

***Hy-Line***<sup>®</sup>

**W-80 PLUS**

Conventional Systems



**Performance Guide**



# Use of the Performance Guide

The genetic potential of Hy-Line W-80 Plus 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 Plus 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.

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**Hy-Line W-80  
Online Management Guide**

## Table of Contents

### Variety Standards

Summary of Performance Standards	3
Rearing Period Performance Table	4
Production Period Performance Table	5–6
Production Period Space Recommendations	7
Performance Graph	7
Egg Quality	8
Egg Size Distribution	8–9

### Management

#### **Brooding Period**

Brooding Temperatures and Lighting	9
Development of the Organ Systems in Pullets	10
Body Score Chart	10

#### **Transition Period**

Transition Period from Rear to Peak Egg Production	11
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### Lighting

Light Program for Light-Controlled Housing	12
Intermittent Lighting Program for Chicks	12

### Nutrition

#### **Rearing Period**

Nutritional Recommendations	13
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#### **Production Period**

Nutritional Recommendations (Economical Performance)	14
Dietary Nutrient Concentrations (Economical Performance)	15
Nutritional Recommendations (Optimal Performance)	16
Dietary Nutrient Concentrations (Optimal Performance)	17
Vitamins and Trace Minerals	18
Water Quality	19

# Summary of Performance Standards

<b>REARING PERIOD (TO 18 WEEKS):</b>	
Livability	96.60%
Feed Consumed	6.17 kg
Body Weight at 18 Weeks	1.280–1.360 kg
<b>LAYING PERIOD (TO 100 WEEKS):</b>	
Percent Peak	94.0–97.9%
Hen-Day Eggs to 60 Weeks	255.8–269.9
Hen-Day Eggs to 100 Weeks	484.0–507.6
Hen-Housed Eggs to 60 Weeks	247.6–261.3
Hen-Housed Eggs to 100 Weeks	456.9–479.4
Livability to 60 Weeks	94.6%
Livability to 100 Weeks	88.7%
Days to 50% Production (from hatch)	143
Egg Weight at 26 Weeks	54.5–59.4 g
Egg Weight at 32 Weeks	59.7–63.4 g
Egg Weight at 70 Weeks	63.4–67.3 g
Egg Weight at 100 Weeks	64.8–68.8 g
Total Egg Mass per Hen-Housed (19–100 weeks)	29.7 kg
Body Weight at 26 Weeks	1.56–1.66 kg
Body Weight at 32 Weeks	1.66–1.77 kg
Body Weight at 70 Weeks	1.71–1.82 kg
Body Weight at 100 Weeks	1.71–1.82 kg
Freedom From Egg Inclusions	Excellent
Shell Strength	Excellent
Haugh Units at 38 Weeks	88.1
Haugh Units at 56 Weeks	85.6
Haugh Units at 70 Weeks	83.7
Haugh Units at 100 Weeks	80.0
Average Daily Feed Consumption (19–100 weeks)	104.9–113.2 g/day per bird
Feed Conversion Rate, kg Feed/kg Eggs (20–60 weeks)	1.97–2.05
Feed Conversion Rate, kg Feed/kg Eggs (20–100 weeks)	2.06–2.15
Feed Utilization, kg Egg/kg Feed (20–60 weeks)	0.49–0.51
Feed Utilization, kg Egg/kg Feed (20–100 weeks)	0.47–0.48
Feed Consumption per Dozen Eggs (20–60 weeks)	1.41–1.47 kg
Feed Consumption per Dozen Eggs (20–100 weeks)	1.48–1.55 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](mailto:info@hyline.com). An easy to use record-keeping program, Hy-Line International EggCel, can be found at [hyline.com](http://hyline.com).

# Rearing Period Performance Table

AGE (weeks)	MORTALITY Cumulative (%)	BODY WEIGHT (kg)	WATER INTAKE (ml/bird/day)	FEED INTAKE (g/bird/day)	CUMULATIVE FEED INTAKE (g/bird to date)	UNIFORMITY %
1	1.00	0.068–0.072	18–30	12 – 15	84 – 105	>85%
2	1.40	0.122–0.130	24–40	16 – 20	196 – 245	
3	1.60	0.184–0.196	32–52	21 – 26	343 – 427	
4	1.70	0.255–0.271	41–62	27 – 31	532 – 644	>80%
<b>5</b>	<b>1.80</b>	<b>0.331–0.352</b>	<b>48–72</b>	<b>32 – 36</b>	<b>756 – 896</b>	
6	1.90	0.411–0.437	54–80	36 – 40	1008 – 1176	
7	2.00	0.518–0.551	59–90	39 – 45	1281 – 1491	>85%
8	2.10	0.605–0.644	65–96	43 – 48	1582 – 1827	
9	2.20	0.692–0.736	69–104	46 – 52	1904 – 2191	
<b>10</b>	<b>2.30</b>	<b>0.776–0.826</b>	<b>74–110</b>	<b>49 – 55</b>	<b>2247 – 2576</b>	
11	2.40	0.857–0.912	80–116	53 – 58	2618 – 2982	
12	2.50	0.934–0.994	84–122	56 – 61	3010 – 3409	
13	2.60	1.003–1.067	89–128	59 – 64	3423 – 3857	
14	2.80	1.065–1.133	93–136	62 – 68	3857 – 4333	
<b>15</b>	<b>2.90</b>	<b>1.120–1.191</b>	<b>99–142</b>	<b>66 – 71</b>	<b>4319 – 4830</b>	>90%
16	3.00	1.167–1.241	105–150	70 – 75	4809 – 5355	
17	3.20	1.218–1.296	110–156	73 – 78	5320 – 5901	
18	3.30	1.252–1.332	116–168	77 – 84	5859 – 6489	

