TETRA

SELECTED FOR QUALITY

TETRA-SL LL

PARENT STOCK MANAGEMENT GUIDE

TETRA-SL LL

PARENT STOCK MANAGEMENT GUIDE

Contents

Introduction

TETRA-SL LL parent stocks (PS) are aimed to produce brown-feathered layer hens for cage or alternative systems. Pedigree lines of TETRA-SL LL are selected for their viability, efficient and long-term egg production as well as superior internal and external egg quality. Genetic selection of pure lines is an ongoing task for Bábolna TETRA geneticists to maintain and improve the quality and performance of grandparent, parent and commercial stocks.

This extended manual is a guideline and information source for maximizing your profits and satisfaction with your stocks; although special requests due to climatic or lighting conditions may require assistance from your nearest Bábolna TETRA specialist. We believe that by following this Management Guide and keeping accurate records, the results of your TETRA-SL LL parent stock will gradually improve year by year.

BÁBOLNA TETRA

TETRA – Selected for Quality

In recent decades, the consumer market has undergone some significant changes, resulting in increased expectations towards laying hens. The key to this adaptation is a properly structured and efficient selection programme supported by a systematically developed consulting network, which lies behind the increasing popularity of Bábolna TETRA breeding stocks and their progenies.

Continuous investment over the last years, such as a new pedigree farm and high-capacity layer breeder hatchery, has enabled the creation of a larger base for selection and more efficient and safer hatching for their valued customers. Close contact with the market is essential for the development of their products and to fulfill long-term needs, hence TETRA will continue to actively participate in product fairs and organize partner meetings in the future.

Nowadays, TETRA is determined to improve the competitiveness of their poultry, which has a long tradition and increasing share in the global market. Despite the diversity of the current market, TETRA focuses on the selection of the most important traits (persistency, egg quality, viability) and is determined to stabilize economic performance of their stocks for all technological environment. Current test capabilities ensure that individual and group progeny tests are carried out until 90-100 weeks of age.

The success of the company's R&D programme has been greatly due to its cooperation with partner institutions over many decades. Thanks to this, results of in vivo (CT) examination of the hens and their eggs, welfare indicators (state of plumage, pecking, etc.) and behavioural observations have been used in the selection index of pure lines for years. Intensive selection work continues to preserve a calm temperament and minimalize beak trimming.

Performance Data of TETRA-SL LL Parent Stock

Table 1.

Livability	
0-20 weeks of age	96-98%
21-72 weeks of age	90-96%
Egg production and hatching	
Age at 50% production	145-152 days
Peak production	26-32 weeks
Eggs/hen housed to 72 weeks of age	292-297 (295)
Settable eggs/hen housed to 72 weeks of age	262-269 (265)
Saleable chicks/hen housed to 72 weeks of age	105-110 (107)
Hatchability	81-85% (83%)
Bodyweight	
Males	
At 20 weeks of age	2.1-2.3 kg
At 72 weeks of age	2.9-3.1 kg
Females	
At 20 weeks of age	1.5-1.7 kg
At 72 weeks of age	1.9-2.1 kg
Feed consumption	
0-20 weeks of age	7.6-8.4 kg (8 kg)
21-72 weeks of age	41.0-45.0 kg (43 kg)

General Recommendations and Biosecurity of Poultry Farms

General rules

- Isolation of the house is vitally important to reduce the possibility of introducing a disease organism into a clean house environment.
- Human traffic constitutes the largest threat to isolation and the introduction of disease-causing agents. Ideally, shower facilities and farm clothing are to be made available for all employees and necessary visitors.

Keep cars and other vehicles out of the farm area, only allowing minimal traffic. Always use sanitizing liquid to carry out proper disinfection.

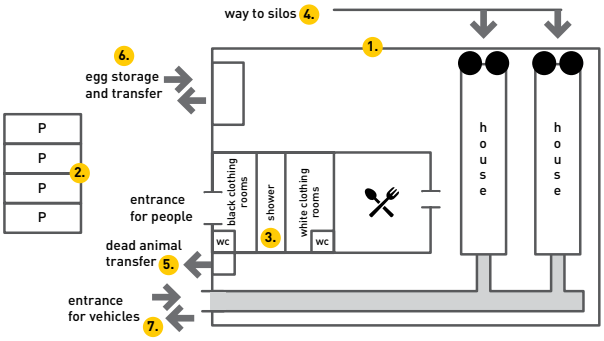
- If this is not possible, visits should be limited to only those persons who are necessary and they should be required to wear clean coveralls, new plastic or cleaned rubber boots and hair covering.
- Disinfectant footbaths should be present at the entranceway to each house and should be replenished with fresh disinfectant daily.
- Doors should be kept locked at all times to prevent unwanted, improperly attired visitors from entering. NO TRESPASSING signs should be prominently displayed on the doors and BIO-SECURITY ZONE signs should be displayed at the farm entrance to warn visitors that they are entering a bio-secure area.
- Remembering that people spread many diseases from farm to farm will help to encourage less people traffic to and from farms.

The importance of biosecurity

Pathogens can reach your flock in hundreds of different ways, such as feed, wild birds, rodents, insects, day-old chicks, visitors, trucks, equipment and other flocks. These pathogens (bacteria, viruses, fungi, etc.) can cause poor performance as well as outbreaks of diseases. This is why TETRA takes it very seriously indeed. It is far easier to prevent these problems from occurring, than cure or eradicate your flock.

Plan and build

Before building a farm, one has to consider some important facts. It is best to start building it with a good deal of planning and great attention to details, otherwise it is more difficult to change it after it is has been constructed.



1. Fence around the farm
2. Parking facilities for visitors
3. Black and white clothing room
4. Way to silos
5. Dead animal transfer
6. Egg storage
7. Entrance for the vehicles

Location

Put your farm as far as possible from any other farms to reduce the risk of contamination. Avoid high traffic motorways, where poultry transfer is very common. Take care to prevent the ingress of airborne hazards.

Single-age flock

Avoid horizontal contamination by housing single-age flocks. One farm should contain same age and same breeding level chickens. Separate growing and laying farms are welcomed. Hatcheries, closely located feed mixing plants and slaughter houses increase the transmission of infection.

Visitors

Follow the black (dirty) and white (clean) principle. Erect a fence around your farm with a closed entrance (sign with UNAUTHORZED ENTRY PROHIBITED). Everything outside the farm is "black", and inside is "white". Minimize the number of visitors, entering only when it is required.

Set up parking facilities outside of the fence. Visitors are not allowed to enter by car.

Around the poultry houses

The surroundings of the houses are to be kept free of vegetation as wild birds prefer this, keep them clean and place a 0.5-1 m strip of stone close to the wall of the poultry houses to deter rodents.

Construct the wall with smooth materials, which are stainless, so it can be easily washed with liquid, containing detergent or disinfectant.

Personal hygiene

Before entering the farm, use boot and hand disinfectant. Provide a "black and white" clothing room inside the biosecurity building, located at the fence line. Visitors have to change their clothes and remove their personal belongings.

Before entering the poultry house, change your boots and use them only inside of the house. Wear different boots on the farm, and inside of each house.

