

GENERAL NUTRITION RECOMMENDATIONS



**EDGE FEMALES
AND CONVENTIONAL MALES
PARENT STOCK**



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INTRODUCTION

This document provides general nutrition recommendations and some practical adaptations to specific situations. The optimum nutritional programme will vary according to local conditions such as:

- ▷ ingredients availability and ingredient economics;
- ▷ feed intake, climate;
- ▷ housing type;
- ▷ disease status.

It is very important to remember that growth and egg production are all driven by nutrient intake measured in mg, g or unit of energy per day. The following formula is key to achieving target nutrient intake needed at each stage of rearing or production:

$$\text{Nutrient intake (g or kcal/d)} = \text{Feed Intake (g/d)} \times \text{Nutrient in the feed (\% or kcal)}$$



1. NUTRIENT RECOMMENDATIONS FOR FEMALES: FEMALE PARENT STOCK TARGET DAILY NUTRIENT ALLOCATION AT PEAK

Table 1 provides some key data for the critical period at peak production that impacts nutrition during the production period.

- Daily nutrient intakes recommended to achieve or exceed the performance objectives at peak daily egg production for the EDGE.
- Data for amino acids are provided as either total or digestible amino acids. The optimal recommended amino acid balance on an ideal protein basis is also shown.
- Minimum target intakes for Calcium and Available Phosphorus. Available Phosphorus is still the most widely used basis for Phosphorus nutrition across the world for breeders. Adapted recommendations for digestible Phosphorus systems are available by contacting Hubbard Nutritionists.

TABLE 1: FEMALE PARENT STOCK TARGET DAILY ALLOCATION AT PEAK

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	1131	1025	100		°F	59.0	63.5	68.0	72.5	77.0	> 77.0	
Methionine	639	573	56	Floor	kcal	500	485	470	460	450	450 to 475	
Meth. & Cystine	1124	1011	99		MJ	2.09	2.03	1.97	1.92	1.88	1.87 to 1.98	
Valine	1177	1043	102	Feed intake (g/bird/day)								
Isoleucine	912	808	79	Temperature	°C	15.0	17.5	20.0	22.5	25.0	> 25.0	
Arginine	1269	1128	110		°F	59.0	63.5	68.0	72.5	77.0	> 77.0	
Tryptophan	282	249	24	ME level in feed	2750 kcal/kg	Floor	182	176	171	167	164	164 to 171
Threonine	912	808	79				2850 kcal/kg	Floor	175	170	165	161

Minerals (mg/bird/day)		
	Min.	Max.
Calcium	5000	5400
Av. Phosphorus	630	680

- Estimates of the expected Metabolisable Energy (ME) intake per day are shown and are adjusted according to average daily temperature in the house which will affect ME requirements.

► CALCULATIONS

- ▷ Once the ME content of the Breeder diet is known, it is possible to estimate the expected daily peak feed intake.

$$470 \text{ kcal (ME intake)} / 2750 \text{ kcal/kg (ME of the feed)} = 171 \text{ g feed/d (Feed intake)}$$

- ▷ Using the predicted feed intake and the target intakes for all nutrients it is possible to calculate the % of each nutrient needed in the diet. If birds experience heat stress, then the additional demands to use energy to dissipate heat may increase ME requirements. The precise amount of energy is not easy to predict.
- ▷ In addition, if bodyweight exceeds the target, then the maintenance ME requirement will be increased. As a guide, for each 100 g over the bodyweight target, the ME requirement increases by 10 kcal/day or 0.05 MJ/d.

1. NUTRIENT RECOMMENDATIONS FOR FEMALES: GENERAL NUTRIENT RECOMMENDATIONS (G/KG PER 1000 KCAL OF METABOLISABLE ENERGY)



■ METABOLISABLE ENERGY

- ▷ The recommendations in this guide are in accordance with the WPSA (1999) ME content of feed ingredients.
- ▷ It is important to note that there are differences between various international databases that describe the ME content of feed ingredients. This causes much discussion and makes direct comparisons of diets or recommendations difficult unless they are made using the same database.
- ▷ Target ME intakes may vary between countries based on many factors so what is optimal in one location may not be the same elsewhere.

Table 2 shows:

- ▷ Examples of the ratio on nutrients per 1000 kcal of ME for all ages.
- ▷ The values that can be used to calculate the nutrient content of the diet according to the local choice of ME level. For example, if a ME of 2800 kcal/kg is the best option for Breeder 1 then the digestible lysine content of the diet can be calculated as:

$$\% \text{ Digestible Lysine} = (2.18 \text{ g dg Lysine/kg} \times 2800 \text{ kcal/kg}) / 10000$$

■ The best way to use this table is as a spreadsheet. Contact your Hubbard Technical Manager for further information.

