



F15 TECHNICAL BULLETIN FOR CHALLENGING CONDITIONS

Key Management Guidelines

SPECIAL NOTES

This is a supplement to the **F15 Management Guidelines** and is adapted for regionalised closed house conditions. It details bodyweight, feeding and some specific technical key points that should help to improve early egg size and the number of hatching eggs. If more detailed information is required, contact your Hubbard local technician.

Customers that plan to use open-side housing, transfer from dark to open or clear sided tunnel houses with the longest day above 13 hours or cages should contact their local Hubbard technician for more details.

This female is early maturing and should not be pushed into lay early otherwise egg size can be affected. Light stimulation should not be before 154 -161 days.

Feed presentation during production is important to aid fast and uniform flock eating time.

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KEY POINTS

- No undersize females at 4 weeks:
- Early grading at 21 days and achievement of the 580 g bodyweight at 4 weeks is important.
- Maintain a strong body frame during growing
- Delay light if less than 95% birds have less than 3 cm pelvic bone opening
- Strong weekly weight gain during the pre-lay period of 120 – 130 grams
- A controlled increase of amino acids and energy 7 – 10 days prior to 5% daily production
- Increase feed fast from 5% daily production
- Feed the “onset of lay” feed to help improve egg size
- Decrease feed according to weekly weight gain after peak
- Change to Breeder I when egg size is 60 g

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Managing F15 females in the growing period

It is important to develop the skeleton during the early part of life. Grow the flock to achieve stronger growth for the first 8 weeks with good uniformity – **See table 1. Beak trim at around 7 days and at 10 weeks revise beaks as required (no sharp edges).** Use low energy grower (<2650 kcal/kg) to improve gut health and eating behaviour and to help expand the crop to accept larger quantities of feed from 5 weeks to the end of 19 weeks. For further details consult with your local Hubbard technician.

Key points:

- 0-6 weeks: Chicks need a good start to develop a uniform skeleton. No underweight females at 6 weeks.
- 7-10 weeks: Continued skeletal development and achieve the desired uniformity of 85–90%.
- 11-19 weeks: Consistent weekly weight gain. Consider feed management and flock eating behaviour.
- 20-24 weeks: Consistent weekly weight gain (**120 - 130 g per week**). Achieve the bodyweight target and improve the uniformity to above 85%. Bodyweight must not drop below the target or stall in this period.

Table 1: F15 female bodyweight and feed program - closed tunnel / pad houses

Age		Bodyweight(g)	Daily feed (g/female)			Important and practical management information	
wk	day	Fasted	ME (Kcal/kg) level				
		Up to 25 weeks	2800	2650	2700		
1	7	150	Ad lib			Use pre-starter for 10-14 days. Decrease light quickly to 8 hours at 7 days. By 7 days find all the small chicks. Segregate and manage them to be on target weight at 4 - 6 weeks. Beak trim the smaller ones later. Do not start feed control until the 4 week weight is achieved.	
2	14	290	Ad lib				
3	21	450	Ad lib				
4	28	580	40				
5	35	685	45			Grade the flock 100% at 21 days to give more chance for all weight groups to achieve the desired weight and start the 6/7 feed program. If the 4 week bodyweight is achieved change to grower, if not delay accordingly. At 6 weeks start the 5/7 feed program and use <2650 Kcal/kg feed to match feed distribution (< 4 min) and clean up time (45-60 min). The 4/7 feed programme can also help to expand the crop. Re-grade at 7 weeks.	
6	42	785	49				
7	49	875		52			
8	56	955		55			
9	63	1040		58			
10	70	1125		60			
11	77	1205		62			
12	84	1285		64		The level of bodyweight control should always consider stocking density, distribution time, eating space, eating behaviour (consumption time) and feed presentation (mash or crumbles). Consistent weekly weight gain. Continue the 5/7 feed program until 154 - 161 days (max feed per day: 140 g) and then change to 6/7 until the first eggs to maintain proper eating time and uniformity and help delay production from starting too early. Do not feed less than 110 g when daily feed is started and increase feed amounts at least twice weekly to be on 120 g at 1% daily production. Do not drop below the target weight.	
13	91	1370		66			
14	98	1455		68			
15	105	1540		70			
16	112	1625		73			
17	119	1710		76			
18	126	1805		80			
19	133	1915		84			
20	140	2045			88	Check a sample of 100 females per pen to determine the pelvic bone opening at 154 days. Female weekly weight gain 120 - 130 g. Read table 2 for example light programs. Start to mix males at 168 days. Start transition feed from 140 days. <i>If production starts too early, extend skip feeding and don't push light or feed until 5% production.</i>	
21	147	2175			94		
22	154	2305			100		
23	161	2430			106		
24	168	2550			113		
25	175	2670	120			Change to the onset of lay ration at the first eggs and do not start daily feeding before the first eggs. Handle males regularly and observe their eating behaviour. Monitor bodyweight, production and egg weight and temperature to correctly manage the feed quantity after peak. Change to Breeder I when egg size is 60 g.	
26	182	2780 - 2850	From 26 weeks target weight range includes feed and water. See table 3 for an example of feeding at onset of lay.				
27	189	2880 - 2950					
30	210	3070 - 3150					
40	280	3250 - 3330					
65	455	3470 - 3560					

