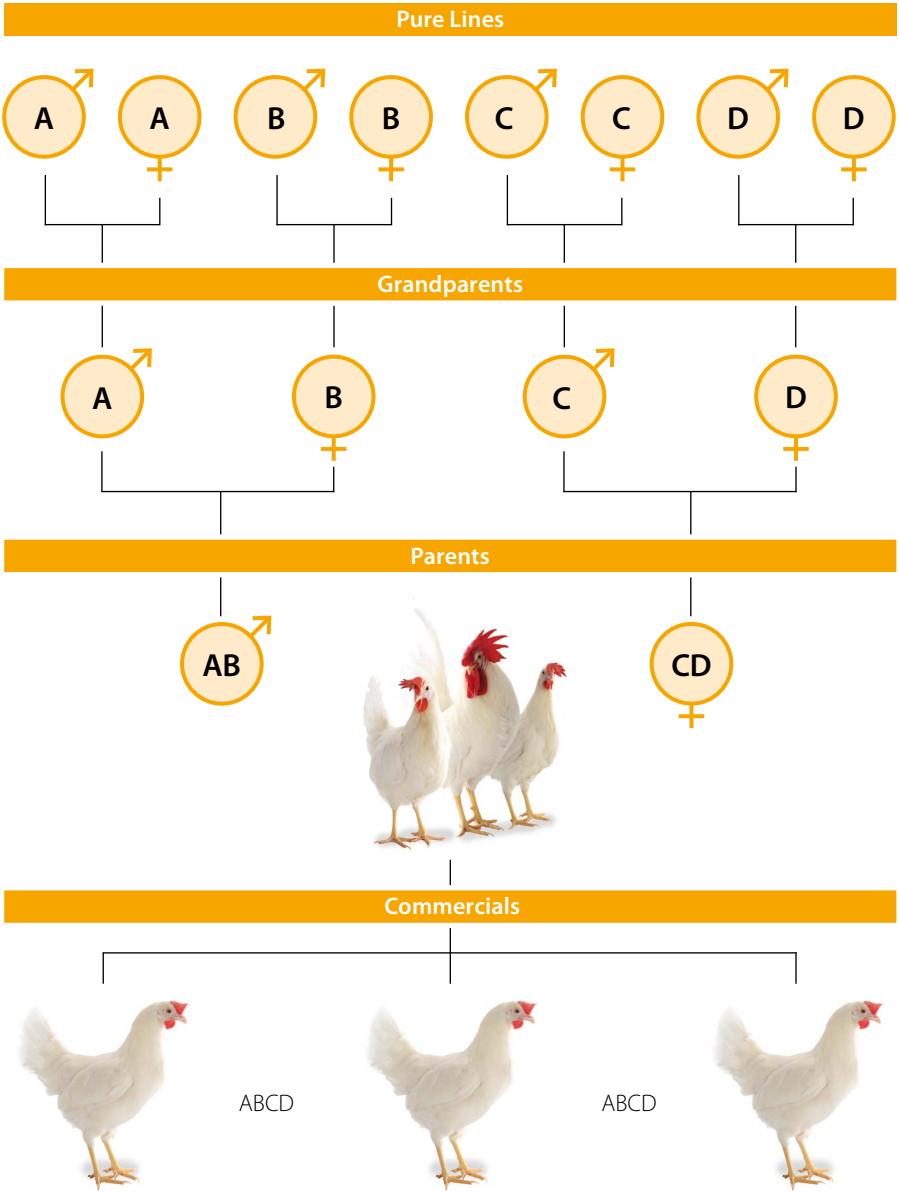
In addition, LOHMANN TIERZUCHT also provides expert advice on all questions of feed, nutrition and technical service.

