



GUIDE

Parent Stock



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1. FEMALE REARING PERIOD (0 – 24 WEEKS)

1.1. KEY POINTS IN REARING

- ✓ First week weight ≥ 150 g.
- ✓ 100% individual grading between 3 – 4 weeks.
- ✓ Bodyweight ≥ 600 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.

Female Bodyweight (g)		
Age	Closed house	Difficult conditions
7 days	150	150
4 weeks	600	600
10 weeks	1150	1180
16 weeks	1800	1860
22 weeks	2686	2750
24 weeks	3042	3100

1.2. FASTED BODYWEIGHT TARGETS (WITHOUT FEED)

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

The sample size should not be less than 3 - 5% 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 fasted weight will show the true physiological development of a bird. All weights shown in our product documentation are without feed (fasted). Increase target weight by 5% if birds are weighed with feed.

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 achieving 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 activity in the first 10 days; use floor paper for feeding to supplement the feed plates for the first 3 - 5 days, until chicks can easily access the plates. Ensure that the smallest chicks achieve proper development.
- If brooder surrounds are used open them up quickly to give full space by 10 days.
- Assure minimum ventilation to encourage bird activity 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	11
	60 - 80	Transfer at 154 days at 2686 g			Transfer at 161 days**	
** When the natural day length is 14 or 15 hours transfer at 161 days with a bodyweight of not less than 2864 g.						

(1) 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) / (°F)			Humidity	
				Using brooders				Whole house heating
				Under brooders	Living area	"Cold" area		
0	24 h	60		34 - 35	28	22 - 23	31 - 32	55 - 60%
1	22 h	60	Ad lib up to 25 g / Female bodyweight 150 g / Male bodyweight 150g	34 - 35	28	22 - 23	30 - 31	55 - 60%
2	21 h	60		34 - 35	28	22 - 23	29 - 30	55 - 60%
3	20 h	40		34 - 35	28	22 - 23	28 - 29	55 - 60%
4	19 h	30		31 - 33	28	22 - 23	28 - 29	55 - 60%
5	18 h	20		31 - 33	27 - 28	22 - 23	26 - 27	55 - 60%
6	17 h	15		31 - 33	27 - 28	22 - 23	26 - 27	55 - 60%
7	16 h	10		27 - 28	28 - 28	23 - 23	26 - 27	50 - 55%
If the male or female 7 day bodyweight is not achieved, extend the light in the second week as shown. For open-side houses use your experience.								
8	15 h	10	Ad lib up to 35 g / Female bodyweight 300 g / Male bodyweight 330g	27 - 28	25 - 26		25 - 26	50 - 55%
9	14 h	10		27 - 28	25 - 26		25 - 26	50 - 55%
10	13 h	10		27 - 28	25 - 26		25 - 26	50 - 55%
11	12 h	10		27 - 28	25 - 26		25 - 26	50 - 55%
12	11 - 12 h	5 - 10		27 - 28	25 - 26		25 - 26	50 - 55%
13	10 - 12 h	5 - 10		27 - 28	25 - 26		25 - 26	50 - 55%
14 - 21	8 - 12 h	5 - 10		27 - 28	25 - 26		25 - 26	50 - 55%
If the male or female weight is not on target at 14 days maintain 12 hours until 21 days. Light intensity may need to be adjusted to avoid picking. For open-side houses use your own experience								
22 - 28	8 - 12 h	5 - 10		As required	23 - 24		23 - 24	50 - 55%
If the male weight is still not on target continue with 12 hours until 28 days and then reduce to 8 h and 5 lux								
29 - 154	8 h	3 - 5		NA	18 - 20		18 - 20	45 - 50 %
For transfer to open-side houses see the example table for how to arrange light until 154 days								

* For open-side 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 normal starter crumbles until 28 - 35 days. Assure bodyweight is achieved at 28 days.
- **Between 28 and 42 days** change to grower feed if bodyweight is on target. As much as possible, use low energy (<2 650 kcal/kg) to improve gut health and eating behaviour.
- Transition feed can normally start at 134 days, earlier if struggling with bodyweight gain.
- Flocks transferred from the rearing farm generally lose bodyweight. Anticipate this with extra feed.
- Consistent feed increases from light stimulation to 5% daily production. Do not hold feed.
- Change to breeder feed between first eggs and 1% daily production.

