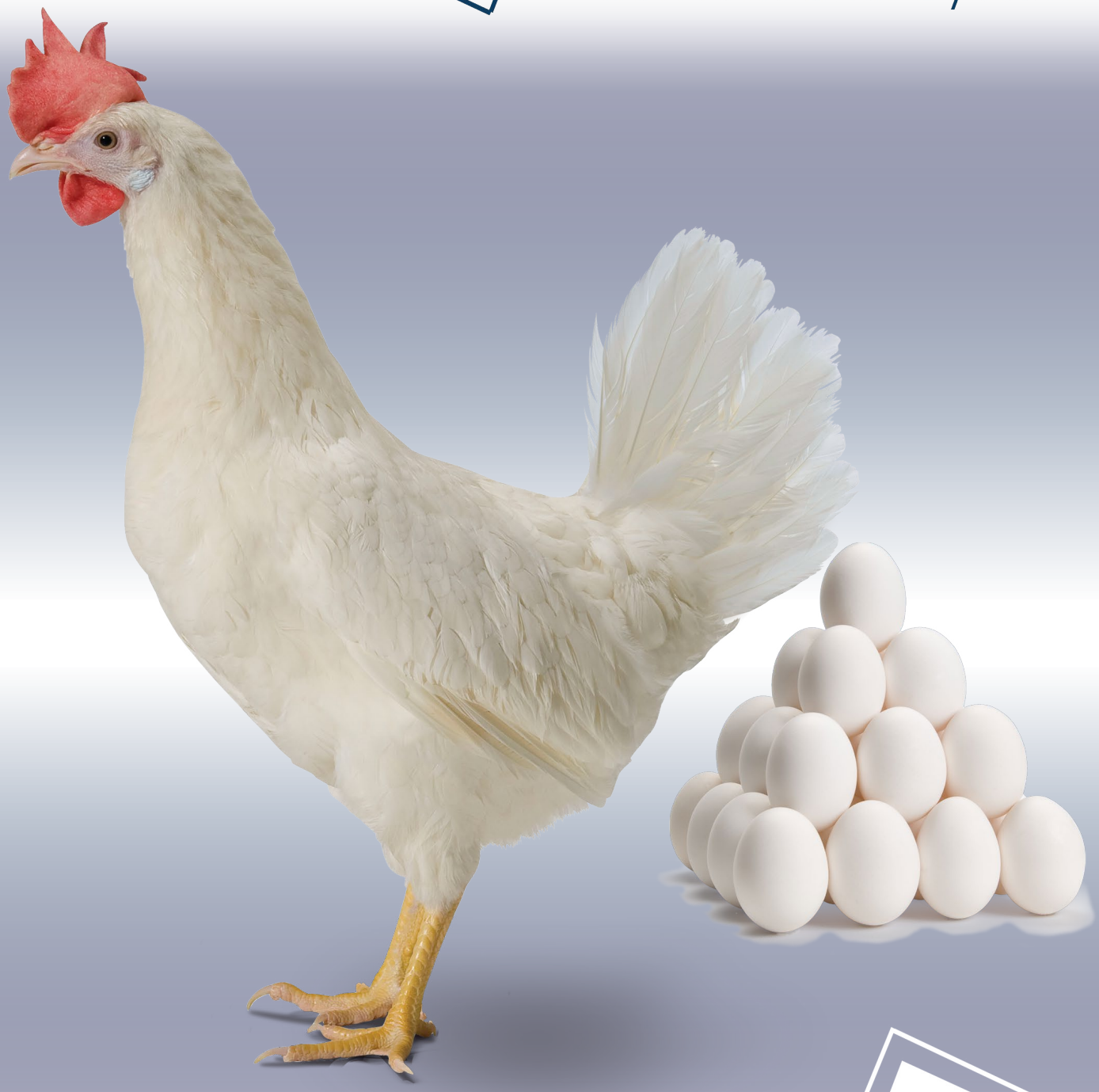
Hy-Line®

W-80 PRO

Conventional Systems



Performance Guide

Hy-Line®

Use of the Performance Guide

The genetic potential of Hy-Line W-80 Pro Commercial can only be realized if good poultry husbandry practices and management are used. This management guide outlines successful flock management programmes for Hy-Line Variety W-80 Pro Commercial based on field experience compiled by Hy-Line International and using an extensive commercial layer flock database of Hy-Line flocks from all parts of the world. Hy-Line International Management Guides are periodically updated as new performance data and/or nutrition information become available.

The information and suggestions contained in this management guide should be used for guidance and educational purposes only, recognising that local environmental and disease conditions may vary and a guide cannot cover all possible circumstances. While every attempt has been made to ensure that the information presented is accurate and reliable at the time of publication, Hy-Line International cannot accept responsibility for any errors, omissions or inaccuracies in such information or management suggestions. Further, Hy-Line International does not warrant or make any representations or guarantees regarding the use, validity, accuracy, or reliability of, or flock performance or productivity resulting from the use of, or otherwise respecting, such information or management suggestions. In no event shall Hy-Line International be liable for any special, indirect or consequential damages or special damages whatsoever arising out of or in connection with the use of the information or management suggestions contained in this management guide.

Always consult hyline.com for the latest performance, nutrition, and management information.

Hy-Line W-80
Online Management Guide

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Summary of Performance Standards

REARING PERIOD (TO 17 WEEKS):	
Livability	97%
Feed Consumed	5.10–5.67 kg
Body Weight at 17 Weeks	1.19–1.27 kg
LAYING PERIOD (TO 100 WEEKS):	
Percent Peak	94.9–98.8%
Hen-Day Eggs to 60 Weeks Hen-Day Eggs to 100 Weeks	260.7–275.0 498.7–523.0
Hen-Housed Eggs to 60 Weeks Hen-Housed Eggs to 100 Weeks	252.8–266.8 472.4–495.6
Livability to 60 Weeks Livability to 100 Weeks	94.9% 89.4%
Days to 50% Production (from hatch)	141 days
Average Egg Weight at 26 Weeks Average Egg Weight at 32 Weeks Average Egg Weight at 70 Weeks Average Egg Weight at 100 Weeks	54.3 g / egg 58.6 g / egg 61.7 g / egg 62.7 g / egg
Total Egg Mass per Hen-Housed (18–100 weeks)	29.12 kg
Body Weight at 26 Weeks Body Weight at 32 Weeks Body Weight at 70 Weeks Body Weight at 100 Weeks	1.46–1.55 kg 1.55–1.65 kg 1.60–1.70 kg 1.60–1.70 kg
Freedom From Egg Inclusions	Excellent
Shell Strength	Excellent
Haugh Units at 38 Weeks Haugh Units at 56 Weeks Haugh Units at 70 Weeks Haugh Units at 100 Weeks	88.1 85.6 83.7 80.0
Average Daily Feed Consumption (18–100 weeks)	100.9–108.3 g / day per bird
Feed Conversion Rate, kg Feed/kg Eggs (20–60 weeks) Feed Conversion Rate, kg Feed/kg Eggs (20–100 weeks)	1.99 2.06
Feed Utilization, kg Egg/kg Feed (20–60 weeks) Feed Utilization, kg Egg/kg Feed (20–100 weeks)	0.50 0.49
Feed Consumption per 10 Eggs (20–60 weeks) Feed Consumption per 10 Eggs (20–100 weeks)	1.27–1.44 kg 1.33–1.50 kg
Condition of Droppings	Dry

Performance Summary data is based on results obtained from customers around the world. Please send your results to info@hyline.com. An easy to use record-keeping program, Hy-Line International EggCel*, can be found at* www.hyline.com.

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Rearing Period Performance Table

AGE (weeks)	MORTALITY Cumulative (%)	BODY WEIGHT (kg)	FEED INTAKE (g / bird / day)	CUMULATIVE FEED INTAKE (g to date)	WATER CONSUMPTION (ml / bird/ day)	UNIFORMITY (Cage)
1	1.0	0.063 – 0.067	12 – 14	84 – 105	18 – 28	>85%
2	1.3	0.117 – 0.125	16 – 19	196 – 245	23 – 38	
3	1.5	0.175 – 0.187	21 – 25	343 – 420	32 – 50	
4	1.6	0.246 – 0.262	25 – 31	518 – 623	41 – 62	>80%
5	1.7	0.322 – 0.343	30 – 35	728 – 861	47 – 70	
6	1.8	0.397 – 0.423	34 – 39	966 – 1,127	53 – 78	
7	1.9	0.497 – 0.528	37 – 43	1,225 – 1,428	59 – 86	
8	2.0	0.565 – 0.602	41 – 46	1,512 – 1,750	63 – 92	
9	2.0	0.644 – 0.684	44 – 50	1,820 – 2,100	66 – 100	
10	2.2	0.719 – 0.765	47 – 53	2,149 – 2,471	72 – 106	
11	2.2	0.805 – 0.856	51 – 56	2,506 – 2,863	77 – 112	
12	2.3	0.888 – 0.946	54 – 59	2,884 – 3,276	81 – 118	
13	2.4	0.961 – 1.023	57 – 62	3,283 – 3,710	86 – 124	>85%
14	2.6	1.028 – 1.094	60 – 65	3,703 – 4,165	90 – 130	
15	2.7	1.086 – 1.155	63 – 68	4,144 – 4,641	95 – 136	
16	2.8	1.137 – 1.209	67 – 72	4,613 – 5,145	101 – 144	
17	3.0	1.190 – 1.266	70 – 75	5,103 – 5,663	105 – 150	>90%
18	3.2	1.228 – 1.306	74 – 80	5,621 – 6,223	108 – 156	