■ The ME content of each diet is shown as a range. The optimal ME content of the diet used locally will depend on many factors but the limits for this choice are shown for each diet.

Hubbard Nutritionists can help to determine the optimal local ME content of each diet and from this the percentage of other nutrients can be calculated using Table 2.

Some diets shown are optional depending on local factors such as chick growth, egg size, low feed intake etc. These choices are discussed in more detail in later sections.

TABLE 2: BREEDER NUTRIENT RECOMMENDATIONS : G/KG PER 1000 KCAL (MCAL) OF METABOLISABLE ENERGY

PHASE	PRE-STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		BREEDER III	
Age (days)	0 to 21 d or 28 d		Optional 22 to 42 d		29 d or 43 d to 126 d		126 d to 1% lay		Optional 1% lay to 60 g egg weight		1% lay or 60 g egg weight to 280 d or depletion		Optional 281 d to depletion		Optional 350 d to depletion	
Suggested ME	kcal/kg	2800-3 000	2750-2 900		2400-2900		2700-2900		2650-2900		2650-2900		2650-2900		2650-2900	
	MJ/kg	11.70-12.50	11.50-12.10		10.00-12.10		11.30-12.10		11.10-12.10		11.10-12.10		11.10-12.10		11.10-12.10	
	kcal/lb	1270-1360	1250-1315		1090-1315		1225-1315		1200-1315		1200-1315		1200-1315		1200-1315	
Min. amino acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine	3.80	3.40	3.02	2.72	2.37	2.05	2.19	1.95	2.49	2.25	2.41	2.18	2.31	2.09	2.17	1.96
Methionine	1.75	1.59	1.56	1.40	1.24	1.08	1.24	1.08	1.43	1.28	1.36	1.22	1.31	1.17	1.23	1.10
Meth. & Cystine	3.13	2.81	2.84	2.52	2.47	2.15	2.30	2.00	2.53	2.25	2.39	2.15	2.30	2.07	2.16	1.94
Valine	3.11	2.73	2.98	2.62	2.41	2.05	2.29	1.95	2.62	2.29	2.50	2.22	2.40	2.14	2.25	2.01
Isoleucine	2.58	2.28	2.34	2.06	1.96	1.68	1.88	1.61	2.04	1.77	1.94	1.72	1.86	1.65	1.75	1.55
Arginine	4.05	3.65	3.42	3.08	2.69	2.32	2.42	2.09	2.75	2.48	2.70	2.40	2.59	2.31	2.43	2.17
Tryptophan	0.73	0.63	0.70	0.61	0.61	0.51	0.59	0.49	0.65	0.55	0.60	0.53	0.57	0.51	0.54	0.48
Threonine	2.65	2.35	2.45	2.15	2.00	1.70	1.78	1.51	2.06	1.78	1.94	1.72	1.86	1.66	1.80	1.61
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein	64.00	68.00	60.00	64.00	53.00	55.00	50.00	52.00	52.50	55.00	50.90	52.70	48.10	50.00	46.70	49.00
Calcium	3.60	3.80	3.60	3.70	3.30	3.50	4.50	5.50	10.00	11.00	10.50	11.50	11.50	12.50	12.00	13.00
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	1.18	1.28
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	0.60	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	0.60	0.80
Potassium	2.30	2.80	2.30	2.80	2.20	2.80	2.20	2.80	2.20	2.80	2.20	2.80	2.20	2.80	2.20	2.80
Linoleic acid	4.10	7.00	4.00	8.00	3.80	8.00	4.40	10.00	6.50	10.00	5.50	10.00	4.50	10.00	4.00	9.00

1. NUTRIENT RECOMMENDATIONS FOR FEMALES: EXAMPLES OF NUTRIENT % AND ME CONTENT FOR SPECIFIC SITUATIONS

TABLE 3: EXAMPLES OF DIET SPECIFICATION FOR TEMPERATE CLIMATES (WHEAT BASED DIETS)

