



**Hubbard**  
YOUR CHOICE, OUR COMMITMENT

**EFFICIENCY  
PLUS**

**PARENT STOCK**  
*Guide*



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## 1. FEMALE REARING PERIOD (0 - 24 WEEKS)

### 1.1. KEY POINTS IN REARING

- >> First week weight  $\geq 140$  g.
- >> 100% individual grading between 3 - 4 weeks.
- >> Bodyweight  $\geq 550$  g at 4 weeks.
- >> Maintain 50 - 60 minutes eating time; adjust the feeding programme as required.
- >> Age at light stimulation should consider pelvic bone opening, bodyweight and fleshing.

### 1.2. BODYWEIGHT TARGETS (WITHOUT FEED)

>> Close observation of chick growth during the first 2 weeks helps to identify inadequacies in brooder management. Thereafter weigh weekly. Take collective weights for the first two weeks and then individual weights thereafter.

>> The sample size should not be less than 3 - 5% or 100 birds from each pen. Take samples from 3 separate places in each pen; weigh every bird in the catching pen to record data which reflects the flock's true bodyweight.

>> Only bodyweight before feeding will show the true physiological development of a bird. All weights shown in our product documentation are without feed. Increase target weight by 5% if birds are weighed with feed.



The Performance Objectives can be found on our website:  
[www.hubbardbreeders.com](http://www.hubbardbreeders.com)

### 1.3. MAIN POINTS TO ACHIEVE TARGET BODYWEIGHT WITH GOOD UNIFORMITY

#### BROODING

>> Allow sufficient light and heat for the chicks to drink and eat. Delay the reduction in day length and light intensity if the 7 day weight for either males or females is not achieved. If males are grown in the same house as the females, the light decrease should be slower and achieve 8 hours not earlier than 21 days or later if growth is not on target.

>> Ensure sufficient light intensity and equipment to promote eating / drinking activities in the first 10 days; use floor paper for feeding to supplement the feed plates for the first 3 days, until chicks can easily access the plates. Ensure that the smallest chicks can achieve proper development.

>> If brooder surrounds are used, open them up quickly to give full space by 10 days.

>> Assure minimum ventilation to encourage birds' activities and develop appetite.

#### DARK REARING HOUSE AND NON-DARK PRODUCTION HOUSE

Natural daylength (h) at 154 days		< 11	12	13	14	15
Age (days)	Intensity (lux)	# hours of artificial light up to 154 days				
21 - 154	5 - 10	8	8	9	10	10
	60 - 80	Transfer at 154 days			Transfer at 161 days*	

\* When the natural daylength is 14 or 15 hours transfer at 161 days

Note: for non-dark houses, refer to the additional information in the light section in the Breeder Manual and your own local experience, for the minimum light to apply during rearing.

## DARK REARING HOUSE AND DARK PRODUCTION HOUSE

Age in days	Daylength*	Light intensity (lux)	Feed / day **	Temperature (°C)				Humidity
				Using brooders ***			Whole house heating	
				Under brooders	Living area	"Cold" area		
0	24 h	60	Ad lib up to 25 g / Female bodyweight 140 g / Male bodyweight 150 g	34 - 35	28	22 - 23	31 - 32	50 - 60%
1	22 h	60		34 - 35	28	22 - 23	30 - 31	50 - 60%
2	21 h	60		34 - 35	28	22 - 23	29 - 30	50 - 60%
3	20 h	40		34 - 35	28	22 - 23	28 - 29	50 - 60%
4	19 h	30		31 - 33	28	22 - 23	28 - 29	50 - 60%
5	18 h	20		31 - 33	27 - 28	22 - 23	26 - 27	50 - 60%
6	17 h	15		31 - 33	27 - 28	22 - 23	26 - 27	50 - 60%
7	16 h	10		29 - 31	26 - 27	22 - 23	26 - 27	50 - 60%
If the male or female 7 day bodyweight is not achieved, extend the light in the second week as shown. For open-sided houses use your experience.								
8	15 h	10	Ad lib up to 35 g / Female bodyweight 270 g / Male bodyweight 330 g	27 - 28	25 - 26		25 - 26	50 - 60%
9	14 h	10		27 - 28	25 - 26		25 - 26	50 - 60%
10	13 h	10		27 - 28	25 - 26		25 - 26	50 - 60%
11	12 h	10		27 - 28	25 - 26		25 - 26	50 - 60%
12	11 - 12 h	5 - 10		27 - 28	25 - 26		25 - 26	50 - 60%
13	10 - 12 h	5 - 10		27 - 28	25 - 26		25 - 26	50 - 60%
14 - 21	8 - 12 h	5 - 10		27 - 28	25 - 26		25 - 26	50 - 60%
If the male or female weight is not on target at 14 days maintain 10 - 12 hours until 21 days. Light intensity may need to be adjusted to avoid pecking.								
22 - 28	8 - 12 h	5 - 10		As required	23 - 24			50 - 60%
If the male weight is still not on target continue with 12 hours light until 28 days and then reduce to 8 h and 5 lux.								
29 - 154	8 h	3 - 5		NA	18 - 20			50 - 60%