FEED PROGRAMME

- Continue daily feed until about 28 days.

- The Hubbard breeder is a fast eater. The choice of feed programme to achieve a consistent eating time of 50 - 60 minutes is important.
- 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

- By 7 days separate all the small chicks. Manage them to be on target weight by 4 weeks.
- At 21 - 28 days grade the flock 100% and create weight groups, each with at least 85% uniformity.
- Improve grade-wise and flock uniformity between 28 and 84 days.
- At 12 weeks if flock uniformity is not in the 80 - 85% range, re-grade the flock to assure that each group achieves at least 85% uniformity.
- At transfer and / or before light stimulation, assess the flock based on pelvic bone opening and fleshing. Pen those with a smaller bone opening (generally the underweight birds) separately and manage them accordingly.

1.4. EQUIPMENT AND STOCKING DENSITY

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

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

- No water restriction during extremely hot weather or medication treatment.
- On days with feed, 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 restriction is required.
- 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 the water sanitization is functioning properly.

1.6. GRIT AND GRAIN FROM 4-5 WEEKS

- Insoluble grit (∅ 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 4th week to train the pullets to jump up to the nests and to help prevent floor eggs.

2. LIGHTING PROGRAMME

OBJECTIVE: 5 TO 10% PRODUCTION (WEEK AVERAGE) AT 25 WEEKS

Stimulate no earlier than 154 days with a uniform minimum fasted bodyweight of 2 686 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 from 21 weeks of age onwards to check the progress of the pelvic bone aperture at each weighing. 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 (fasted) at stimulation Add 5% to the target if weighed with feed	Pelvic bone opening - sexual maturity	
		Good Less than 5% with pelvic bone opening <3 cm			Insufficient More than 5% with pelvic bone opening <3 cm	
Actual		Actual			Actual	
Underweight pen minimum weight >2600 g		Underweight pen minimum weight > 2680 g			Underweight pen minimum weight > 2680 g	
Week	Days	Hours	Lux		Hours	Lux
<22	153	8	3 - 5		8	3 - 5
22	154	12	60 - 80	2686 +	8	3 - 5
23	161	13	60 - 80	2864 +	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 for stimulation must consider, age, bodyweight, pelvic bone opening and the minimum bodyweight in the house.
- Maximum day length 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-side 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).

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.

DURING PRODUCTION

- Light-proof houses: Make the best choice of light type (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 eggs and 5% daily production.
- ✓ Feeding the flock for production and choosing the correct moment for peak feed (no later than 60-65% daily production).
- ✓ Observance of, and reaction to male and female behaviour to minimize stress.
- ✓ Use a proper size restriction grill 45mm X 60mm or adjust pan feeders, to control male access.
- ✓ Timely reaction to floor laying with corrective action.

3.2. EQUIPMENT STANDARD DURING PRODUCTION

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

3.3. BODYWEIGHT DURING PRODUCTION

Once feeding for production has started, non-fasted bodyweight 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 non-fasted bodyweight appears 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 weight after peak bodyweight more than 10 g weekly. Please use local experience and also consult with your local Hubbard Technician for more assistance.

3.4. FEEDING DURING PRODUCTION

- From the first eggs 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 eggs 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 protein and energy, by using the onset of lay formulation.

Assure that the protein and energy ratio is 53 g/kg per 1 000 kcal. Too much protein causes bodyweight to increase and often the flock is underfed (trying to control bodyweight) and peak production is compromised.

- Increase feed according to the production level:

Once 5 - 10% daily production is achieved the flock is ready to feed for production.

Feed the flock according to the daily increase in production: +3-4 g/day. Flocks will vary according to their uniformity, with increases of 3 to 5 % daily. Sexually uniform flocks can achieve 80% production in 15 - 18 days.

As production increases assure that:

- Bodyweight gain is consistent between 25 and 30 weeks and does not stall.
- Daily egg weight increase is consistent.
- Production increases 3 - 5% / day in a normal sexually mature flock.

- Female parent stock target daily nutrient allocation at peak:

The general objective is to reach the maximum feed intake by 60 - 65% daily production. The use of the daily onset of lay sheet is advised and allows fine tuning for each individual flock.