# Production Period Performance Table

AGE (weeks)	% HEN-DAY Current	HEN-DAY EGGS Cumulative	HEN-HOUSED EGGS Cumulative	MORTALITY Cumulative (%)	BODY WEIGHT (kg)	WATER INTAKE (ml/bird/day)	FEED INTAKE (g/bird/day)	HH EGG MASS Cumulative (kg)	AVG. EGG WT. (g/egg)
19	6.6–12.1	0.5–0.8	0.5–0.8	0.0	1.32–1.41	120–174	80–87	0.02–0.03	42.0–45.9
<b>20</b>	<b>27.6–47.7</b>	<b>2.4–4.2</b>	<b>2.4–4.2</b>	<b>0.2</b>	<b>1.37–1.46</b>	<b>125–186</b>	<b>83–93</b>	<b>0.1–0.2</b>	<b>44.7–48.9</b>
21	61.1–82.0	6.7–9.9	6.6–9.9	0.5	1.41–1.50	134–194	89–97	0.3–0.5	47.0–51.5
22	79.0–89.7	12.2–16.2	12.1–16.1	0.6	1.44–1.53	137–200	91–100	0.6–0.8	49.0–53.6
23	87.0–90.6	18.3–22.5	18.2–22.4	0.8	1.48–1.57	138–204	92–102	0.9–1.1	50.6–55.4
24	89.7–93.4	24.6–29.1	24.4–28.9	0.9	1.50–1.59	141–208	94–104	1.3–1.5	52.0–57.0
<b>25</b>	<b>91.3–95.1</b>	<b>31.0–35.7</b>	<b>30.7–35.5</b>	<b>1.1</b>	<b>1.53–1.63</b>	<b>146–212</b>	<b>97–106</b>	<b>1.6–1.8</b>	<b>53.2–58.3</b>
26	92.6–96.4	37.4–42.5	37.1–42.2	1.2	1.56–1.66	147–214	98–107	2.0–2.2	54.5–59.4
27	93.3–97.2	44.0–49.3	43.6–48.9	1.4	1.58–1.68	149–220	99–110	2.4–2.6	55.7–60.4
28	93.8–97.7	50.5–56.1	50.0–55.6	1.5	1.61–1.71	150–222	100–111	2.7–3.0	56.7–61.2
29	94.0–97.9	57.1–63.0	56.5–62.3	1.7	1.63–1.73	152–222	101–111	3.1–3.4	57.7–61.9
<b>30</b>	<b>94.0–97.9</b>	<b>63.7–69.8</b>	<b>63.0–69.1</b>	<b>1.8</b>	<b>1.64–1.75</b>	<b>153–224</b>	<b>102–112</b>	<b>3.5–3.8</b>	<b>58.5–62.4</b>
31	93.8–97.7	70.3–76.7	69.4–75.8	2.1	1.65–1.76	155–226	103–113	3.9–4.2	59.3–63.0
32	93.7–97.6	76.8–83.5	75.8–82.4	2.2	1.66–1.77	156–226	104–113	4.3–4.6	59.7–63.4
33	93.6–97.4	83.4–90.3	82.2–89.1	2.4	1.67–1.78	156–226	104–113	4.7–5.1	60.0–63.8
34	93.4–97.3	89.9–97.1	88.6–95.7	2.5	1.68–1.78	158–228	105–114	5.1–5.5	60.4–64.1
<b>35</b>	<b>93.3–97.2</b>	<b>96.4–103.9</b>	<b>94.9–102.4</b>	<b>2.7</b>	<b>1.68–1.79</b>	<b>159–228</b>	<b>106–114</b>	<b>5.5–5.9</b>	<b>60.6–64.4</b>
36	93.2–97.1	103.0–110.7	101.3–109.0	2.8	1.68–1.79	159–228	106–114	5.9–6.3	60.9–64.6
37	93.1–96.9	109.5–117.5	107.6–115.5	3.0	1.69–1.79	161–230	107–115	6.3–6.7	61.1–64.8
38	93.0–96.8	116.0–124.3	113.9–122.1	3.1	1.69–1.79	161–230	107–115	6.7–7.1	61.2–65.0
39	92.9–96.7	122.5–131.1	120.2–128.7	3.2	1.69–1.80	161–230	107–115	7.1–7.5	61.4–65.2
<b>40</b>	<b>92.7–96.6</b>	<b>129.0–137.8</b>	<b>126.5–135.2</b>	<b>3.4</b>	<b>1.69–1.80</b>	<b>161–230</b>	<b>107–115</b>	<b>7.5–8.0</b>	<b>61.5–65.3</b>
41	92.6–96.5	135.5–144.6	132.7–141.7	3.5	1.69–1.80	161–230	107–115	7.9–8.4	61.7–65.5
42	92.6–96.4	142.0–151.3	139.0–148.2	3.6	1.70–1.80	161–230	107–115	8.3–8.8	61.8–65.6
43	92.5–96.3	148.4–158.1	145.2–154.7	3.7	1.70–1.81	161–230	107–115	8.7–9.2	61.9–65.7
44	92.3–96.2	154.9–164.8	151.4–161.2	3.8	1.70–1.81	161–230	107–115	9.1–9.6	62.0–65.8
<b>45</b>	<b>92.2–96.0</b>	<b>161.3–171.5</b>	<b>157.6–167.6</b>	<b>3.9</b>	<b>1.70–1.81</b>	<b>161–230</b>	<b>107–115</b>	<b>9.5–10.0</b>	<b>62.0–65.9</b>
46	91.8–95.7	167.8–178.2	163.8–174.1	4.1	1.70–1.81	161–230	107–115	9.9–10.4	62.1–66.0
47	91.7–95.5	174.2–184.9	169.9–180.5	4.2	1.71–1.81	161–230	107–115	10.3–10.8	62.2–66.0
48	91.4–95.2	180.6–191.6	176.1–186.9	4.3	1.71–1.81	161–230	107–115	10.6–11.3	62.3–66.1
49	91.2–95.0	187.0–198.2	182.2–193.2	4.4	1.71–1.82	161–230	107–115	11.0–11.7	62.3–66.2
<b>50</b>	<b>90.8–94.6</b>	<b>193.3–204.8</b>	<b>188.2–199.5</b>	<b>4.5</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>11.4–12.1</b>	<b>62.4–66.3</b>
51	90.6–94.3	199.7–211.4	194.3–205.8	4.6	1.71–1.82	161–230	107–115	11.8–12.5	62.5–66.3
52	90.3–94.1	206.0–218.0	200.3–212.1	4.7	1.71–1.82	161–230	107–115	12.2–12.9	62.5–66.4
53	90.0–93.7	212.3–224.6	206.3–218.4	4.8	1.71–1.82	161–230	107–115	12.6–13.3	62.6–66.4
54	89.7–93.4	218.6–231.1	212.3–224.6	4.9	1.71–1.82	161–230	107–115	13.0–13.7	62.6–66.5
<b>55</b>	<b>89.4–93.1</b>	<b>224.8–237.7</b>	<b>218.2–230.8</b>	<b>5.0</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>13.4–14.1</b>	<b>62.7–66.6</b>
56	89.1–92.8	231.1–244.1	224.1–236.9	5.1	1.71–1.82	161–230	107–115	13.7–14.5	62.7–66.6
57	88.7–92.4	237.3–250.6	230.0–243.1	5.2	1.71–1.82	161–230	107–115	14.1–14.9	62.8–66.7
58	88.5–92.1	243.5–257.1	235.9–249.2	5.2	1.71–1.82	161–230	107–115	14.5–15.3	62.8–66.7