\* For open-sided houses the step down period is often slower to allow eating in the cooler part of the day. Use your own experience.

\*\* Adjust the feed quantity so that at the end of the day the feeders are empty.

\*\*\* For canopy / traditional brooders the thermometer height should be 10 cm from the litter and 30 cm from the edge of the brooder.

### FEED

>> 0 - 28 days: full feed for 14 - 21 days. Use pre-starter crumbles for as long as required to achieve the 21 day bodyweight (longer for the smaller chicks). Then change to starter crumbles until 28 - 35 days. Assure bodyweight is achieved at 28 days.

>> Between 28 and 35 days change to grower feed if bodyweight is on target. As much as possible, use low energy feed (<2 650 kcal/kg) to improve gut health and eating behaviour.

>> Transition feed can normally start at 134 days, earlier if bodyweights are not being achieved.

>> Flocks transferred from the rearing farm generally lose bodyweight. Anticipate this with extra feed.

>> Give consistent feed increases from light stimulation to 5% daily production. Do not stop increasing feed amounts.

>> Change to breeder feed between first egg and 1% daily production.

### FEED PROGRAMME

>> Continue daily feed until about 28 days.

>> At about 28 days change to a 6/7 feeding programme.

>> From 36 to 154 days use the 5/7 feed programme to help develop proper eating behaviour and to improve uniformity. If eating time is less than 50 minutes at any time during this period change to 4/7 until 17 - 18 weeks (150 g max feed per day) and then convert back to 5/7.

>> Change to the 6/7 feed programme at 23 weeks and to daily feeding when the first eggs are observed (≈ 24 weeks).

**GRADING**

- >> Separate out all small chicks by 7 days. Manage them with special care to achieve target weight by 4 weeks.
- >> At 21 - 28 days grade the flock 100% and create weight groups, each with at least 85% uniformity.
- >> Improve flock uniformity between 28 and 84 days.
- >> At 12 weeks if flock uniformity is not between 80 - 85%, re-grade the flock to assure that each group achieves at least 85% uniformity.

**1.4. EQUIPMENT AND STOCKING DENSITY**

	Temperate climates (18-24°C)	Hot climates (>25°C)
<b>Stocking density</b>	6.0 birds / m <sup>2</sup>	4.5 birds / m <sup>2</sup>
<b>Brooders</b>	1 for 500 chicks	1 for 500 chicks
<b>Watering - round</b>	1 for 80 birds	1 for 70 birds
<b>Watering - nipple</b>	1 for 8 - 10 birds	1 for 6 - 8 birds
<b>Feeding - chain</b>	15 cm / bird (7.5m/100 birds)	15 cm / bird (7.5m/100 birds)
<b>Feeding pans - round</b>	1 for 12 birds	1 for 12 birds
<b>Feeding pans - oval</b>	1 for 13 - 14 birds	1 for 13 - 14 birds
<b>Spin feeder</b>	1 spinner for 1500 - 1800 birds with density of 7 - 8 birds / m <sup>2</sup>	Not recommended
<b>Feed distribution time</b>	4 minutes	4 minutes

**1.5. WATER CONTROL (ONLY IF REQUIRED) / WATER QUALITY**

- >> No water restriction during extremely hot weather or medication treatment.
- >> Stop water 2 - 3 hours after the end of the feed clean-up. If using 4/7 or skip-a-day (SAD) feed programmes, the crop may be too full and no intake control is required.
- >> In case a skip-a-day feeding programme is used, on days with no feed give a minimum of 2 hours and longer if it is required.
- >> Check the crop before stopping the water. It should be soft.
- >> Regularly check the chemical and bacteriological water quality to ensure that water sanitation is working properly.