PHASE		STARTER		GROWER		TRANSITION		BREEDER I		BREEDER II		BREEDER III	
Age (days)		0 to 28 d		29 d to 126 d		126 d to 1% lay		1% lay to 280 d or depletion		Optional 281 d to depletion		Optional 350 d to depletion	
Suggested ME	kcal/kg	2850		2650		2750		2750		2700		2800	
	MJ/kg	11.93		11.10		11.51		11.51		11.30		11.72	
	kcal/lb	1293		1202		1248		1248		1225		1270	
Min. amino acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		1.08	0.97	0.63	0.54	0.60	0.54	0.66	0.60	0.62	0.56	0.61	0.55
Methionine %		0.50	0.45	0.33	0.29	0.34	0.30	0.37	0.34	0.35	0.32	0.34	0.31
Meth. & Cystine %		0.89	0.80	0.65	0.57	0.63	0.55	0.66	0.59	0.62	0.56	0.60	0.54
Valine %		0.89	0.78	0.64	0.54	0.63	0.54	0.69	0.61	0.65	0.58	0.63	0.56
Isoleucine %		0.74	0.65	0.52	0.45	0.52	0.44	0.53	0.47	0.50	0.45	0.49	0.43
Arginine %		1.15	1.04	0.71	0.61	0.67	0.57	0.74	0.66	0.70	0.62	0.68	0.61
Tryptophan %		0.21	0.18	0.16	0.14	0.16	0.13	0.17	0.15	0.15	0.14	0.15	0.13
Threonine %		0.76	0.67	0.53	0.45	0.49	0.41	0.53	0.47	0.50	0.45	0.51	0.45
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %		18.2	19.4	14.0	14.6	13.8	14.3	14.0	14.5	13.0	13.5	13.1	13.7
Crude fibre %		2.50	3.50	3.50	8.00	3.00	6.00	3.50	6.00	4.00	6.50	4.00	6.50
Calcium %		1.03	1.08	0.87	0.93	1.24	1.51	2.89	3.16	3.11	3.38	3.36	3.64
Av. Phosphorus %		0.46	0.48	0.37	0.40	0.39	0.41	0.36	0.39	0.32	0.35	0.33	0.36
Sodium %		0.17	0.20	0.15	0.19	0.15	0.19	0.15	0.19	0.16	0.19	0.17	0.20
Chloride %		0.17	0.23	0.16	0.21	0.17	0.22	0.17	0.22	0.16	0.22	0.17	0.22
Potassium %		0.66	0.80	0.58	0.74	0.61	0.77	0.61	0.77	0.59	0.76	0.62	0.78
Crude fat %		3.50	4.00	2.50	4.00	3.00	7.00	3.00	7.50	3.00	7.50	3.00	7.50
Linoleic acid %		1.17	2.00	1.01	2.12	1.21	2.75	1.51	2.75	1.22	2.70	1.12	2.52

Table 3 content:

- ⇒ Example programme of diets to use in a temperate climate where the principal cereal is likely to be wheat and higher ME levels may be expensive to achieve.
- ⇒ Under normal conditions Breeder I and Breeder II will be the only diets used in the production period.
- ⇒ The Breeder III diet shown here is an optional diet only to be used in exceptional circumstances. The objective of this diet is to help control egg size in situations after 350 days where egg size exceeds the performance objective by 3 g according to the age of the flock.

1. NUTRIENT RECOMMENDATIONS FOR FEMALES: EXAMPLES OF NUTRIENT % AND ME CONTENT FOR SPECIFIC SITUATIONS

TABLE 4: EXAMPLES OF DIET SPECIFICATION FOR TEMPERATE CLIMATES (MAIZE BASED DIETS)

PHASE		PRE-STARTER		STARTER		GROWER		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		BREEDER III	
Age (days)		0 to 21 d		21d to 42 d		42 d to 126 d		126 d to 1% lay		Optional 1% lay to 60 g egg weight		1% or 60 g egg weight to 280 d / depletion		Optional 281 d to depletion		Optional 350 d to depletion	
Suggested ME	kcal/kg	2850		2800		2700		2800		2850		2850		2830		2800	
	MJ/kg	11.93		11.72		11.30		11.72		11.93		11.93		11.85		11.72	
	kcal/lb	1293		1270		1225		1270		1293		1293		1284		1270	
Min. amino acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		1.08	0.97	0.85	0.76	0.64	0.55	0.61	0.55	0.71	0.64	0.69	0.62	0.65	0.59	0.61	0.55
Methionine %		0.50	0.45	0.44	0.39	0.33	0.29	0.35	0.30	0.41	0.36	0.39	0.35	0.37	0.33	0.34	0.31
Meth. & Cystine %		0.89	0.80	0.79	0.71	0.67	0.58	0.64	0.56	0.72	0.64	0.68	0.61	0.65	0.58	0.60	0.54
Valine %		0.89	0.78	0.83	0.73	0.65	0.55	0.64	0.55	0.75	0.65	0.71	0.63	0.68	0.60	0.63	0.56
Isoleucine %		0.74	0.65	0.65	0.58	0.53	0.45	0.53	0.45	0.58	0.50	0.55	0.49	0.53	0.47	0.49	0.43
Arginine %		1.15	1.04	0.96	0.86	0.73	0.63	0.68	0.58	0.78	0.71	0.77	0.68	0.73	0.65	0.68	0.61
Tryptophan %		0.21	0.18	0.20	0.17	0.16	0.14	0.16	0.14	0.19	0.16	0.17	0.15	0.16	0.14	0.15	0.13
Threonine %		0.76	0.67	0.69	0.60	0.54	0.46	0.50	0.42	0.59	0.51	0.55	0.49	0.53	0.47	0.51	0.45
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %		18.2	19.4	16.8	17.9	14.3	14.9	14.0	14.6	15.0	15.7	14.5	15.0	13.6	14.2	13.1	13.7
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	4.00	6.50
Calcium %		1.03	1.08	1.01	1.04	0.89	0.95	1.26	1.54	2.85	3.14	2.99	3.28	3.25	3.54	3.36	3.64
Av. Phosphorus %		0.46	0.48	0.42	0.45	0.38	0.41	0.39	0.42	0.38	0.41	0.37	0.40	0.34	0.37	0.33	0.36
Sodium %		0.17	0.20	0.16	0.20	0.15	0.19	0.15	0.20	0.16	0.20	0.16	0.20	0.17	0.20	0.17	0.20
Chloride %		0.17	0.23	0.17	0.22	0.16	0.22	0.17	0.22	0.17	0.23	0.17	0.23	0.17	0.23	0.17	0.22
Potassium %		0.66	0.80	0.64	0.78	0.59	0.76	0.62	0.78	0.63	0.80	0.63	0.80	0.62	0.79	0.62	0.78
Crude fat %		2.50	4.00	3.00	4.00	2.50	4.00	4.00	6.00	4.00	8.00	4.00	8.00	4.00	7.00	3.00	7.50
Linoleic acid %		1.17	2.00	1.12	2.24	1.03	2.16	1.23	2.80	1.85	2.85	1.57	2.85	1.27	2.83	1.12	2.52