The flock requires 25 g of crude protein and 470 – 480 kcals energy per day to support a normal peak, but in the case of a flock producing over the standard, some additional feed may be required to support the extra production.

Female parent stock target daily allocation at peak production

Amino-acids (mg/bird/day)

	Tot.	Dig.
Lysine	1120	995
Methionine	600	540
Meth. & Cystine	1053	940
Valine	992	870
Isoleucine	930	810
Arginine (2)	1176	1045
Tryptophan	300	250
Threonine	860	740

Ideal Protein

100
54
94
87
81
105
25
74

Metabolisable energy intake (Kcal or MJ /bird/day)

Temperature	°C	15.0	17.5	20.0	22.5	> 25.0 (1)
	°F	59.0	63.5	68.0	72.5	> 77.0 (1)
Floor	Kcal	500	485	470	460	450 - 480
	MJ	2.09	2.03	1.97	1.92	1.88 - 2.00
Cage	Kcal	475	460	445	435	425 - 450
	MJ	1.99	1.92	1.86	1.82	1.77 - 1.88

Feed intake (g/bird/day)

Temperature	°C	15.0	17.5	20.0	22.5	> 25.0 (1)	
	°F	59.0	63.5	68.0	72.5	> 77.0 (1)	
ME Level	2750	Floor	182	176	171	167	161 - 171
		Cage	173	167	162	158	152 - 161
in feed	2825	Floor	177	172	166	163	158 - 168
		Cage	168	163	158	154	149 - 158

Minerals (mg/bird/day)

	Min.	Max.
Calcium	4900	5300
Av. phosphorus	630	680

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

(2) The arginine / lysine ratio can be increase to 110 % in hot conditions.

Note: For each 100 g bodyweight above the standard the female requires approximately 10 calories more feed.

- 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.

PERSISTENCY

- The objectives are to control:
 - Bodyweight – fleshing and body fat
 - 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.

3.5. 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 day length. 14 hour days mean more nest occupancy early in the morning.
- Poor water and feed management. Avoid a too long eating time and poor feed distribution. Maintain the correct water pressure / level in the drinkers.
- Incorrect water pressure / level in the nipple line / drinkers.
- Chain feeder too low increases difficulty to get to the 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.
- Infrequent floor walking to find the floor layers and to place them in a nest.
- 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%.

Please read the Hubbard Technical Bulletin on floor eggs for more specific details.

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 – GROWTH AND UNIFORMITY

- Good brooding conditions.
- Careful beak trimming at 7 - 10 days. Follow local legislation.
- Crumble feed for the first 3 weeks.
- Good early frame development.
- Grade 100% between 21-28 days. Use at least 4 pens with tight weight groups of > 85% uniformity.
- 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

- Consistent growth on the target bodyweight with 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 stall in this period to prevent future fertility issues.
- A minimum weekly growth between 140 and 160 g is required according to the type of male.
- Observe eating behaviour and correct accordingly.

4.2. EQUIPMENT

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

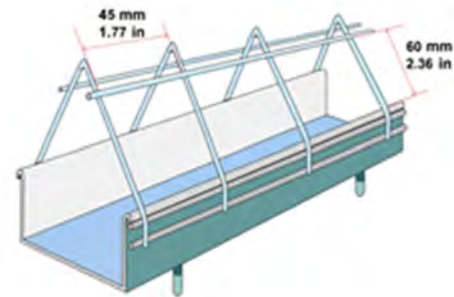
**where possible males should be grown on the same type of feeder as they will eat from in production.*

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: 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 female body characteristics (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 to comply with both condition and bodyweight.
 - Feed males when the female feed distribution is complete.
 - **Low protein (12.75 - 13.75%) / 2650 kcals/kg male mash feed is recommended.**
 - Bodyweight taken with feed may be 3 - 6% above the fasted target weight.



AFTER 27 WEEKS

- Male bodyweight gain should be regular.
- Maintain bodyweight within the range shown on the graph. Feed to maintain their condition.