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

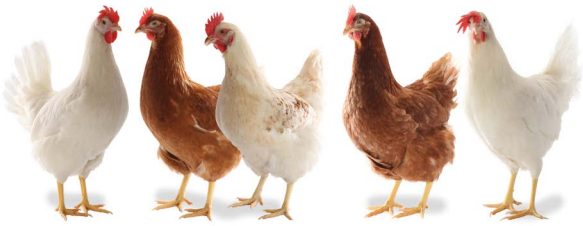
LOHMANN LSL



PERFORMANCE DATA

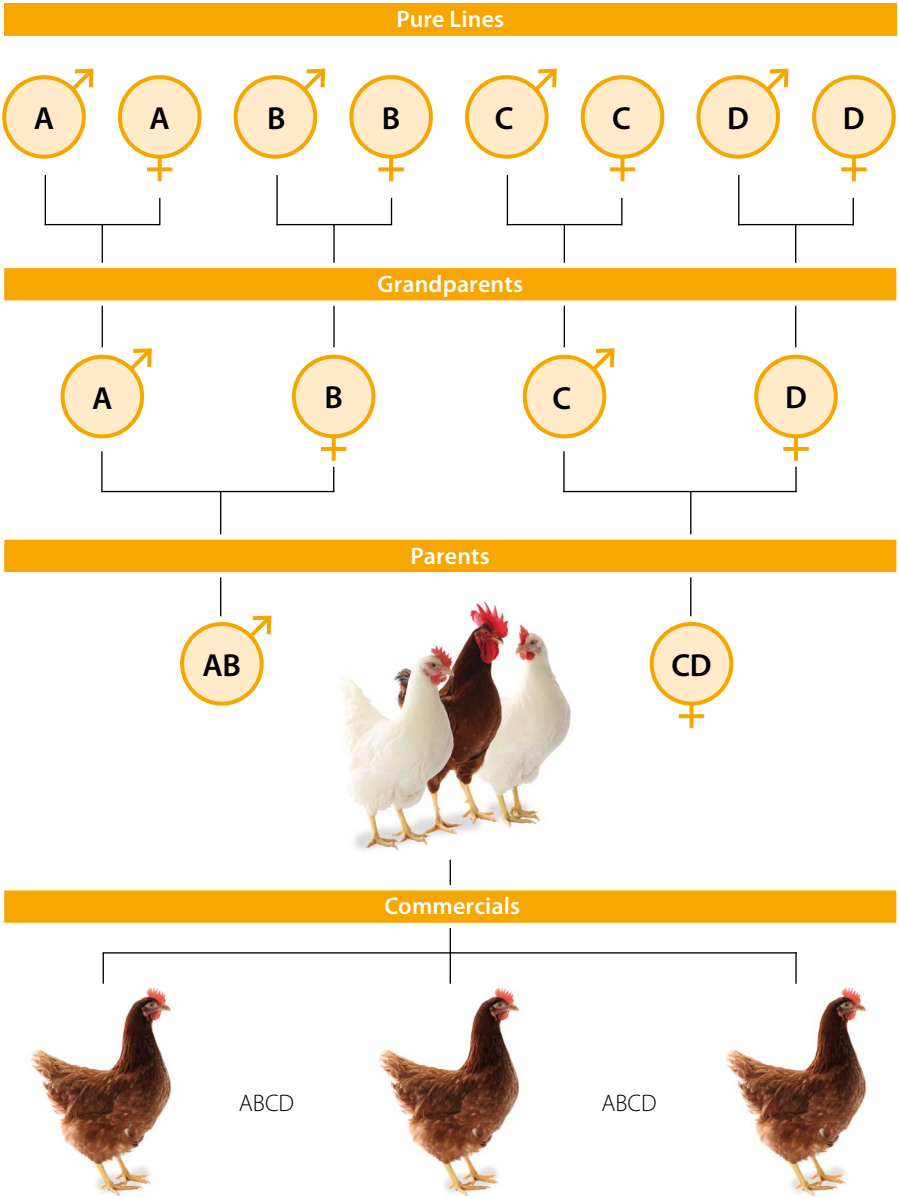
LOHMANN LSL Parent Stock

Egg Production	Age at 50 % production	21–22 weeks
	Peak production	26–30 weeks
	Eggs per Hen Housed	
	to 68 weeks of age	287–292 (289)
	to 72 weeks of age	307–312 (310)
	Settable Eggs per Hen Housed	
	to 68 weeks of age	260–265 (262)
	to 72 weeks of age	278–283 (280)
	Saleable Chicks per Hen Housed	
	to 68 weeks of age	105–110 (108)
	to 72 weeks of age	112–117 (114)
Hatchability	Average	80–83 %
Body Weight	Female	
	at 20 weeks	1.2–1.4 kg (2.6–3.1 lbs.)
	at 72 weeks	1.6–1.8 kg (3.5–4.0 lbs.)
	Male	
	at 20 weeks	1.6–1.8 kg (3.5–4.0 lbs.)
	at 72 weeks	2.2–2.4 kg (4.8–5.3 lbs.)
Feed Consumption (Male and Female)	1–20 weeks	7.2 kg (15.8 lbs.)
	21–72 weeks	42 kg (92.6 lbs.)
Liveability	Rearing	96–98 %
	Laying period	90–96 %



BREEDING SCHEME

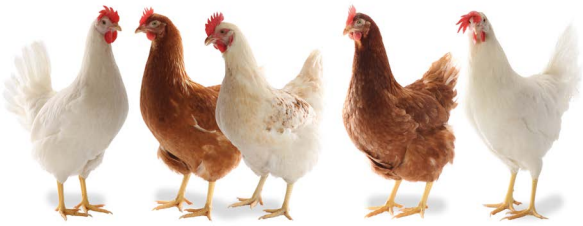
LOHMANN BROWN



PERFORMANCE DATA

LOHMANN BROWN Parent Stock

Egg Production	Age at 50 % production	21–22 weeks
	Peak production	26–30 weeks
	Eggs per Hen Housed	
	to 68 weeks of age	275–280 (278)
	to 72 weeks of age	295–300 (298)
	Settable Eggs per Hen Housed	
	to 68 weeks of age	253–258 (255)
	to 72 weeks of age	270–275 (273)
	Saleable Chicks per Hen Housed	
	to 68 weeks of age	102–107 (104)
	to 72 weeks of age	108–113 (110)
Hatchability	Average	80–83 %
Body Weight	Female	
	at 20 weeks	1.5–1.7 kg (3.3–3.7 lbs.)
	at 72 weeks	1.8–2.1 kg (4.0–4.6 lbs.)
	Male	
	at 20 weeks	2.1–2.3 kg (4.6–5.1 lbs.)
	at 72 weeks	2.9–3.1 kg (6.4–6.8 lbs.)
Feed Consumption (Male and Female)	1–20 weeks	8.0 kg (17.6 lbs.)
	21–72 weeks	43 kg (94.8 lbs.)
Liveability	Rearing	96–98 %
	Laying period	90–96 %



HOUSING CHICKS

General Recommendations

- Before bringing in the chicks, check that everything is in good working order.
- Males and females should be reared together from the first day.
- Warm up the house in good time to 35 – 36 °C (95 – 97 °F). 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 / 95 – 97 °F) 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 (68 – 77 °F) by temporarily flushing the nipple drinker lines or renewing the water in the chick founts.
- Follow the recommended lighting programmes (refer to page 26).

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 (3.15 in) inside the outer edge of the brooder and 8 cm (3.15 in) 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.

Environment

Environmental conditions have an effect on the wellbeing 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 recommended temperature at bird level.

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 drought.
› If the chicks are laying on the floor with their wings spread out 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.

Table 1: Desired Temperatures at Bird Level Dependent on Age

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

** Body temperatures of 40–41 °C (104–106 °F) are the optimum for the chicks.*

HOUSING CHICKS

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_2S	under	5 ppm

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

Body Temperature of the Chicks

There are findings which confirm that the temperature of chicks is between 40.0 (104 °F) and 41.0 °C (105.8 °F) after the moment of full homeothermy. This information can be parallelly used with the behaviour of the housed chicks to adjust house temperatures in an optimal way. Use modern ear thermometers, known from human medicine, as these are useful devices to measure the body temperature of day old chicks.
Make sure that you collect samples of chicks in different parts of the house and control the rectal temperature of the latter. Proceed in a way like you normally would do when weighing chicks / pullets and check for uniformity. Obtain samples from chicks distributed throughout the house in order to have reliable readings. Collect the information, calculate the average and adjust the house temperatures accordingly to achieve optimal chick temperatures.

If the actual barn temperature, humidity or uniformity of air distribution are significantly below the recommended levels, chick growth maybe adversely affected due to chilling.

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

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 (IBD)*	●		DW	2 live vaccinations recommended
Infectious Bronchitis *	●		DW – SP – SC – IM	Number of vaccinations according to disease pressure
AE	●		DW – SC – WW	Vaccination between 8–14 weeks
CAV	●		DW – SC – IM	Vaccination between 8–14 weeks
Mycoplasmosis		●	SP – ED – SC – IM	Vaccination before transfer
Fowl Pox		●	WW	Vaccination before transfer
Pasteurellosis		●	SC	2 vaccinations between 8–14 weeks
Infectious Coryza		●	SC	2 vaccinations between 8–14 weeks
Salmonella		●	DW – SP – IM	Vaccination before transfer
ILT		●	DW – ED	2 vaccinations between 6–14 weeks
EDS		●	SC – IM	Vaccination before transfer
E. Coli		●	SC – IM	2 vaccinations between 6–16 weeks

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

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

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:

- Treat only healthy, unstressed birds, at the age of 7 – 10 days.
- Allow only experienced personnel to do the work.
- Work slowly and carefully.
- 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.
- Under optimal housing conditions, males should generally not be beak treated. Nevertheless, if a beak treatment for males is necessary, just treat them very gently.

NUTRITION

Principles

Correct nutrition is a prerequisite to utilize the high genetic performance potential of LOHMANN LSL and LOHMANN BROWN Parent Stock. Best control on nutrition is achieved by feeding a ready mixed compound feed. The recommended feeding programme concentrates on the essential nutrients and is designed to cover the requirements for top performance in rearing and production.

The base for correct nutrition is correct feedstuff evaluation. The following table gives information on the sources used for the recommendations in this programme and on analytical methods for the determination of specific nutrients.