Production Period Performance Table

AGE (weeks)	% HEN-DAY Current	HEN-DAY EGGS Cumulative	HEN-HOUSED EGGS Cumulative	MORT-ALITY Cumulative (%)	BODY WEIGHT (kg)	FEED INTAKE (g / bird / day)	WATER CONSUMP-TION (ml / bird / day)	HEN-HOUSED EGG MASS Cumulative (kg)	AVG. EGG WEIGHT (g / egg)
18	–	–	–	0.1	1.25 – 1.27	74 – 81	111 – 162	–	–
19	6.7 – 12.3	0.5 – 0.9	0.5 – 0.9	0.0	1.23 – 1.31	76 – 83	114 – 166	0.02 – 0.04	41.8
20	27.5 – 47.5	2.4 – 4.2	2.4 – 4.2	0.2	1.28 – 1.36	79 – 89	119 – 178	0.10 – 0.18	44.5
21	61.1 – 82.0	6.7 – 9.9	6.6 – 9.9	0.5	1.31 – 1.39	85 – 93	128 – 186	0.30 – 0.45	46.8
22	79.0 – 89.7	12.2 – 16.2	12.1 – 16.1	0.6	1.34 – 1.42	87 – 96	131 – 192	0.57 – 0.76	48.8
23	87.6 – 91.3	18.3 – 22.6	18.2 – 22.5	0.8	1.37 – 1.46	88 – 98	132 – 196	0.88 – 1.08	50.5
24	90.5 – 94.3	24.7 – 29.2	24.5 – 29.0	0.9	1.39 – 1.48	90 – 100	135 – 200	1.21 – 1.42	52.0
25	92.2 – 96.1	31.1 – 35.9	30.9 – 35.7	1.1	1.43 – 1.52	93 – 102	140 – 204	1.55 – 1.77	53.1
26	93.4 – 97.3	37.7 – 42.7	37.4 – 42.4	1.2	1.46 – 1.55	94 – 103	141 – 206	1.90 – 2.14	54.3
27	94.1 – 98.0	44.2 – 49.6	43.8 – 49.2	1.3	1.47 – 1.56	95 – 105	143 – 210	2.26 – 2.51	55.3
28	94.6 – 98.5	50.9 – 56.5	50.4 – 56.0	1.4	1.50 – 1.59	96 – 106	144 – 212	2.62 – 2.89	56.2
29	94.9 – 98.8	57.5 – 63.4	56.9 – 62.8	1.6	1.52 – 1.61	97 – 106	146 – 212	3.00 – 3.28	57.0
30	94.9 – 98.8	64.2 – 70.3	63.4 – 69.6	1.7	1.53 – 1.63	98 – 107	147 – 214	3.37 – 3.67	57.6
31	94.9 – 98.8	70.8 – 77.2	70.0 – 76.3	1.9	1.54 – 1.64	99 – 108	149 – 216	3.75 – 4.07	58.2
32	94.8 – 98.8	77.4 – 84.1	76.5 – 83.1	2.0	1.55 – 1.65	100 – 108	150 – 216	4.13 – 4.46	58.6
33	94.7 – 98.7	84.1 – 91.1	82.9 – 89.9	2.2	1.56 – 1.65	100 – 108	150 – 216	4.52 – 4.86	59.0
34	94.7 – 98.6	90.7 – 98.0	89.4 – 96.6	2.3	1.56 – 1.66	101 – 109	152 – 218	4.90 – 5.26	59.3
35	94.6 – 98.5	97.3 – 104.9	95.9 – 103.3	2.5	1.57 – 1.67	102 – 109	153 – 218	5.28 – 5.66	59.5
36	94.6 – 98.5	103.9 – 111.7	102.3 – 110.1	2.6	1.57 – 1.67	102 – 109	153 – 218	5.67 – 6.06	59.7
37	94.5 – 98.4	110.5 – 118.6	108.7 – 116.8	2.8	1.57 – 1.67	103 – 110	155 – 220	6.05 – 6.46	59.9
38	94.4 – 98.4	117.1 – 125.5	115.2 – 123.4	2.9	1.57 – 1.67	103 – 110	155 – 220	6.44 – 6.87	60.1
39	94.4 – 98.3	123.8 – 132.4	121.6 – 130.1	3.0	1.57 – 1.67	103 – 110	155 – 220	6.83 – 7.27	60.2
40	94.3 – 98.2	130.4 – 139.3	128.0 – 136.8	3.2	1.57 – 1.67	103 – 110	155 – 220	7.21 – 7.67	60.4
41	94.2 – 98.2	137.0 – 146.1	134.3 – 143.4	3.3	1.58 – 1.68	103 – 110	155 – 220	7.60 – 8.07	60.5
42	94.3 – 98.2	143.5 – 153.0	140.7 – 150.1	3.4	1.58 – 1.68	103 – 110	155 – 220	7.98 – 8.47	60.5
43	94.2 – 98.1	150.1 – 159.9	147.1 – 156.7	3.5	1.58 – 1.68	103 – 110	155 – 220	8.37 – 8.88	60.6
44	94.1 – 98.0	156.7 – 166.8	153.4 – 163.3	3.6	1.58 – 1.68	103 – 110	155 – 220	8.75 – 9.28	60.7
45	94.0 – 97.9	163.3 – 173.6	159.8 – 169.9	3.6	1.59 – 1.69	103 – 110	155 – 220	9.14 – 9.68	60.8
46	93.9 – 97.8	169.9 – 180.5	166.1 – 176.5	3.8	1.59 – 1.69	103 – 110	155 – 220	9.53 – 10.08	60.9
47	93.8 – 97.7	176.5 – 187.3	172.4 – 183.1	3.9	1.59 – 1.69	103 – 110	155 – 220	9.91 – 10.48	60.9
48	93.7 – 97.6	183.0 – 194.1	178.7 – 189.6	4.0	1.59 – 1.69	103 – 110	155 – 220	10.29 – 10.88	60.9
49	93.5 – 97.4	189.6 – 200.9	185.0 – 196.2	4.1	1.59 – 1.69	103 – 110	155 – 220	10.68 – 11.28	61.0
50	93.4 – 97.3	196.1 – 207.8	191.2 – 202.7	4.2	1.59 – 1.69	103 – 110	155 – 220	11.06 – 11.68	61.1
51	93.2 – 97.1	202.6 – 214.6	197.5 – 209.2	4.3	1.59 – 1.69	103 – 110	155 – 220	11.44 – 12.08	61.1
52	93.0 – 96.9	209.1 – 221.3	203.7 – 215.7	4.4	1.59 – 1.69	103 – 110	155 – 220	11.82 – 12.47	61.1
53	92.8 – 96.7	215.6 – 228.1	209.9 – 222.1	4.5	1.59 – 1.69	103 – 110	155 – 220	12.20 – 12.87	61.1
54	92.6 – 96.5	222.1 – 234.9	216.1 – 228.6	4.6	1.59 – 1.69	103 – 110	155 – 220	12.58 – 13.26	61.2
55	92.4 – 96.3	228.6 – 241.6	222.3 – 235.0	4.7	1.59 – 1.70	103 – 110	155 – 220	12.96 – 13.65	61.2
56	92.2 – 96.0	235.0 – 248.3	228.4 – 241.4	4.8	1.59 – 1.70	103 – 110	155 – 220	13.33 – 14.05	61.3
57	92.0 – 95.8	241.5 – 255.0	234.5 – 247.8	4.9	1.59 – 1.70	103 – 110	155 – 220	13.71 – 14.44	61.3
58	91.7 – 95.6	247.9 – 261.7	240.6 – 254.2	4.9	1.59 – 1.70	103 – 110	155 – 220	14.08 – 14.83	61.3
59	91.5 – 95.3	254.3 – 268.4	246.7 – 260.5	5.0	1.59 – 1.70	103 – 110	155 – 220	14.46 – 15.22	61.3

Production Period Performance Table (cont.)