4.4. SPIKING

- Biosecurity must be considered before doing this, especially in areas with Avian Influenza risk.
- Inter-house spiking does not require importing males from outside. All poor quality males are eliminated and 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 by 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 (MCAL) OF METABOLISABLE ENERGY – FLOOR HOUSING

PHASE	PRE-STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		MALES	
Age fed (days)	Optional 0 to 10d		0 or 10d to 35/42d		36 or 43d to 140d or 1%lay		141d to 1% lay		Optional 1% lay to 60g egg		1% or 60g egg weight to cull		281d to cull		141d to cull	
Suggested kcal	2 800 - 3 000		2 750 - 2 900		2 400 - 2 900		2 650 - 2 900		2 650 - 2 900		2 650 - 2 900		2 650 - 2 900		2 400 - 2 900	
ME per Kg MJ	11.70 - 12.50		11.50 - 12.10		10.00 - 12.10		11.10 - 12.10		11.10 - 12.10		11.10 - 12.10		11.10 - 12.10		10.00 - 12.10	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine	3.80	3.39	3.71	3.32	2.56	2.21	2.30	1.99	2.43	2.16	2.38	2.12	2.33	2.08	2.03	1.75
Methionine	1.60	1.45	1.55	1.40	1.24	1.08	1.24	1.08	1.38	1.24	1.28	1.15	1.25	1.13	1.09	0.95
Meth. & Cystine	2.90	2.58	2.80	2.50	2.16	1.88	2.16	1.88	2.38	2.12	2.24	2.00	2.20	1.96	1.90	1.65
Valine	2.64	2.33	2.58	2.25	2.03	1.73	1.95	1.66	2.16	1.89	2.11	1.85	2.07	1.81	1.71	1.46
Isoleucine	2.55	2.25	2.50	2.21	1.96	1.68	1.88	1.61	2.02	1.76	1.98	1.72	1.94	1.69	1.66	1.42
Arginine	3.99	3.56	3.90	3.49	2.69	2.32	2.42	2.09	2.55	2.27	2.50	2.23	2.45	2.18	2.13	1.84
Tryptophan	0.75	0.64	0.73	0.62	0.61	0.51	0.59	0.49	0.65	0.54	0.64	0.53	0.63	0.52	0.52	0.43
Threonine	2.58	2.25	2.55	2.22	1.85	1.57	1.78	1.51	1.87	1.60	1.83	1.57	1.79	1.54	1.56	1.33
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein (1)	65.00	69.00	64.00	68.00	53.00	55.00	50.00	52.00	53.50	55.50	53.00	55.00	52.00	54.00	47.00	49.00
Calcium	3.60	3.80	3.60	3.70	3.30	3.50	4.50	5.00	10.00	11.00	10.25	11.00	11.50	12.50	3.30	3.50
Av. Phosphorus	1.60	1.70	1.50	1.60	1.40	1.50	1.40	1.50	1.40	1.50	1.35	1.45	1.20	1.30	1.40	1.50
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	0.55	0.75
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	0.60	0.80

(1)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.

From the above table the nutritionist can make whatever ration he/she is required to do. Following are four examples of diet specifications for floor and cage housed birds.