Nutrient	Source of Information	Analytical Method
Energy	Results of European Research Institutes	N-corrected Metabolizable Energy
Crude Protein	Results of European Research Institutes	Method according to Kjeldahl
Amino Acids	Results of LOHMANN TIERZUCHT and Amino Acid Producers	Amino Acid Analyser
Digestible Amino Acids	Digestion Coefficients based on Dutch trials	
Calcium Sodium	Results of LOHMANN TIERZUCHT	Flame - Photometry
Total Phosphorus	Results of LOHMANN TIERZUCHT	Ultraviolet-Spectroscopy
Available Phosphorus	Results of French Availability Studies	
Chlorine	Results of LOHMANN TIERZUCHT	Titration Method acc. to Mohr
Linoleic Acid	Results of LOHMANN TIERZUCHT	Gas-Chromatography Analysis

Table 4: LOHMANN LSL Parent Stock Females
Body Weight Development, Feed Consumption and Water Consumption with Standard Lighting Programme

Age in Weeks	Body Weight (g)		kJ** Bird/ Day	Feed Consumption***		Water Consumption	
	Average	Range		g/Bird/ Day	Cumulative (g)	ml/Bird/ Day	Cumulative (ml)
1	65	62–68	126	11	74	18	129
2	130	123–137	204	17	193	30	337
3	190	180–200	276	23	354	40	619
4	250	237–263	319	28	550	49	962
5	320	303–337	365	32	774	56	1354
6	400	379–421	410	36	1026	63	1795
7	485	460–510	456	40	1306	70	2285
8	570	540–600	502	44	1614	77	2824
9	650	616–684	547	48	1950	84	3412
10	730	692–768	593	52	2314	91	4049
11	810	767–853	638	56	2706	98	4735
12	880	834–926	684	60	3126	105	5470
13	945	895–995	730	64	3574	112	6254
14	1005	952–1058	764	67	4043	117	7074
15	1065	1009–1121	798	70	4533	123	7932
16	1120	1061–1179	832	73	5044	128	8826
17	1170	1109–1231	878	77	5583	135	9769
18	1220	1156–1284	935	82	6157	144	10774
19	1270	1203–1337	992	87	6766	152	11840
20	1320	1251–1389	1049	92	7410	161	12967

* *Depends upon sexual maturity - 100 – 200 g higher for hens in production.*

** *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, variation is possible due to differences in feed consumption and environments.*

NUTRITION

Table 5: LOHMANN BROWN Parent Stock Females Body Weight Development, Feed Consumption and Water Consumption with Standard Lighting Programme

Age in Weeks	Body Weight (g)		kJ** Bird/ Day	Feed Consumption***		Water Consumption	
	Average	Range		g/Bird/ Day	Cumulative (g)	ml/Bird/ Day	Cumulative (ml)
1	65	62–68	120	10	70	18	123
2	130	124–137	228	19	203	33	355
3	180	171–189	300	25	378	44	662
4	250	238–263	342	30	588	53	1029
5	320	304–336	399	35	833	61	1458
6	410	390–431	456	40	1113	70	1948
7	500	475–525	513	45	1428	79	2499
8	590	561–620	570	50	1778	88	3112
9	680	646–714	616	54	2156	95	3773
10	770	732–809	650	57	2555	100	4471
11	860	817–903	684	60	2975	105	5206
12	950	903–998	718	63	3416	110	5978
13	1030	979–1082	752	66	3878	116	6787
14	1110	1055–1166	787	69	4361	121	7632
15	1190	1131–1250	821	72	4865	126	8514
16	1270	1207–1334	855	75	5390	131	9433
17	1350	1283–1418	889	78	5936	137	10388
18	1440	1368–1512	923	81	6503	142	11380
19	1530	1454–1607	958	84	7091	147	12409
20	1600	1520–1680	992	87	7700	152	13475

* *Depends upon sexual maturity - 100 – 200 g higher for hens in production.*

** *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, variation is possible due to differences in feed consumption and environments.*

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 undersupply of nutrients will harm the birds. They lose production and once exhausted, they easily can run into a health problem.

Rearing and Growing Period

The recommended feed schedule for the rearing period of LOHMANN LSL and LOHMANN BROWN Parent Stock is based on four diets.

The Starter is a diet with a high nutrient density, based on a feed formulation including raw materials of excellent quality and digestibility. This feed is supposed to be used until chicks have reached body weight targets in the first three weeks.

It is followed by a traditional Grower feed based on an energy level of 11.4 MJ/kg (2720 Kcal/kg). This feed is supposed to be fed till chicks have reached a body weight targets at 8 weeks of age.

A Developer feed should be fed after 8 weeks. A low nutrient density, a good feed structure and crude fibre content up to 5 – 6 % in this special feed should be used to develop eating capacities.

The use of a Pre-Layer feed for LOHMANN LSL and LOHMANN BROWN Parent Stock has several advantages:

- The Pre-Layer feed gives a better uniformity due to the higher protein and amino acid content in the critical period of sexual maturity. Individual males and females with weight below standard are given the chance to compensate.
- The Pre-Layer feed has a higher calcium content than the Developer and improves the shell quality of early maturing hens at a later age.
- The Pre-Layer feed also smoothens the transition from low to high Calcium amount in the feed.

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.

NUTRITION

Table 6: Recommended Nutrient Levels (Rearing)

Diet type*		Starter	Grower	Developer	Pre-Layer
Nutrient		**1 – 3 weeks**	**4 – 8 weeks**	**9 – 17/18 weeks**	**18/19 weeks – 5 % prod.**
Metabol. Energy	kcal	2900	2720 – 2800	2720 – 2800	2720 – 2800
	MJ	12.00	11.40 – 11.70	11.40 – 11.70	11.40 – 11.70
Crude Protein	%	20.00	18.50	15.00	17.50
Methionine	%	0.48	0.40	0.34	0.36
Dig. Methionine	%	0.39	0.33	0.28	0.29
Meth./Cysteine	%	0.83	0.70	0.60	0.68
Dig. M/C	%	0.68	0.57	0.50	0.56
Lysine	%	1.20	1.00	0.68	0.85
Dig. Lysine	%	0.98	0.82	0.55	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	0.17	0.20
Dig. Tryptophan	%	0.19	0.17	0.14	0.16
Threonine	%	0.80	0.70	0.55	0.60
Dig. Threonine	%	0.65	0.57	0.44	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
Phosphorus, total	%	0.75	0.70	0.58	0.65
Phosphorus, 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.*

Table 7: 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*

NUTRITION

Laying Period

For maximum hatching egg production and optimum hatchability a phase feeding programme is recommended. Since the requirements for specific nutrients like essential amino acids, calcium, available phosphorus and linoleic acid are changing with age, a programme with at least 2 phases is recommended.

Table 8: Recommended Nutrient Levels per kg of Feed for different daily Feed Consumption, Phase 1 (20 to approx. 50 weeks)

Nutrient		Requirement g/Hen/Day	Daily Feed Consumption			
			105 g	110 g	115 g	120 g
Protein	%	19.20	18.29	17.45	16.70	16.00
Calcium	%	4.10	3.90	3.73	3.57	3.42
Phosphorus*	%	0.63	0.60	0.57	0.55	0.52
Av. Phosphorus	%	0.44	0.42	0.40	0.38	0.37
Sodium	%	0.17	0.16	0.15	0.15	0.14
Chloride	%	0.17	0.16	0.15	0.15	0.14
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	0.72	0.69	0.66
Dig. M/C	%	0.65	0.62	0.59	0.57	0.54
Arginine	%	0.92	0.87	0.83	0.80	0.76
Dig. Arginine	%	0.75	0.72	0.68	0.65	0.63
Valine	%	0.74	0.71	0.68	0.65	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	0.12
Threonine	%	0.61	0.58	0.55	0.53	0.51
Dig. Threonine	%	0.50	0.47	0.45	0.43	0.41
Isoleucine	%	0.69	0.66	0.63	0.60	0.58
Dig. Isoleucine	%	0.57	0.54	0.52	0.49	0.47
Linoleic Acid	%	2.00	2.00	1.82	1.74	1.67

** without Phytase*

Table 9: Recommended Nutrient Levels per kg of Feed for different daily Feed Consumption, Phase 2 (after approx. 50 weeks of age)