Keep your environment clean: sweep and clean biosecurity rooms, the poultry house entrance and surrounding roads.

Traffic inside the farm

The best choice is, when no vehicles enter the farm.

- Feed: Put silos near the fence so the truck can fill them from outside.
- Dead birds: Collect dead birds minimum once a day and place them in a collecting box along the line of the fence. This has to be closed and preferably cooled, while the frequency of removal depends on temperature as well.
- Egg storage: Place the egg storage building far from other areas.

If you cannot avoid vehicles entering the farm (day-old chicks, litter, manure transfer, slaughter house vehicles), disinfect them thoroughly, especially the wheels with a high-pressure washer. Please consult your veterinarian in choosing the right disinfectant. If it is necessary for the driver to get out of the truck, they must wear disposable clothes and boots. Entry to the poultry house for the driver is prohibited.

Book for visitors

Create a book for visitors. Each person has to write their name, the purpose of visit, date, and declare when they were visiting poultry facility, hatchery, slaughter house, feed mill in the last two weeks. If you have to visit several flocks, follow this rule: at first, visit the younger flocks, and only then the older ones: the higher ones first, then the lower breeding level. Everything must be recorded in the visitors' book.

Cleaning and disinfection

The most effective way to reduce the negative impact of disease-causing pathogens on the growth and subsequent performance of a laying flock is to avoid exposure to these organisms. A sound sanitation program and effective isolation plans are instrumental in achieving this goal. Cleaning and disinfection is of prime importance to prevent reinfection of the new flock, coming to the farm. After depopulation, all the hiding birds and bodies must be removed. An insecticide program is most effective when applied immediately in a still warm house environment.

All flexible parts of the equipment have to be dissembled, while manure and litter must be eliminated. Transfer the litter far from the farm to a fermentation plant, and make sure you do not spill any on the road. The residue of the feed must be removed from the silos, bins and feeders. Dry cleaning should be done as soon as possible after the old flock is removed.

Soak the inside and equipment of the house for hours, use disinfectant and sufficient liquid.

High pressure cleaners perform cleaning well, using effective detergent in cold or hot water. Do not forget feeders, drinkers, fans, air in- and outlets. Rinsing with water is the next step, after that allow the equipment and house to dry.

Always use a broad spectrum sanitizing agent for proper disinfection of the poultry houses between flocks

Use a multi-level disinfection programme in order to reduce the number of germs in the house. Take care with walls, floors, fan blades, lights, slats, nests, feeders and drinkers, outside and inside. Do not forget closed areas, like sanitation and store rooms. An effective disinfection requires clean surfaces without any remaining dirty or organic material. The dosage and the application time of the disinfectant must be properly calculated. Use disinfectants with antiviral, antibacterial and antifungal effect. Sporocides kill very resistant parasite spores as well. Change active ingredients frequently and monitor the effect by microbiological tests. Take care that some disinfectants do not work well under low temperature. Disinfectants can harm human health, so follow instructions thoroughly and use personal protection.

Cleaning and disinfection involve not only chicken houses, but all the farm area as well, included biosecurity building, feed store, litter store, egg store etc. Do not forget vehicles, tools, clothes and boots.

Water hygiene

Water and watering systems require regular checks and maintenance. The water quality has to be checked every 6 months for microbiological and chemical compounds. Chlorinate the water when necessary. When the house is empty, use effective detergents and disinfectants to remove biofilm and carbonate deposits from the pipeline.

When there are any birds in the house, water lines must be flushed frequently in hot weather conditions, before and after vaccination or medication.

Feed hygiene

Feed quality is of prime importance. Buy feed from certified and controlled suppliers. When you mix feed by yourself, use high-quality ingredients and premixes. Nutritional content, energy and protein balance, macro- and microelements, enzymes are necessary for good development and performance. Microbial contamination (bacteria, fungi) and toxins (mainly mycotoxins) should be avoided. Heat treatment reduces bacterial germs, use toxin binding substances when needed. For Salmonella control, use appropriate supplements. Pelleting the feed means heat treatment and better homogeneity after handling. Layer breeders prefer crumbled feed. Hygienically storing and transporting the feed is also important. The surrounding of silos, feed bins must be kept clean, spilled feed should be removed immediately, so as not to attract wild birds. Silos must be emptied and cleaned regularly, so two silos are preferred to each of the houses. It is best to place feed silos in a shaded area to avoid overheating.

Wild bird and rodent control

Wild bird and rodent control is the first line of defence against transmission of dangerous diseases. It is important to prevent viral, bacteriological and parasitic infections and for this purpose, bird-nets are to be used. Doors and walls must be intact, so as to prevent entry of wild animals. Avoid spilling of feed, remove dead birds and broken eggs. Implement a rodent control program.

Housing

Before the arrival of the new flock

- Raise the house temperature to 34-35°C at least 24 hours prior to chick arrival to ensure the equipment is also warm. The desired relative humidity should be greater than 60%. This humidity level should be maintained for at least three weeks.
- Set light clocks to 23 hours per day with the light intensity as high as possible (20-30 lux). If any shadows are being cast onto any drinkers/ nipples, the use of droplights is suggested to eliminate them.
- Trigger nipples to ensure that they are in working order and set at the proper height. Nipples should be at the chick's eye level and bell drinkers should be on the floor. Supplemental drinkers should be used during floor brooding and removed slowly once the chicks are established and are clearly using the main drinking system.

Brooding

For TETRA-SL LL parent stock, the use of spot brooding is recommended. Heat is provided by conventional canopy brooders while rearing space can be divided into half by a curtain to save on space and energy costs. Males and females are advised to be raised mixed in the same building.

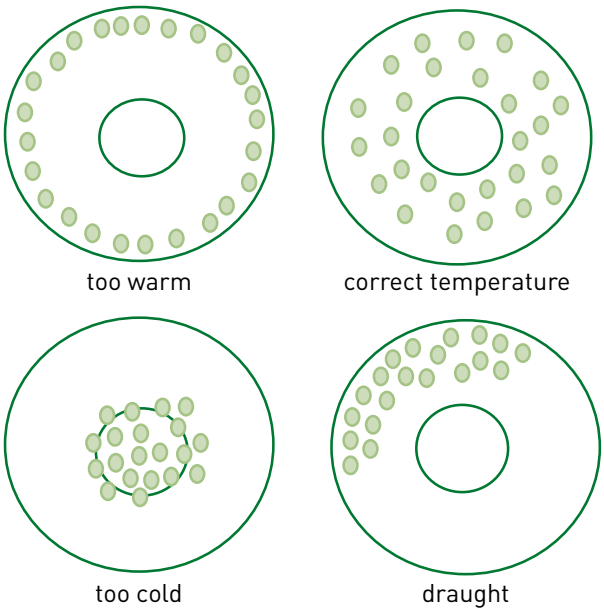
Table 2: Temperature requirements for TETRA-SL LL PS chicks

Age in days	Brooding temperature (°C) on chicks' level
Day-old	35
1-4	34-35
5-7	32
8-14	30
15-21	27
22-28	24
29-35	22
35-119	20

Checklist

- The behaviour of the chicks is the best indicator of the temperature. By following some simple rules, we can ensure the conformity of the chicks during this fragile period.
- When the birds are calm and quiet and are spread equally in the house, it means they feel comfortable.
- Always measure the temperature at the bird's level.
- Besides the temperature, it is essential to maintain proper humidity as well, especially if brooding in cages. Relative humidity must be kept between 60-70% by evaporating water (floor brooding) or watering the walks (cage brooding), if necessary.