Transition to breeder feed: "Transition" or pre-breeder can start from 140 days to boost protein and energy intake.

Managing F15 females in the production period

Light stimulation: This female is early maturing and starting light stimulation too early may affect egg size. Start day length increase if average bodyweight is above 2305 g (the minimum bodyweight recorded in the sample weight should not be more than 100 g less than the target) with uniformity above 90% and **not before 154 days**. If uniformity is poor and fleshing is not sufficient, wait.

At 154 days it is highly suggested to make a physical assessment of the flock's sexual maturity. If the pelvic bone opening is **not 3 cm and above 95%** uniformity, delay stimulation as shown in **table 2**, wait 2 weeks before the next shot and give 2 hours. 16 hours is the maximum day length. Short day length is not advised.

Table 2: Example of light programme for closed houses

Age		Bodyweight (fasted) at stimulation	Pelvic bone opening			
Week	Days		> 95% 3 cm		< 95% 3 cm	
			Hours	Lux	Hours	Lux
<22	153		8	5	8	5
22	154	2305 +	12	60	8	5
23	161	2430 +	13	60	12	60
24	168	2550 +	14	60	13	60
25	175	2670 +	14	60	13	60
30%	prod		15	60	15	60
80%	prod		16	60	16	60

Take into account light leakage when choosing the initial light intensity at 154 – 161 days.

Start to mix 6 % males at 168 days of age. Over the next two weeks, add more males until attaining 9% to 10% males. The further addition of males is based on the male to female relationship.

At any time if male activity is too strong, remove some males.

Flock monitoring at onset of lay: From 5% daily production, production data and egg weight should be recorded and analysed daily on the Hubbard "onset of lay" table and curve.

Table 3: Feeding guideline at onset of lay for floor flocks (25°C)

METABOLIC ENERGY IN FEED		
2750 Kcal/kg	% Production	2825 Kcal/kg
120 - 122 g	1%	117 - 119
122 - 124 g	5 %	119 - 121
128 - 132 g	10 %	129 - 131
+4-5 g/ day	5 to 50%	+4-5 g/ day
149 g	50 %	145 g
149-152* g	> 80%	145-149* g

* The higher feed amount is for flocks above 85% production that will peak high (+88%)

useful".

Feed for production: Adjust feed according to the above flock monitoring. The objective is for the flock to eat 370-390 kcal in cages or 390-410 kcal on the floor and 25 g protein / female (according to bodyweight and weather) as soon as 50% lay is achieved (Table 3).