**1.6. GRIT AND GRAIN FROM 4 - 5 WEEKS**

- >> Insoluble grit (ø 3 - 4 mm): 3 - 5 g / bird / week.
- >> Scratch grain: 3 g / bird daily (cracked maize or whole wheat).

**1.7. PERCHES**

- >> Provide 3 cm of perch space/pullet from the 4<sup>th</sup> week to train the pullets to jump up to the nests and to help prevent floor eggs.

**2. LIGHTING PROGRAMME****2.1. OBJECTIVE: 5 TO 10% PRODUCTION (WEEK AVERAGE) AT 25 WEEKS**

- >> Stimulate no earlier than 154 days with a uniform minimum bodyweight without feed of 2 665 g. The onset of lay should normally start about 3 weeks after the initial stimulation. If sexual maturity is poor (>5% females with a pelvic bone opening of less than 3 cm) delay the stimulation accordingly.
- >> It is advisable to check the progress of the pelvic bone aperture at each weighing from 21 weeks of age onwards. This helps to indicate the overall trend of flock sexual maturity.

>> The light programme should be calculated to stimulate the flock when it will be responsive:

Age		Pelvic bone opening – sexual maturity		Bodyweight at stimulation. Add 5% to the target if weighed with feed	Pelvic bone opening – sexual maturity	
		Good			Insufficient	
		Less than 5% with pelvic bone opening <3 cm			More than 5% with pelvic bone opening <3 cm	
		Underweight pen minimum weight >2600 g			Underweight pen minimum weight < 2600 g	
Week	Days	Hours	Lux		Hours	Lux
<22	153	8	3 - 5		8	3 - 5
22	154	12	60 - 80	2665 +	8	3 - 5
23	161	13	60 - 80	2820 +	12	60 - 80
24	168	14	60 - 80		13	60 - 80
25	175	15	60 - 80		15	60 - 80
Between 75 - 80 %		16	60 - 80		16	60 - 80

>> The decision when to light stimulate must consider age, bodyweight, fleshing and pelvic bone opening.

>> Maximum daylength may vary between 14 and 16 hours depending on company policy. Consider house temperature, light leakage, flock uniformity and feeding time if only 14 hours is used.

>> Numerous parameters effect sexual maturity: the type of house, latitude, season, bodyweight history and uniformity.

>> For open-sided housing we advise darkening the houses during rearing. Do this by 5 to 6 weeks of age, using black curtains, light traps on fans and air inlets. Dew / shed net to cover the sides also works, but ventilation and season must be carefully considered to assure optimum flock and litter conditions.

>> The light programme for males is often the same as for females. This programme can however be adjusted according to the males' level of maturity at the end of the rearing period to help assure a good balance of the male and female sexual maturity (for example, males may sometimes be stimulated one week earlier than females).

## 2.2. LIGHT INTENSITY

>> Uniform light intensity is important. In closed houses decrease gradually to 3 - 5 lux at 4 - 5 weeks.

>> In non-light proof houses during periods of increasing day length maintain light intensity at 10 lux.

## 2.3. DURING PRODUCTION

>> Light-proof houses: make the best choice of light type such as incandescent, energy saver (white or yellow), tube, sodium and LED, to assure uniform light intensity at bird level.

>> Traditional open-sided type houses: the additional artificial light should be given both in the morning and evening period using a light intensity of a minimum of 80 lux in season and 60 lux out of season. Use a photo sensor to maintain uniform light intensity on cloudy days.

# 3. PRODUCTION PERIOD (25 - 65 WEEKS)

## 3.1. KEY POINTS FOR OPTIMUM CHICK PRODUCTION

>> Flocks with adequate physiological development at the chosen time for light stimulation.

>> Sufficient males of the appropriate sexual maturity.

>> Appropriate eating behaviour between first egg and 5% daily production.

>> Feeding the flock for production and choosing the correct time for peak feed (no later than 65 - 70% daily production).

>> Observance of, and reaction to, male and female behaviour to minimize stress.

>> Use a proper size grill 45 mm x 60 mm or adjust pan feeders, to control male access.

>> Timely reaction to floor laying with corrective action.