Nutrient		Requirement g/Hen/Day	Daily Feed Consumption			
			105 g	110 g	115 g	120 g
Protein	%	18.40	17.52	16.73	16.00	15.33
Calcium	%	4.30	4.10	3.91	3.74	3.58
Phosphorus*	%	0.54	0.52	0.49	0.47	0.45
Av. Phosphorus	%	0.38	0.36	0.35	0.33	0.32
Sodium	%	0.17	0.16	0.15	0.15	0.14
Chloride	%	0.17	0.16	0.15	0.15	0.14
Lysine	%	0.85	0.81	0.78	0.74	0.71
Dig. Lysine	%	0.70	0.67	0.64	0.61	0.58
Methionine	%	0.44	0.41	0.40	0.38	0.36
Dig. Methionine	%	0.36	0.34	0.32	0.31	0.30
Meth./Cyst.	%	0.79	0.75	0.71	0.68	0.65
Dig. M/C	%	0.64	0.61	0.59	0.56	0.54
Arginine	%	0.90	0.86	0.82	0.79	0.75
Dig. Arginine	%	0.74	0.71	0.67	0.65	0.62
Valine	%	0.73	0.70	0.67	0.64	0.61
Dig. Valine	%	0.62	0.59	0.57	0.54	0.52
Tryptophan	%	0.18	0.17	0.16	0.16	0.15
Dig. Tryptophan	%	0.15	0.14	0.13	0.13	0.12
Threonine	%	0.60	0.57	0.54	0.52	0.50
Dig. Threonine	%	0.49	0.47	0.45	0.43	0.41
Isoleucine	%	0.68	0.65	0.62	0.59	0.57
Dig. Isoleucine	%	0.56	0.53	0.51	0.49	0.47
Linoleic Acid	%	1.60	1.60	1.45	1.39	1.33

** without Phytase*

In the tables with recommended nutrient levels per kg of LOHMANN LSL and LOHMANN BROWN Parent Stock feed different daily feed consumption is taken into consideration.

An average daily feed consumption of 115 g can be expected with a feed containing 11.4 MJ = 2720 kcal metabolizable energy per kg at an in-house temperature of 22 °C and good feather quality.

NUTRITION

Feed Consumption

The level of feed intake in the production period 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 stages of production.

Micro-Nutrients

The supplementation of parent stock feed with micro-nutrients like essential vitamins, trace elements and substances like antioxidants, coccidiostats and organic acids are essential for maximum hatching egg production and hatchability. By adding these micronutrients in suitable quantities, varying contents in the raw materials are compensated and the correct supply to the parent stock is safeguarded.

Remark: Vitamin C is synthesized 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.

Heat Treatment

As a preventive measure against salmonella and other bacteria/viruses a heat treatment of the feed is sometimes applied. Depending upon the treatment technique the efficiency of specific micro-nutrients can be damaged. These micro-nutrients must therefore be added in higher quantities. According to our experience mainly Vitamin A and K_3 are affected. For further details contact LOHMANN TIERZUCHT.

Table 10: Recommended Micro-Nutrient Specification

Supplements per kg Feed		Starter/Grower	Developer	Pre-Layer/Phase I+II
Vitamin A*	I.U.	10000	10000	10000
Vitamin D_3	I.U.	2500	2500	3000
Vitamin E	mg	20–30***	20–30***	50–100***
Vitamin K_3	mg	3****	3****	5****
Vitamin B_1	mg	2	2	4
Vitamin B_2	mg	8	6	10
Vitamin B_6	mg	4	4	4
Vitamin B_{12}	mcg	20	20	30
Pantothenic Acid	mg	10	10	20
Nicotinic Acid	mg	30	30	50
Folic Acid	mg	1	1	2
Biotin	mcg	100	100	200
Cholin	mg	300	300	400
Antioxydant	mg	100–150***	100–150***	100–150***
Coccidiostat		as required	as required	–
Manganese**	mg	100	100	100
Zinc**	mg	60	60	60
Iron	mg	40	40	40
Copper**	mg	5	5	10
Iodine	mg	1	1	1
Selenium**	mg	0.3	0.3	0.3

* *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 11: 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 %

** can be partly replaced by oyster shells*

LIGHTING

General

The lighting programme controls onset of lay and affects the performance during the production period. So, within certain limits, performance can be adapted to farm specific requirements by adjusting the lighting scheme.
It is easiest to follow the lighting programme in closed houses. In this case the hours of light and light intensity can be adjusted to changing needs.

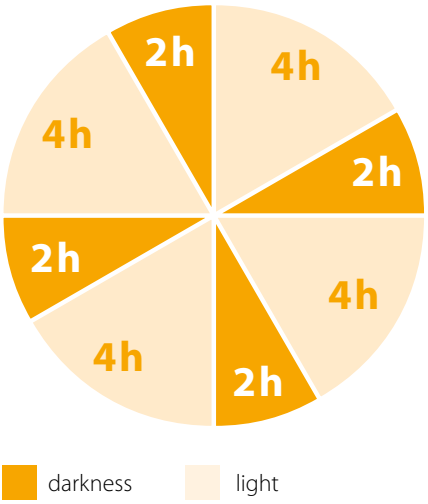
Intermittent Lighting Programme for Day Old Chicks

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 principal in splitting the day into phases of resting and activity using a special designed intermittent lighting programme. The aim is to synchronise the chicks' activities. The farmer gets a better impression of the flock's condition and the birds are encouraged by the group's 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



This programme can be used for up to 7 or 10 days after arrival, then switch to the regular step down lighting programme. The use

of the following lighting programme 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 synchronised.
- 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 monitoring of the birds is made easier.
- Mortality will decrease.

Lighting Programme for Closed Houses

In closed houses the basic principles of lighting programmes for layers are:

- **Never increase hours of light during the growing period.**
- **Never decrease hours of light during the production period.**

To what degree lighting hours are reduced during the growing period, and the time when stimulation is started by increasing the lighting hours, are means by which performance can be adapted to farm specific requirements.

Table 12: Lighting Programme for Windowless Houses

LOHMANN LSL Parent Stock

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

* *Lux = Lumen/m²*
** *or run an Intermittent Lighting Programme*
*** *According to recent research results, 14 hours of light are sufficient during production provided the house is light tight.*
**** *until the end of production*

LIGHTING

Table 13: Lighting Programme for Windowless Houses

LOHMANN BROWN Parent Stock

Age (Weeks)	Hours of Light (Standard)	Light Intensity (Lux*)
Day 1 – 2 **	24	20 – 40
Day 3 – 6 **	20	20 – 30
2	16	10 – 20
3	12	5 – 10
4	9	5 – 10
5	9	5 – 10
6	9	5 – 10
7	9	5 – 10
8	9	5 – 10
9	9	5 – 10
10	9	5 – 10
11	9	5 – 10
12	9	5 – 10

Age (Weeks)	Hours of Light (Standard)	Light Intensity (Lux*)
13	9	5 – 10
14	9	5 – 10
15	9	5 – 10
16	9	5 – 10
17	9	5 – 10
18	11	5 – 10
19	12	5 – 10
20	13	20 – 30
21	14***	20 – 30
22	14.5***	20 – 30
23	15***	20 – 30
24	15.5***	20 – 30
25 ****	16***	20 – 30

* *Lux = Lumen/m²*
** *or run an Intermittent Lighting Programme*
*** *According to recent research results, 14 hours of light are sufficient during production provided the house is light tight.*
**** *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 ≥ 50–60 Lux.
- Dimmer switch on at ≤ 50–60 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.

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

LIGHTING

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.

Light Intensity

It is very important to bear in mind that birds in an open house are exposed to very high light intensity in the natural daylight. Therefore it is crucial to prepare the pullets in the rearing for such high light intensities to avoid behavioural disorders. High frequency light sources with a bright light spectrum are recommended.