Table 4 content:

- ⇒ Example programme of diets that may be used where maize is the primary cereal and diets are likely to have few other ingredients. Soya may typically be the only major protein source.
- ⇒ Under these conditions, the optimal ME content of the diets is higher especially in the production period. The higher ME content also may help allow extra oil or fat to be added to the diet to help palatability and reduce heat stress under challenging conditions.
- ⇒ An optional onset of lay diet is shown that can be used at the start of egg production until egg size reaches 60 g where early egg size is a challenge or feed intake is low. This diet is only used in very exceptional circumstances.
- ⇒ Breeder III again should only be used in exceptional circumstances where egg size is over target after 350 days.

1. NUTRIENT RECOMMENDATIONS FOR FEMALES: EXAMPLES OF NUTRIENT % AND ME CONTENT FOR SPECIFIC SITUATIONS

Table 5 shows an example of diets in a programme used in conditions where ME intake per day during production is expected to be low due to for example, high ambient temperature in open sided houses. The assumption here is that low ME intake and therefore low feed intake means the intake of all other nutrients will not achieve the targets outlined in Table 1.

► Higher ME diets in production > 2825 kcal/kg are recommended in situations where environment may reduce energy requirements or reduce energy intake. The objective is to provide a minimum of 10% of the dietary energy as energy from lipid which is more easily achieved in higher energy diets. Higher ME diets also reduce the pressure on volume feed intake under stressful conditions.



TABLE 5: EXAMPLES OF DIET SPECIFICATION FOR HOT CLIMATES (> 28°C/82°F)

PHASE	PRE-STARTER		STARTER		GROWER		TRANSITION		BREEDER I		BREEDER II	
Age (days)	0 to 21 d		21 d to 42 d		42 d to 133 d		133 d to 1% lay		1% or 60 g egg weight to 280 d / depletion		Optional 281 d to depletion	
Suggested ME	kcal/kg	2850	2800	2700	2750	2850	2825					
	MJ/kg	11.93	11.72	11.30	11.51	11.93	11.83					
	kcal/lb	1293	1270	1225	1248	1293	1282					
Min. amino acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %	1.08	0.97	0.85	0.76	0.64	0.55	0.64	0.57	0.73	0.66	0.69	0.63
Methionine %	0.50	0.45	0.44	0.39	0.33	0.29	0.36	0.31	0.41	0.37	0.39	0.35
Meth. & Cystine %	0.89	0.80	0.79	0.71	0.67	0.58	0.67	0.58	0.72	0.65	0.69	0.62
Valine %	0.89	0.78	0.83	0.73	0.65	0.55	0.67	0.57	0.76	0.67	0.72	0.64
Isoleucine %	0.74	0.65	0.65	0.58	0.53	0.45	0.55	0.47	0.59	0.52	0.56	0.49
Arginine %	1.15	1.04	0.96	0.86	0.73	0.63	0.71	0.61	0.82	0.73	0.78	0.69
Tryptophan %	0.21	0.18	0.20	0.17	0.16	0.14	0.17	0.14	0.18	0.16	0.17	0.15
Threonine %	0.76	0.67	0.69	0.60	0.54	0.46	0.52	0.44	0.59	0.52	0.56	0.50
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	18.2	19.4	16.8	17.9	14.3	14.9	14.6	15.2	15.4	15.9	14.4	15.0
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
Calcium %	1.03	1.08	1.01	1.04	0.89	0.95	1.31	1.60	3.17	3.47	3.44	3.74
Av. Phosphorus %	0.46	0.48	0.42	0.45	0.38	0.41	0.41	0.44	0.39	0.42	0.36	0.39
Sodium %	0.17	0.20	0.16	0.20	0.15	0.19	0.16	0.20	0.17	0.21	0.18	0.21
Chloride %	0.17	0.23	0.17	0.22	0.16	0.22	0.17	0.23	0.18	0.24	0.18	0.24
Potassium %	0.66	0.80	0.64	0.78	0.59	0.76	0.64	0.82	0.66	0.85	0.66	0.84
Crude fat %	2.50	4.00	3.00	4.00	2.50	4.00	4.50	6.00	5.00	8.00	5.00	7.00
Linoleic acid %	1.17	2.00	1.12	2.24	1.03	2.16	1.28	2.92	1.66	3.02	1.35	2.99