### 3.2. EQUIPMENT STANDARDS DURING PRODUCTION

	Temperate climates (18-24°C)		Hot climates (>25°C)
	All litter to 20% slats	½ litter + ½ slats	
<b>Density</b>	5.0 hens/available m <sup>2</sup>	5.5 hens/available m <sup>2</sup>	4.0 hens/available m <sup>2</sup>
<b>Feeders:</b> - trough - round pans (ø35 cm - 13.8in) - oval pans	15 cm feeder space per bird / 7.5m length for 100 birds  1 for 12 hens  1 for 12 - 13 hens	15 cm feeder space per bird / 7.5m length for 100 birds  1 for 12 hens  1 for 12 - 13 hens	15 cm feeder space per bird / 7.5m length for 100 birds  1 for 12 hens  1 for 12 - 13 hens
<b>Drinkers:</b> - rounds - nipples (flow 90 -120 ml/mn)	  1 for 80 hens  1 for 6 to 8 hens	  1 for 80 hens  1 for 6 to 8 hens	  1 for 70 hens  1 for 6 hens
<b>Feed distribution time</b>	4 minutes	4 minutes	4 minutes
<b>Nests</b>	1 manual nest / 4 hens or 80 - 90 hens/linear meter of automatic nest	1 manual nest / 4 hens or 80 - 90 hens/linear meter of automatic nest	1 manual nest / 4 hens or 80 - 90 hens/linear meter of automatic nest
<b>Ventilation capacity</b>	5 m <sup>3</sup> /kg liveweight/hour	5 m <sup>3</sup> /kg liveweight/hour	8 m <sup>3</sup> /kg liveweight/hour
<b>Light intensity</b>	60 - 80 lux	60 - 80 lux	60 - 80 lux

### 3.3. BODYWEIGHT DURING PRODUCTION

- >> Once feeding for production has started, bodyweight with feed may rise to the top or sometimes higher than our bodyweight range. Increase the target weight by 5% when bodyweight includes feed. It is not advised to hold feed because bodyweight with feed appears to be higher than the target, if production is increasing within the stated limits shown below. Peak could be affected.
- >> Under certain conditions, individual flocks may gain more weight after peak than the standard. Please use local experience and also consult with your local Hubbard Technician for more assistance.

### 3.4. FEEDING DURING PRODUCTION

- >> From first egg to peak production:
  - Eating behaviour, stocking density, eating / drinking space and ventilation are critical for a good peak and persistency. Maintain the supplementary feed hoppers until the end of the flock.
  - Once daily feed starts, assure that feed remains evenly distributed into the feed system (adjust feed equipment if required).
  - Change to daily feeding and breeder feed between first egg and 1% daily production; if changed too early, flock uniformity can be lost due to change in eating behaviour. If house temperature is above 25°C increase both amino-acid / protein and energy, by using the onset of lay formulation.
  - Too much protein causes bodyweight to increase and then it will be difficult to balance weight and nutrient requirements; then easily peak production will be compromised.
- >> Increase feed according to the production level:
  - Once 5 - 10% daily production is achieved the flock is ready to be fed for production.
  - Feed the flock according to the daily increase in production: + 2-3 g/day. Flocks will vary according to their uniformity.
  - As production increases assure that:
    - Bodyweight gain is consistent between 25 and 30 weeks and does not come to a halt.
    - Daily egg weight increase is consistent.
- >> Female parent stock target daily nutrient allocation at peak:
  - The general objective is to reach the maximum feed intake by 65 - 70% daily production.
  - The use of the daily onset of lay sheet is advised and allows fine tuning for each individual flock.

Female parent stock target daily allocation at peak production											
Amino-acids (mg/bird/day)			Ideal Protein	Metabolisable energy intake (kcal or MJ/bird/day)							
	Tot.	Dig.		Temperature	°C	15.0	17.5	20.0	22.5	25.0	> 25.0*
Lysine	1 100	995			°F	59.0	63.5	68.0	72.5	77.0	> 77.0*
Methionine	640	575		Floor	kcal	500	485	470	460	450	450 - 475
Meth. & Cystine	1 070	965			MJ	2.09	2.03	1.97	1.92	1.87	1.87 - 1.98
Valine	995	885		Cage	kcal	475	460	445	435	425	425 - 450
Isoleucine	910	810			MJ	1.99	1.92	1.86	1.82	1.78	1.78 - 1.88
Arginine**	1 270	1 130									
Tryptophan	280	250									
Threonine	910	810									
				Feed intake (g/bird/day)							
				Temperature	°C	15.0	17.5	20.0	22.5	25.0	> 25.0*
					°F	59.0	63.5	68.0	72.5	77.0	> 77.0*
ME level in feed	2750 kcal/kg	Floor	182	176	171	167	164	164 - 172			
		Cage	173	167	162	158	155	155 - 164			
	2850 kcal/kg	Floor	175	170	165	161	158	158 - 166			
		Cage	167	161	156	153	149	149 - 158			
Minerals (mg/bird/day)											
	Min.	Max.									
Calcium	5 000	5 400									
Av. Phosphorus	610	655									