Figure 1: Indication of chicks' well-being during brooding



Growth Management

IMPORTANT:

- Flock uniformity and bodyweight are the predictors of future laying performance of the female parents.
- Ensure that targets stated in this manual are reached in the main points of their development (change in feed type).
- Keep records of mortality, feed intake, feed conversion ratio, water consumption and weekly bodyweight.

Stocking density

Environmental factors, such as type of housing, ventilation and temperature, have a greater effect upon stocking rate than genetics. The following recommendations (Table 3.) are given as a guide for floor and cage rearing. These rates should be reduced by 2-3% for each 1°C rise in temperature.

Feeding space

Standards should be regarded as the minimum requirements for a satisfactory performance.

Drinking space

Water is essential in itself. It can also influence nutrient intakes by controlling feed intake. Restriction on water intake will cause a voluntary reduction in feed intake.

To ensure that all birds find water when initially housed, there should be a minimum light intensity of 20 lux at bird level. This is especially important at one day-old and where a change of drinking system occurs when moving birds into the laying house.

Table 3: Standards for TETRA-SL LL parent stock during rearing

Age in weeks		0-6	7-17	over 17
Density (bird/m^2)	Floor	20-24	max. 13	max. 9
	Aviary	30-40	20-25	11-12
	Cage	50-80	30-40	14-15
Drinking space	Birds/nipple	10-12	8	4-6
	Birds/drinker (ø 46 cm)	100-130		
Feeding space	Trough or circular feeder (space/bird)	4 cm + extra feeding surface in first week	7 cm	10 cm

Cover the cage floor with paper and place feed on it. Check the availability of feed and water.

Beak trimming

Beak trimming need not be carried out routinely when parent stock is kept in a controlled environment. If experience from previous flocks suggests that it is necessary, it will be worthwhile first checking all other aspects of management before embarking on a programme of beak trimming of the females. **Males should not to be beak trimmed**. The provision of more feeders and drinkers, more space per bird, correct nutritional components or improved ventilation may be the correct action to take.

- Infrared treatment is the most recommended method for beak trimming, which can be done soon after hatching, when chicks are dried up.
- Beak trimming can also be done at about 7-8 days of age. In order to reduce stress, it should be delayed for flocks where the brooding conditions have not been suitable or adequate.
- In open-sided housing, routine beak trimming is recommended, as both bright light intensities and high temperatures may promote undesirable behaviour. Care must always be taken that all birds are correctly and uniformly beak trimmed.
- Each bird should mature with a rounded, but slightly shortened, beak and be able to conduct normal feeding activity

Vaccination programmes

Always consult your local vet as rules are constantly changing according to each country's own regulations. Stock must be healthy at the time of vaccination. Out of date vaccines must not be used. Vaccination programme defined by the local vet must always be followed and notes must be taken of the dates for post-controlling.

Table 4: Example of a vaccination programme for TETRA-SL LL parent stock

Disease	Suggested time of application	Occurrence
Marek's disease (MD)	First day at the hatchery	**
Newcastle disease (ND)	The number of vaccinations depend on disease pressure in that area (suggestion: Day 1 and 12, Week 6 and 15 and before transfer)	**
Infectious bronchitis (IB)	The number of vaccinations depend on disease pressure in that area (suggestion: Day 1 and 12, Week 6, 11, 15 and before transfer)	**
Gumboro disease (IBD)	Two live and one inactivated vaccination (Day 18 and 28 and before transfer) is recommended	**
Avian encephalomyelitis (AE)	The number of vaccinations depend on disease pressure in that area (suggestion: Week 9)	*
Avian pneumovirus (APV)	Vaccination around Week 13 and before transfer	**
Coccidiosis	Vaccination is recommended on the first day (on the farm)	**
Mycoplasma synoviae (MS)	Vaccination around Week 8	**
Salmonella	Two live and one inactivated vaccine is recommended (suggestion: Day 5 and Week 7 and before transfer)	*
Fowl pox (FP)	Vaccination around Week 8	*
E. coli	Vaccination Day 1 and Week 14 (live vaccine), inactivated vaccine before transfer	**
EDS	Vaccination before transfer	*

**: Worldwide; *: Locally

Nutrition

The genetic potential of TETRA-SL LL parent stocks may only be exploited when their biological needs are met. The same complete feed is necessary for both sexes, with specialized nutrient content which is adapted to the birds' needs in respect of each production phase. This is a topic that the feed industry nowadays specializes in; a mix of cutting-edge technology and up to date physiological knowledge in order to perform new tasks.

Energy and nutrients

Due to the excellent productivity of TETRA-SL LL parent stocks, the demand for nutrients is relatively high and varied. Scientific studies classified up to almost 40 (macro and micro) nutrients that are to be supplied in appropriate concentrations and ratios.

Energy demand is considered to be the most important factor. The recorded feed digestion (burning) provides energy for the body, a part of which (metabolizable energy or ME) can be utilized for metabolic processes such as subsistence, weight gain and production.

Proteins and amino acids

Protein is the highest proportion of components in the body, feathers and eggs, therefore it is essential for growth and production. The "crude protein" content has become less valued in scientific circles, although it still has great significance in practice. Simple laboratory tests (N x 6.25) and rapid tests are available in order to monitor the protein content of the feed, which is necessary to control the reliability of the manufacturing plant.

In fact, protein added in the feed is broken down into amino acids, from which the body compiles its own proteins, but their genetically-encoded amino acid composition and sequence is different. About 20 different amino acids are required, some of which poultry cannot synthesize, known as 'essential' amino acids, as well as those 'non-essential' amino acids only found in a very limited amount in the feed. Methionine and lysine supplements are now required in almost all poultry feed, with threonine and valin usually being indicated on the values, that set limits on excessive protein reduction. Birds require cystine for their plumage, whereas in its absence, it is produced by sulphur-containing methionine.

Fats, oils, fatty acids

Components of fats/oils are fatty acids. Their ratio affects their melting point (solid "fats" and liquid "oils"). All power provider compounds, like fatty acids, especially linoleic acid, are essential for the growth and development of skin and feathers, the development of the reproductive tract and are also considered to be essential in terms of eggshell formation. The linoleic acid content of maize, sunflower and soybean oil is favourably high.

Minerals

Calcium (Ca) and **phosphorus** (P), quantitatively are the most important components of eggshell and bone and are also present in other tissues of the body. Grain-based feeds are poor in calcium, so ground limestone (calcium carbonate, 38% Ca) supplementation is necessary. However, plants contain a higher proportion of phosphorus but, because of phytin connections, the bioavailability of P rate is only 10-40%. Previously, a large-scale mineral phosphate supplement was needed although, today, because of the wide-range use of phytase enzyme, P-utilization has significantly improved.