## Production Period Performance Table (cont.)

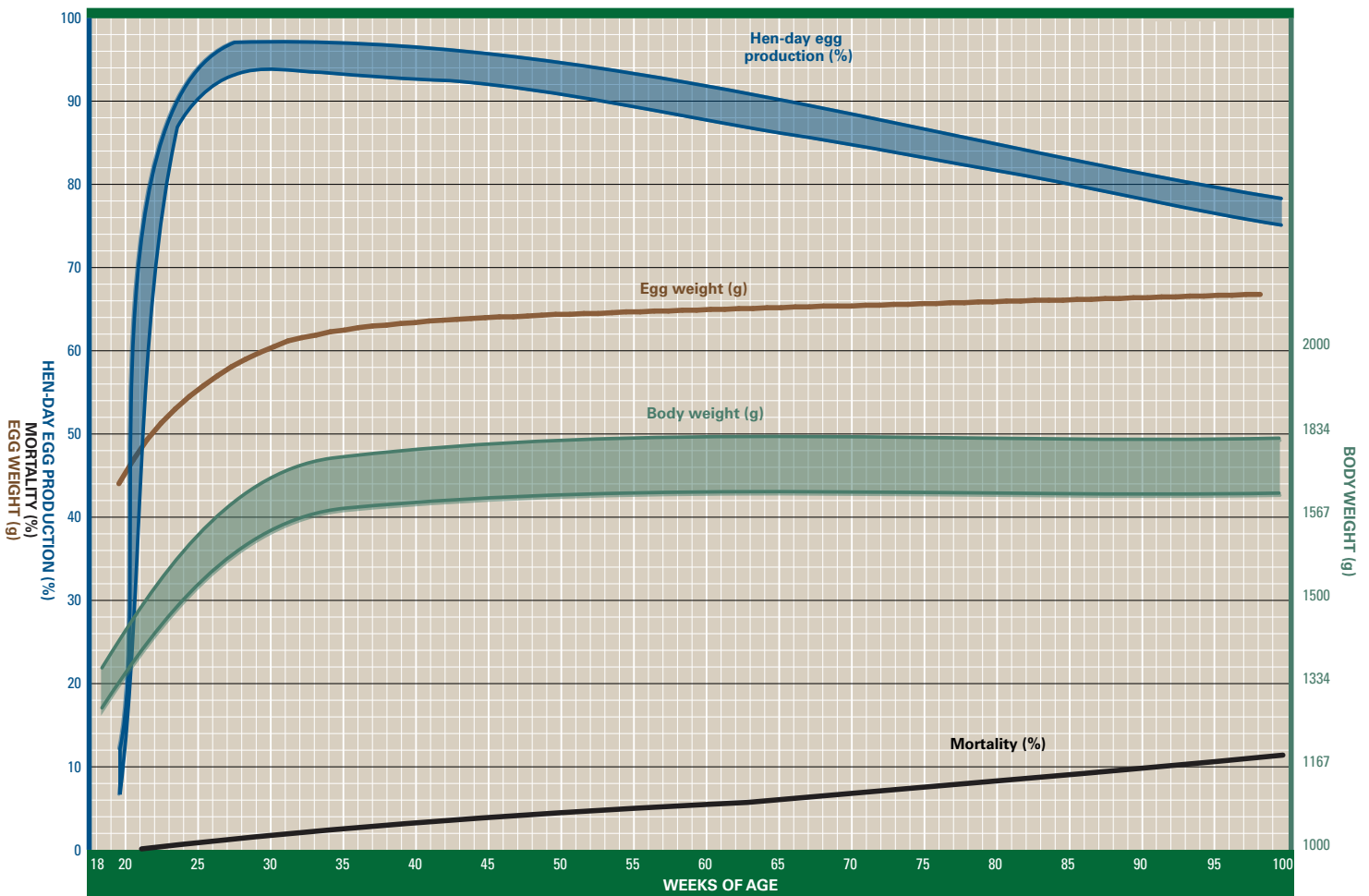
AGE (weeks)	% HEN-DAY Current	HEN-DAY EGGS Cumulative	HEN-HOUSED EGGS Cumulative	MORTALITY Cumulative (%)	BODY WEIGHT (kg)	WATER INTAKE (ml/bird/day)	FEED INTAKE (g/bird/day)	HH EGG MASS Cumulative (kg)	AVG. EGG WT. (g/egg)
59	88.2–91.8	249.6–263.5	241.7–255.3	5.3	1.71–1.82	161–230	107–115	14.9–15.7	62.9–66.8
<b>60</b>	<b>87.9–91.5</b>	<b>255.8–269.9</b>	<b>247.6–261.3</b>	<b>5.4</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>15.3–16.1</b>	<b>62.9–66.8</b>
61	87.5–91.1	261.9–276.3	253.4–267.3	5.5	1.71–1.82	161–230	107–115	15.6–16.5	63.0–66.9
62	87.2–90.8	268.0–282.6	259.1–273.3	5.6	1.71–1.82	161–230	107–115	16.0–16.8	63.0–66.9
63	86.9–90.5	274.1–289.0	264.9–279.3	5.7	1.71–1.82	161–230	107–115	16.4–17.2	63.1–67.0
64	86.6–90.2	280.2–295.3	270.6–285.3	5.9	1.71–1.82	161–230	107–115	16.8–17.6	63.1–67.0
<b>65</b>	<b>86.3–89.9</b>	<b>286.2–301.6</b>	<b>276.2–291.2</b>	<b>6.1</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>17.1–18.0</b>	<b>63.2–67.1</b>
66	86.1–89.6	292.2–307.8	281.9–297.0	6.2	1.71–1.82	161–230	107–115	17.5–18.4	63.2–67.1
67	85.8–89.3	298.2–314.1	287.5–302.9	6.4	1.71–1.82	161–230	107–115	17.9–18.8	63.3–67.2
68	85.5–89.0	304.2–320.3	293.1–308.7	6.5	1.71–1.82	161–230	107–115	18.2–19.2	63.3–67.2
69	85.2–88.7	310.2–326.5	298.7–314.5	6.7	1.71–1.82	161–230	107–115	18.6–19.5	63.4–67.3
<b>70</b>	<b>84.9–88.4</b>	<b>316.1–332.7</b>	<b>304.2–320.3</b>	<b>6.8</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>19.0–19.9</b>	<b>63.4–67.3</b>
71	84.5–88.0	322.0–338.9	309.7–326.0	6.9	1.71–1.82	161–230	107–115	19.3–20.3	63.4–67.4
72	84.3–87.8	328.0–345.0	315.2–331.7	7.1	1.71–1.82	161–230	107–115	19.7–20.7	63.5–67.4
73	84.0–87.5	333.8–351.1	320.7–337.4	7.2	1.71–1.82	161–230	107–115	20.0–21.0	63.5–67.5
74	83.7–87.1	339.7–357.2	326.1–343.1	7.4	1.71–1.82	161–230	107–115	20.4–21.4	63.6–67.5
<b>75</b>	<b>83.3–86.8</b>	<b>345.5–363.3</b>	<b>331.5–348.7</b>	<b>7.5</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>20.7–21.8</b>	<b>63.6–67.6</b>
76	83.0–86.5	351.3–369.4	336.8–354.3	7.6	1.71–1.82	161–230	107–115	21.1–22.1	63.7–67.6
77	82.6–86.1	357.1–375.4	342.2–359.8	7.8	1.71–1.82	161–230	107–115	21.4–22.5	63.7–67.7
78	82.4–85.8	362.9–381.4	347.5–365.4	7.9	1.71–1.82	161–230	107–115	21.8–22.9	63.8–67.7