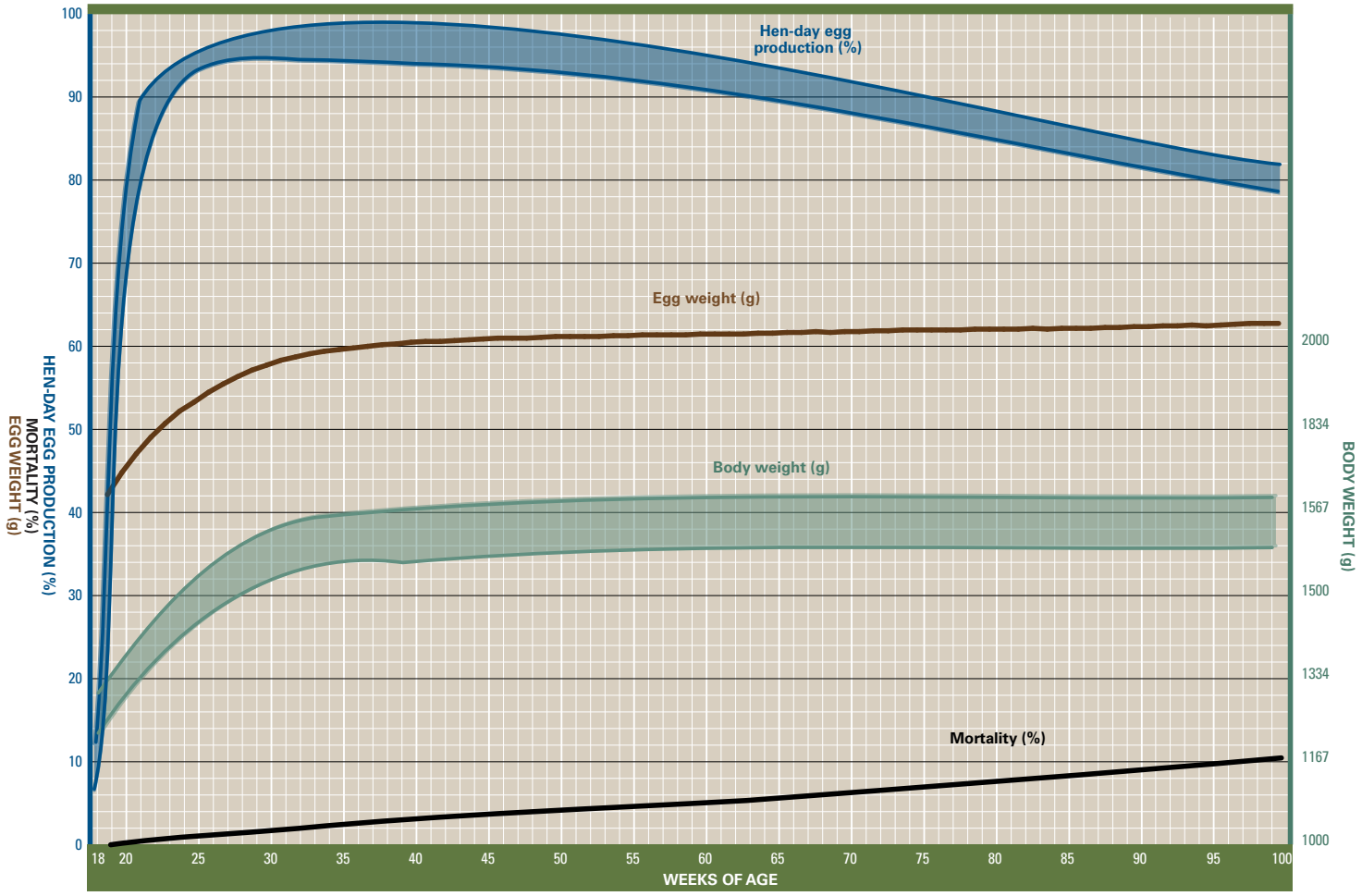
AGE (weeks)	% HEN-DAY Current	HEN-DAY EGGS Cumulative	HEN-HOUSED EGGS Cumulative	MORT-ALITY Cumulative (%)	BODY WEIGHT (kg)	FEED INTAKE (g / bird / day)	WATER CONSUMP-TION (ml / bird / day)	HEN-HOUSED EGG MASS Cumulative (kg)	AVG. EGG WEIGHT (g / egg)
60	91.2 – 95.0	260.7 – 275.0	252.8 – 266.8	5.1	1.59 – 1.70	103 – 110	155 – 220	14.83 – 15.60	61.4
61	91.0 – 94.8	267.1 – 281.7	258.8 – 273.1	5.2	1.59 – 1.70	103 – 110	155 – 220	15.20 – 15.99	61.4
62	90.7 – 94.5	273.4 – 288.3	264.8 – 279.4	5.3	1.60 – 1.70	103 – 110	155 – 220	15.57 – 16.38	61.4
63	90.4 – 94.2	279.7 – 294.9	270.8 – 285.6	5.4	1.60 – 1.70	103 – 110	155 – 220	15.94 – 16.76	61.4
64	90.2 – 93.9	286.1 – 301.5	276.8 – 291.8	5.6	1.60 – 1.70	103 – 110	155 – 220	16.30 – 17.14	61.5
65	89.9 – 93.6	292.3 – 308.0	282.7 – 298.0	5.7	1.60 – 1.70	103 – 110	155 – 220	16.67 – 17.52	61.5
66	89.6 – 93.3	298.6 – 314.6	288.6 – 304.1	5.8	1.60 – 1.70	103 – 110	155 – 220	17.03 – 17.90	61.6
67	89.3 – 93.0	304.9 – 321.1	294.5 – 310.3	6.0	1.60 – 1.70	103 – 110	155 – 220	17.39 – 18.28	61.6
68	89.0 – 92.7	311.1 – 327.6	300.4 – 316.4	6.0	1.60 – 1.70	103 – 110	155 – 220	17.75 – 18.65	61.6
69	88.7 – 92.4	317.3 – 334.0	306.2 – 322.4	6.2	1.60 – 1.70	103 – 110	155 – 220	18.11 – 19.03	61.7
70	88.4 – 92.1	323.5 – 340.5	312.0 – 328.5	6.3	1.60 – 1.70	103 – 110	155 – 220	18.47 – 19.40	61.7
71	88.1 – 91.8	329.7 – 346.9	317.8 – 334.5	6.4	1.60 – 1.70	103 – 110	155 – 220	18.83 – 19.77	61.7
72	87.8 – 91.4	335.8 – 353.3	323.5 – 340.5	6.6	1.60 – 1.70	103 – 110	155 – 220	19.18 – 20.14	61.8
73	87.5 – 91.1	341.9 – 359.7	329.2 – 346.4	6.7	1.60 – 1.70	103 – 110	155 – 220	19.53 – 20.51	61.8
74	87.1 – 90.8	348.0 – 366.0	334.9 – 352.3	6.9	1.60 – 1.70	103 – 110	155 – 220	19.89 – 20.87	61.9
75	86.8 – 90.4	354.1 – 372.4	340.5 – 358.2	7.0	1.60 – 1.70	103 – 110	155 – 220	20.24 – 21.24	61.9
76	86.5 – 90.1	360.2 – 378.7	346.2 – 364.1	7.1	1.60 – 1.70	103 – 110	155 – 220	20.58 – 21.60	61.9
77	86.2 – 89.8	366.2 – 384.9	351.8 – 369.9	7.3	1.60 – 1.70	103 – 110	155 – 220	20.93 – 21.96	61.9
78	85.9 – 89.4	372.2 – 391.2	357.3 – 375.7	7.4	1.60 – 1.70	103 – 110	155 – 220	21.28 – 22.32	61.9
79	85.5 – 89.1	378.2 – 397.4	362.9 – 381.5	7.6	1.60 – 1.70	103 – 110	155 – 220	21.62 – 22.68	62.0
80	85.2 – 88.8	384.2 – 403.7	368.4 – 387.2	7.7	1.60 – 1.70	103 – 110	155 – 220	21.96 – 23.03	62.0
81	84.9 – 88.4	390.1 – 409.8	373.8 – 392.9	7.9	1.60 – 1.70	103 – 110	155 – 220	22.30 – 23.39	62.0
82	84.6 – 88.1	396.0 – 416.0	379.3 – 398.6	8.0	1.60 – 1.70	103 – 110	155 – 220	22.64 – 23.74	62.0
83	84.3 – 87.8	401.9 – 422.2	384.7 – 404.2	8.1	1.60 – 1.70	103 – 110	155 – 220	22.97 – 24.09	62.0
84	84.0 – 87.5	407.8 – 428.3	390.1 – 409.8	8.3	1.60 – 1.70	103 – 110	155 – 220	23.31 – 24.44	62.1
85	83.7 – 87.1	413.7 – 434.4	395.5 – 415.4	8.4	1.60 – 1.70	103 – 110	155 – 220	23.64 – 24.78	62.1
86	83.4 – 86.8	419.5 – 440.5	400.8 – 421.0	8.5	1.60 – 1.70	103 – 110	155 – 220	23.97 – 25.13	62.1
87	83.0 – 86.5	425.3 – 446.5	406.1 – 426.5	8.6	1.60 – 1.70	103 – 110	155 – 220	24.30 – 25.47	62.1
88	82.7 – 86.2	431.1 – 452.5	411.4 – 432.0	8.8	1.60 – 1.70	103 – 110	155 – 220	24.63 – 25.82	62.2
89	82.5 – 85.9	436.9 – 458.6	416.7 – 437.5	8.9	1.60 – 1.70	103 – 110	155 – 220	24.96 – 26.16	62.2
90	82.1 – 85.5	442.6 – 464.5	421.9 – 442.9	9.1	1.60 – 1.70	103 – 110	155 – 220	25.28 – 26.50	62.3
91	81.7 – 85.1	448.3 – 470.5	427.1 – 448.3	9.2	1.60 – 1.70	103 – 110	155 – 220	25.61 – 26.83	62.3
92	81.4 – 84.7	454.0 – 476.4	432.2 – 453.7	9.4	1.60 – 1.70	103 – 110	155 – 220	25.93 – 27.17	62.4
93	81.0 – 84.4	459.7 – 482.3	437.4 – 459.1	9.5	1.60 – 1.70	103 – 110	155 – 220	26.25 – 27.50	62.4
94	80.7 – 84.0	465.3 – 488.2	442.5 – 464.4	9.7	1.60 – 1.70	103 – 110	155 – 220	26.57 – 27.83	62.4
95	80.3 – 83.7	471.0 – 494.1	447.5 – 469.7	9.8	1.60 – 1.70	103 – 110	155 – 220	26.88 – 28.16	62.5
96	80.0 – 83.3	476.6 – 499.9	452.6 – 474.9	10.0	1.60 – 1.70	103 – 110	155 – 220	27.20 – 28.49	62.5
97	79.7 – 83.0	482.1 – 505.7	457.6 – 480.1	10.1	1.60 – 1.70	103 – 110	155 – 220	27.51 – 28.82	62.6
98	79.4 – 82.7	487.7 – 511.5	462.6 – 485.3	10.3	1.60 – 1.70	103 – 110	155 – 220	27.83 – 29.14	62.7
99	79.1 – 82.3	493.2 – 517.3	467.5 – 490.5	10.5	1.60 – 1.70	103 – 110	155 – 220	28.14 – 29.47	62.7
100	78.8 – 82.0	498.7 – 523.0	472.4 – 495.6	10.6	1.60 – 1.70	103 – 110	155 – 220	28.44 – 29.79	62.7

Production Period Space Recommendations

check local regulations concerning space requirements)

WEEKS OF AGE	3	17	20	30	40	50	60	70	80
CONVENTIONAL AND COLONY CAGES									
Floor Space									
100–200 cm^2 (50–100 birds / m^2)	310 cm^2 (32 birds / m^2)		490 cm^2 (20 birds / m^2) – 750 cm^2 (13 birds / m^2)						
Nipple/Cup									
1 / 12 birds	1 / 8 birds		1 / 12 birds or access to 2 drinkers						
Feeders									
5 cm / bird	8 cm / bird		7–12 cm / bird						

Performance Graph



Egg Quality and Egg Size Distribution

AGE (weeks)	HAUGH UNITS	BREAKING STRENGTH
20	**90.6**	**4490**
22	90.3	4480
24	90.1	4470
26	89.8	4450
28	89.5	4430
30	**89.2**	**4410**
32	89.0	4390
34	88.7	4360
36	88.4	4340
38	88.1	4330
40	**87.8**	**4320**
42	87.6	4310
44	87.3	4300
46	87.0	4290
48	86.7	4280
50	**86.5**	**4270**
52	86.2	4260
54	85.9	4250
56	85.6	4240
58	85.4	4230
60	**85.1**	**4220**
62	84.8	4210
64	84.5	4200
66	84.3	4190
68	84.0	4170
70	**83.7**	**4150**
72	83.4	4130
74	83.2	4110
76	82.9	4090
78	82.6	4070
80	**82.3**	**4050**
82	82.1	4030
84	81.8	4010
86	81.5	4000
88	81.2	3980
90	**81.0**	**3960**
92	80.8	3950
94	80.6	3940
96	80.4	3930
98	80.2	3920
100	**80.0**	**3910**