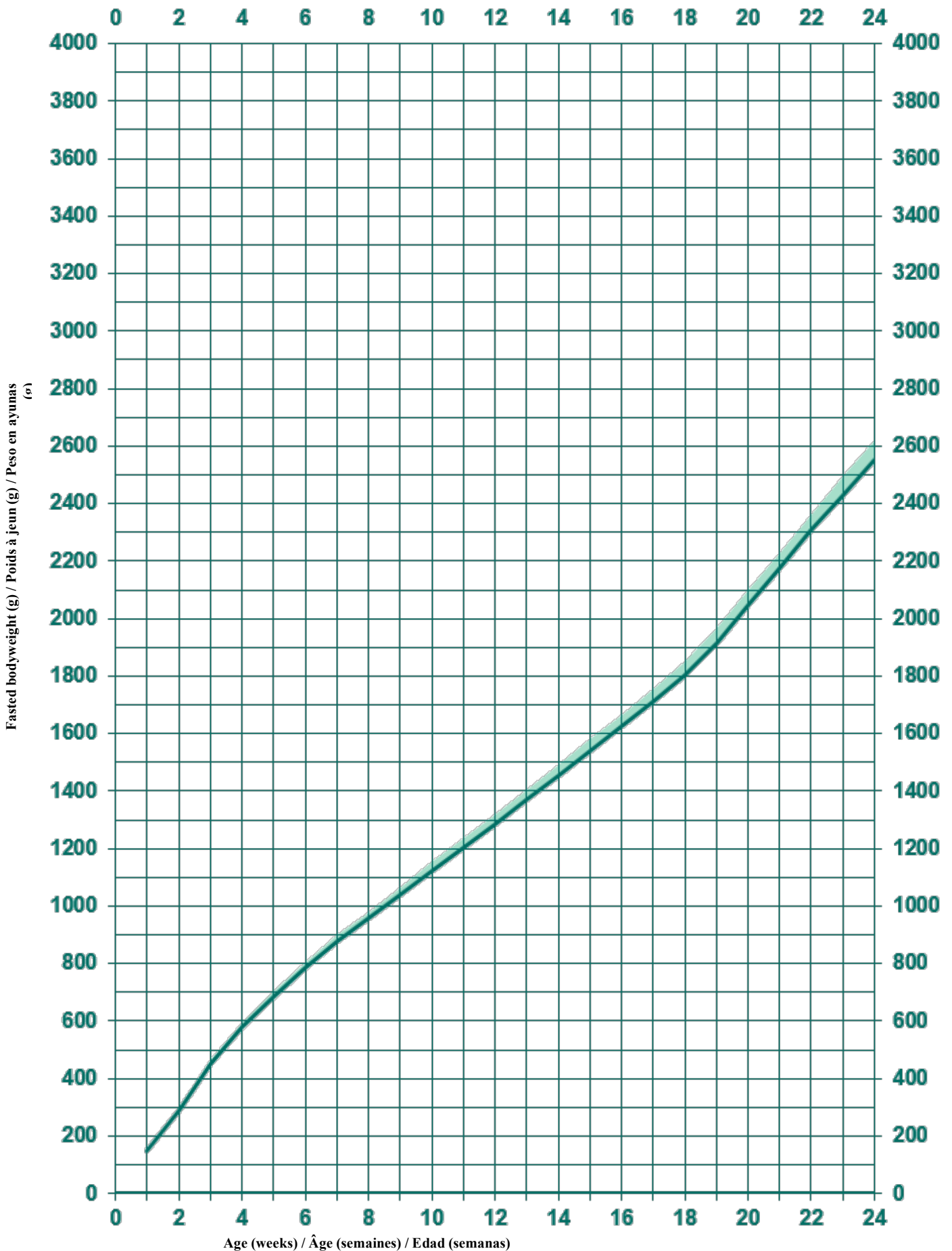
A specific "onset of lay" feed 16.5-17% CP / 2750-2825 kcals/kg) is strongly advised and should provide: Dig. Methionine 0.37%, Linoleic acid 2.1%, Ca 3.1% and a source of organic minerals. **A 3mm pellet** helps speed up consumption in hot temperature.

Special points for reducing feed: Maintain the peak feed until production drops 4% from peak. Then monitor carefully weekly egg weight gain and bodyweight gain. Weigh eggs twice weekly in this period. Only if gains are more than the target cut feed fast e.g. 1g / week up to 40 weeks and then 1 g / 2 weeks. If production drops too much reinstate the previous feed and stop reducing feed for a few weeks.

Breeder I: This is generally required to slow down over fleshing and control egg size (reduction in amino acids) when egg size achieves 60 g.

Weigh 360 non-selected (remove double yolk eggs only) eggs daily from the second collection and calculate to 1 decimal place.

Important markers: Feed clean-up in the range of 2 to 3 hours and bodyweight gain. Production increases as much as 10 points daily, so feed increases must be strong to support increasing egg mass. If production is rising fast do not worry if peak feed comes before 50% daily production. **If eating time is more than 4 hours** change to split feed 50/50 morning and evening before peak feed is achieved and assure good feed distribution. "Midnight water is also