Sodium (Na^+), **potassium** (K^+) and **chloride** (Cl^-) ions play an important role in blood and osmotic pressure, maintaining the pH of cells while also activating enzymes. Sodium supplements with common salt (NaCl) usually satisfy the chlorine demand. In the case of heat stress, in the form of sodium carbonate supplementation is recommended. The potassium (K^+) content in plants is already known to be high.

Vitamins, microelements

Vitamins are micronutrients that are essential for maintaining health, fertility and performance. Each vitamin has a separate function which is not able to be performed by other vitamins. Vitamins - with few exceptions - cannot be synthesized by the organizm, so they

must be introduced by feed. For the supply of vital functions, a few milligrams or micrograms of certain vitamins is sufficient, but this must be provided on a regular basis. In today's intensive technology, satisfactory results can only be achieved by a purpose-built vitamin supply.

Trace elements are components of enzymes, each of which play a crucial role in certain metabolic processes. Regular poultry feeds contain a compound of 13 different vitamins and 7 trace elements; incorporation of Vitamin C is recommended in the case of increased stress. Certain poultry feed contains the same vitamins and trace elements but their amount and utilization is not suitable for breeders selected for their high performance - partial absence of either micro-component has a noticeable negative impact on health and production.

Other supplements and additives

- Regular mixing of **antioxidants** protects vitamins and unsaturated fatty acids.
- In recent decades, the **exogenous enzymes** have caused major changes and **NSP**-degrading (non-starch polysaccharides) enzymes have allowed a higher grade, risk-free mixing of cereals, while the **phytase enzyme** has strongly improved phosphorus utilization of plant components, as well as favourably affects the digestibility of other nutrients.

Feeding during Growing Period

By following the recommendations in our feeding program, described in TETRA-SL LL Parent Stock Management Guide, birds achieve their weight in accordance with their age. This is an essential condition for normal sexual maturity in addition to starting and maintaining a high level of production during the laying period.

During the various phases of development, differently composed feed is recommended for each growth phase to accommodate the nutritional requirements of the birds themselves. The actual weight of the flock must be considered before moving on to the next level. **If pullets have not reached the desired weight by the end of each feeding phase, any changes in ration need to be delayed.**

Feed particle size

For chicks, young birds and breeding stocks, heat treated, **crumbled** diets are the most appropriate, although excessively coarse feed leads to selective eating whereas too fine feed particles cause reduced feed intake and as a result, uneven nutrition in both cases.

Pre-starter, Starter (0-3 weeks; 4-8 weeks)

Essentially **Starter** rations aim to produce a strong skeleton, good organ development and help promote an active immune system. This is achieved by feeding the **Pre-starter** ad libitum during the first week, with the correct balance and absolute levels of essential amino acids for growth, development of the immune system, feathering and skin condition.

Grower (9-17 weeks)

Whilst the **Grower** diet will be the lowest density ration that the bird receives, with higher fibre content, while it is important that all nutrients are correctly included. Fibres positively influence the development of the digestive tract and consequently, the appetite. It is very important that young breeders are able to take all nutrients that they need, at the start of their production. We recommend to use **5-6% crude fibre** in the grower diet for TETRA-SL LL parent stocks. Cereals and their by-products as well as DDGS can be used as a source of crude fibre.

Feed restriction is not recommended during this period as it may be difficult to achieve the correct bodyweight at first egg. As feeding portions are being increased, it is essential to monitor bodyweight weekly during this period.

Pre-layer (18-20 weeks)

Pre-layer is a transition from **Grower** to **Breeder I**, with not only a significantly increased calcium content, but also a higher level of each nutrient. **Pre-layer** should compensate lower feed intake, that often occurs at the start of production.

During this period, the layers undergo significant physiological changes. The medulla of a layer's tubular bones are developed which provides the calcification of the shell calcium content in the egg production period.

An adequate amount of calcium is important to be added at this time, for proper bone strength and eggshell quality during production. Increased levels of energy and amino acids are also desirable since these promote the development of the ovarian tissue. The daily weight gain of 10-15 grams increases 3-15 days before the onset of egg production. In order to begin egg production of TETRA-SL PS females, a target of 1500-1550 grams bodyweight should be achieved. For that time males must reach 2100 grams bodyweight.

Clean water should always be available and its quality needs to be checked regularly.

Bodyweight control during rearing

Uniformity and regular weighing is of utmost importance. During the growing period and until peak production is reached, regular weighing must be carried out. It is always done at the same hour of the same day of the week. Regular weighing should be started in the first few weeks, and needs to be continued weekly, during the growing period. Changes in bodyweight and homogeneity of the stock provide information about normal development of TETRA-SL LL parents. The growth of a flock is normal and the birds can be considered equal if their CV% is below 10%.

CV%= (standard deviation/ average bodyweight) x 100

Young TETRA-SL LL breeder flocks are not prone to obesity, so if the data obtained during the weighing does not differ significantly from the technological value (± 5%) and is recorded as homogeneous, *ad libitum* feeding can be used throughout the rearing period.

If the birds, nevertheless, do not reach the required weight value, feed consumption by frequent running of the feeders might be used and feed with higher nutritional value should be implemented. At the time of transfer (16-17 weeks of age), the average bodyweight of Tetra-SL LL breeders should be around 1370-1360 g and 1760-1880 g for females and males, respectively.

TETRA-SL LL parent stock

Table 5: Nutritional recommendation for TETRA-SL LL parent stock in the rearing period

Feed type		Pre-starter	Starter	Grower	Pre-layer
Energy & Nutrients		1-3 weeks	4-8 weeks	9-17 weeks	18-20 weeks
Met. energy	MJ/kg	12.4	12.0	11.5	11.7
Met. energy	kcal/kg	2950.0	2870.0	2750.0	2800.0
Crude protein	%	20.0	18.0	15.5	17.5
AMINO ACIDS, TOTAL					
Lysine	%	1.20	1.00	0.75	0.80
Methionine	%	0.48	0.42	0.35	0.40
Methionine+cystine	%	0.84	0.74	0.61	0.70
Threonine	%	0.75	0.65	0.50	0.60
Valine	%	0.93	0.78	0.60	0.65
Arginine	%	1.22	1.02	0.77	0.82
Tryptophan	%	0.24	0.22	0.17	0.18
AMINO ACIDS, DIGESTIBLE					
Lysine	%	1.00	0.83	0.60	0.70
Methionine	%	0.40	0.35	0.30	0.35
Methionine+cystine	%	0.70	0.60	0.50	0.58
Threonine	%	0.63	0.55	0.42	0.50
Valine	%	0.76	0.65	0.50	0.54
Arginine	%	1.02	0.84	0.63	0.68
Tryptophan	%	0.20	0.18	0.14	0.15
Isoleucine	%	0.69	0.62	0.49	0.52
Linolenic acid	%	1.50	1.25	1.00	1.50
Calcium	%	1.00	1.00	1.00	2.50
Phosphorus, available	%	0.48	0.44	0.38	0.44
Sodium	%	0.17	0.17	0.17	0.17
Chloride	%	0.18	0.18	0.18	0.18