► Compared with Table 3 and 4 for situations where energy intake during egg production is normal, with the situation where energy intake is below target then the nutrient contents in Table 5 have been increased. This is to try to ensure that actual nutrient intake will be closer to the target.

► If feed and energy intake are below target, then there is a limit to how much the nutrient content of the diet can be increased. This is especially true for amino acids where an increase of more than 6% in the amino acid : energy ratio is not recommended. This is because a response to increased amino acid intakes is unlikely if energy intake is still limiting egg production. In addition, energy used to dispose of excess protein is likely make heat stress worse.

2. NUTRIENT RECOMMENDATIONS FOR MALES

TABLE 6: EXAMPLE OF DIET SPECIFICATIONS FOR MALES

PHASE		MALE 1		MALE 2 OPTIONAL	
Age (days)		141 days to depletion or 141 to 210 days		211 days to depletion	
Suggested ME	kcal/kg	2 800		3 000	
	MJ/kg	11.72		12.56	
	kcal/lb	1270		1361	
Min. amino acids		Tot.	Dig.	Tot.	Dig.
Lysine %		0.49	0.42	0.47	0.41
Methionine %		0.26	0.23	0.25	0.22
Meth. & Cystine %		0.46	0.40	0.44	0.38
Valine %		0.42	0.35	0.40	0.34
Isoleucine %		0.40	0.34	0.38	0.33
Arginine %		0.55	0.49	0.52	0.45
Tryptophan %		0.12	0.10	0.12	0.10
Threonine %		0.38	0.32	0.36	0.31
		Min.	Max.	Min.	Max.
Crude protein %		11.62	12.18	10.80	11.25
Crude fibre %		4.00	6.50	4.00	6.50
Calcium %		0.92	0.98	0.99	1.05
Av. Phosphorus %		0.39	0.42	0.42	0.45
Sodium %		0.15	0.21	0.17	0.23
Chloride %		0.17	0.22	0.18	0.24
Potassium %		0.62	0.78	0.66	0.84
Crude fat %		3.00	6.50	3.00	6.50
Linoleic acid %		1.12	2.52	1.20	2.70

► REARING DIETS

The general feed specifications are the same for conventional males as for the EDGE females.

► PRODUCTION DIETS

In recent years new feeding strategies have been developed for males using high ME male diets with lower protein content. This is to allow males to maintain sufficient ME intake without an increased risk of excess fleshing.

2-stage approach

- ▷ Regular Male 1 diet: to ensure weekly growth to 28–30 weeks of age is on target (using a regular male diet).
- ▷ Male 2 diet from 30 weeks of age or later to slow growth to meet the weekly growth targets using feed with lower protein and higher energy content.

The Male 2 diet is optional and is intended for conventional M77 or M99 males and the implementation of such a male diet may be necessary when it is difficult to control fleshing and energy intake needs to be maintained. → See Performance Objectives “M77 PS male mated with conventional females” & Performance Objectives “M99 PS male mated with conventional females”.



It is advised that you contact your Hubbard Technical Manager to discuss this option before using the Male 2 diet. The use of the diet is not recommended if:

- ▷ male bodyweights are below the bodyweight target in the period from 24 to 30 weeks of age;
- ▷ weekly growth is slow and erratic;
- ▷ there are other issues affecting feed intake like disease, heat stress or poor feed distribution.