79	82.2–85.6	368.6–387.4	352.8–370.9	8.1	1.71–1.82	161–230	107–115	22.1–23.2	63.8–67.8
<b>80</b>	<b>81.8–85.2</b>	<b>374.4–393.4</b>	<b>358.0–376.3</b>	<b>8.2</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>22.5–23.6</b>	<b>63.9–67.8</b>
81	81.6–85.0	380.1–399.3	363.3–381.8	8.4	1.71–1.82	161–230	107–115	22.8–23.9	63.9–67.9
82	81.2–84.6	385.8–405.2	368.5–387.2	8.5	1.71–1.82	161–230	107–115	23.2–24.3	64.0–67.9
83	80.9–84.3	391.4–411.1	373.6–392.6	8.6	1.71–1.82	161–230	107–115	23.5–24.7	64.0–68.0
84	80.5–83.9	397.1–417.0	378.8–398.0	8.8	1.71–1.82	161–230	107–115	23.9–25.0	64.1–68.0
<b>85</b>	<b>80.2–83.6</b>	<b>402.7–422.9</b>	<b>383.9–403.3</b>	<b>8.9</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>24.2–25.4</b>	<b>64.1–68.1</b>
86	79.9–83.2	408.3–428.7	389.0–408.6	9.1	1.71–1.82	161–230	107–115	24.5–25.7	64.1–68.1
87	79.5–82.8	413.8–434.5	394.0–413.8	9.2	1.71–1.82	161–230	107–115	24.9–26.1	64.2–68.2
88	79.2–82.5	419.4–440.3	399.0–419.1	9.4	1.71–1.82	161–230	107–115	25.2–26.4	64.2–68.2
89	78.8–82.1	424.9–446.0	404.0–424.3	9.5	1.71–1.82	161–230	107–115	25.5–26.8	64.3–68.3
<b>90</b>	<b>78.5–81.7</b>	<b>430.4–451.7</b>	<b>409.0–429.4</b>	<b>9.7</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>25.9–27.1</b>	<b>64.3–68.3</b>
91	78.1–81.3	435.8–457.4	413.9–434.6	9.8	1.71–1.82	161–230	107–115	26.2–27.4	64.4–68.4
92	77.7–80.9	441.3–463.1	418.8–439.7	10.1	1.71–1.82	161–230	107–115	26.5–27.8	64.4–68.4
93	77.4–80.6	446.7–468.7	423.7–444.7	10.2	1.71–1.82	161–230	107–115	26.8–28.1	64.5–68.5
94	77.0–80.3	452.1–474.3	428.5–449.8	10.4	1.71–1.82	161–230	107–115	27.2–28.4	64.5–68.5
<b>95</b>	<b>76.7–79.9</b>	<b>457.5–479.9</b>	<b>433.3–454.8</b>	<b>10.5</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>27.5–28.8</b>	<b>64.6–68.6</b>
96	76.4–79.6	462.8–485.5	438.1–459.8	10.7	1.71–1.82	161–230	107–115	27.8–29.1	64.6–68.6
97	76.1–79.3	468.1–491.1	442.9–464.7	10.8	1.71–1.82	161–230	107–115	28.1–29.4	64.7–68.7
98	75.8–79.0	473.4–496.6	447.6–469.6	11.0	1.71–1.82	161–230	107–115	28.4–29.8	64.7–68.7
99	75.5–78.7	478.7–502.1	452.3–474.5	11.2	1.71–1.82	161–230	107–115	28.7–30.1	64.8–68.8
<b>100</b>	<b>75.2–78.4</b>	<b>484.0–507.6</b>	<b>456.9–479.4</b>	<b>11.3</b>	<b>1.71–1.82</b>	<b>161–230</b>	<b>107–115</b>	<b>29.0–30.4</b>	<b>64.8–68.8</b>