\* The additional energy demands to dissipate heat will vary with bodyweight, feed intake, feed composition (oil content), feathering, activity and environmental management.

\*\* The arginine / lysine ratio can be increased to 120 % in hot climates.

Note: for each 100 g bodyweight above the standard, the female requires approximately 10 calories.

>> During hot weather to stimulate production:

- Change to the “onset of lay” feed formula.
- Increase the particle size of the feed (mash to crumble or crumble to pellet).
- Turn on the lights in the middle of the dark (sleeping) period for 1 to 2 hours and give cold water with vitamin C and salicylic acid to reduce heat stress.

### 3.5. PERSISTENCY

>> The objectives are to control bodyweight - fleshing, body fat and egg weight increase. Generally one may maintain peak feed until production drops below 80% and then reduce 1 g per 2% decrease in production.

>> However, good control of bodyweight is essential and feed should be immediately adjusted at any time that bodyweight drifts away from the recommended objective. If production drops after a feed reduction, reinstate the previous amount. Adjust feed for both hot (>25°C) and cold (<18°C) weather to supplement metabolic requirements.

### 3.6. FLOOR EGGS

>> Some factors that can influence floor eggs:

- Too heavy females; less active and not want to jump to the nest or over equipment.
- Incorrect number, design, distribution and access to the nests.
- Shorter daylength. 14 hour days mean increased nest occupancy early in the morning.
- Poor water and feed management. Avoid long eating times and poor feed distribution.
- Incorrect water pressure / level in the nipple line / drinkers.
- Chain feeder too low increases difficulty to get to nest.
- Male aggressiveness and eating behaviour blocks females from entering the nest. In this case remove excess males to a level where the flock is in harmony.
- Frequent floor walking to find the floor layers and to place them in a nest on time.
- In manual nests, use of plastic mats and / or too little nest litter is uncomfortable.
- Poor light intensity, which causes dark areas and deep litter is attractive to the hens.
- Slat height too high: 40 - 45 cm is recommended. Slat slope should not be more than 5 - 8°.



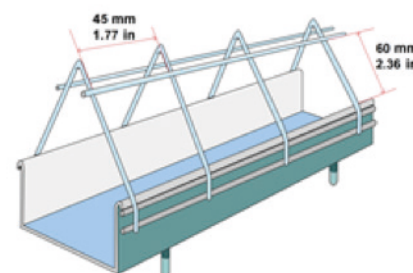
## 4. HUBBARD MALE MANAGEMENT

Please read the Male Management for more specific details.

### 4.1. REARING PERIOD: 3 STEPS

#### STEP 1: 1 DAY TO 10 WEEKS - GOOD EARLY FRAME DEVELOPMENT

- >> Good brooding conditions.
- >> Careful beak treatment. Follow local legislation.
- >> Crumble feed for the first 3 weeks.
- >> Grade 100% between 21 - 28 days. Use at least 4 pens with tight weight groups of > 85% uniformity.
- >> If used, the no feed day feeding system starts from 5 weeks (6/7); 5/7 can also be used if feed consumption time is too short. Uniform eating behaviour is very important to assure uniform growth.



#### STEP 2: 10 TO 15 WEEKS - CONSISTENT GROWTH AND GOOD UNIFORMITY

- >> Adjust feed allocation to get a consistent growth on the target bodyweight.
- >> For good uniformity, re-grade the flock and separate those with poor fleshing at 12 - 14 weeks.

#### STEP 3: 15 TO 24 WEEKS - TESTICLE DEVELOPMENT

- >> Bodyweight must not come to a halt in this period to prevent future potential fertility issues.
- >> A minimum weekly growth between 140 and 160 g is required; adjust feed intake accordingly.
- >> Observe eating behaviour and correct accordingly.