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[Performance Objectives
M77 PS male mated with
conventional females](#)



[Performance Objectives
M99 PS male mated with
conventional females](#)

3. VITAMINS AND MINERALS

TABLE 7: ADDED VITAMIN GUIDELINES

Inclusion rates are per kg feed		Rearing	Egg Production and Male Breeders
Vitamin A	IU	12000	13000
Vitamin D3	IU	4000	5000
Vitamin E	IU	100	130
Vitamin K (menadione)	mg	5.0	7.5
Thiamin B1	mg	4.0	5.0
Riboflavin B2	mg	14	16
Pantothenic acid	mg	15	22
Nicotinic acid	mg	60	65
Pyridoxine B6	mg	6.0	8.0
Folic acid B10	mg	3.0	4.0
Cyanocobalamin B12	mg	0.040	0.055
Biotin Vit. H	mg	0.30	0.45
Choline	mg	750	750

1. Where permitted by local regulations, inclusion levels may be increased by 10% if feed intake is observed or expected to be 10% or more below the target feed intake.
2. Check local regulations for the maximum permitted amount of each vitamin especially Vitamin A and D.
3. These recommendations may need to be reviewed if harsh heat treatment conditions are used (>85°C for over 5 minutes). Please consult a Hubbard Nutritionist.

TABLE 8: ADDED MINERAL GUIDELINES

Mineral		Inclusion rates are per kg feed
Manganese	mg	100
Iron	mg	50
Iodine	mg	2
Copper	mg	10
Zinc	mg	100
Selenium	mg	0.30 – 0.40

1. Assumes inorganic and organic mineral sources.
2. Check local regulations for the maximum permitted of all minerals but particularly for zinc and selenium.



4. MANAGEMENT DURING SOME SPECIFIC PERIODS: TRANSITION FACHIEVING THE 6 WEEK BODYWEIGHT IN MALES AND FEMALES

What diets to use at the start? It is very important that both males and females achieve the target bodyweights at early ages in rearing (28 d and 42 d).

- Traditional feed programmes in many countries use just one starter and one Grower diet.
- Where there is a risk that it may be difficult to achieve these bodyweight targets, possible solutions include:
 - ▷ Using a pre-starter. This is highly recommended in conjunction with adaptations to the lighting programme.
 - ▷ Focus on physical quality of the feed.
 - ▷ In exceptional circumstances a Broiler type starter may be used for the first 7 days.

TABLE 9: OPTION FOR DIETS TO USE IN THE STARTER PERIOD
Global Temperate / Good conditions – risk to poor 35 d weight is low

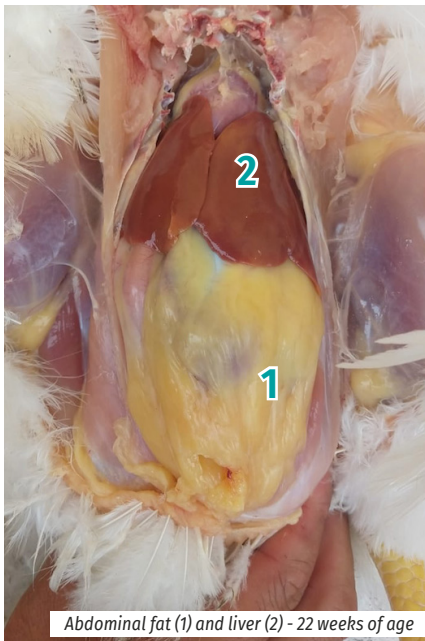
PHASE		STARTER		GROWER	
Age (days)		0 to 28 d		29 d to 126 d	
Suggested ME	kcal/kg	2900		2650	
	MJ/kg	12.14		11.10	
	kcal/lb	1315		1200	
Min. amino acids		Tot.	Dig.	Tot.	Dig.
Lysine %		1.10	0.99	0.68	0.59
Methionine %		0.49	0.44	0.33	0.29
Meth. & Cystine %		0.84	0.75	0.57	0.50
Valine %		0.81	0.71	0.54	0.46
Isoleucine %		0.74	0.65	0.52	0.45
Arginine %		1.17	1.06	0.71	0.61
Tryptophan %		0.21	0.19	0.16	0.14
Threonine %		0.77	0.68	0.49	0.42
		Min.	Max.	Min.	Max.
Crude protein %		18.6	19.7	14.0	14.6
Crude fibre %		2.50	3.50	3.50	8.00
Calcium %		1.04	1.10	0.87	0.93
Av. Phosphorus %		0.46	0.49	0.37	0.40
Sodium %		0.17	0.20	0.15	0.19
Chloride %		0.17	0.23	0.16	0.21
Potassium %		0.67	0.75	0.53	0.69
Crude fat %		3.50	4.00	2.50	4.00
Linoleic acid %		1.19	2.03	1.01	2.12

TABLE 10: OPTION FOR DIETS TO USE IN THE STARTER PERIOD
Where prior performance shows a risk to poor 35 d weight is high use a Prestarter