5.2. EXAMPLES OF DIET SPECIFICATIONS

FOR TEMPERATE CONDITIONS (18 - 24°C) - FLOOR HOUSING

PHASE	STARTER		GROWER		TRANSITION		BREEDER I		BREEDER II		MALE	
Age (days)	0 to 35d		36d to 140d		141d to 1% lay		1% lay to 280d		281d to cull		141d to cull	
ME	kcal/kg		2800		2650		2750		2750		2650	
	MJ/kg		11.72		11.10		11.51		11.51		11.10	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %	1.04	0.93	0.68	0.59	0.63	0.55	0.66	0.58	0.64	0.57	0.54	0.46
Methionine %	0.43	0.39	0.33	0.29	0.34	0.30	0.35	0.32	0.34	0.31	0.29	0.25
Meth. and Cyst. %	0.78	0.70	0.57	0.50	0.59	0.52	0.62	0.55	0.60	0.53	0.50	0.44
Valine %	0.72	0.63	0.54	0.46	0.54	0.46	0.58	0.51	0.56	0.49	0.45	0.39
Isoleucine %	0.70	0.62	0.52	0.45	0.52	0.44	0.54	0.47	0.53	0.46	0.44	0.38
Arginine %	1.09	0.98	0.71	0.61	0.67	0.57	0.69	0.61	0.67	0.59	0.56	0.49
Tryptophan %	0.20	0.17	0.16	0.14	0.16	0.13	0.18	0.15	0.17	0.14	0.14	0.11
Threonine %	0.71	0.62	0.49	0.42	0.49	0.41	0.50	0.43	0.49	0.42	0.41	0.35
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	17.9	19.0	14.0	14.6	13.8	14.3	14.6	15.1	14.2	14.7	12.5	13.0
Crude fibre %	2.50	3.50	3.50	8.00	3.00	6.00	3.50	6.00	4.00	6.50	3.50	7.00
Calcium %	1.00	1.04	0.87	0.93	1.24	1.38	2.82	3.02	3.12	3.41	0.87	0.93
Av. Phosphorus %	0.42	0.45	0.37	0.40	0.39	0.41	0.37	0.40	0.33	0.35	0.37	0.40
Sodium %	0.16	0.20	0.15	0.19	0.15	0.19	0.15	0.19	0.16	0.19	0.15	0.20
Chloride %	0.17	0.22	0.16	0.21	0.17	0.22	0.17	0.22	0.16	0.22	0.16	0.21
Potassium %	0.64	0.73	0.53	0.69	0.55	0.72	0.61	0.74	0.55	0.71	0.53	0.69
Crude fat %	3.50	4.00	2.50	4.00	3.00	4.00	4.00	7.00	3.00	6.50	2.50	4.00
Linoleic acid %	1.12	2.24	1.01	2.12	1.21	2.75	1.51	2.75	1.23	2.73	1.06	2.39

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

FOR TEMPERATE CONDITIONS (18 - 24°C) - CAGE HOUSING

PHASE	PRE-STARTER		STARTER		GROWER		TRANSITION		BREEDER I		BREEDER II		MALE	
Age (days)	0 to 10d		11d to 42d		43d to 140d		141d to 1% lay		1% to 280d		281d to cull		141d to cull	
ME	kcal/kg		2850		2800		2650		2750		2800		2650	
	MJ/kg		11.93		11.72		11.10		11.51		11.72		11.10	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %	1.08	0.97	1.04	0.93	0.70	0.60	0.65	0.56	0.69	0.61	0.67	0.59	0.55	0.48
Methionine %	0.46	0.41	0.43	0.39	0.34	0.29	0.35	0.31	0.37	0.33	0.36	0.32	0.30	0.26
Meth. and Cyst. %	0.83	0.74	0.78	0.70	0.59	0.51	0.61	0.53	0.65	0.58	0.63	0.56	0.52	0.45
Valine %	0.75	0.66	0.72	0.63	0.55	0.47	0.55	0.47	0.61	0.53	0.59	0.52	0.47	0.40
Isoleucine %	0.73	0.64	0.70	0.62	0.53	0.46	0.53	0.46	0.57	0.50	0.55	0.48	0.45	0.39
Arginine %	1.14	1.03	1.12	1.01	0.77	0.67	0.76	0.65	0.80	0.71	0.77	0.69	0.64	0.55
Tryptophan %	0.21	0.18	0.20	0.17	0.17	0.14	0.17	0.14	0.18	0.15	0.18	0.15	0.14	0.12
Threonine %	0.74	0.64	0.71	0.62	0.50	0.43	0.50	0.43	0.53	0.45	0.51	0.44	0.43	0.36
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	18.5	19.7	17.9	19.0	14.5	15.0	14.2	14.7	15.3	15.9	14.7	15.3	12.8	13.4
Crude fibre %	2.50	3.50	2.50	3.50	3.50	8.00	3.00	6.00	3.50	6.00	4.00	6.50	3.50	7.00
Calcium %	1.00	1.04	1.00	1.04	0.90	0.96	1.27	1.42	2.96	3.17	3.26	3.54	0.90	0.96
Av. Phosphorus %	0.46	0.48	0.42	0.45	0.38	0.41	0.40	0.42	0.39	0.42	0.34	0.37	0.38	0.41
Sodium %	0.17	0.20	0.16	0.20	0.15	0.19	0.16	0.20	0.16	0.20	0.17	0.20	0.15	0.20
Chloride %	0.17	0.23	0.17	0.22	0.16	0.22	0.17	0.23	0.17	0.23	0.17	0.23	0.16	0.22
Potassium %	0.66	0.74	0.64	0.73	0.55	0.71	0.57	0.74	0.63	0.78	0.57	0.74	0.55	0.71
Crude fat %	2.50	4.00	3.00	4.00	2.50	4.00	3.00	6.00	4.00	8.00	5.50	7.00	2.50	5.00
Linoleic acid %	1.17	1.28	1.12	1.18	1.04	2.18	1.25	2.83	1.59	2.88	1.27	2.83	1.09	2.46