### 4.2. EQUIPMENT

STAGE	REARING	PRODUCTION
Density	4 males/m <sup>2</sup>	
Pan feeders*	1/8 males	1/8 males
Linear troughs*	20 cm/male	20 cm/male
Bell drinkers	1/80 males	
Nipple drinkers (90 - 120 ml/min)	1/10 males	
Distribution time	4 minutes	4 minutes

\*Where possible males should be grown on the same type of feeder as they will eat from in production.

### 4.3. PRODUCTION PERIOD

#### MIXING TO 27 WEEKS

- >> This period is crucial to establish a good relationship between the males and females:
  - Never mix shy, immature males.
  - Mix males that are on target bodyweight with uniform skeleton size and good leg length.
- >> Progressive mixing is ideal: start 5% between 22 - 24 weeks. Observe flock behaviour and gradually increase to a total of 8 - 10% mature males at 26 - 27 weeks of age depending on the type of male. This is usually sufficient when the male bodyweight is under control. For exceptionally high producing flocks more males may be required.
- >> The risk of excessive weight gain and / or loss of condition during this period is high so:
  - Grill size is important to reduce male access to the female feeder. To stop the males from having access to the female feed, the female feeding system must be fitted with grills adapted to the size of the females head (45 x 60 mm). The few points on the circuit without grills (corners for instance) should be sealed with covers.
  - Weigh males at least weekly. Adjust feed according to both condition and bodyweight.
  - Feed males after the female feed distribution is complete.
  - Bodyweights with feed may be 3 - 6% above the target weight without feed.

#### AFTER 28 WEEKS

- >> Male bodyweight gain should be regular.
- >> Maintain bodyweight within the range shown on the graph of the Performance Objectives. Feed to maintain their condition.
- >> Use the low protein male feed to maintain male in good conditions.

### 4.4. MALE REPLACEMENT

- >> Biosecurity must be considered before doing this, especially in areas with Avian Influenza risk.
- >> Inter-house male replacement does not require importing males from outside. All poor quality males are taken out and humanely euthanized; then the whole flock is re-mated.
- >> To obtain persistent fertility at the end of production, it may be useful to replace 10 - 30 % of the males with younger ones between 38 and 45 weeks. They should weigh between 3 700 to 4 000 g depending on the type of male, be at least 27 weeks old and should come from a known clean source.

## 5. NUTRITION

### 5.1. NUTRIENT RECOMMENDATIONS: G/KG PER 1000 KCAL OF METABOLISABLE ENERGY

PHASE		PRE STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II	
Age fed (days)		0 to 21 or 28 days		Optional 22 to 42 days		29 or 43 to 134 d or 5%		Optional 134 d to 5%		Optional 5% to 60g egg weight		5% or 60g egg weight to 280 d or cull		281 d to cull	
Suggested ME	kcal/kg	2 750 - 3 000		2 700 - 2 900		2 400 - 2 900		2 700 - 2 900		2 700 - 2 900		2 700 - 2 900		2 650 - 2 900	
	MJ/kg	11.50 - 12.50		11.30 - 12.10		10.00 - 12.10		11.30 - 12.10		11.30 - 12.10		11.30 - 12.10		11.10 - 12.10	
Min. amino-acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		3.80	3.40	3.02	2.72	2.22	2.00	2.25	2.00	2.42	2.16	2.34	2.12	2.25	2.03
Methionine %		1.68	1.53	1.56	1.40	1.24	1.12	1.27	1.14	1.43	1.28	1.36	1.22	1.31	1.17
Meth. & Cystine %		2.90	2.60	2.70	2.40	2.13	1.92	2.20	1.96	2.41	2.15	2.28	2.05	2.19	1.97
Valine %		2.78	2.44	2.34	2.06	1.83	1.65	1.87	1.65	2.22	1.94	2.12	1.88	2.03	1.81
Isoleucine %		2.55	2.25	2.18	1.92	1.71	1.54	1.75	1.54	2.04	1.77	1.94	1.72	1.86	1.65
Arginine %		4.05	3.65	3.42	3.08	2.74	2.46	2.74	2.46	2.75	2.48	2.70	2.40	2.59	2.31
Tryptophan %		0.74	0.64	0.63	0.55	0.49	0.44	0.50	0.44	0.65	0.55	0.60	0.53	0.57	0.51
Threonine %		2.65	2.35	2.30	2.02	1.80	1.62	1.84	1.62	2.06	1.78	1.94	1.72	1.86	1.66
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %*		64.00	68.00	60.00	64.00	52.00	55.00	50.00	52.00	52.50	55.00	50.00	53.00	48.00	51.00
Calcium %		3.60	3.80	3.60	3.70	3.30	3.50	4.50	5.00	10.00	11.00	10.50	11.50	11.50	12.50
Av. Phosphorus %		1.60	1.70	1.50	1.60	1.40	1.50	1.40	1.50	1.35	1.45	1.30	1.40	1.20	1.30
Sodium %		0.60	0.70	0.58	0.70	0.55	0.70	0.55	0.70	0.55	0.70	0.55	0.70	0.60	0.70
Chloride %		0.60	0.80	0.60	0.80	0.60	0.80	0.60	0.80	0.60	0.80	0.60	0.80	0.60	0.80