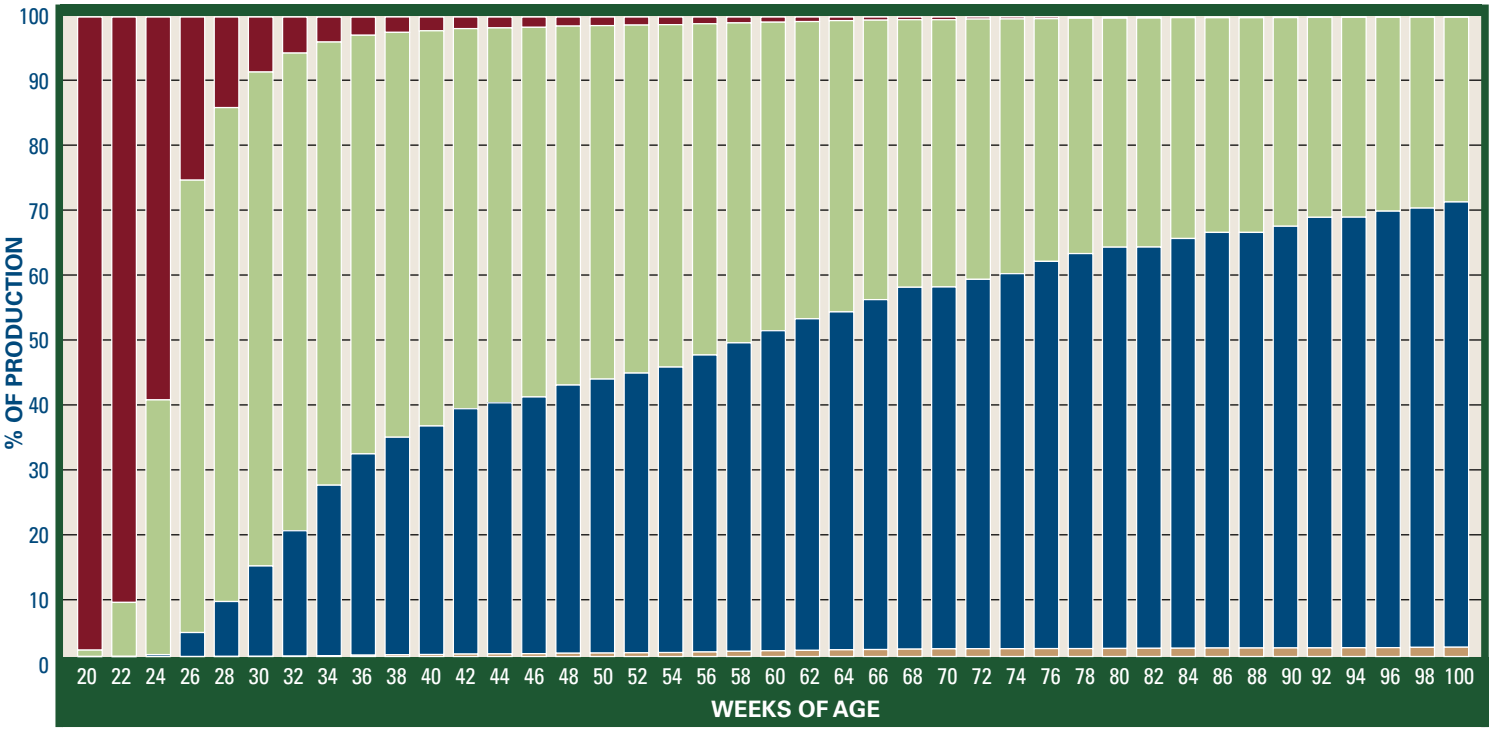
E.U. Standards–Weekly*

AGE (weeks)	AVERAGE EGG WEIGHT (g)	WEEKLY % VERY LARGE Over 73 g	WEEKLY % LARGE 63–73 g	WEEKLY % MEDIUM 53–63 g	WEEKLY % SMALL 43–53 g
20	44.5	0.00	0.00	1.00	99.00
22	48.8	0.00	0.01	8.45	91.54
24	52.0	0.00	0.30	39.83	59.87
26	54.3	0.00	3.75	70.74	25.51
28	56.2	0.01	8.59	77.24	14.16
30	57.6	0.02	14.14	77.24	8.60
32	58.6	0.05	19.62	74.69	5.64
34	59.3	0.13	26.66	69.30	3.90
36	59.7	0.21	31.48	65.46	2.84
38	60.1	0.27	34.02	63.31	2.41
40	60.4	0.31	35.74	61.80	2.15
42	60.5	0.38	38.37	59.44	1.81
44	60.7	0.41	39.26	58.63	1.70
46	60.9	0.44	40.15	57.80	1.61
48	60.9	0.51	41.94	56.13	1.42
50	61.1	0.54	42.84	55.28	1.34
52	61.1	0.58	43.74	54.42	1.26
54	61.2	0.62	44.64	53.55	1.19
56	61.3	0.71	46.44	51.80	1.05
58	61.3	0.81	48.24	50.03	0.92
60	61.4	0.90	50.05	48.24	0.81
62	61.4	0.96	51.85	46.48	0.71
64	61.5	1.05	52.84	45.55	0.56
66	61.6	1.09	54.72	43.70	0.49
68	61.6	1.15	56.59	41.84	0.42
70	61.7	1.20	56.59	41.79	0.42
72	61.8	1.22	57.76	40.70	0.32
74	61.9	1.22	58.65	39.83	0.30
76	61.9	1.24	60.55	37.95	0.26
78	61.9	1.24	61.77	36.80	0.19
80	62.0	1.26	62.75	35.81	0.17
82	62.0	1.28	62.75	35.81	0.17
84	62.1	1.29	64.08	34.53	0.11
86	62.1	1.33	64.99	33.57	0.11
88	62.2	1.33	64.99	33.57	0.11
90	62.3	1.34	65.94	32.63	0.10
92	62.4	1.35	67.33	31.26	0.06
94	62.4	1.37	67.33	31.25	0.06
96	62.5	1.39	68.25	30.31	0.06
98	62.7	1.43	68.69	29.84	0.05
100	62.7	1.45	69.63	28.88	0.04

** Distribution of egg sizes based on weekly (not cumulative) average egg weights.*

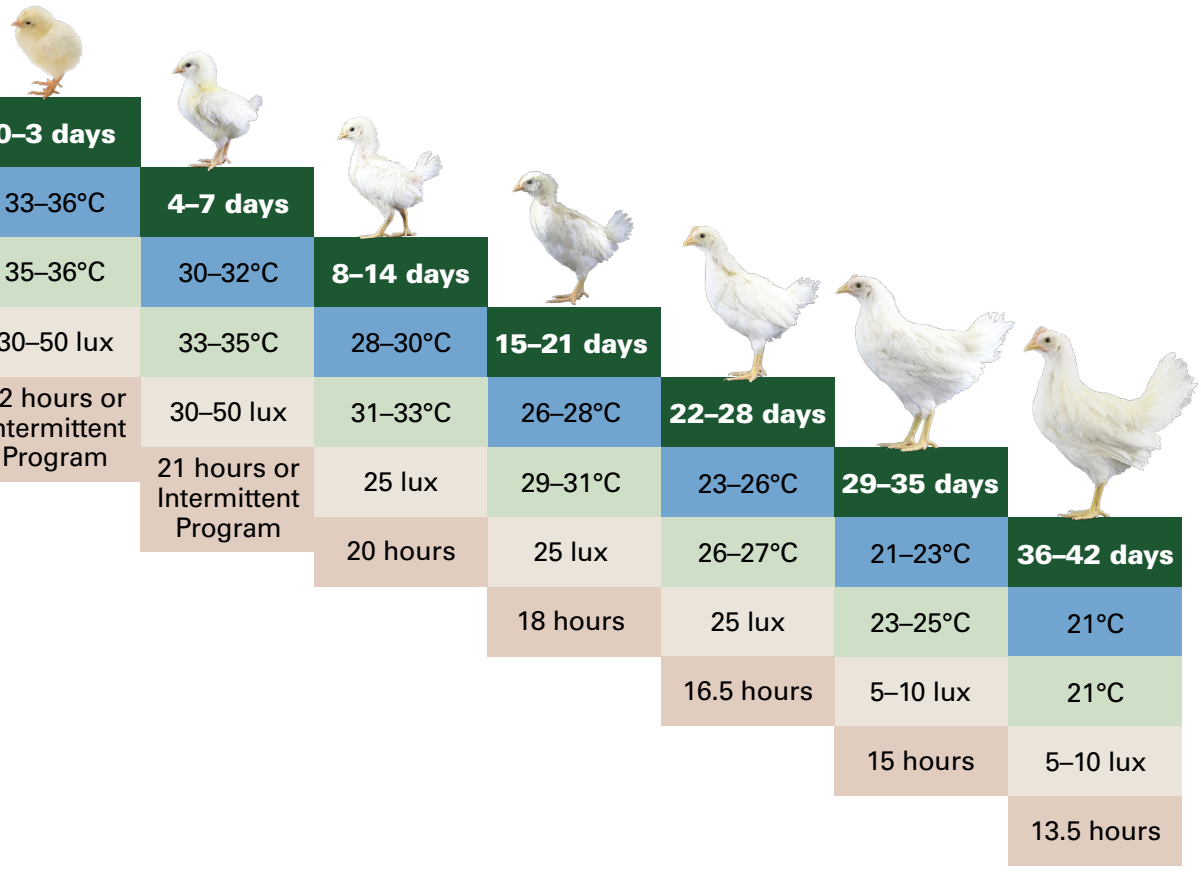
Egg Size Distribution (cont.)