# Production Period Space Recommendations

check local regulations concerning space requirements)

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

## Performance Graph



# Egg Quality and Egg Size Distribution

## E.U. Standards–Weekly\*

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

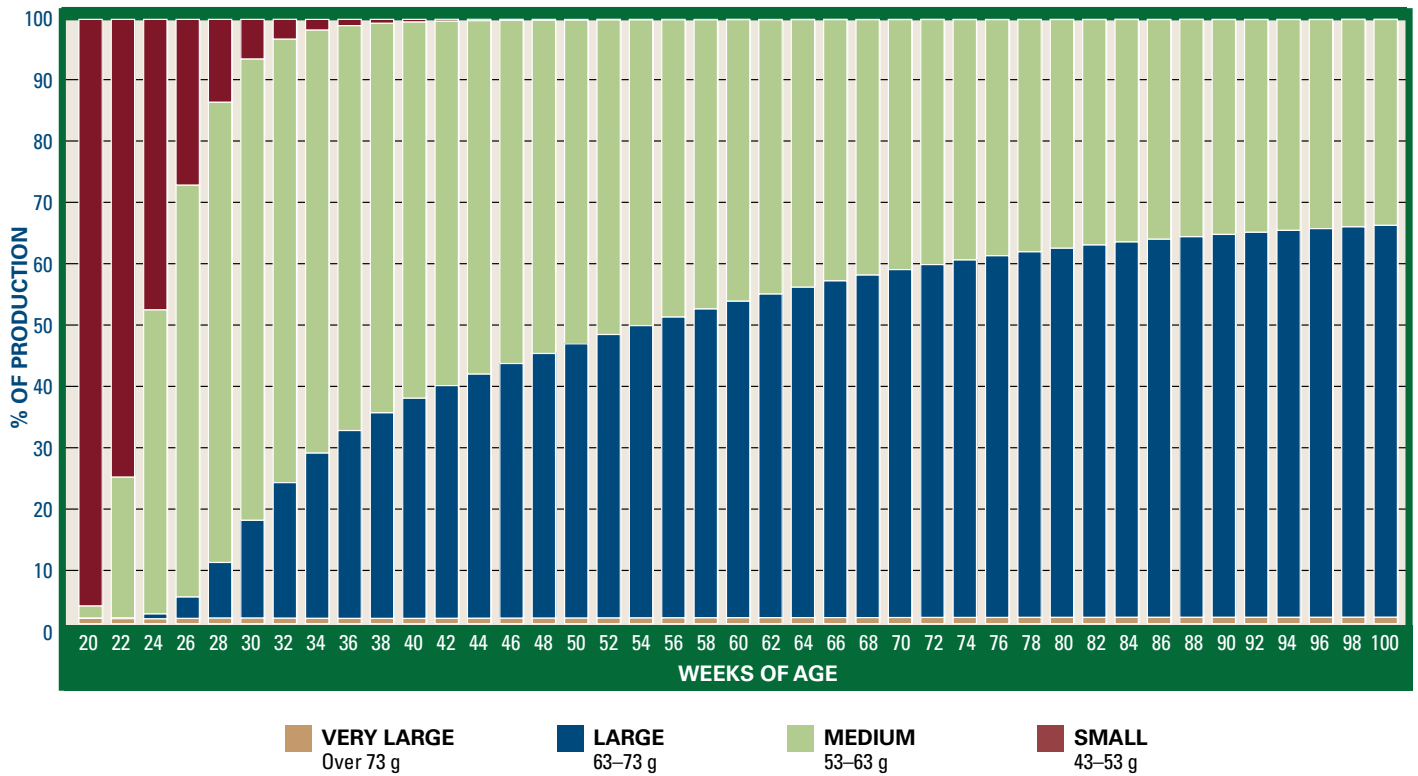
AGE (weeks)	AVERAGE EGG WEIGHT (g)	WEEKLY % VERY LARGE Over 73 g	WEEKLY % LARGE 63–73 g	WEEKLY % MEDIUM 53–63 g	WEEKLY % SMALL 43–53 g
20	46.8	0.53	0.09	5.72	93.66
22	51.3	0.53	0.57	34.83	64.07
24	54.5	0.63	2.65	60.81	35.91
26	57.0	0.76	8.45	74.81	15.99
28	59.0	0.83	17.38	75.49	6.30
30	60.5	0.87	26.47	70.06	2.60
32	61.6	0.91	33.98	63.91	1.21
34	62.3	0.96	39.79	58.60	0.64
36	62.8	1.04	44.36	54.22	0.38
38	63.1	1.13	48.09	50.53	0.25
40	63.4	1.24	51.27	47.32	0.18
42	63.7	1.35	54.05	44.46	0.13
44	63.9	1.48	56.52	41.89	0.11
46	64.1	1.62	58.72	39.57	0.09
48	64.2	1.75	60.69	37.48	0.08
50	64.4	1.89	62.44	35.60	0.07
52	64.5	2.03	63.99	33.92	0.06
54	64.6	2.17	65.35	32.43	0.05
56	64.7	2.31	66.53	31.11	0.05
58	64.8	2.45	67.56	29.95	0.05
60	64.9	2.58	68.44	28.94	0.04
62	65.0	2.70	69.21	28.05	0.04
64	65.1	2.82	69.87	27.27	0.04
66	65.2	2.94	70.43	26.59	0.04
68	65.3	3.05	70.92	26.00	0.04
70	65.4	3.16	71.33	25.47	0.04
72	65.5	3.26	71.69	25.02	0.04
74	65.6	3.35	72.00	24.62	0.03
76	65.7	3.44	72.26	24.26	0.03
78	65.8	3.53	72.48	23.95	0.03
80	65.9	3.61	72.68	23.68	0.03
82	66.0	3.69	72.84	23.43	0.03
84	66.1	3.76	72.99	23.22	0.03
86	66.1	3.83	73.11	23.02	0.03
88	66.2	3.90	73.22	22.85	0.03
90	66.3	3.96	73.31	22.70	0.03
92	66.4	4.02	73.39	22.56	0.03
94	66.5	4.07	73.47	22.43	0.03
96	66.6	4.12	73.53	22.32	0.03
98	66.7	4.17	73.58	22.22	0.03
100	66.8	4.21	73.63	22.13	0.03