PHASE		PRE-STARTER		STARTER		GROWER	
Age (days)		0 to 21 d		21 d to 42 d		42 d to 126 d	
Suggested ME	kcal/kg	2950		2800		2650	
	MJ/kg	12.35		11.72		11.10	
	kcal/lb	1340		1270		1200	
Min. amino acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		1.12	1.00	0.85	0.76	0.68	0.59
Methionine %		0.50	0.45	0.44	0.39	0.33	0.29
Meth. & Cystine %		0.86	0.77	0.76	0.67	0.57	0.50
Valine %		0.82	0.72	0.66	0.58	0.54	0.46
Isoleucine %		0.75	0.66	0.61	0.54	0.52	0.45
Arginine %		1.19	1.08	0.96	0.86	0.71	0.61
Tryptophan %		0.22	0.19	0.18	0.15	0.16	0.14
Threonine %		0.78	0.69	0.64	0.57	0.49	0.42
		Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %		18.9	20.1	16.8	17.9	14.0	14.6
Crude fibre %		2.50	3.50	2.50	3.50	3.50	8.00
Calcium %		1.06	1.12	1.01	1.04	0.87	0.93
Av. Phosphorus %		0.47	0.50	0.42	0.45	0.37	0.40
Sodium %		0.18	0.21	0.16	0.20	0.15	0.19
Chloride %		0.18	0.24	0.17	0.22	0.16	0.21
Potassium %		0.68	0.77	0.64	0.73	0.53	0.69
Crude fat %		2.50	4.00	3.00	4.00	2.50	4.00
Linoleic acid %		1.21	2.07	1.12	2.24	1.01	2.12

4. MANAGEMENT DURING SOME SPECIFIC PERIODS: TRANSITION FEED - MANAGING THE MOVE FROM REARING TO PRODUCTION PHASES

- ▶ Preparing the female parents to have the correct bodyweight but also body composition while avoiding excess body fleshing or conformation score is essential for good production. → See Management guide “EDGE PS”.
- ▶ One key tool to help manage body composition is the use of a specific transition diet.
 - ▷ Ensure the transition diet is designed together with the Grower diet and the first Breeder diet.
 - ▷ Have a step-up programme of the ME content from the Grower to transition to Breeder I diets as shown in the example.
 - ▷ Have a lower digestible lysine per unit of ME than the value used for the Grower to control fleshing development.
 - ▷ Increase calcium and vitamins contents to prepare for the onset of lay.
- ▶ Effects of the transition diet:
 - ▷ Allows some increase in feed allocation and ensures weekly growth meets the weekly bodyweight targets from 18 weeks of age.
 - ▷ Ensure ME intake is sufficient to allow the natural increase in abdominal fat before the first light stimulation. The target range for abdominal body fat is 1.5-2% at 22 weeks of age.
 - ▷ Normally using transition diet before 18 weeks is not recommended for EDGE as this may promote higher body fat content at 22 weeks.
 - ▷ The choice of age to start using the transition diet should be made by referring to records for previous flock’s abdominal fat content at 22 weeks of age.



Abdominal fat (1) and liver (2) - 22 weeks of age



Good fleshing score - 22 weeks of age

TABLE 11: DESIGNING THE TRANSITION DIET IN CONJUNCTION WITH THE GROWER AND BREEDER DIET

PHASE		GROWER		TRANSITION		BREEDER I	
Age (days)		42 d to 126 d		126 d to 1% lay		1% lay or 60 g egg weight to 280 d / depletion	
Suggested ME	kcal/kg	2700		2800		2850	
	MJ/kg	11.30		11.72		11.93	
	kcal/lb	1225		1270		1293	
Min. amino acids		Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
Lysine %		0.64	0.55	0.61	0.55	0.69	0.62
Methionine %		0.33	0.29	0.35	0.30	0.39	0.35
Meth. & Cystine %		0.67	0.58	0.64	0.56	0.68	0.61
Valine %		0.65	0.55	0.64	0.55	0.71	0.63
Isoleucine %		0.53	0.45	0.53	0.45	0.55	0.49
Arginine %		0.73	0.63	0.68	0.58	0.77	0.68
Tryptophan %		0.16	0.14	0.16	0.14	0.17	0.15
Threonine %		0.54	0.46	0.50	0.42	0.55	0.49
		Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %		14.3	14.9	14.0	14.6	14.5	15.0
Crude fibre %		3.50	8.00	3.00	6.00	3.50	6.00
Calcium %		0.89	0.95	1.26	1.54	2.99	3.28
Av. Phosphorus %		0.38	0.41	0.39	0.42	0.37	0.40
Sodium %		0.15	0.19	0.15	0.20	0.16	0.20
Chloride %		0.16	0.22	0.17	0.22	0.17	0.23
Potassium %		0.59	0.76	0.62	0.78	0.63	0.80
Crude fat %		2.50	4.00	4.00	6.00	4.00	8.00
Linoleic acid %		1.03	2.16	1.23	2.80	1.57	2.85

5. GUIDELINES FOR PHYSICAL QUALITY OF FEED

Providing consistent physical quality of the feed is important at all stages to ensure adequate feeding behaviour. Guidelines are given in the table below for crumbs, mash and pellets.