E.U. Standards–Weekly*



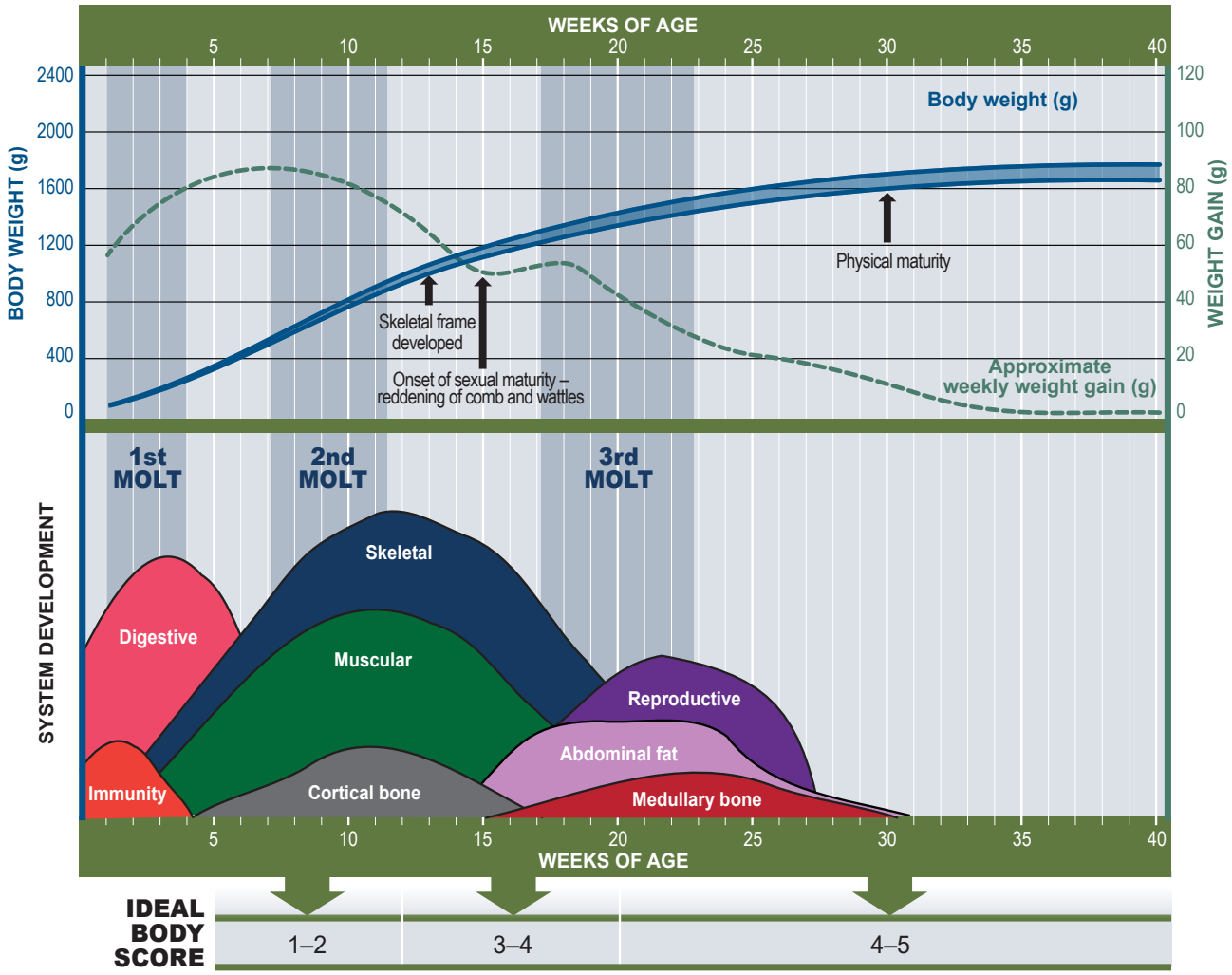
** Distribution of egg sizes based on weekly (not cumulative) average egg weights.*

Brooding Temperature and Lighting Recommendations



AGE	0–3 days	4–7 days	8–14 days	15–21 days	22–28 days	29–35 days	36–42 days
AIR TEMP. (CAGE)	33–36°C	30–32°C	28–30°C	26–28°C	23–26°C	21–23°C	21°C
AIR TEMP. (FLOOR)	35–36°C	33–35°C	31–33°C	29–31°C	26–27°C	23–25°C	21°C
LIGHT INTENSITY	30–50 lux	30–50 lux	25 lux	25 lux	25 lux	5–10 lux	5–10 lux
LIGHT HOURS	22 hours or Intermittent Program	21 hours or Intermittent Program	20 hours	18 hours	16.5 hours	15 hours	13.5 hours

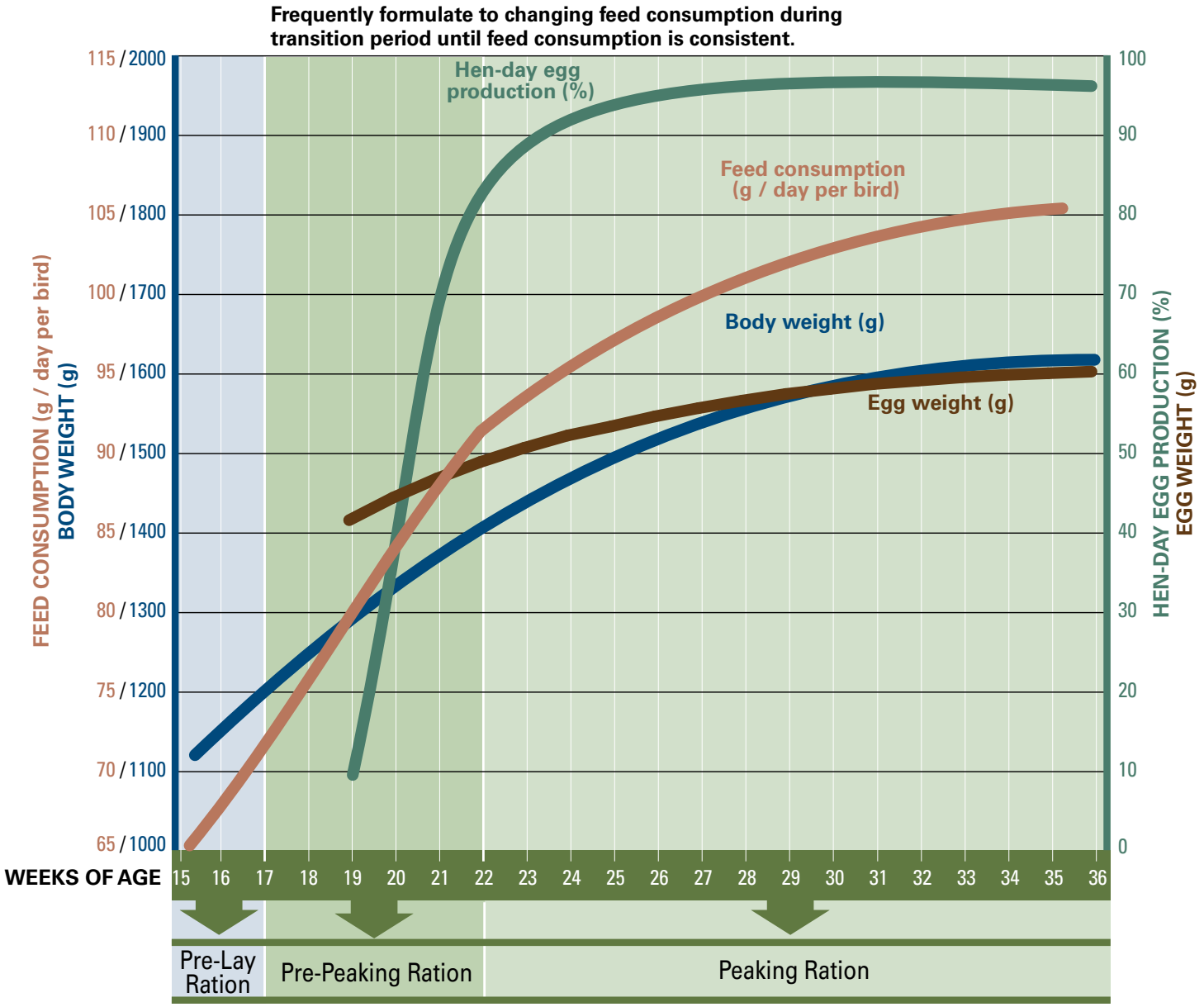
Development of the Organ Systems in Pullets



Body Score Chart

	0	1	2	3	4	5	6
Sternum (Keel)							
Abdominal Fat	None	None	None	None	< 0.7 cm	> 0.7 cm	Large fat pad
Comments	Emaciated birds	Low level of breast flesh concave in shape	Moderate breast flesh pyramid in shape	Well fleshed breast convex in shape	Abdominal fat pad small; Breast convex in shape	Abdominal fat pad increasing in size; Breast convex in shape	Pendulous fat pad; Breast convex in shape

Transition Period from Rear to Peak Egg Production



Pre-Peak

- Pre-Peak diets are intended for flocks with low feed intake and are fed for a limited period from first egg to the beginning of peak production. The nutrient specification of the Pre-Peak diet should be dense enough to allow for lower feed intake and also cater to the increased nutritional needs of the bird entering egg production. Continue to feed the Pre-Peak until feed intake has developed sufficiently to allow transition to the Peak diet.
- If utilized until no more than 50–70% HD, a Pre-Peak diet with reduced energy concentration can be beneficial to stimulate feed intake. Pre-Peaking diets are useful in situations where local conditions may result in reduced feed intake, such as hot climates where feed intake may be depressed.
- Increasing the vitamins and trace mineral inclusion to 30% can be useful to cope with the lower feed intake during the Pre-Peak phase.