\* The progress made in raw material analyses and digestible amino acid evaluation should avoid unnecessary protein excess which can be the cause of excessive muscle deposition, poor litter quality and low hatchability.

Note: for birds housed in cages, provide 5 % more amino-acids, minerals and vitamins.

From the above table, the nutritionist can make whatever ration he/she is required to do.

### 5.2. EXAMPLES OF DIET SPECIFICATIONS

#### FOR TEMPERATE CLIMATES

PHASE		STARTER		GROWER		TRANSITION		BREEDER I		BREEDER II	
Age (days)		0 to 28 days		29 to 133 days		134 to 5% lay		5% to 280 days		280 days to cull	
Suggested ME	kcal/kg	2 850		2 650		2 750		2 750		2 700	
	MJ/kg	11.9		11.1		11.5		11.5		11.3	
Min. amino-acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		1.08	0.97	0.59	0.53	0.62	0.55	0.64	0.58	0.61	0.55
Methionine %		0.48	0.44	0.33	0.30	0.35	0.31	0.37	0.33	0.35	0.32
Meth. & Cystine %		0.83	0.74	0.57	0.51	0.61	0.54	0.63	0.56	0.59	0.53
Valine %		0.79	0.70	0.49	0.44	0.52	0.45	0.58	0.52	0.55	0.49
Isoleucine %		0.73	0.64	0.45	0.41	0.48	0.42	0.53	0.47	0.50	0.45
Arginine %		1.15	1.04	0.73	0.65	0.75	0.68	0.74	0.66	0.70	0.62
Tryptophan %		0.21	0.18	0.13	0.12	0.14	0.12	0.16	0.15	0.15	0.14
Threonine %		0.76	0.67	0.48	0.43	0.51	0.44	0.53	0.47	0.50	0.45
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %		18.00	19.00	14.00	14.50	14.00	14.50	14.00	14.50	13.00	13.50
Crude fiber %		2.50	3.50	3.50	8.00	3.00	6.00	3.50	6.00	4.00	6.50
Calcium %		1.00	1.05	0.90	0.95	1.20	1.30	2.90	3.10	3.20	3.40
Av. Phosphorus %		0.45	0.47	0.37	0.39	0.39	0.41	0.36	0.38	0.33	0.35
Sodium %		0.16	0.20	0.15	0.18	0.15	0.18	0.15	0.18	0.16	0.18
Chloride %		0.18	0.23	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22
Potassium %		0.70	0.80	0.55	0.70	0.55	0.70	0.55	0.70	0.55	0.70
Crude fat %		3.00	5.00	2.50	4.00	3.00	4.00	3.00	4.00	3.00	3.50
Linoleic acid %		1.20	1.80	1.00	1.40	1.50	1.70	1.50	1.70	1.20	1.40

Note: increasing vitamin levels by 20 % at the start of production is an additional precaution.