An example of a lighting programme for LOHMANN BROWN Parent Stock adjusted to location, condition and requirements by LOHMANN TIERZUCHT lighting programme tool

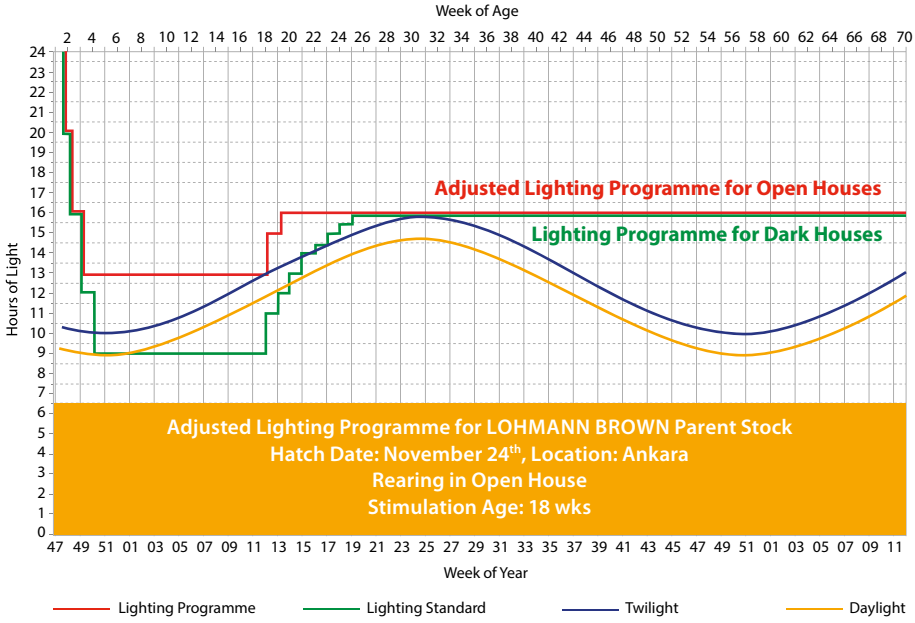


Table 14: Natural Daylight at different Latitudes

Week of Year		Approximate Duration of Natural Daylight in hours							
Hemisphere		Latitude°							
North	South	25–30	30–35	35–40	40–45	45–50	50–55	55–60	60–65
1	27	10.30	10.10	9.40	9.10	8.30	8.00	6.40	5.00
2	28	10.30	10.10	9.40	9.20	8.40	8.10	6.50	5.40
3	29	10.40	10.20	10.00	9.30	8.50	8.20	7.20	6.00
4	30	10.40	10.30	10.10	9.40	9.10	8.40	7.50	6.40
5	31	10.50	10.40	10.20	10.00	9.30	9.00	8.20	7.20
6	32	11.00	10.50	10.30	10.10	10.00	9.30	9.00	8.10
7	33	11.10	11.00	10.40	10.30	10.20	10.00	9.20	9.00
8	34	11.20	11.10	11.00	10.50	10.40	10.20	9.50	9.30
9	35	11.30	11.30	11.20	11.10	11.00	10.50	10.40	10.10
10	36	11.40	11.40	11.40	11.30	11.30	11.20	11.20	11.00
11	37	11.50	11.50	12.00	11.50	11.50	11.50	12.00	11.40
12	38	12.10	12.10	12.10	12.10	12.10	12.20	12.20	12.20
13	39	12.20	12.20	12.30	12.30	12.40	12.40	13.00	13.00
14	40	12.30	12.40	12.50	12.50	13.00	13.10	13.30	13.50
15	41	12.40	13.00	13.00	13.20	13.20	13.40	14.10	14.40
16	42	12.50	13.10	13.20	13.30	13.40	14.20	14.50	15.20
17	43	13.00	13.20	13.30	13.50	14.00	14.30	15.10	16.00
18	44	13.10	13.30	13.50	14.00	14.30	15.00	15.40	16.50
19	45	13.20	13.40	14.00	14.20	14.50	15.20	16.20	17.30
20	46	13.30	13.50	14.20	14.40	15.10	15.50	16.50	18.10
21	47	13.40	14.00	14.30	15.00	15.30	16.10	17.20	18.50
22	48	13.40	14.10	14.40	15.10	15.30	16.20	17.40	19.20
23	49	13.50	14.10	14.40	15.10	15.40	16.30	18.00	19.50
24	50	13.50	14.20	14.40	15.20	15.40	16.40	18.10	20.10
25	51	13.50	14.20	14.40	15.20	15.50	16.40	18.10	20.20
26	52	13.50	14.20	14.40	15.20	16.00	16.40	18.10	20.10

GENERAL RECOMMENDATIONS

Table 15: Natural Daylight at different Latitudes

Week of Year		Approximate Duration of Natural Daylight in hours							
Hemisphere		Latitude°							
North	South	25–30	30–35	35–40	40–45	45–50	50–55	55–60	60–65
27	1	13.50	14.20	14.40	15.10	15.50	16.30	18.00	19.50
28	2	13.50	14.20	14.40	15.10	15.50	16.20	17.40	19.20
29	3	13.40	14.20	14.30	15.10	15.30	16.10	17.20	18.40
30	4	13.30	14.00	14.20	14.40	15.20	15.50	16.50	18.10
31	5	13.30	13.50	14.10	14.30	14.50	15.30	16.20	17.30
32	6	13.20	13.30	13.50	14.10	14.30	15.00	15.50	16.50
33	7	13.10	13.20	13.40	13.50	14.10	14.30	15.10	16.00
34	8	13.00	13.10	13.20	13.30	13.50	14.00	14.50	15.20
35	9	12.50	13.00	13.10	13.20	13.30	13.40	14.10	14.50
36	10	12.40	12.40	12.50	13.00	13.10	13.20	13.40	14.00
37	11	12.30	12.30	12.30	12.40	12.40	12.50	13.00	13.10
38	12	12.30	12.10	12.10	12.10	12.10	12.20	13.20	12.20
39	13	12.10	12.00	12.00	11.50	11.50	12.00	11.50	11.50
40	14	11.50	11.50	11.40	11.30	11.30	11.20	11.10	11.00
41	15	11.40	11.30	11.20	11.20	11.00	10.50	10.40	10.20
42	16	11.30	11.20	11.10	11.00	10.40	10.30	10.10	9.50
43	17	11.20	11.10	11.00	10.40	10.20	10.00	9.30	9.00
44	18	11.10	11.00	10.40	10.20	10.00	9.40	9.00	8.10
45	19	11.00	10.40	10.20	10.00	9.40	9.10	8.20	7.30
46	20	10.50	10.30	10.10	9.40	9.20	8.50	7.50	6.50
47	21	10.40	10.20	10.00	9.30	9.00	8.30	7.30	6.10
48	22	10.30	10.10	9.50	9.20	8.40	8.10	7.00	5.40
49	23	10.20	10.10	9.40	9.10	8.30	8.00	6.50	5.10
50	24	10.20	10.00	9.40	9.00	8.20	7.50	6.30	4.50
51	25	10.20	10.00	9.40	9.00	8.20	7.40	6.30	4.40
52	26	10.20	10.00	9.40	9.00	8.20	7.50	6.30	4.40

Hygiene

- Set up the farm at a safe distance from other poultry houses and fence in.
- Keep birds of only one age group on the farm.
- Keep 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.
- Provide the farm´s own protective 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.

Insect and Parasite Control

If necessary, use a suitable insecticide immediately after the birds have been removed in order to kill the insects before they are hiding in walls and parts of the equipment.

Use a contact insecticide before warming up the house to control remaining insects. Make sure that the application is safe for the chicks!