➔ HUBBARD BREEDERS

FOR HOT CONDITIONS ($\geq 25^{\circ}\text{C}$) ON CORN - SOYA DIETS - FLOOR HOUSING

PHASE	PRE-STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		MALE	
Age (days)	0 to 10d		11d to 42d		43d to 140d		141d to 1% lay		1% lay to 60g egg		60 g egg weight to 280d		281d to cull		141d to cull	
ME kcal/kg MJ/kg	2850		2800		2650		2750		2825		2800		2775		2650	
	11.93		11.72		11.10		11.51		11.83		11.72		11.62		11.10	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %	1.08	0.97	1.04	0.93	0.70	0.60	0.65	0.56	0.71	0.63	0.69	0.61	0.67	0.59	0.55	0.48
Methionine %	0.46	0.41	0.43	0.39	0.34	0.29	0.35	0.31	0.40	0.36	0.37	0.33	0.36	0.32	0.30	0.26
Meth. and Cyst. %	0.83	0.74	0.78	0.70	0.59	0.51	0.61	0.53	0.69	0.62	0.65	0.58	0.63	0.56	0.52	0.45
Valine %	0.75	0.66	0.72	0.63	0.55	0.47	0.55	0.47	0.63	0.55	0.61	0.53	0.59	0.52	0.47	0.40
Isoleucine %	0.73	0.64	0.70	0.62	0.53	0.46	0.53	0.46	0.59	0.51	0.57	0.50	0.55	0.48	0.45	0.39
Arginine %	1.14	1.03	1.12	1.01	0.77	0.67	0.76	0.65	0.82	0.73	0.80	0.71	0.77	0.69	0.64	0.55
Tryptophan %	0.21	0.18	0.20	0.17	0.17	0.14	0.17	0.14	0.19	0.16	0.18	0.15	0.18	0.15	0.14	0.12
Threonine %	0.74	0.64	0.71	0.62	0.50	0.43	0.50	0.43	0.54	0.47	0.53	0.45	0.51	0.44	0.43	0.36
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	18.5	19.7	17.9	19.0	14.5	15.0	14.2	14.7	15.6	16.1	15.3	15.9	14.9	15.4	12.8	13.4
Crude fibre %	2.50	3.50	2.50	3.50	3.50	8.00	3.00	6.00	3.50	6.00	3.50	6.00	4.00	6.50	3.50	7.00
Calcium %	1.00	1.04	1.00	1.04	0.90	0.96	1.27	1.42	2.91	3.18	2.96	3.17	3.29	3.57	0.90	0.96
Av. Phosphorus %	0.46	0.48	0.42	0.45	0.38	0.41	0.40	0.42	0.41	0.44	0.39	0.42	0.34	0.37	0.38	0.41
Sodium %	0.17	0.20	0.16	0.20	0.15	0.19	0.16	0.20	0.16	0.20	0.16	0.20	0.17	0.20	0.15	0.20
Chloride %	0.17	0.23	0.17	0.22	0.16	0.22	0.17	0.23	0.17	0.23	0.17	0.23	0.17	0.23	0.16	0.22
Potassium %	0.66	0.74	0.64	0.73	0.55	0.71	0.57	0.74	0.64	0.79	0.63	0.78	0.57	0.74	0.55	0.71
Crude fat %	2.50	4.00	3.00	4.00	2.50	4.00	3.00	6.00	4.00	8.00	4.00	8.00	5.50	7.00	2.50	5.00
Linoleic acid %	1.17	1.28	1.12	1.18	1.04	2.18	1.25	2.83	1.89	2.91	1.59	2.88	1.29	2.86	1.09	2.46