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



# Egg Size Distribution (cont.)

E.U. Standards–Weekly\*

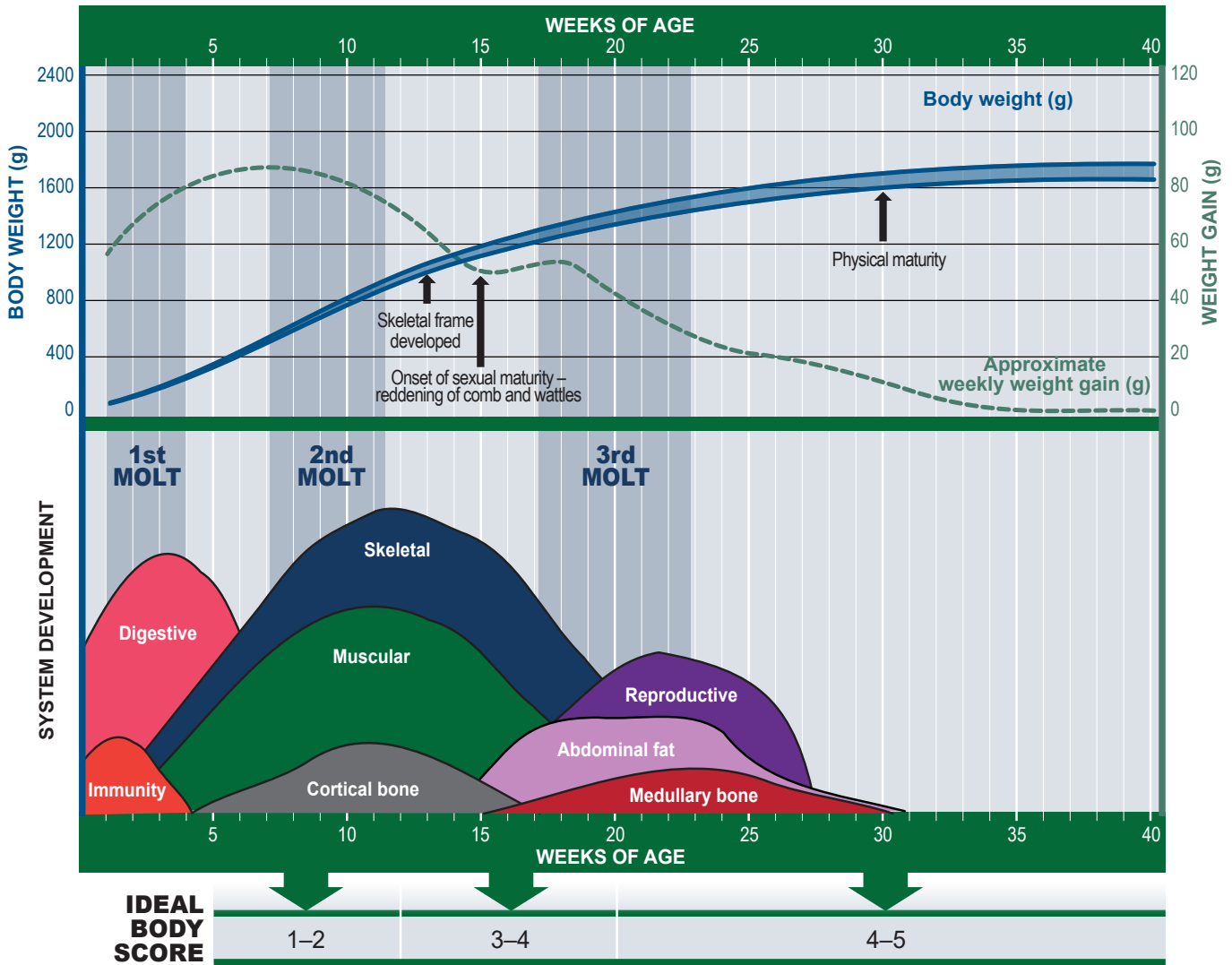


\* Distribution of egg sizes based on weekly (not cumulative) average egg weights.