Table 6: Weight development and feed intake of TETRA-SL LL parent stock in the rearing period

Age in weeks	Tetra-SL LL parent stock FEMALES		Tetra-SL LL parent stock MALES		Feed consumption		Feed type
	Bodyweight (g)		Bodyweight (g)				
	Average	Min. Max.	Average	Min. Max.	Average g/bird/day	Cumulative (kg)	
1	70	65 - 75	70	65 - 75	12	0.1	
2	125	125 - 135	140	140 - 150	20	0.2	Pre-starter
3	190	180 - 200	230	220 - 240	25	0.4	
4	260	245 - 275	330	315 - 345	30	0.6	
5	330	315 - 345	450	435 - 465	35	0.9	
6	410	390 - 430	570	550 - 590	40	1.1	Starter
7	500	475 - 525	690	665 - 715	45	1.5	
8	590	560 - 620	810	780 - 840	51	1.8	
9	680	645 - 715	930	895 - 965	56	2.2	
10	770	730 - 810	1050	1010 - 1090	62	2.6	
11	860	815 - 905	1170	1125 - 1215	65	3.1	
12	950	905 - 1000	1290	1245 - 1340	68	3.6	
13	1040	990 - 1090	1400	1350 - 1450	70	4.1	
14	1120	1065 - 1175	1520	1465 - 1575	72	4.6	Grower
15	1200	1140 - 1260	1640	1580 - 1700	75	5.1	
16	1280	1215 - 1345	1760	1695 - 1825	77	5.6	
17	1360	1290 - 1430	1880	1810 - 1950	80	6.2	
18	1440	1370 - 1510	1990	1920 - 2060	83	6.8	
19	1520	1445 - 1595	2100	2025 - 2175	87	7.4	Pre-layer
20	1600	1520 - 1680	2200	2120 - 2280	90	8.0	

*Always check average bodyweight of the flock before switching to the next level of feed type. Unless the bodyweight is lower than stated in TETRA-SL LL PS Management Guide, do not move on from one diet type to another. Check the bodyweight frequently, until the birds reach the target weights.

Production Period

Management into lay (from 15 weeks to peak production)

The target at the beginning of this period is 5-10% average production.

Minimize variation in bodyweight and sexual maturity of the birds. Prepare the flock for the production period with extra calcium-phosphorus and introduce larger feed particles. Slow transfer from **Pre-layer** feed to **Breeder I**, when first eggs appear (>5%).

Management during production

TETRA-SL LL parent stocks are suitable for alternative keeping systems during the production period. In hot climates, it is advisable to provide shelter (house, trees, sheds), extra drinking and living space for the birds. Controlled environmental houses are more suitable for all-year production programs.

Bodyweight should be monitored every week until 30 weeks of age, then on a monthly basis.

Overweight hens lay fewer eggs during their production cycle, therefore daily feed consumption should be adjusted to the bodyweight standard.

Control of uniformity

- TETRA-SL LL parent stocks are usually transferred to the poultry house around 17 weeks of age. Bodyweight should be closely monitored until the onset of production.
- Flock uniformity must be the main target. The more uniform the flock is, the quicker will be the increase in production. It is advised to split the daily amount of feed, giving the first round in the morning just before switching on the lights and subsequently, distributing the rest of the feed after the peak laying hours.
- The level of feed intake in the production period is mainly affected by bodyweight, temperature, feathering, energy level, texture of the feed and production intensity.

- TETRA-SL LL females in the laying period primarily alter their daily feed intake to accommodate changes in their energy requirements. Therefore, factors which alter the bird's demand for energy, such as ambient temperature, automatically affect the birds' feed intake. If there has been no modification of the ration formulation, changes in daily intake will alter all nutrient levels including amino acids, vitamins, minerals, anti-coccidials, that will correspondingly affect birds' performance.
- Breeder females do not completely adjust their feed intake due to extremes of temperature or higher dietary energy concentration. In fact, high temperatures or high energy concentrations can overly reduce energy intake and egg output suffers as a result.
- Females with low bodyweight lay fewer eggs, whereas higher bodyweight at the beginning of the production will be an advantage until the peak period.

Feeding during production period

First eggs appear at 19-20 weeks of age and more can be expected from week 21 (141-147 days). The daily feed intake increases from 90 to 100 grams between weeks 20 and 24. During this period, an intensive high-energy and nutritious diet needs to be fed, with increased calcium supplementation.

Table 7: Weight development and feed consumption of TETRA-SL LL parent stock in the production period

Age in weeks	Tetra-SL LL parent stock FEMALES		Tetra-SL LL parent stock MALES		Feed consumption		Feed type
	Bodyweight (g)		Bodyweight (g)				
	Average	Min. Max.	Average	Min. Max.	Average g/bird/day	Cumulative	
18	1440	1370 - 1510	1990	1920 - 2060	83	-	Pre-layer
19	1520	1445 - 1595	2100	2025 - 2175	87	-	
20	1600	1520 - 1680	2200	2120 - 2280	90	-	
21	1650	1570 - 1735	2290	2210 - 2375	95	0.67	Breeder I 21-45 wks
22	1700	1615 - 1785	2370	2285 - 2455	100	1.37	
23	1740	1655 - 1825	2440	2355 - 2525	105	2.10	
24	1770	1680 - 1860	2500	2410 - 2590	110	2.87	
25	1800	1710 - 1890	2550	2460 - 2640	112	3.65	
30	1875	1780 - 1970	2700	2605 - 2795	113	7.61	
35	1900	1805 - 1995	2780	2685 - 2875	113	11.56	
40	1920	1825 - 2015	2850	2755 - 2945	113	15.52	
45	1940	1845 - 2035	2900	2805 - 2995	113	19.47	
50	1960	1860 - 2060	2925	2825 - 3025	112	23.40	Breeder II 46-72 wks
55	1970	1870 - 2070	2950	2850 - 3050	112	27.32	
60	1980	1880 - 2080	2975	2875 - 3075	112	31.24	
65	1990	1890 - 2090	3000	2900 - 3100	112	35.16	
70	2000	1900 - 2100	3000	2900 - 3100	112	39.08	
72	2000	1900 - 2100	3000	2900 - 3100	112	43.00	

**: Feed amount must be adjusted to the production intensity and uniformity. Check bodyweight weekly around peak production, increase daily feed amount for hens as production intensity rises.

Breeder I

At the start of egg production daily feed intake rises relatively slowly. At the same time the formation of the egg, the increasing egg weight and bodyweight gain further enhance the nutritional requirements of the TETRA-SL LL parent stock females. It is important to understand that the quality of nutrition has a crucial impact on when they reach peak production and how they perform during persistency. Feeding is *ad libitum* and any factors which would reduce the feed uptake should be minimized. We recommend feeding **Breeder I** with high nutrient concentrations, as long as production is expected to be over 90% (42-46 weeks of age).

Breeder II

With increasing age, both the production of eggs and the nutritional needs of the birds decrease. In order to optimize costs, lower concentrations of energy and less expensive feed is allowed. To prevent fattening, energy or fat/oil supplementation should also be reduced. A proper ratio of nutrients should also be closely monitored during this period.