Cleaning and Disinfection

- Disinfection is only effective after cleaning thoroughly.
- Remove litter first and wash floor, walls and all equipment with plenty of water.
- Remove all feed from silos and wash silos. Clean feeding and drinker systems.
- Disinfect walls and floor first time by spraying an effective disinfectant.
- Disinfect smaller parts of the equipment by dipping into a disinfecting solution.
- Disinfect feeders and drinkers by spraying or rinsing with a disinfectant.
- Disinfect the silos by spraying a disinfectant.
- Clean and disinfect streets on the farm area.
- Leave the house for a rest period of 1 – 2 weeks.
- Disinfect house and equipment for a second time by fumigating or fogging a disinfectant.
- Rinse drinker lines with plenty of water before placing chicks.

GENERAL RECOMMENDATIONS

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 consistency of droppings.

Mating Ratio

Depending on environmental conditions, the mating ratio ranges between 8 and 10 males per 100 females. In controlled environment, usually 8 – 9 males per 100 females are sufficient. In open houses, on slatted floors and hot climate 9 – 10 males per 100 females are recommended. More males than needed cause disturbance in the flock, resulting in reduced fertility.

Water Supply

Clean water is as equally 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 always be assured.
A water meter is a very useful tool to monitor water consumption. The optimal water temperature is about 20 °C (68 °F). Furthermore feed and water intake are closely correlated.

If birds don't drink enough water for any reason, feed intake is consequently reduced. The water to feed ratio at comfortable temperature is around
1.8 – 2 : 1, but this relation increases up to 5 : 1 at high ambient temperatures above 30 °C (86 °F). 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*

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 16: Amount and Granulation of Grit Dependent on Age

Week 1–2	once a week 1 g /bird (size 1–2 mm / 0.04–0.08 in)
Week 3–8	once a week 2 g/bird (size 3–4 mm / 0.12–0.16 in)
From week 9	once a month 3 g/bird (size 4–6 mm / 0.16–0.24 in)

Stocking Density

The optimal bird density depends on management conditions and to which extent climate can be controlled. 6 – 8 birds/m^2 can be taken as a general guide for barn systems. Follow the local laws and statutory regulations.

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 17: 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 11–20	2 feeders (Ø 40 cm) for 100 birds 3 feeders (Ø 40 cm) for 100 birds
Chain feeders	3–10 11–20	2.5–3.5 lin. m for 100 birds 4.5 lin. m for 100 birds

Follow the Instructions of Manufacturer!

GENERAL RECOMMENDATIONS

Table 18: 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

Follow the Instructions of Manufacturer!

Litter

Softwood shavings or straw make suitable litter. Use shavings from untreated wood only in order to avoid poisonings and residues in the egg. Provide sufficient ventilation to ensure good litter condition and remove wet litter, if necessary.

Nests and Egg Collection

Quality of nests is also a factor which affects egg quality. Regularly renew the litter in litter-type nests 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:

- frequent collection of floor eggs
- no draught in the nest area
- clean, dry litter or soft nest lining
- only one type of nest in the house
- easy access
- even distribution of the nests within the house

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

Hatching Egg Care

- Collect hatching eggs frequently.
- Keep floor eggs separately – many will already be contaminated internally.
- If floor eggs are to be used, set in separate incubators (large hatchery) or set at the bottom of setter and hatch trolleys where exploding eggs will cause less damage.
- Take out heavily soiled eggs, do not send them to the hatchery.
- Do not wash hatching eggs.
- Store eggs in a clean egg store. If farm store does not have a controlled temperature, transfer as soon as possible to the hatchery.
- Store eggs at 22 °C (71.6 °F) if setting within 4 days, or 16– 18 °C (60.8 – 64.4 °F) if storing for 5 – 12 days. Older eggs will have markedly lower hatchability.

Hatching Egg Disinfection

- Fog or spray eggs with a modern disinfectant after collection, then place in store. Follow manufacturers' instructions carefully.
- If desired, fog eggs in egg store once a day, but this should not be necessary if the store is regularly cleaned.
- Eggs should be fogged again before prewarming and setting.
- Several manufacturers are producing modern disinfectants suitable for use in hatcheries.
- A fogging machine is a good investment as there is no wetting of the eggs and the fog will reach all the eggs.
- Spraying can be carried out using a small droplet size but the spray will not reach all eggs without a fan to aid circulation.
- Formaldehyde (Formalin) is no longer recommended as it is harmful to the embryo, increasing early embryonic death, and it is hazardous to human health.

If fumigation is the only way to disinfect eggs, it can to be done in two ways:

a) Mixing of 21 cm^3 of Formaldehyde with 17 g of Potassium Permanganate an 21 cm^3 of water per m^3 air
   - **Caution: Never add Potassium Permanganate to Formaldehyde!**

b) Heat in of 8 g Paraformaldehyde plus 20 cm^3 of water per m^3 in an electrical heater. Follow closely the instructions of the manufacturer.
   - **Never fumigate with Formaldehyde within the first 96 hours of incubation!**
   - **Never exceed a fumigation time of 30 minutes!**
   - **Keep in mind that the ventilation of a fumigation chamber has to be done with clean air to avoid a recontamination of the hatching eggs!**

GENERAL RECOMMENDATIONS

Table 19: Body Weight Development of LOHMANN LSL Parent Stock

Age in Weeks	Females			Males
	Average (g)	Range (g)		Average (g)
1	65	62	68	70
2	130	123	137	140
3	190	180	200	200
4	250	237	263	260
5	320	303	337	340
6	400	379	421	430
7	485	460	510	530
8	570	540	600	660
9	650	616	684	785
10	730	692	768	905
11	810	767	853	1020
12	880	834	926	1120
13	945	895	995	1210
14	1005	952	1058	1295
15	1065	1009	1121	1375
16	1120	1061	1179	1450
17	1170	1109	1231	1520
18	1220	1156	1284	1585
19	1270	1203	1337	1645
20	1320	1251	1389	1720
21	1370	1298	1442	1790
22	1420	1345	1495	1855
23	1460	1383	1537	1915
24	1500	1421	1579	1970
25	1535	1454	1616	2020
26	1565	1483	1647	2065
27	1590	1507	1673	2105
28	1610	1525	1695	2140
29	1630	1544	1716	2170
30	1640	1554	1726	2195
31	1648	1561	1735	2215
32	1654	1567	1741	2225
33	1658	1571	1745	2230
34	1660	1573	1747	2234
35	1662	1575	1749	2237
36	1664	1577	1751	2240

Age in Weeks	Females			Males
	Average (g)	Range (g)		Average (g)
37	1666	1579	1753	2243
38	1668	1580	1756	2246
39	1670	1582	1758	2249
40	1672	1584	1760	2252
41	1674	1586	1762	2255
42	1676	1588	1764	2258
43	1678	1590	1766	2261
44	1680	1592	1768	2264
45	1682	1594	1770	2267
46	1684	1596	1772	2270
47	1686	1597	1775	2273
48	1688	1599	1777	2276
49	1690	1601	1779	2279
50	1692	1603	1781	2282
51	1694	1605	1783	2285
52	1696	1607	1785	2288
53	1698	1609	1787	2290
54	1700	1611	1789	2292
55	1702	1613	1791	2294
56	1704	1615	1793	2296
57	1706	1616	1796	2298
58	1708	1618	1798	2300
59	1710	1620	1800	2302
60	1712	1622	1802	2304
61	1713	1623	1803	2306
62	1714	1624	1804	2308
63	1715	1625	1805	2310
64	1716	1626	1806	2312
65	1717	1627	1807	2314
66	1718	1628	1808	2316
67	1719	1629	1809	2318
68	1720	1630	1810	2320
69	1721	1631	1811	2322
70	1722	1632	1812	2324
71	1723	1633	1813	2326
72	1724	1633	1815	2328