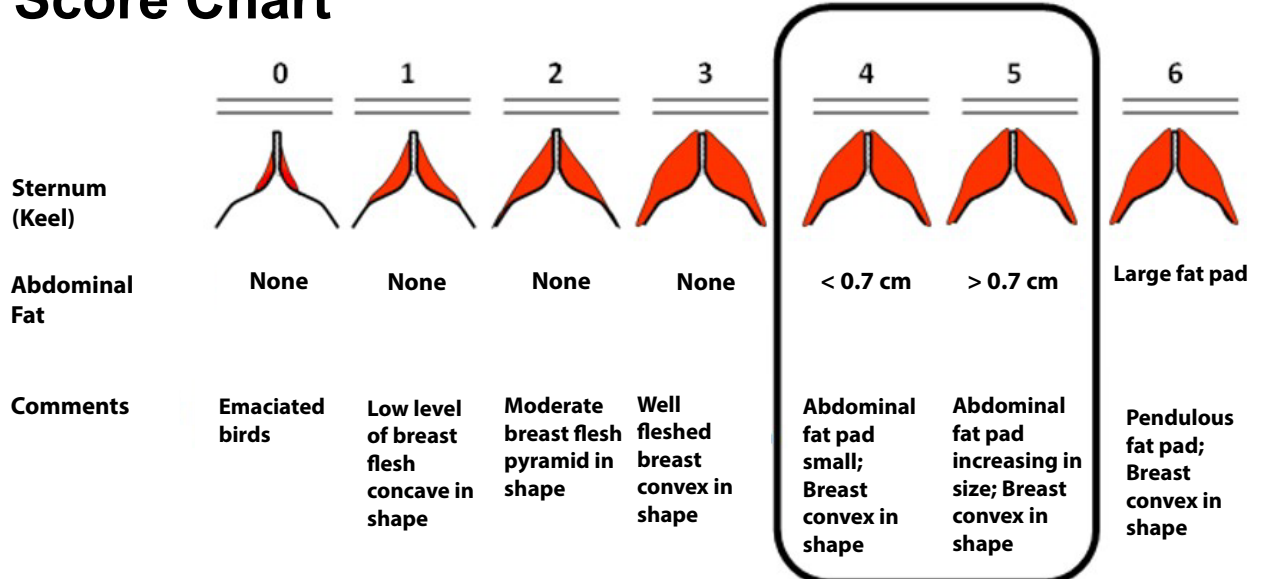
# Brooding Temperature and Lighting Recommendations

AGE	0-3 days	4-7 days	8-14 days	15-21 days	22-28 days	29-35 days	36-42 days
<b>AIR TEMP. (CAGE)</b>	33-36°C	30-32°C	28-30°C	26-28°C	23-26°C	21-23°C	21°C
<b>AIR TEMP. (FLOOR)</b>	35-36°C	33-35°C	31-33°C	29-31°C	26-27°C	23-25°C	21°C
<b>LIGHT INTENSITY</b>	30-50 lux	30-50 lux	25 lux	25 lux	5-10 lux	5-10 lux	13.5 hours
<b>LIGHT HOURS</b>	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