Values in Table 8 give the opportunity to make recommendations in the event of different feed consumptions from average (lower or higher), on the basis of the daily nutritional needs. In the case of higher feed intake (118 g / day), a moderate-intensity diet is needed, while with a lower than average (106 g / day) feed consumption, the diet should be more concentrated.

Table 8: TETRA-SL LL parent stock nutritional recommendation for the production period from 21 to 45 weeks of age. Breeder I feed for different daily feed consumption.

Feed type: Breeder I	Daily nutritional requirements mg/bird	Daily feed consumption		
ENERGY & NUTRIENTS		106 g	112 g	118 g
Met. energy MJ/kg		11.75	11.5	11.25
Met. energy kcal/kg		2800	2750	2700
Crude protein mg/bird	19000			
Crude protein %		18	17	16
AMINO ACIDS, TOTAL	mg	%	%	%
Lysine	920	0.87	0.82	0.78
Methionine	460	0.43	0.41	0.39
Methionine+cystine	800	0.75	0.71	0.68
Threonine	640	0.60	0.57	0.54
Valine	740	0.70	0.66	0.63
Arginine	950	0.90	0.85	0.81
Tryptophan	190	0.18	0.17	0.16
Isoleucine	735	0.69	0.66	0.62
AMINO ACIDS, DIGESTIBLE				
Lysine	750	0.71	0.67	0.64
Methionine	400	0.38	0.36	0.34
Methionine+cystine	660	0.62	0.59	0.56
Threonine	520	0.49	0.46	0.44
Valine	600	0.57	0.54	0.51
Arginine	780	0.74	0.70	0.66
Tryptophan	155	0.15	0.14	0.13
Isoleucine	600	0.57	0.54	0.51
Linoleic acid	2000	1.90	1.80	1.70
Calcium	4150	3.90	3.70	3.50
Phosphorus, available	440	0.42	0.39	0.37
Sodium	190	0.18	0.17	0.16
Chloride	200	0.19	0.18	0.17

Table 9: TETRA-SL LL parent stock nutritional recommendation for the production period from 46 to 72 weeks of age. Breeder II feed for different daily feed consumption.

Feed type: Breeder II	Daily nutritional requirements mg/bird	Daily feed consumption		
ENERGY & NUTRIENTS		106 g	112 g	118 g
Met. energy MJ/kg		11.75	11.50	11.25
Met. energy kcal/kg		2800	2750	2700
Crude protein mg/bird	18000			
Crude protein %		17	16	15
AMINO ACIDS, TOTAL	mg	%	%	%
Lysine	880	0.83	0.79	0.75
Methionine	440	0.42	0.39	0.37
Methionine+cystine	780	0.74	0.70	0.66
Threonine	620	0.58	0.55	0.53
Valine	705	0.67	0.63	0.60
Arginine	910	0.86	0.81	0.77
Tryptophan	180	0.17	0.16	0.15
Isoleucine	700	0.66	0.63	0.59
AMINO ACIDS, DIGESTIBLE				
Lysine	730	0.69	0.65	0.62
Methionine	380	0.36	0.34	0.32
Methionine+cystine	650	0.61	0.58	0.55
Threonine	510	0.48	0.46	0.43
Valine	585	0.55	0.52	0.50
Arginine	740	0.70	0.66	0.63
Tryptophan	145	0.14	0.13	0.12
Isoleucine	575	0.54	0.51	0.49
Linoleic acid	1900	1.80	1.70	1.60
Calcium	4300	4.10	3.80	3.60
Phosphorus, available	420	0.40	0.38	0.36
Sodium	190	0.18	0.17	0.16
Chloride	200	0.19	0.18	0.17

Vitamin and Micro-Nutrient Supplementation

According to the Introduction stated earlier in this manual, vitamins, trace elements and, if necessary, other additives are always to be present in the diet, in micro amounts. For **Pre-starter/ Starter**, higher doses are recommended, which may be reduced in **Grower**, whereas a higher dose is used in **Breeder** diets. The micronutrient supplementation is uniform for all age groups.

Table 10: Vitamins and micro-nutrient recommendation for TETRA-SL LL parent stock

Age in weeks		Pre-starter / Starter	Grower	Pre-layer / Breeder I-II
		0-8 wks	9-17 wks	17-72 wks
Added vitamins per kg feed				
Vitamin A	IU/kg	12000	10000	15000
Vitamin D_3	IU/kg	3000	3000	3000
Vitamin E	mg/kg	50	30	60
Vitamin K_3	mg/kg	2	1.5	5
Vitamin B_1	mg/kg	2	2	4
Vitamin B_2	mg/kg	8	6	10
Vitamin B_6	mg/kg	5	4	5
Vitamin B_{12}	mcg/kg	15	15	30
Panthotenic acid	mg/kg	10	8	15
Niacin	mg/kg	40	30	50
Biotin	mcg/kg	200	150	200
Folic acid	mg/kg	1.5	1	2
Choline	mg/kg	200	200	200
Vitamin C*	mg/kg	-	-	50 - 100
ADDED TRACE MINERALS				
Iron	mg/kg	50		
Manganese	mg/kg	100		
Copper	mg/kg	8		
Zinc	mg/kg	80		
Iodine	mg/kg	1		
Selenium	mg/kg	0.3		

*Vitamin C is recommended to prevent stress

Limestone additions

In accordance with the calcium (Ca) requirements for TETRA-SL LL parent stock females, limestone must be present in their feed in high proportions. In addition, the quantity and shape of limestone is equally important. A lower content of Ca in the diet causes a higher feed intake, which leads to an uneven supply of nutrients. On the other hand, excess Ca supply has a controversial effect on consumption, causing the remaining nutrient supply to become insufficient.

Table 11: Supply of fine- and coarse limestone (recommended ratio within diet)

Feed type	Fine (<0.5 mm)		Coarse (1.5-3.5 mm)
21-45 weeks	1	:	2.5
46-72 weeks	1	:	4

Egg Handling

Nests

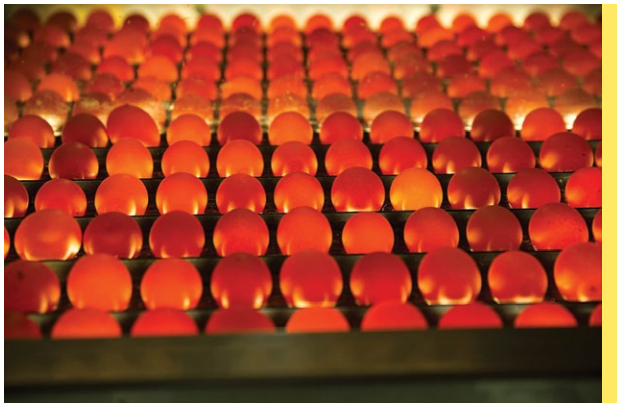
- The production of clean eggs and the minimization of eggs laid on the floor are influenced greatly by the provision of sufficient, well-sited and maintained automatic nests or nest boxes. For the best quality hatching eggs rollaway nest boxes are recommended.
- Floor eggs should be avoided, because of contaminations, cracking and excess work for collection. Nests should be well-ventilated to discourage broodiness and litter material should be replenished regularly to prevent breakages and minimize bacterial contamination.