### FOR HOT CLIMATES (>25°C)

PHASE		PRE STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II	
Age (days)		0 to 21 days		22 to 42 days		43 to 133 days		134 days to 1%		1% to 60g egg weight		60g egg weight to 280 days		280 days to cull	
Suggested ME	kcal/kg	2 850		2 800		2 650		2 800		2 850		2 850		2 800	
	MJ/kg	11.9		11.7		11.1		11.7		11.9		11.9		11.7	
Min. amino-acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		1.08	0.97	0.85	0.76	0.59	0.53	0.63	0.56	0.69	0.62	0.67	0.60	0.63	0.57
Methionine %		0.48	0.44	0.44	0.39	0.33	0.30	0.36	0.32	0.41	0.37	0.39	0.35	0.37	0.33
Meth. & Cystine %		0.83	0.74	0.76	0.67	0.57	0.51	0.62	0.55	0.69	0.61	0.65	0.58	0.61	0.55
Valine %		0.79	0.70	0.66	0.58	0.49	0.44	0.52	0.46	0.63	0.55	0.60	0.54	0.57	0.51
Isoleucine %		0.73	0.64	0.61	0.54	0.45	0.41	0.49	0.43	0.61	0.53	0.58	0.51	0.54	0.48
Arginine %		1.21	1.09	1.01	0.91	0.76	0.69	0.80	0.72	0.82	0.74	0.81	0.72	0.76	0.68
Tryptophan %		0.21	0.18	0.18	0.15	0.13	0.12	0.14	0.12	0.19	0.16	0.17	0.15	0.16	0.14
Threonine %		0.76	0.67	0.64	0.57	0.48	0.43	0.51	0.45	0.59	0.51	0.55	0.49	0.52	0.46
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %		18.50	19.00	17.00	17.50	14.00	14.50	14.50	15.00	15.00	15.50	14.50	15.00	14.00	14.50
Crude fiber %		2.50	3.50	2.50	4.00	3.50	8.00	3.00	6.00	3.00	6.00	3.00	6.00	3.50	6.50
Calcium %		1.00	1.05	1.00	1.05	0.90	0.95	1.25	1.40	2.90	3.10	3.00	3.20	3.30	3.50
Av. Phosphorus %		0.45	0.47	0.41	0.44	0.37	0.39	0.39	0.41	0.39	0.41	0.38	0.40	0.34	0.36
Sodium %		0.16	0.20	0.16	0.20	0.15	0.18	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20
Chloride %		0.18	0.23	0.18	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22
Potassium %		0.70	0.80	0.65	0.75	0.55	0.70	0.55	0.75	0.60	0.75	0.60	0.75	0.55	0.70
Crude fat %		3.00	5.00	3.00	5.00	2.50	4.00	3.00	4.00	4.00	5.00	4.00	5.00	3.00	4.00
Linoleic acid %		1.20	2.00	1.20	1.80	1.00	1.50	1.50	2.00	1.90	2.20	1.60	1.90	1.40	1.80

Note: increasing vitamin levels by 20 % at the start of production is an additional precaution.

>> The 2<sup>nd</sup> feed (starter 22 to 42 days) is useful for chicks that have difficulties in achieving the early target weight. The use of the onset of lay feed is useful when it is difficult to achieve egg weight when using a standard breeder feed.

### MALE FEED

Example of male feed specifications:

PHASE		MALE		MALE II	
Age fed (days)		141 d to cull		Optional 210 d to cull	
ME	kcal/kg	2 800		3 000	
	MJ/kg	11.70		12.60	
Min. amino-acids		Tot.	Dig.	Tot.	Dig.
Lysine %		0.56	0.50	0.39	0.34
Methionine %		0.32	0.29	0.29	0.27
Meth. & Cystine %		0.56	0.50	0.52	0.46
Valine %		0.53	0.48	0.40	0.35
Isoleucine %		0.50	0.45	0.37	0.32
Arginine %		0.70	0.64	0.53	0.48
Tryptophan %		0.120	0.110	0.095	0.085
Threonine %		0.46	0.41	0.35	0.30
		Min.	Max.	Min.	Max.
Crude protein %		12.50	13.00	10.00	10.50
Calcium %		0.85	0.95	0.85	0.95
Av. Phosphorus %		0.36	0.39	0.35	0.38
Sodium %		0.15	0.20	0.16	0.21
Chloride %		0.17	0.22	0.18	0.22

>> In recent years a new feeding programme has shown that higher energy male diets with lower protein have worked well. In this new programme, a 2-stage approach is implemented to ensure growth to 28 weeks of age is on target or higher (using a regular male diet) and then quickly after 30 weeks to ensure slowing down the growth (using feed with lower protein and higher energy). The implementation of such high energy / low protein second stage male diet may be necessary when it is difficult to control fleshing and energy intake needs to be ensured.

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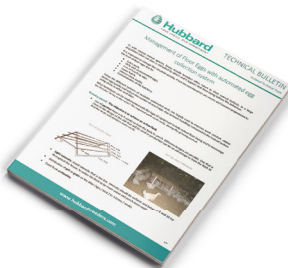
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