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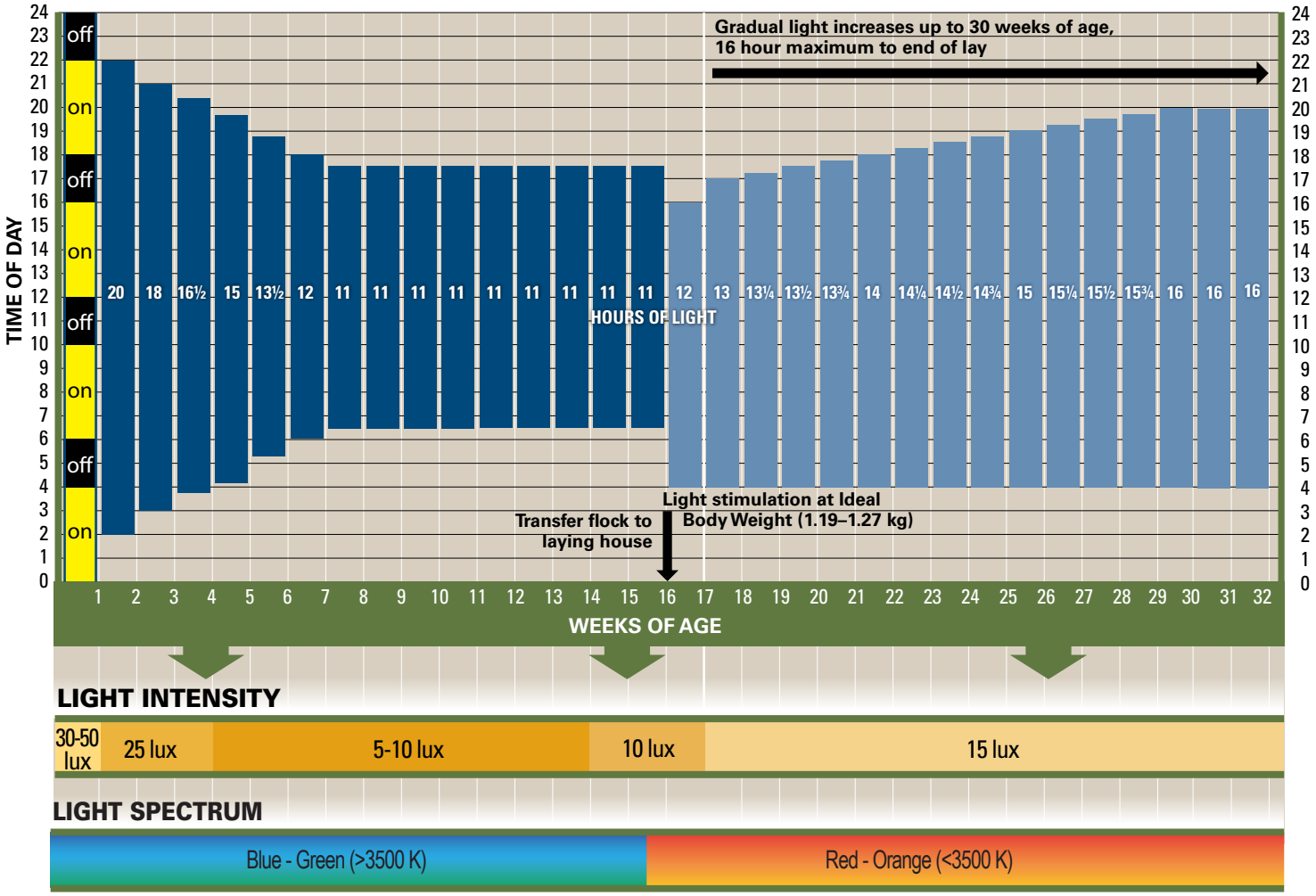
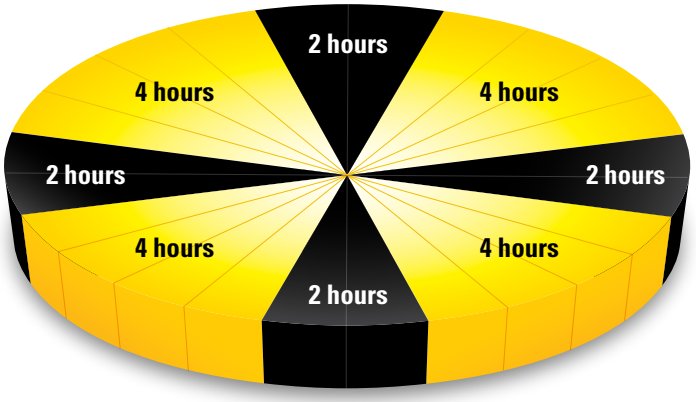
Light Program for Light-Controlled Housing

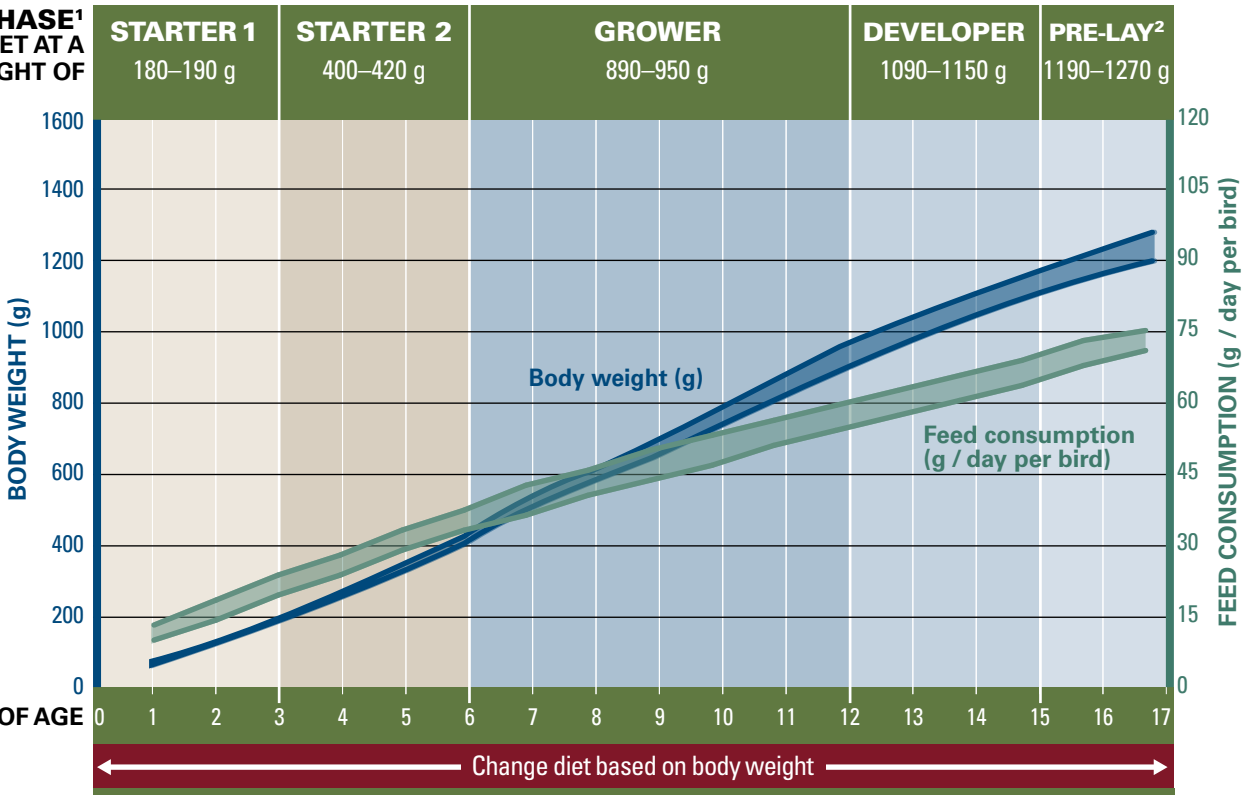


Intermittent Lighting Program for Chicks

- Preferred lighting technique.
- Use from 0–7 days (can be used up to 14 days of age).
- Intermittent dark periods provide rest periods for chicks.
- Synchronises chicks' activities and feedings.
- Establishes more natural behaviour of rest and activity.
- May improve 7-day livability and pullet body weight.
- Some dark periods may be shortened or removed to accommodate work schedules.



Rearing Period Nutritional Recommendations



NUTRITION	RECOMMENDED NUTRIENT CONCENTRATION				
Metabolizable energy[3], kcal/kg	2900–3050	2850–3035	2800–2950	2700–2900	2780–2950
Metabolizable energy[3], MJ/kg	12.13–12.76	11.92–12.70	11.72–12.34	11.30–12.13	11.63–12.34
	Standardized Ileal Digestible Amino Acids / Total Amino Acids[4]				
Lysine, %	**1.05** / 1.15	**0.96** / 1.05	**0.84** / 0.92	**0.64** / 0.70	**0.76** / 0.83
Methionine, %	**0.47** / 0.51	**0.43** / 0.46	**0.38** / 0.42	**0.30** / 0.32	**0.37** / 0.40
Methionine+Cystine,%	**0.74** / 0.83	**0.72** / 0.81	**0.64** / 0.72	**0.50** / 0.56	**0.64** / 0.72
Threonine, %	**0.69** / 0.82	**0.65** / 0.75	**0.57** / 0.67	**0.44** / 0.52	**0.54** / 0.62
Tryptophan, %	**0.18** / 0.21	**0.18** / 0.21	**0.16** / 0.19	**0.13** / 0.15	**0.16** / 0.19
Arginine, %	**1.12** / 1.21	**1.03** / 1.11	**0.90** / 0.96	**0.68** / 0.73	**0.81** / 0.88
Isoleucine, %	**0.74** / 0.79	**0.70** / 0.74	**0.62** / 0.67	**0.48** / 0.51	**0.60** / 0.65
Valine, %	**0.76** / 0.83	**0.72** / 0.78	**0.66** / 0.73	**0.51** / 0.56	**0.64** / 0.71
Crude protein[5], %	20.00	18.25	17.50	15.50	16.50
Calcium[6], %	1.05	1.00	0.95	0.90	2.50
Phosphorus (available)[7], %	0.48	0.47	0.45	0.40	0.43
Phosphorus (digestible), %	0.44	0.43	0.41	0.35	0.38
Sodium, %	0.18	0.17	0.17	0.18	0.18
Chloride, %	0.18	0.17	0.17	0.18	0.18
Linoleic acid (C18:2 n-6), %	1.20	1.20	1.20	1.20	1.20
Choline, mg/kg	2,000	1,800	1,800	1,300	1,500

[1] Body weights are approximate. Ages shown are a guide only. Please note that at time of transfer, there will be some loss in body weight (normally 10–12%) due to reduced water intake.

[2] Do not feed Pre-Lay Diet earlier than 15 weeks of age. Do not feed Pre-Lay later than first egg as it contains insufficient calcium to support egg production. Implementing a pre-lay diet can be challenging in mixed-age flocks. If it's not possible to use the Pre-Lay diet, the calcium content of the last stage rearing diet (developer) must be increased to 1.4%.

[3] Recommended energy range is based on raw material energy values shown in feed ingredient table at back of this guide. It is important that target concentrations of dietary energy are adjusted according to energy system applied to raw material matrix.