Table 20: Body Weight Development of LOHMANN BROWN Parent Stock

Age in Weeks	Females			Males
	Average (g)	Range (g)		Average (g)
1	65	62	68	65
2	130	124	137	145
3	180	171	189	245
4	250	238	263	345
5	320	304	336	445
6	410	390	431	555
7	500	475	525	675
8	590	561	620	795
9	680	646	714	915
10	770	732	809	1035
11	860	817	903	1155
12	950	903	998	1275
13	1030	979	1082	1395
14	1110	1055	1166	1515
15	1190	1131	1250	1635
16	1270	1207	1334	1755
17	1350	1283	1418	1870
18	1440	1368	1512	1985
19	1530	1454	1607	2100
20	1600	1520	1680	2210
21	1650	1568	1733	2290
22	1695	1610	1780	2360
23	1735	1648	1822	2420
24	1773	1684	1862	2475
25	1808	1718	1898	2525
26	1828	1737	1919	2570
27	1843	1751	1935	2610
28	1855	1762	1948	2645
29	1862	1769	1955	2675
30	1870	1777	1964	2695
31	1873	1779	1967	2710
32	1876	1782	1970	2724
33	1879	1785	1973	2739
34	1882	1788	1976	2753
35	1885	1791	1979	2768
36	1888	1794	1982	2782

Age in Weeks	Females			Males
	Average (g)	Range (g)		Average (g)
37	1891	1796	1986	2797
38	1894	1799	1989	2811
39	1897	1802	1992	2826
40	1900	1805	1995	2840
41	1902	1807	1997	2848
42	1904	1809	1999	2855
43	1906	1811	2001	2863
44	1908	1813	2003	2870
45	1910	1815	2006	2878
46	1912	1816	2008	2885
47	1914	1818	2010	2893
48	1916	1820	2012	2900
49	1918	1822	2014	2908
50	1920	1824	2016	2915
51	1923	1826	2019	2923
52	1925	1829	2021	2930
53	1928	1831	2024	2938
54	1930	1834	2027	2945
55	1933	1836	2029	2953
56	1935	1838	2032	2960
57	1938	1841	2034	2968
58	1940	1843	2037	2975
59	1943	1845	2040	2983
60	1945	1848	2042	2990
61	1948	1850	2045	2996
62	1950	1853	2048	3000
63	1953	1855	2050	3000
64	1955	1857	2053	3000
65	1958	1860	2056	3000
66	1960	1862	2058	3000
67	1963	1864	2061	3000
68	1965	1867	2063	3000
69	1968	1869	2066	3000
70	1970	1871	2068	3000
71	1972	1873	2070	3000
72	1974	1875	2072	3000

GENERAL RECOMMENDATIONS

Table 21: Performance Goals of LOHMANN LSL Parent Stock

Week 21 – 46

Age in Weeks	Rate of Lay (%)		Egg No.		Hatching Eggs			Hatch (%)		No. Saleable Chicks	
	per H.H.	per H.D.	per Week	accumulated	%	per Week	accumulated	total Chicks	saleable Chicks	per Week	accumulated
21	24.0	24.0	1.7	1.7	0	0.0	0.0	0	0.0	0.0	0.0
22	54.0	54.0	3.8	5.5	30	1.1	1.1	50	25.0	0.3	0.3
23	74.0	74.1	5.2	10.7	60	3.1	4.2	75	37.5	1.2	1.5
24	89.0	89.2	6.2	16.9	70	4.3	8.5	77	38.5	1.7	3.2
25	93.0	93.3	6.5	23.4	80	5.2	13.7	79	39.5	2.1	5.3
26	94.0	94.4	6.6	30.0	85	5.6	19.3	81	40.5	2.3	7.6
27	94.5	95.0	6.6	36.6	90	5.9	25.2	83	41.5	2.4	10.0
28	94.7	95.3	6.6	43.2	93	6.1	31.3	84	42.0	2.6	12.6
29	94.7	95.4	6.6	49.8	94	6.2	37.5	85	42.5	2.6	15.2
30	94.6	95.4	6.6	56.4	95	6.3	43.8	86	43.0	2.7	17.9
31	94.5	95.4	6.6	63.0	96	6.3	50.1	87	43.5	2.7	20.6
32	94.4	95.4	6.6	69.6	96	6.3	56.4	87	43.5	2.7	23.3
33	94.4	95.4	6.6	76.2	96	6.3	62.7	88	44.0	2.8	26.1
34	94.3	95.4	6.6	82.8	96	6.3	69.0	88	44.0	2.8	28.9
35	94.2	95.4	6.6	89.4	96	6.3	75.3	87	43.5	2.7	31.6
36	94.0	95.4	6.6	96.0	96	6.3	81.6	87	43.5	2.7	34.3
37	93.8	95.3	6.6	102.6	96	6.3	87.9	87	43.5	2.7	37.0
38	93.4	95.1	6.5	109.1	96	6.2	94.1	86	43.0	2.7	39.7
39	93.1	94.9	6.5	115.6	96	6.2	100.3	86	43.0	2.7	42.4
40	92.8	94.7	6.5	122.1	96	6.2	106.5	86	43.0	2.7	45.1
41	92.4	94.5	6.5	128.6	96	6.2	112.7	86	43.0	2.7	47.8
42	92.1	94.3	6.4	135.0	96	6.1	118.8	85	42.5	2.6	50.4
43	91.7	94.1	6.4	141.4	95	6.1	124.9	85	42.5	2.6	53.0
44	91.4	93.9	6.4	147.8	95	6.1	131.0	85	42.5	2.6	55.6
45	91.1	93.7	6.4	154.2	95	6.1	137.1	84	42.0	2.6	58.2
46	90.7	93.5	6.3	160.5	95	6.0	143.1	84	42.0	2.5	60.7