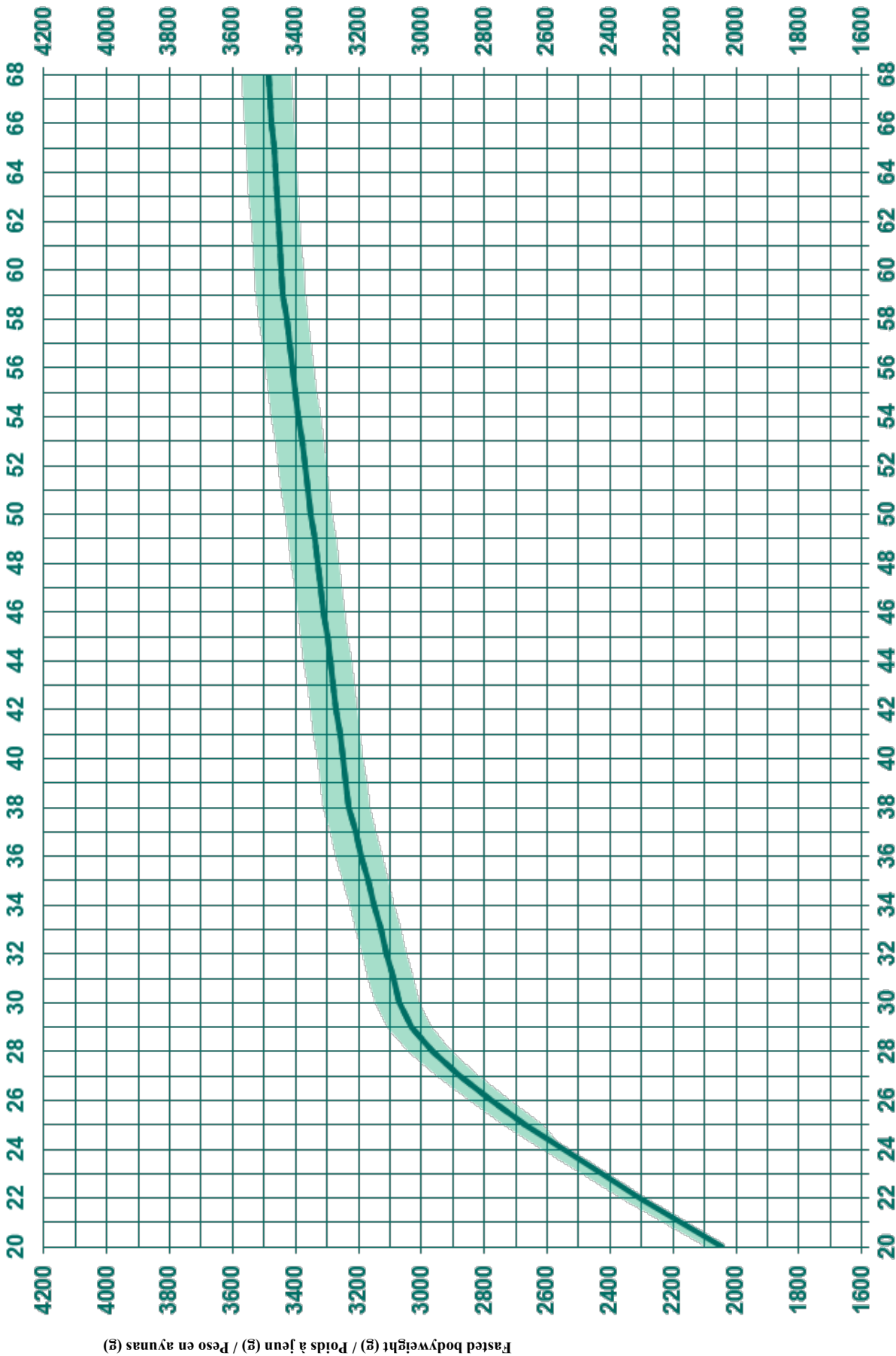




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FEMALE GROWTH TARGET – PRODUCTION PERIOD



Age (weeks) / Âge (semaines) / Edad (semanas)

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 (1)		
Lysine (2)	1 080	960	100							°F	59.0
Methionine	570	510	53	Floor	Kcal	445	432	420	410	390 to 410	
Meth. & Cystine	960	855	89		MJ	1.86	1.81	1.76	1.72	1.62 to 1.72	
Valine	900	790	82	Cage	Kcal	420	407	395	385	370 to 390	
Isoleucine	855	745	78		MJ	1.76	1.70	1.65	1.61	1.54 to 1.62	
Arginine (2)	1 200	1 020	106	Feed intake (g/bird/day)							
Tryptophan	275	230	24	Temperature °C	15.0	17.5	20.0	22.5	> 25,0		
Threonine	800	690	72							ME level in feed	2700 Kcal/kg
Minerals (mg/bird/day)			Min.	Max.	2800 Kcal/kg	Floor	159	154	150		
Calcium	4 500	4 700					610	630	Cage	150	145
Av. phosphorus	610	630									

(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 increased to 110 % in hot conditions.