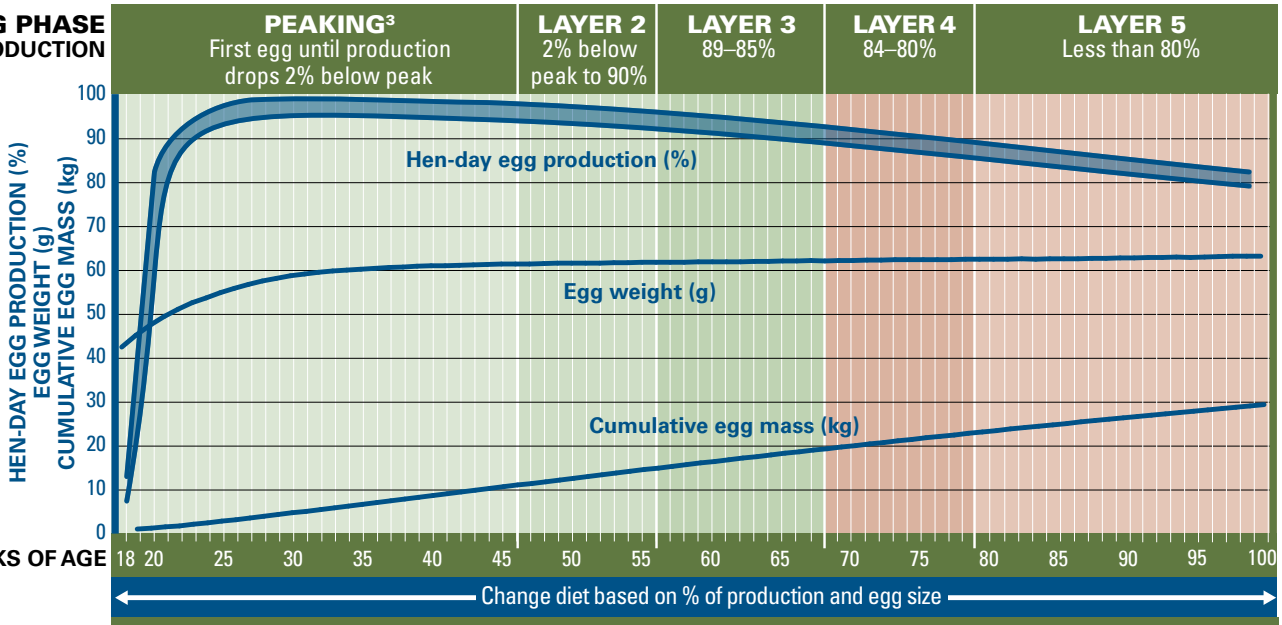
[4] Recommendation for Total Amino Acids is only appropriate to corn and soybean meal diet. Where diets utilize other ingredients, recommendations for Standardized Ileal Digestible Amino Acids must be followed.

[5] Diets should always be formulated to provide required intake of amino acid. Concentration of crude protein in diet will vary with raw materials used. Crude protein value provided is an estimated typical value only.

[6] Calcium should be supplied as fine calcium carbonate (mean particle size less than 2 mm). Coarse limestone (2–4 mm) can be introduced in Pre-Lay Diet at up to 50% of total limestone.

[7] Where other phosphorus systems are used, diets should contain recommended minimum level of available phosphorus.

Production Period Nutritional Recommendations for Economical Performance[1,2]



NUTRITION	RECOMMENDED DAILY NUTRIENT INTAKE				
Metabolizable energy[4], kcal/bird/day	295–310	290–305	285–300	280–295	275–290
Metabolizable energy[4], MJ/bird/day	1.23–1.30	1.21–1.28	1.19–1.26	1.17–1.23	1.15–1.21
	Standardized Ileal Digestible Amino Acids / Total Amino Acids[5]				
Lysine, mg/day	**820** / 898	**810** / 887	**790** / 865	**760** / 832	**730** / 799
Methionine, mg/day	**418** / 450	**405** / 435	**394** / 424	**379** / 408	**364** / 392
Methionine+Cystine, mg/day	**746** / 842	**729** / 822	**711** / 802	**684** / 771	**657** / 741
Threonine, mg/day	**574** / 675	**567** / 667	**553** / 651	**532** / 626	**511** / 601
Tryptophan, mg/day	**180** / 216	**178** / 213	**174** / 208	**167** / 200	**161** / 192
Arginine, mg/day	**853** / 917	**842** / 906	**822** / 883	**790** / 850	**759** / 816
Isoleucine, mg/day	**672** / 723	**656** / 705	**632** / 680	**608** / 654	**584** / 628
Valine, mg/day	**738** / 814	**721** / 795	**695** / 766	**668** / 737	**642** / 708
Crude protein[6], g/day	17.60	17.40	16.90	16.30	15.70
Sodium, mg/day	180	170	170	170	170
Chloride, mg/day	180	170	170	170	170
Linoleic acid (C18:2 n-6), g/day	2.00	1.80	1.60	1.40	1.20
Choline, mg/day	180	180	180	180	180

	CALCIUM AND PHOSPHORUS			
	Calcium[7,8] g/day	Phosphorus (available)[7,9] mg/day	Phosphorus (digestible) mg/day	Calcium Particle Size (fine : coarse) (see p. 17)
Weeks 18–32	4.00	447	401	40% : 60%
Weeks 33–55	4.15	421	381	35% : 65%
Weeks 56–72	4.30	395	356	30% : 70%
Weeks 73–85	4.45	369	334	25% : 75%
Weeks 86+	4.60	344	309	25% : 75%

	IDEAL PROTEIN REFERENCE				
	PEAKING	PHASE 2	PHASE 3	PHASE 4	PHASE 5
Lysine	100%	100%	100%	100%	100%
Methionine	51%	50%	50%	50%	50%
M+C	91%	90%	90%	90%	90%
Threonine	70%	70%	70%	70%	70%
Tryptophan	22%	22%	22%	22%	22%
Arginine	104%	104%	104%	104%	104%
Isoleucine	82%	81%	80%	80%	80%
Valine	90%	89%	88%	88%	88%

Production Period Dietary Nutrient Concentrations for Economical Performance[1,2]

FEEDING PHASE / PRODUCTION	PEAKING[3] First egg until production drops 2% below peak					LAYER 2 2% below peak to 90%					LAYER 3 89–85%					LAYER 4 84–80%					LAYER 5 Less than 80%				
NUTRITION	**RECOMMENDED CONCENTRATION**																								
Metabolizable energy[4], kcal/bird/day	295–310					290–305					285–300					280–295					275–290				
Metabolizable energy[4], MJ/bird/day	1.23–1.30					1.21–1.28					1.19–1.26					1.17–1.23					1.15–1.21				
FEED CONSUMPTION (*Typical Feed Consumption)																									
g/day per bird	85	90	**95***	100	105	95	100	**105***	110	115	95	100	**105***	110	115	95	100	**105***	110	115	95	100	**105***	110	115
Standardized Ileal Digestible Amino Acids																									
Lysine, %	0.96	0.91	**0.86**	0.82	0.78	0.85	0.81	**0.77**	0.74	0.70	0.83	0.79	**0.75**	0.72	0.69	0.80	0.76	**0.72**	0.69	0.66	0.77	0.73	**0.70**	0.66	0.63
Methionine, %	0.49	0.46	**0.44**	0.42	0.40	0.43	0.41	**0.39**	0.37	0.35	0.41	0.39	**0.38**	0.36	0.34	0.40	0.38	**0.36**	0.34	0.33	0.38	0.36	**0.35**	0.33	0.32
Methionine+Cystine,%	0.88	0.83	**0.79**	0.75	0.71	0.77	0.73	**0.69**	0.66	0.63	0.75	0.71	**0.68**	0.65	0.62	0.72	0.68	**0.65**	0.62	0.59	0.69	0.66	**0.63**	0.60	0.57
Threonine, %	0.68	0.64	**0.60**	0.57	0.55	0.60	0.57	**0.54**	0.52	0.49	0.58	0.55	**0.53**	0.50	0.48	0.56	0.53	**0.51**	0.48	0.46	0.54	0.51	**0.49**	0.46	0.44
Tryptophan, %	0.21	0.20	**0.19**	0.18	0.17	0.19	0.18	**0.17**	0.16	0.15	0.18	0.17	**0.17**	0.16	0.15	0.18	0.17	**0.16**	0.15	0.15	0.17	0.16	**0.15**	0.15	0.14
Arginine, %	1.00	0.95	**0.90**	0.85	0.81	0.89	0.84	**0.80**	0.77	0.73	0.87	0.82	**0.78**	0.75	0.71	0.83	0.79	**0.75**	0.72	0.69	0.80	0.76	**0.72**	0.69	0.66
Isoleucine, %	0.79	0.75	**0.71**	0.67	0.64	0.69	0.66	**0.62**	0.60	0.57	0.67	0.63	**0.60**	0.57	0.55	0.64	0.61	**0.58**	0.55	0.53	0.61	0.58	**0.56**	0.53	0.51
Valine, %	0.87	0.82	**0.78**	0.74	0.70	0.76	0.72	**0.69**	0.66	0.63	0.73	0.70	**0.66**	0.63	0.60	0.70	0.67	**0.64**	0.61	0.58	0.68	0.64	**0.61**	0.58	0.56
Total Amino Acids[5]																									
Lysine, %	1.06	1.00	**0.95**	0.90	0.86	0.93	0.89	**0.84**	0.81	0.77	0.91	0.87	**0.82**	0.79	0.75	0.88	0.83	**0.79**	0.76	0.72	0.84	0.80	**0.76**	0.73	0.69
Methionine, %	0.53	0.50	**0.47**	0.45	0.43	0.46	0.44	**0.41**	0.40	0.38	0.45	0.42	**0.40**	0.39	0.37	0.43	0.41	**0.39**	0.37	0.35	0.41	0.39	**0.37**	0.36	0.34
Methionine+Cystine,%	0.99	0.94	**0.89**	0.84	0.80	0.87	0.82	**0.78**	0.75	0.71	0.84	0.80	**0.76**	0.73	0.70	0.81	0.77	**0.73**	0.70	0.67	0.78	0.74	**0.71**	0.67	0.64
Threonine, %	0.79	0.75	**0.71**	0.68	0.64	0.70	0.67	**0.64**	0.61	0.58	0.69	0.65	**0.62**	0.59	0.57	0.66	0.63	**0.60**	0.57	0.54	0.63	0.60	**0.57**	0.55	0.52
Tryptophan, %	0.25	0.24	**0.23**	0.22	0.21	0.22	0.21	**0.20**	0.19	0.19	0.22	0.21	**0.20**	0.19	0.18	0.21	0.20	**0.19**	0.18	0.17	0.20	0.19	**0.18**	0.17	0.17
Arginine, %	1.08	1.02	**0.97**	0.92	0.87	0.95	0.91	**0.86**	0.82	0.79	0.93	0.88	**0.84**	0.80	0.77	0.89	0.85	**0.81**	0.77	0.74	0.86	0.82	**0.78**	0.74	0.71
Isoleucine, %	0.85	0.80	**0.76**	0.72	0.69	0.74	0.71	**0.67**	0.64	0.61	0.72	0.68	**0.65**	0.62	0.59	0.69	0.65	**0.62**	0.59	0.57	0.66	0.63	**0.60**	0.57	0.55
Valine, %	0.96	0.90	**0.86**	0.81	0.78	0.84	0.80	**0.76**	0.72	0.69	0.81	0.77	**0.73**	0.70	0.67	0.78	0.74	**0.70**	0.67	0.64	0.75	0.71	**0.67**	0.64	0.62
Crude protein[6], %	20.71	19.56	**18.53**	17.60	16.76	18.32	17.40	**16.57**	15.82	15.13	17.79	16.90	**16.10**	15.36	14.70	17.16	16.30	**15.52**	14.82	14.17	16.53	15.70	**14.95**	14.27	13.65
Sodium, %	0.21	0.20	**0.19**	0.18	0.17	0.18	0.17	**0.16**	0.15	0.15	0.18	0.17	**0.16**	0.15	0.15	0.18	0.17	**0.16**	0.15	0.15	0.18	0.17	**0.16**	0.15	0.15
Chloride, %	0.21	0.20	**0.19**	0.18	0.17	0.18	0.17	**0.16**	0.15	0.15	0.18	0.17	**0.16**	0.15	0.15	0.18	0.17	**0.16**	0.15	0.15	0.18	0.17	**0.16**	0.15	0.15
Linoleic acid (C18:2 n-6), %	2.35	2.22	**2.11**	2.00	1.90	1.89	1.80	**1.71**	1.64	1.57	1.68	1.60	**1.52**	1.45	1.39	1.47	1.40	**1.33**	1.27	1.22	1.26	1.20	**1.14**	1.09	1.04
Choline, mg/kg	2118	2000	**1895**	1800	1714	1895	1800	**1714**	1636	1565	1895	1800	**1714**	1636	1565	1895	1800	**1714**	1636	1565	1895	1800	**1714**	1636	1565