FOR HOT CONDITIONS ($\geq 25^{\circ}\text{C}$) ON CORN - SOYA DIETS - CAGE HOUSING

PHASE	PRE-STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		MALE	
Age (days)	0 to 10d		11d to 42d		43d to 140d		141d to 1% lay		1% lay to 60g egg weight		60 g egg weight to 280d		281d to cull		141d to cull	
ME kcal/kg MJ/kg	2850		2800		2650		2750		2825		2800		2775		2650	
	11.93		11.72		11.10		11.51		11.83		11.72		11.62		11.10	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %	1.08	0.97	1.04	0.93	0.72	0.62	0.67	0.58	0.73	0.65	0.71	0.63	0.69	0.61	0.57	0.49
Methionine %	0.46	0.41	0.43	0.39	0.35	0.30	0.36	0.31	0.41	0.37	0.38	0.34	0.37	0.33	0.31	0.27
Meth. and Cyst. %	0.83	0.74	0.78	0.70	0.61	0.53	0.63	0.55	0.71	0.63	0.66	0.59	0.65	0.58	0.53	0.46
Valine %	0.75	0.66	0.72	0.63	0.57	0.49	0.57	0.48	0.65	0.57	0.63	0.55	0.61	0.53	0.48	0.41
Isoleucine %	0.73	0.64	0.74	0.65	0.55	0.47	0.55	0.47	0.61	0.53	0.59	0.51	0.57	0.50	0.47	0.40
Arginine %	1.14	1.08	1.12	0.96	0.79	0.69	0.74	0.64	0.80	0.72	0.78	0.70	0.76	0.68	0.63	0.54
Tryptophan %	0.21	0.18	0.20	0.17	0.17	0.14	0.17	0.14	0.19	0.16	0.19	0.16	0.18	0.15	0.14	0.12
Threonine %	0.74	0.64	0.71	0.62	0.52	0.44	0.52	0.44	0.56	0.48	0.54	0.47	0.53	0.45	0.44	0.37
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	18.5	19.7	17.9	19.0	14.9	15.4	14.6	15.2	16.0	16.6	15.7	16.3	15.3	15.9	13.2	13.8
Crude fibre %	2.50	3.50	2.50	3.50	3.50	8.00	3.00	6.00	3.50	6.00	3.50	6.00	4.00	6.50	3.50	7.00
Calcium %	1.00	1.04	1.00	1.04	0.93	0.98	1.30	1.46	2.97	3.27	3.04	3.24	3.38	3.63	0.93	0.98
Av. Phosphorus %	0.46	0.48	0.42	0.45	0.39	0.42	0.41	0.44	0.42	0.45	0.40	0.43	0.35	0.38	0.39	0.42
Sodium %	0.17	0.20	0.16	0.20	0.15	0.20	0.16	0.20	0.16	0.21	0.16	0.21	0.18	0.21	0.15	0.21
Chloride %	0.17	0.23	0.17	0.22	0.17	0.22	0.17	0.23	0.18	0.24	0.18	0.24	0.18	0.24	0.17	0.22
Potassium %	0.66	0.74	0.64	0.73	0.56	0.73	0.58	0.76	0.66	0.81	0.65	0.80	0.59	0.76	0.56	0.73
Crude fat %	2.50	4.00	3.00	4.00	2.50	4.00	3.00	6.00	4.00	8.00	4.00	8.00	5.50	7.00	2.50	5.00
Linoleic acid %	1.17	1.28	1.12	1.18	1.07	2.25	1.28	2.92	1.95	2.99	1.63	2.97	1.32	2.94	1.12	2.53

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

Pre-starter is useful for chicks that have had a long journey, have come from a young donor flock and where previous flocks had difficulty to achieve 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.

OTHER HUBBARD TECHNICAL DOCUMENTS

BREEDER MANUAL
BREEDER PERFORMANCE SUMMARY
MALE PERFORMANCE SUMMARY
BROILER PERFORMANCE SUMMARY
INCUBATION GUIDE
NUTRITION GUIDE
OTHER SPECIFIC TECHNICAL DOCUMENTS

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