F15 nutrient recommendations : g/kg per 1000 kcal (Mcal) of metabolisable Energy - Floor system

PHASE	PRE-STARTER	STARTER	PULLET	TRANSITION	ONSET OF LAY	BREEDER I	BREEDER II	MALE
Age fed (days)	Optional 0 to 10	0 or 10 to 28 / 35	28 or 35 to 133 or 5%	Optional 133 to 5% lay	Optional 5% to 60g egg weight	5% or 60g egg weight to 280/cull	Optional 280 to cull	Optional 133 to cull
Suggested kcal	2 800 - 3 000	2 750 - 2 900	2 400 - 2 900	2 600 - 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	10.90 - 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	3.85 3.44	3.75 3.36	2.57 2.24	2.62 2.31	2.62 2.34	2.57 2.29	2.52 2.25	2.06 1.80
Methionine	1.62 1.47	1.57 1.42	1.24 1.08	1.25 1.10	1.47 1.32	1.36 1.22	1.32 1.19	0.95 0.83
Meth. & Cystine	2.92 2.60	2.82 2.52	2.16 1.88	2.18 1.92	2.42 2.16	2.29 2.04	2.24 2.00	1.76 1.53
Valine	2.61 2.30	2.55 2.22	2.00 1.70	2.04 1.73	2.18 1.92	2.14 1.88	2.10 1.84	1.89 1.61
Isoleucine	2.55 2.25	2.50 2.21	1.96 1.68	2.00 1.71	2.08 1.81	2.04 1.77	2.00 1.74	1.85 1.59
Arginine	4.00 3.58	3.81 3.42	2.70 2.30	2.70 2.30	2.91 2.48	2.86 2.43	2.80 2.38	2.55 2.17
Tryptophan	0.75 0.64	0.73 0.62	0.61 0.51	0.62 0.52	0.67 0.56	0.66 0.55	0.64 0.54	0.58 0.48
Threonine	2.60 2.27	2.57 2.24	1.85 1.57	1.86 1.58	1.95 1.67	1.90 1.64	1.87 1.61	1.75 1.48
Crude protein (1)	66.00 69.00	64.00 68.00	54.00 56.00	54.00 56.00	59.00 61.00	58.00 60.00	56.00 58.00	48.00 50.00
Calcium	3.60 3.80	3.60 3.70	3.30 3.50	4.50 5.00	10.75 11.25	10.75 11.25	11.25 12.50	13.50 3.30 3.50
Av. Phosphorus	1.60 1.70	1.50 1.60	1.40 1.50	1.42 1.45	1.45 1.50	1.45 1.50	1.30 1.40	1.40 1.50
Sodium	0.60 0.70	0.58 0.70	0.55 0.70	0.55 0.70	0.60 0.70	0.60 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.



Example of F15 diet specifications for hot climate ($\geq 25^{\circ}\text{C}$) on corn-soya diets - Floor Housing

PHASE	STARTER		PULLET		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		MALE	
Age (days)	0 to 35		35 to 133 or 5%		Optional 133 to 5%		Optional 5% to 60g egg weight		5% or 60g egg weight to 315		Optional 315 to cull		133 to cull	
ME - Floor	Kcal/kg		2 800		2 650		2 750		2 825		2 800		2 650	
	MJ/kg		11.70		11.10		11.50		11.80		11.70		11.10	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
	Lysine %	1.05	0.94	0.68	0.59	0.72	0.63	0.74	0.66	0.72	0.64	0.70	0.62	0.55
Methionine %	0.44	0.40	0.33	0.29	0.34	0.30	0.41	0.37	0.38	0.34	0.37	0.33	0.25	0.22
Meth. and Cyst. %	0.79	0.71	0.57	0.50	0.60	0.53	0.69	0.61	0.64	0.57	0.62	0.55	0.47	0.41
Valine %	0.71	0.62	0.53	0.45	0.56	0.48	0.62	0.54	0.60	0.53	0.58	0.51	0.50	0.43
Isoleucine %	0.70	0.62	0.52	0.45	0.55	0.47	0.59	0.51	0.57	0.50	0.55	0.48	0.49	0.42
Arginine %	1.07	0.96	0.72	0.61	0.74	0.63	0.82	0.70	0.80	0.68	0.78	0.66	0.68	0.58
Tryptophan %	0.20	0.17	0.16	0.14	0.17	0.14	0.19	0.16	0.18	0.15	0.18	0.15	0.15	0.13
Threonine %	0.72	0.63	0.49	0.42	0.51	0.43	0.55	0.47	0.53	0.46	0.52	0.45	0.46	0.39
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	18.50	19.00	14.50	15.00	14.75	15.25	16.50	17.00	16.25	16.75	15.75	16.25	12.75	13.25
Crude fiber %	2.50	3.50	3.50	8.00	3.00	6.00	3.00	6.00	3.00	6.00	3.50	6.50	3.50	6.50
Calcium %	1.00	1.05	0.90	0.95	1.25	1.50	3.00	3.20	3.10	3.30	3.40	3.60	0.90	0.95
Av. Phosphorus %	0.42	0.45	0.37	0.40	0.39	0.40	0.41	0.42	0.41	0.42	0.36	0.39	0.37	0.40
Sodium %	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20
Chloride %	0.18	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22
Potassium %	0.65	0.75	0.55	0.70	0.55	0.75	0.65	0.80	0.60	0.75	0.55	0.70	0.55	0.70
Crude fat %	3.00	4.00	2.50	4.00	3.00	4.00	4.50	5.00	4.00	4.50	3.50	4.00	2.50	4.00
Linoleic acid %	1.20	1.60	1.00	1.30	1.40	1.70	1.90	2.10	1.60	1.80	1.30	1.50	1.30	1.70