CALCIUM AND PHOSPHORUS CHANGES BASED ON FEED INTAKE																									
	Weeks 18–32							Weeks 33–55					Weeks 56–72					Weeks 73–85					Weeks 86+				
Feed Consumption, g/day per bird	85	90	95	**100**	105	110	115	95	100	**105**	110	115	95	100	**105**	110	115	95	100	**105**	110	115	95	100	**105**	110	115
Calcium[7,8], %	4.71	4.44	4.21	**4.00**	3.81	3.64	3.48	4.37	4.15	**3.95**	3.77	3.61	4.53	4.30	**4.10**	3.91	3.74	4.68	4.45	**4.24**	4.05	3.87	4.84	4.60	**4.38**	4.18	4.00
Phosphorus (available)[7,9], %	0.53	0.50	0.47	**0.45**	0.43	0.41	0.39	0.44	0.42	**0.40**	0.38	0.37	0.42	0.39	**0.38**	0.36	0.34	0.39	0.37	**0.35**	0.34	0.32	0.36	0.34	**0.33**	0.31	0.30
Phosphorus (digestible), %	0.47	0.45	0.42	**0.40**	0.38	0.36	0.35	0.40	0.38	**0.36**	0.35	0.33	0.38	0.36	**0.34**	0.32	0.31	0.35	0.33	**0.32**	0.30	0.29	0.33	0.31	**0.29**	0.28	0.27

[1] All nutrient requirements are based on the Feed Ingredient Tables.

[2] Crude protein, methionine+cystine, fat, linoleic acid, and / or energy may be changed to optimize egg size.

[3] Peaking nutrient levels are calculated for birds at peak egg production. Prior to achieving peak egg production, the nutrient requirements will be lower.

[4] A good approximation of the influence of temperature on energy needs is that for each 0.5°C change higher or lower than 22°C, subtract or add about 2 kcal /bird /day, respectively.

[5] Recommendation for Total Amino Acids is only appropriate to corn and soybean meal diet. Where diets utilize other ingredients, recommendations for Standardized Ileal Digestible Amino Acids must be followed.

[6] Diets should always be formulated to provide required intake of amino acid. Concentration of crude protein in diet will vary with raw material used. Crude protein value provided is an estimated typical value only.

[7] Calcium and available phosphorus requirements are determined by flock age. When production remains higher and diets are fed for longer than ages shown, it is recommended to increase to calcium and phosphorus concentrations of next feeding phase.

[8] Calcium carbonate particle size recommendation varies throughout lay. Refer to Calcium Particle Size. Dietary calcium levels and fine to coarse ratio may need to be adjusted based on limestone solubility.

[9] Where other phosphorus systems are used, diets should contain recommended minimum level of available phosphorus.

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Vitamins and Trace Minerals

ITEM [1,2,3,4]	IN 1000 KG COMPLETE DIET	
	Rearing Period	Production Period
Vitamin A, IU	10,000,000	8,000,000
Vitamin D_3[5], IU	3,300,000	3,300,000
Vitamin E, g	30.00	25.00
Vitamin K (menadione), g	3.50	3.00
Thiamin (B_1), g	2.20	2.50
Riboflavin (B_2), g	6.60	5.50
Niacin (B_3)[6], g	40.00	30.00
Pantothenic acid (B_5), g	10.00	10.00
Pyridoxine (B_6), g	4.50	5.00
Biotin (B_7), mg	100.00	75.00
Folic acid (B_9), g	1.00	0.90
Cobalamine (B_{12}), mg	23.00	23.00
Manganese[7], g	100.00	100.00
Zinc[7], g	85.00	80.00
Iron[7], g	30.00	40.00
Copper[7], g	15.00	8.00
Magnesium[7], g	600.00	500.00
Iodine, g	1.50	1.20
Selenium[7], g	0.25	0.25

[1] Minimum recommendations for rearing and laying periods. Local regulations may limit dietary content of individual vitamins or minerals. Levels of 150-200mg/kg of Vitamin C can be beneficial during periods of stress.

[2] Store premixes according to supplier's recommendations and observe 'use by' dates to ensure vitamin activity is maintained. Inclusion of antioxidant may improve premix stability.

[3] Vitamin and mineral recommendations vary according to activity.

[4] Where heat treatment is applied to diet, higher levels of vitamins may be required. Consult with vitamin supplier regarding stability through individual production processes.

[5] A proportion of Vitamin D_3 can be supplemented as 25-hydroxy D_3 according to supplier's recommendations and applicable limits.

[6] Higher levels of Niacin are recommended in non-cage systems.

[7] Greater bioavailability and productivity may be possible with use of chelated mineral sources.

Drinking Water Quality for Poultry

ITEM	MAXIMUM CONCENTRATION (ppm or mg/L)*	
Nitrate NO_3^- [1]	25	Older birds will tolerate higher levels up to 20 ppm. Stressed or disease challenged birds may be more sensitive to effects of Nitrate.
Nitrate Nitrogen (NO_3-N) [1]	6	
Nitrite NO_2^- [1]	4	Nitrite is considerably more toxic than Nitrate, especially for young birds, where 1 ppm Nitrite may be considered toxic.
Nitrite Nitrogen (NO_2-N) [1]	1	
Total dissolved solids [2]	1000	Levels up to 3000 ppm may not affect performance but could increase manure moisture.
Chloride (Cl^-) [1]	250	Levels as low as 14 mg may be problematic if sodium is higher than 50 ppm.
Sulphate (SO_4^-) [1]	250	Higher levels may be laxative.
Iron (Fe) [1]	<0.3	Higher levels result in bad odour and taste.
Magnesium (Mg) [1]	125	Higher levels may be laxative. Levels above 50 ppm may be problematic if sulphate levels are high.
Potassium (K) [2]	20	Higher levels may be acceptable depending on sodium level, alkalinity, and pH.
Sodium (Na) [1,2]	50	Higher concentration is acceptable but concentrations above 50 ppm should be avoided if high levels of chloride, sulphate, or potassium exist.
Manganese (Mn) [3]	0.05	Higher levels may be laxative.
Arsenic (As) [2]	0.5	
Fluoride (F^-) [2]	2	
Aluminium (Al) [2]	5	
Boron (B) [2]	5	
Cadmium (Cd) [2]	0.02	
Cobalt (Co) [2]	1	
Copper (Cu) [1]	0.6	Higher levels result in bitter taste.
Lead (Pb) [1]	0.02	Higher levels are toxic.
Mercury (Hg) [2]	0.003	Higher levels are toxic.
Zinc (Zn) [1]	1.5	Higher levels are toxic.
pH [1]	5–7	Birds may adapt to lower pH. Below pH 5 may reduce water intake and corrode metal fittings. Above pH 8 may reduce intake and reduce effectiveness of water sanitation.
Total bacteria counts [3]	1000 CFU/ml	This is likely to indicate dirty water.
Total Coliform bacteria [3]	50 CFU/ml	
Faecal Coliform bacteria [3]	0 CFU/ml	
Oxygen Reduction Potential (ORP) [3]	650–750 mEq	The ORP range at which 2–4 ppm of free chlorine will effectively sanitise water at a favourable pH range of 5–7.

* Limits may be lower as interactions exist between magnesium and sulphate; and between sodium, potassium, chloride, and sulphate.

[1] Carter & Sneed, 1996. Drinking Water Quality for Poultry, Poultry Science and Technology Guide, North Carolina State University Poultry Extension Service. Guide no. 42

[2] Marx and Jaikaran, 2007. Water Analysis Interpretation. Agri-Facts, Alberta Ag-Info Centre. Refer to http://www.agric.gov.ab.ca/app84/rwqit for online Water Analysis Tool

[3] Watkins, 2008. Water: Identifying and Correcting Challenges. Avian Advice 10(3): 10–15 University of Arkansas Cooperative Extension Service, Fayetteville

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