- Coarse mash is the preferred option for the Grower, Transition, Breeder and male diets.
- The use of a feed sieve to monitor physical feed quality is highly recommended. → See “*Hubbard Feed Sieve Tool*”.
- The percentages show the guideline amount in each category of particle size after sieving with screens of 3, 2 and 1 mm such as with a Hubbard feed sieve. It is important for all feeds that the percentage of feed passing through the 1 mm screen does not exceed the amounts shown.
- Where a sieve with a 0.5 mm screen is used then for mash feeds no more than 10% of particles should pass through this screen.

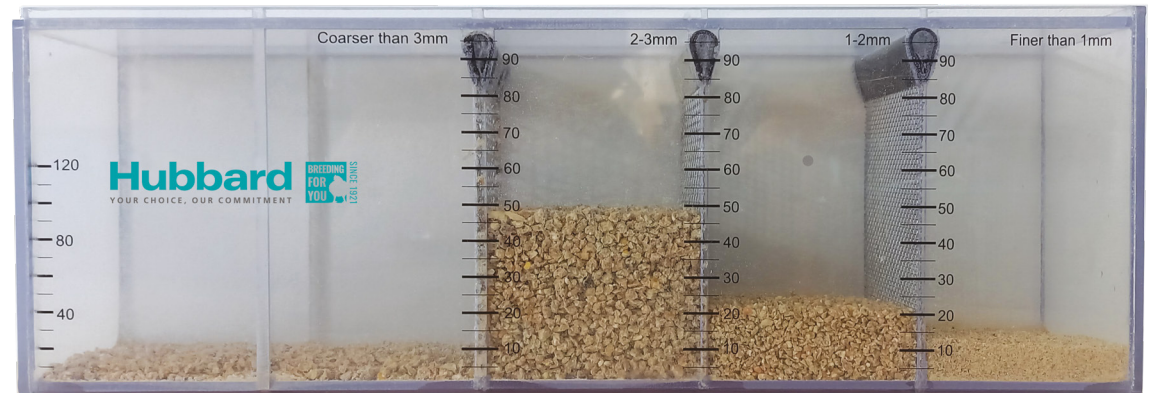


TABLE 12: GUIDELINES FOR PHYSICAL QUALITY OF FEED

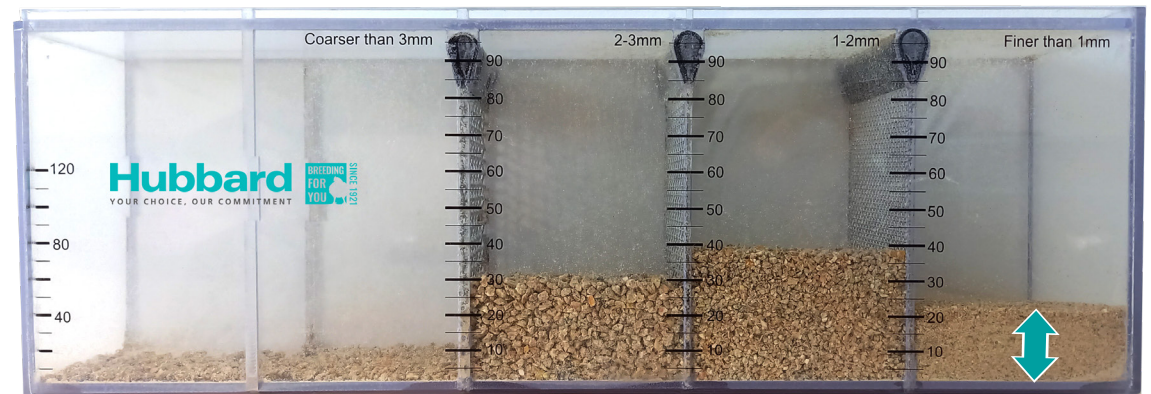
CRUMBS				
	> 3 mm	2-3 mm	1-2 mm	< 1 mm
Starter Good	0%	40%	55%	5%
Starter Average	10%	40%	40%	10%
Grower / Breeder	50%	30%	10%	10%

MASH				
	> 3 mm	2-3 mm	1-2 mm	< 1 mm
Starter	5%	25%	50%	20%
Grower	10%	35%	35%	20%
Breeder	15%	40%	30%	15%

PELLETS				
	> 3 mm	2-3 mm	1-2 mm	< 1 mm
Grower / Breeder	> 70%	< 10%	< 10%	< 10%



Physical quality of the crumble in the feed hopper: correct particle size



Physical quality of the crumble in the chain feeder after one turn: too much fine particles



A series of horizontal dotted lines for taking notes, spanning the right half of the page.



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