Example of diet specifications for hot climate ($\geq 28^{\circ}\text{C}$) on corn-soya diets - Cage housing

PHASE	STARTER		PULLET		TRANSITION		ONSET OF LAY		BREEDER I		BREEDER II		MALE	
Age (days)	0 to 35		35 to 133 or 5%		Optional 133 to 5% lay		Optional 5% to 60g egg weight		5 or 60g egg weight to 315		315 to cull		133 to cull	
ME	kcal/kg		2 800		2 650		2 750		2 825		2 800		2 650	
	MJ/kg		11.70		11.10		11.50		11.80		11.70		10.90	
Min. amino-acids	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.	Tot.	Dig.
	Lysine %	1.05	0.94	0.69	0.61	0.76	0.67	0.78	0.69	0.76	0.67	0.73	0.65	0.57
Methionine %	0.44	0.40	0.34	0.29	0.36	0.32	0.43	0.39	0.40	0.36	0.38	0.35	0.27	0.23
Meth. and Cyst. %	0.79	0.71	0.58	0.51	0.63	0.55	0.72	0.64	0.67	0.60	0.65	0.58	0.49	0.43
Valine %	0.71	0.62	0.54	0.46	0.59	0.50	0.65	0.57	0.63	0.55	0.61	0.54	0.53	0.45
Isoleucine %	0.70	0.62	0.53	0.45	0.58	0.49	0.62	0.54	0.60	0.52	0.58	0.51	0.52	0.44
Arginine %	1.07	0.96	0.73	0.62	0.78	0.66	0.86	0.73	0.84	0.71	0.82	0.69	0.71	0.60
Tryptophan %	0.20	0.17	0.16	0.14	0.18	0.15	0.20	0.17	0.19	0.16	0.19	0.16	0.16	0.13
Threonine %	0.72	0.63	0.50	0.42	0.54	0.45	0.58	0.50	0.56	0.48	0.54	0.47	0.49	0.41
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Crude protein %	18.50	19.00	14.50	15.00	15.00	15.50	16.75	17.25	16.50	17.00	16.00	16.50	13.00	13.50
Crude fiber %	2.50	3.50	3.50	8.00	3.00	6.00	3.00	6.00	3.00	6.00	3.50	6.50	3.50	6.50
Calcium %	1.00	1.05	0.90	0.95	1.25	1.50	3.10	3.30	3.20	3.40	3.50	3.70	0.90	0.95
Av. Phosphorus %	0.42	0.45	0.37	0.40	0.39	0.40	0.42	0.42	0.41	0.43	0.37	0.40	0.37	0.40
Sodium %	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20	0.16	0.20
Chloride %	0.18	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22	0.16	0.22
Potassium %	0.65	0.75	0.55	0.70	0.55	0.75	0.65	0.80	0.60	0.75	0.55	0.70	0.55	0.70
Crude fat %	3.00	4.00	2.50	4.00	3.00	4.00	3.50	4.50	3.00	4.00	2.50	4.00	2.50	4.00
Linoleic acid %	1.20	1.40	1.00	1.30	1.40	1.70	1.70	2.00	1.50	1.80	1.20	1.50	1.30	1.70