Egg collection

- Flock size and nest capacity determine the number of eggs to be collected.
- Eggs should be collected from nests at least 4 times a day. Most eggs will be laid during the morning hours, so collection times should be adjusted accordingly.
- Floor eggs must be collected and handled separately. Percentage of floor eggs must be registered, so management factors can be changed accordingly.
- The basic nature of hens is to find a quiet place for laying eggs, and if nests are located in the right place in the barn, then surely these will be used by the birds.
- Hens will avoid using the nests, if these are in drafty place, or when the light intensity is too high, or any other distractions occur around the nest. The biggest mistake is the wrong timing of feeding.
- Egg-laying period begins 1-2 hours after light switched on and lasts for 4-5 hours. When feeders are in operation during this period, hens are distracted from laying eggs. Therefore, care should be taken in order to practise feeding schedule before or after this period.
- Nest acceptance of TETRA-SL LL breeder females are excellent, however, number of floor eggs can be minimalized by eliminating dark corners and frequent egg collection at the same time of the day.

Hatching egg handling

- Hatching eggs should always be placed on the tray with their pointed end down.
- Small/XL, dirty, cracked eggs are not suitable for hatching, they need to be collected and stored separately from hatching eggs.
- When eggs are packed in a box, they should be cooled down to egg store temperature before packed away.
- Embryonic cell division commences while the egg is travelling down the hen's oviduct at about 41 °C. As soon as the egg is laid, it cools down to the temperature of its surroundings and cell multiplication slows down.
- In case eggs are to be placed into an incubator within 3 days after being laid, the optimum storage temperature is about 25 °C.
- When eggs are being stored for 4 days or more before setting, hatchability is maximized by getting the egg temperature down to 13-16 °C as quickly as possible and storing at a relative humidity of about 75%.



Colour sexing TETRA-SL LL commercial layer chicks

Production Chart

Table 12: Production targets for TETRA-SL LL parent stock females

Age in weeks	Egg production		Eggs per week	Eggs cumulative	Hatching eggs			Hatch		Day-old females	
	per HH	per HD			%	weekly	cumulative	% of all chicks	% of saleable females	weekly	cumulative
	%	%	pcs	pcs		pcs	pcs			pcs	pcs
20	15.0	15.0	1.1	1.1							
21	35.0	35.1	2.5	3.5							
22	60.0	60.2	4.2	7.7							
23	80.0	80.4	5.6	13.3	30.0	1.7	1.7	76.0	37.0	0.6	0.6
24	86.0	86.5	6.0	19.3	60.0	3.6	5.3	78.0	38.0	1.4	2.0
25	90.0	90.7	6.3	25.6	82.0	5.2	10.5	80.0	39.0	2.0	4.0
26	90.5	91.3	6.3	32.0	86.0	5.4	15.9	82.0	40.0	2.2	6.2
27	91.0	92.0	6.4	38.3	92.0	5.9	21.8	84.0	41.0	2.4	8.6
28	91.5	92.6	6.4	44.7	93.0	6.0	27.7	86.0	42.0	2.5	11.1
29	92.0	93.3	6.4	51.2	94.0	6.1	33.8	86.0	42.0	2.5	13.6
30	91.9	93.4	6.4	57.6	95.0	6.1	39.9	87.0	42.0	2.6	16.2
31	91.7	93.4	6.4	64.0	95.0	6.1	46.0	88.0	43.0	2.6	18.8
32	91.5	93.3	6.4	70.4	95.0	6.1	52.1	88.0	43.0	2.6	21.4
33	91.2	93.3	6.4	76.8	95.0	6.1	58.1	88.0	43.0	2.6	24.0
34	90.9	93.1	6.4	83.2	95.0	6.0	64.2	88.0	43.0	2.6	26.6
35	90.6	92.9	6.3	89.5	96.0	6.1	70.3	88.0	43.0	2.6	29.3
36	90.2	92.8	6.3	95.8	96.0	6.1	76.3	88.0	43.0	2.6	31.9
37	89.8	92.5	6.3	102.1	96.0	6.0	82.4	88.0	43.0	2.6	34.5
38	89.4	92.3	6.3	108.4	96.0	6.0	88.4	88.0	43.0	2.6	37.1
39	88.9	92.0	6.2	114.6	96.0	6.0	94.3	88.0	43.0	2.6	39.6
40	88.4	91.6	6.2	120.8	96.0	5.9	100.3	88.0	43.0	2.6	42.2
41	87.9	91.3	6.2	126.9	96.0	5.9	106.2	88.0	43.0	2.5	44.7
42	87.4	90.9	6.1	133.1	96.0	5.9	112.1	88.0	43.0	2.5	47.2
43	86.9	90.5	6.1	139.1	96.0	5.8	117.9	88.0	43.0	2.5	49.8
44	86.4	90.1	6.0	145.2	96.0	5.8	123.7	88.0	43.0	2.5	52.2
45	85.9	89.8	6.0	151.2	96.0	5.8	129.5	88.0	43.0	2.5	54.7
46	85.3	89.3	6.0	157.2	96.0	5.7	135.2	87.0	42.0	2.4	57.1
47	84.7	88.8	5.9	163.1	95.0	5.6	140.9	86.0	42.0	2.4	59.5
48	84.1	88.3	5.9	169.0	95.0	5.6	146.4	86.0	42.0	2.3	61.9
49	83.5	87.8	5.8	174.8	95.0	5.6	152.0	85.0	41.0	2.3	64.1
50	82.9	87.3	5.8	180.6	95.0	5.5	157.5	85.0	41.0	2.3	66.4
51	82.3	86.8	5.8	186.4	95.0	5.5	163.0	84.0	41.0	2.2	68.6
52	81.7	86.3	5.7	192.1	95.0	5.4	168.4	83.0	40.0	2.2	70.8
53	81.0	85.7	5.7	197.8	95.0	5.4	173.8	82.0	40.0	2.2	73.0
54	80.3	85.1	5.6	203.4	95.0	5.3	179.1	81.0	39.0	2.1	75.0
55	79.6	84.5	5.6	209.0	95.0	5.3	184.4	80.0	39.0	2.1	77.1
56	78.9	83.9	5.5	214.5	95.0	5.2	189.7	80.0	39.0	2.0	79.1
57	78.2	83.3	5.5	220.0	95.0	5.2	194.9	80.0	39.0	2.0	81.2
58	77.5	82.7	5.4	225.4	95.0	5.2	200.0	80.0	39.0	2.0	83.2
59	76.7	82.0	5.4	230.7	95.0	5.1	205.1	79.0	38.0	1.9	85.1
60	75.9	81.3	5.3	236.1	95.0	5.0	210.2	79.0	38.0	1.9	87.0
61	75.1	80.5	5.3	241.3	95.0	5.0	215.1	78.0	38.0	1.9	88.9
62	74.3	79.8	5.2	246.5	95.0	4.9	220.1	78.0	38.0	1.9	90.8
63	73.5	79.1	5.1	251.6	95.0	4.9	225.0	77.0	37.0	1.8	92.6
64	72.7	78.4	5.1	256.7	94.0	4.8	229.7	77.0	37.0	1.8	94.4
65	71.7	77.5	5.0	261.7	94.0	4.7	234.5	76.0	37.0	1.7	96.1
66	70.8	76.6	5.0	266.7	93.0	4.6	239.1	75.0	36.0	1.7	97.8
67	69.8	75.7	4.9	271.6	93.0	4.5	243.6	75.0	36.0	1.6	99.4
68	68.9	74.8	4.8	276.4	92.0	4.4	248.1	74.0	36.0	1.6	101.0
69	67.9	73.9	4.8	281.2	92.0	4.4	252.4	74.0	36.0	1.6	102.6
70	66.9	73.0	4.7	285.9	91.0	4.3	256.7	74.0	36.0	1.5	104.1
71	65.9	72.0	4.6	290.5	91.0	4.2	260.9	72.0	35.0	1.5	105.6
72	64.9	71.0	4.5	295.0	90.0	4.1	265.0	70.0	34.0	1.4	107.0