Table 21: Performance Goals of LOHMANN LSL Parent Stock

Week 47 – 72

Age in Weeks	Rate of Lay (%)		Egg No.		Hatching Eggs			Hatch (%)		No. Saleable Chicks	
	per H.H.	per H.D.	per Week	accumulated	%	per Week	accumulated	total Chicks	saleable Chicks	per Week	accumulated
47	90.2	93.2	6.3	166.8	95	6.0	149.1	83	41.5	2.5	63.2
48	89.7	92.9	6.3	173.1	95	6.0	155.1	83	41.5	2.5	65.7
49	89.3	92.6	6.2	179.3	94	5.8	160.9	82	41.0	2.4	68.1
50	88.8	92.3	6.2	185.5	94	5.8	166.7	82	41.0	2.4	70.5
51	88.2	91.9	6.2	191.7	94	5.8	172.5	82	41.0	2.4	72.9
52	87.7	91.5	6.1	197.8	94	5.7	178.2	81	40.5	2.3	75.2
53	87.1	91.1	6.1	203.9	93	5.7	183.9	81	40.5	2.3	77.5
54	86.5	90.7	6.1	210.0	93	5.7	189.6	81	40.5	2.3	79.8
55	86.0	90.3	6.0	216.0	93	5.6	195.2	80	40.0	2.2	82.0
56	85.3	89.8	6.0	222.0	92	5.5	200.7	80	40.0	2.2	84.2
57	84.6	89.3	5.9	227.9	92	5.4	206.1	80	40.0	2.2	86.4
58	83.9	88.8	5.9	233.8	92	5.4	211.5	79	39.5	2.1	88.5
59	83.2	88.3	5.8	239.6	92	5.3	216.8	79	39.5	2.1	90.6
60	82.4	87.7	5.8	245.4	92	5.3	222.1	78	39.0	2.1	92.7
61	81.6	87.1	5.7	251.1	92	5.2	227.3	78	39.0	2.0	94.7
62	80.8	86.5	5.7	256.8	92	5.2	232.5	77	38.5	2.0	96.7
63	80.1	85.9	5.6	262.4	92	5.2	237.7	77	38.5	2.0	98.7
64	79.2	85.2	5.5	267.9	91	5.0	242.7	76	38.0	1.9	100.6
65	78.3	84.5	5.5	273.4	91	5.0	247.7	76	38.0	1.9	102.5
66	77.3	83.7	5.4	278.8	90	4.9	252.6	75	37.5	1.8	104.3
67	76.4	82.9	5.3	284.1	90	4.8	257.4	75	37.5	1.8	106.1
68	75.3	82.0	5.3	289.4	89	4.7	262.1	74	37.0	1.7	107.8
69	74.2	81.1	5.2	294.6	89	4.6	266.7	73	36.5	1.7	109.5
70	73.1	80.1	5.1	299.7	88	4.5	271.2	72	36.0	1.6	111.1
71	71.9	79.1	5.0	304.7	88	4.4	275.6	71	35.5	1.6	112.7
72	70.7	78.0	4.9	309.6	87	4.3	279.9	70	35.0	1.5	114.2

GENERAL RECOMMENDATIONS

Table 22: Performance Goals of LOHMANN BROWN Parent Stock

Week 21 – 46

Age in Weeks	Rate of Lay (%)		Egg No.		Hatching Eggs			Hatch (%)		No. Saleable Chicks	
	per H.H.	per H.D.	per Week	accumulated	%	per Week	accumulated	total Chicks	saleable Chicks	per Week	accumulated
21	15.0	15.0	1.1	1.1	0	0.0	0.0	0	0	0.0	0.0
22	40.0	40.1	2.8	3.9	50	1.4	1.4	70	34	0.5	0.5
23	65.0	65.2	4.6	8.5	60	2.8	4.2	75	37	1.0	1.5
24	83.0	83.3	5.8	14.3	70	4.1	8.3	78	38	1.6	3.1
25	90.5	91.0	6.3	20.6	80	5.0	13.3	80	39	2.0	5.1
26	92.0	92.6	6.4	27.0	85	5.4	18.7	82	40	2.2	7.3
27	92.5	93.2	6.5	33.5	90	5.9	24.6	83	40	2.4	9.7
28	92.8	93.5	6.5	40.0	93	6.0	30.6	86	42	2.5	12.2
29	92.9	93.7	6.5	46.5	94	6.1	36.7	88	43	2.6	14.8
30	92.9	93.8	6.5	53.0	95	6.2	42.9	88	43	2.7	17.5
31	92.8	93.9	6.5	59.5	95	6.2	49.1	88	43	2.7	20.2
32	92.8	94.0	6.5	66.0	95	6.2	55.3	88	43	2.7	22.9
33	92.5	93.9	6.5	72.5	95	6.2	61.5	88	43	2.7	25.6
34	92.3	93.8	6.5	79.0	95	6.2	67.7	88	43	2.7	28.3
35	92.1	93.7	6.4	85.4	96	6.1	73.8	88	43	2.6	30.9
36	91.8	93.6	6.4	91.8	96	6.1	79.9	88	43	2.6	33.5
37	91.6	93.5	6.4	98.2	96	6.1	86.0	88	43	2.6	36.1
38	91.3	93.4	6.4	104.6	96	6.1	92.1	88	43	2.6	38.7
39	91.1	93.3	6.4	111.0	96	6.1	98.2	88	43	2.6	41.3
40	90.8	93.1	6.4	117.4	96	6.1	104.3	88	43	2.6	43.9
41	90.4	92.9	6.3	123.7	95	6.0	110.3	88	43	2.6	46.5
42	90.0	92.7	6.3	130.0	95	6.0	116.3	88	43	2.6	49.1
43	89.5	92.4	6.3	136.3	95	6.0	122.3	88	43	2.6	51.7
44	89.1	92.1	6.2	142.5	95	5.9	128.2	88	43	2.5	54.2
45	88.6	91.8	6.2	148.7	95	5.9	134.1	87	42	2.5	56.7
46	88.1	91.5	6.2	154.9	95	5.9	140.0	87	42	2.5	59.2

Table 22: Performance Goals of LOHMANN BROWN Parent Stock

Week 47 – 72

Age in Weeks	Rate of Lay (%)		Egg No.		Hatching Eggs			Hatch (%)		No. Saleable Chicks	
	per H.H.	per H.D.	per Week	accumulated	%	per Week	accumulated	total Chicks	saleable Chicks	per Week	accumulated
47	87.6	91.2	6.1	161.0	95	5.8	145.8	86	42	2.4	61.6
48	87.0	90.8	6.1	167.1	95	5.8	151.6	86	42	2.4	64.0
49	86.4	90.4	6.0	173.1	95	5.7	157.3	85	41	2.4	66.4
50	85.7	89.9	6.0	179.1	95	5.7	163.0	85	41	2.4	68.8
51	85.0	89.4	6.0	185.1	94	5.6	168.6	84	41	2.3	71.1
52	84.3	88.9	5.9	191.0	94	5.5	174.1	83	40	2.2	73.3
53	83.6	88.4	5.9	196.9	94	5.5	179.6	82	40	2.2	75.5
54	82.9	87.9	5.8	202.7	94	5.5	185.1	80	39	2.1	77.6
55	82.1	87.3	5.7	208.4	94	5.4	190.5	80	39	2.1	79.7
56	81.4	86.7	5.7	214.1	94	5.4	195.9	80	39	2.1	81.8
57	80.6	86.1	5.6	219.7	94	5.3	201.2	80	39	2.1	83.9
58	79.8	85.5	5.6	225.3	93	5.2	206.4	80	39	2.0	85.9
59	79.0	84.9	5.5	230.8	93	5.1	211.5	80	39	2.0	87.9
60	78.3	84.3	5.5	236.3	92	5.1	216.6	80	39	2.0	89.9
61	77.5	83.7	5.4	241.7	92	5.0	221.6	80	39	2.0	91.9
62	76.7	83.1	5.4	247.1	92	5.0	226.6	78	38	1.9	93.8
63	76.0	82.5	5.3	252.4	92	4.9	231.5	78	38	1.9	95.7
64	75.2	81.9	5.3	257.7	92	4.9	236.4	78	38	1.9	97.6
65	74.5	81.3	5.2	262.9	90	4.7	241.1	76	37	1.7	99.3
66	73.6	80.6	5.2	268.1	90	4.7	245.8	76	37	1.7	101.0
67	72.7	79.9	5.1	273.2	90	4.6	250.4	76	37	1.7	102.7
68	71.9	79.2	5.0	278.2	90	4.5	254.9	74	36	1.6	104.3
69	71.0	78.5	5.0	283.2	90	4.5	259.4	74	36	1.6	105.9
70	70.1	77.8	4.9	288.1	90	4.4	263.8	72	35	1.5	107.4
71	69.3	77.1	4.9	293.0	90	4.4	268.2	72	35	1.5	108.9
72	68.4	76.4	4.8	297.8	90	4.3	272.5	70	34	1.5	110.4

NOTES

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INFORMATION

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

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

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

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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

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