Male Management

Growing period

- First evaluation of the males' uniformity should be done at 4 weeks of age. Underweight and underdeveloped males must be removed and put separately for 1-2 weeks. This time should be enough for them to catch up with the rest of the flock.

Transfer

Males should be at good sexual maturity at the time of transfer. The 17 week bodyweight of TETRA-SL LL parent stock males is 1810-1950 grams.

- During rearing and production females and males should receive the same feeding and lighting program.
- Underdeveloped, sexually immature males should not be transferred or must be removed from the flock.
- Comb size, colour and behaviour are the best indicators of males' libido.
- Remove aggressive males and keep them separately for observation. Hens may not be ready to accept them.
- Transfer more males than intended to keep some for later for selection basis.
- Ratio of males and females should be 1:10 by the onset of production, while the ratio may be decreased to 1:7-1:8 later.

Males at production

- Males must not lose weight during production, as they may not recover from excessive weight loss. They may become dull and inactive and need to be removed from the flock, eventually.
- Bodyweight must be monitored every 4 weeks after peak.
- Litter have to be kept dry to avoid leg disorders, which affects the males' activity.
- Strewing grains in the litter will also positively stimulate mating.

Lighting Programmes

Thanks to their genetic potential, Tetra-SL LL parent stocks are capable of a high performance and to produce optimal hatching eggs. These characteristics are closely related to maturity. Early maturity is influenced partly by genetic and partly by environmental factors, and out of these ones feeding and lighting programmes are the most important. TETRA-SL LL parent stock females are able to produce excellently under a wide range of lighting programmes.

The principle function of a lighting program is to influence the age at which the flock becomes sexually mature. At the onset of the production the most important factor is the bodyweight of the hens. Egg numbers decrease by 3-4 eggs for each 10-day delay in age at first egg, but the average egg weight will increase by 1.4 g in the laying cycle. In order to make the maximum use of the genetic potential of your TETRA-SL LL parent stock females, it is important to know and follow the main principles:

- Keep the birds at a constant lighting program.
- Never decrease the duration of lighting periods throughout the laying cycle.
- Full benefits will not be obtained if the house is not light-proof, especially when birds are being reared during a time of naturally-increasing day length. In such circumstances, early sexual maturity and small egg size are potential problems.

Controlled environment

We can apply this program only when we exclude all chances of natural light infiltration.

- During the first 2 days we need to apply 23 hours of light per day with an intensity of 20-30 lux. The chicks need this light for the initial development.
- From day 3 until the end of week 9 reduce the light duration gradually to 11 hours and the intensity to 5-10 lux.
- Until the end of week 18 use a permanent 11 hours of light with an intensity of 5-10 lux.
- In one step, at the age of 19 weeks increase light duration by 1 hour. In the following weeks increase the light period with one further hour.
- Following that, weekly increase by 0.5 hours until the duration of 16 hours per day is reached. Keep the 16 hours period during the whole laying cycle.
- Under ideal conditions at the age of 16-17 weeks, transfer the hens to the laying house before increasing the duration of the light period.

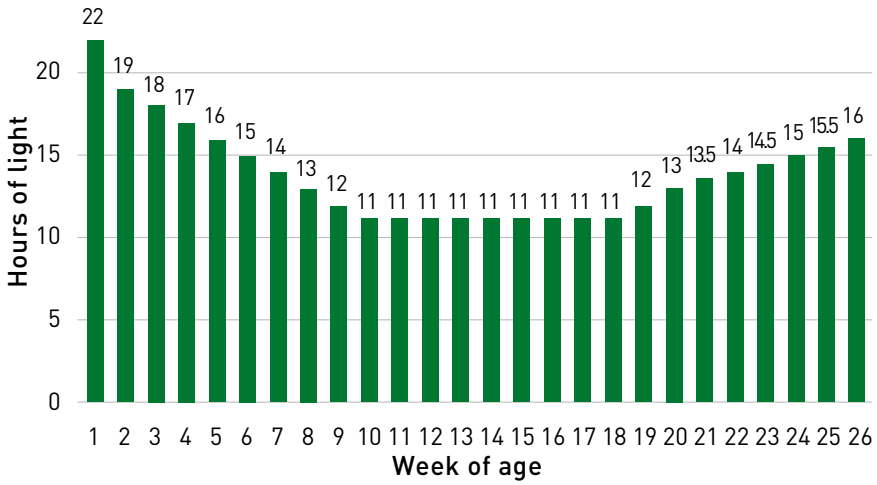


Figure 2: Lighting programme for TETRA-SL LL parent stock pullets and layers

Table 13: Detailed lighting programmes for TETRA-SL LL parent stock

Age in weeks	Hours of light	Light intensity (lux)
1	22	20-30
2	19	10-20
3	18	5-10
4	17	5-10
5	16	5-10
6	15	5-10
7	14	5-10
8	13	5-10
9	12	5-10
10	11	5-10
11	11	5-10
12	11	5-10
13	11	5-10
14	11	5-10
15	11	5-10
16	11	5-10
17	11	5-10
18	11	5-10
19	12	20
20	13	20
21	13.5	20
22	14	20
23	14.5	20
24	15	20
25	15.5	20
26	16	20

Open-house environment

- Lighting program must be adjusted to the natural daylight length, if birds are reared or transferred to an open-sided or free range environment.
- Any adjustment to the lighting program is dependent on the following:
  - Natural daylight increases
  - Natural daylight decreases
- The same rules apply to open housing as in the controlled environment; **never increase the duration of lighting during rearing period and never decrease the duration of lighting periods during the laying cycle.**
- Personalized lighting programmes for regional climatic and lighting conditions are available from your **Bábolna TETRA representatives**.

NOTES

TETRA-SL LL 2018

BÁBOLNA TETRA Ltd.
H-2943 Bábolna, Radnóti u. 16, Hungary
Phone: +36 34 568 152
e-mail: tetrakft@babolnatetra.com
www.babolnatetra.com