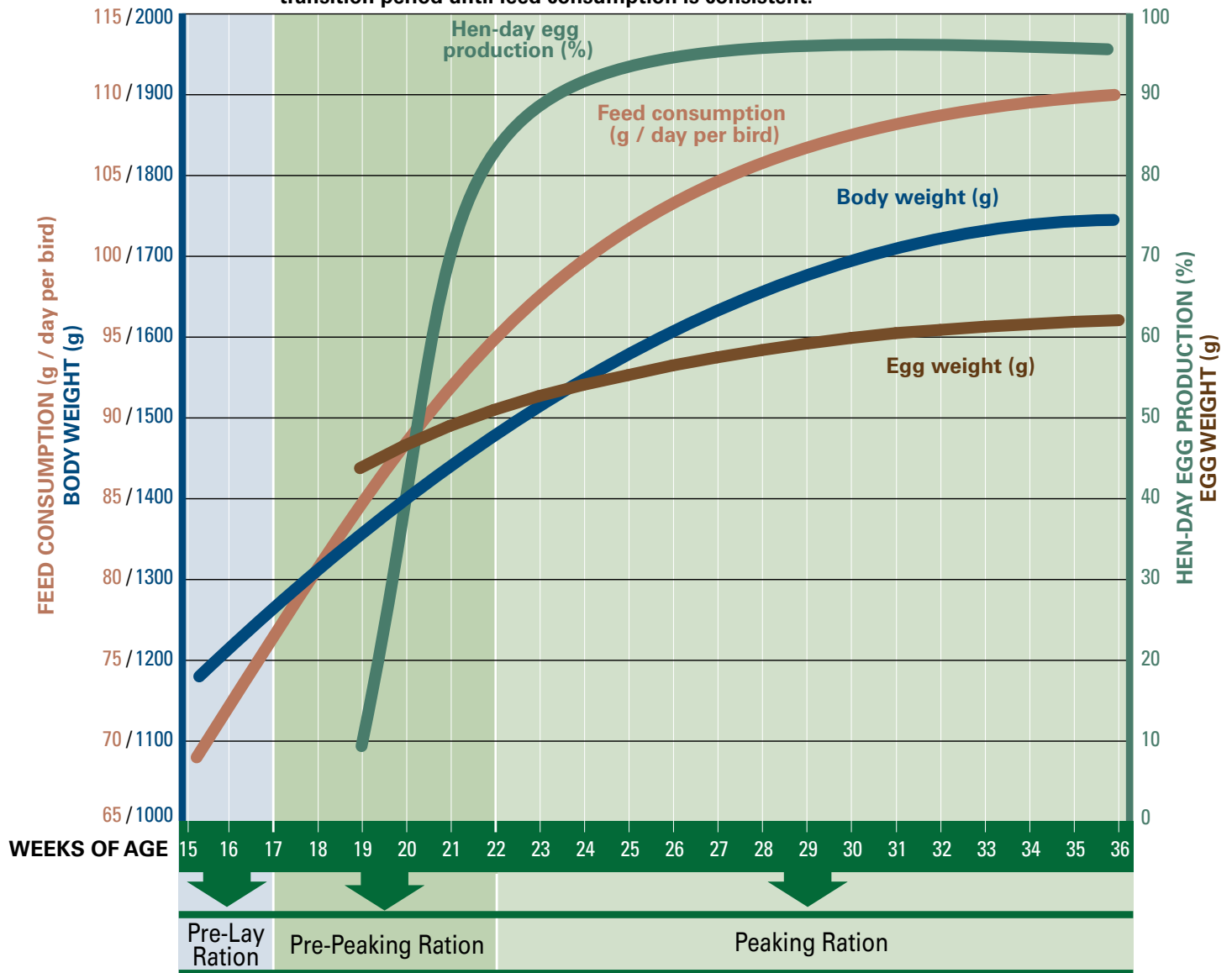


## Body Score Chart



# Transition Period from Rear to Peak Egg Production

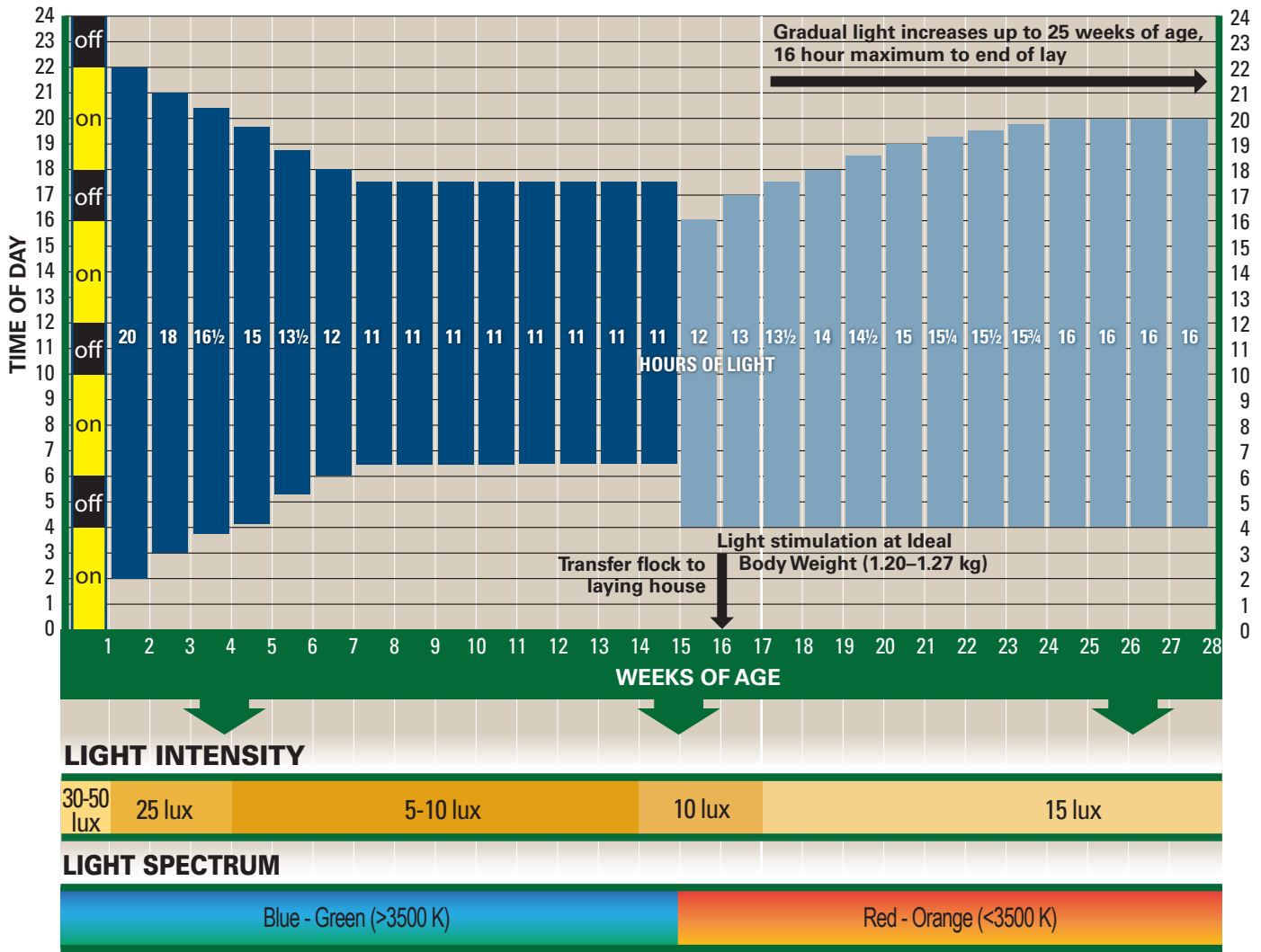
Frequently formulate to changing feed consumption during transition period until feed consumption is consistent.



## Pre-Peak

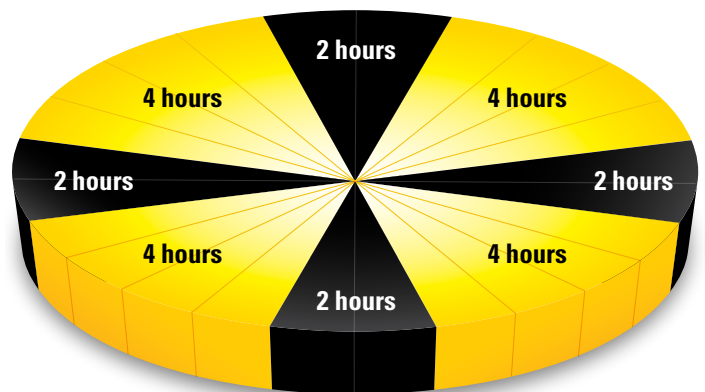
- Pre-Peak diets are intended for flocks with low feed intake and are fed for a limited period from first egg to the beginning of peak production. The nutrient specification of the Pre-Peak diet should be dense enough to allow for lower feed intake and also cater to the increased nutritional needs of 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.

# Light Program for Light-Controlled Housing

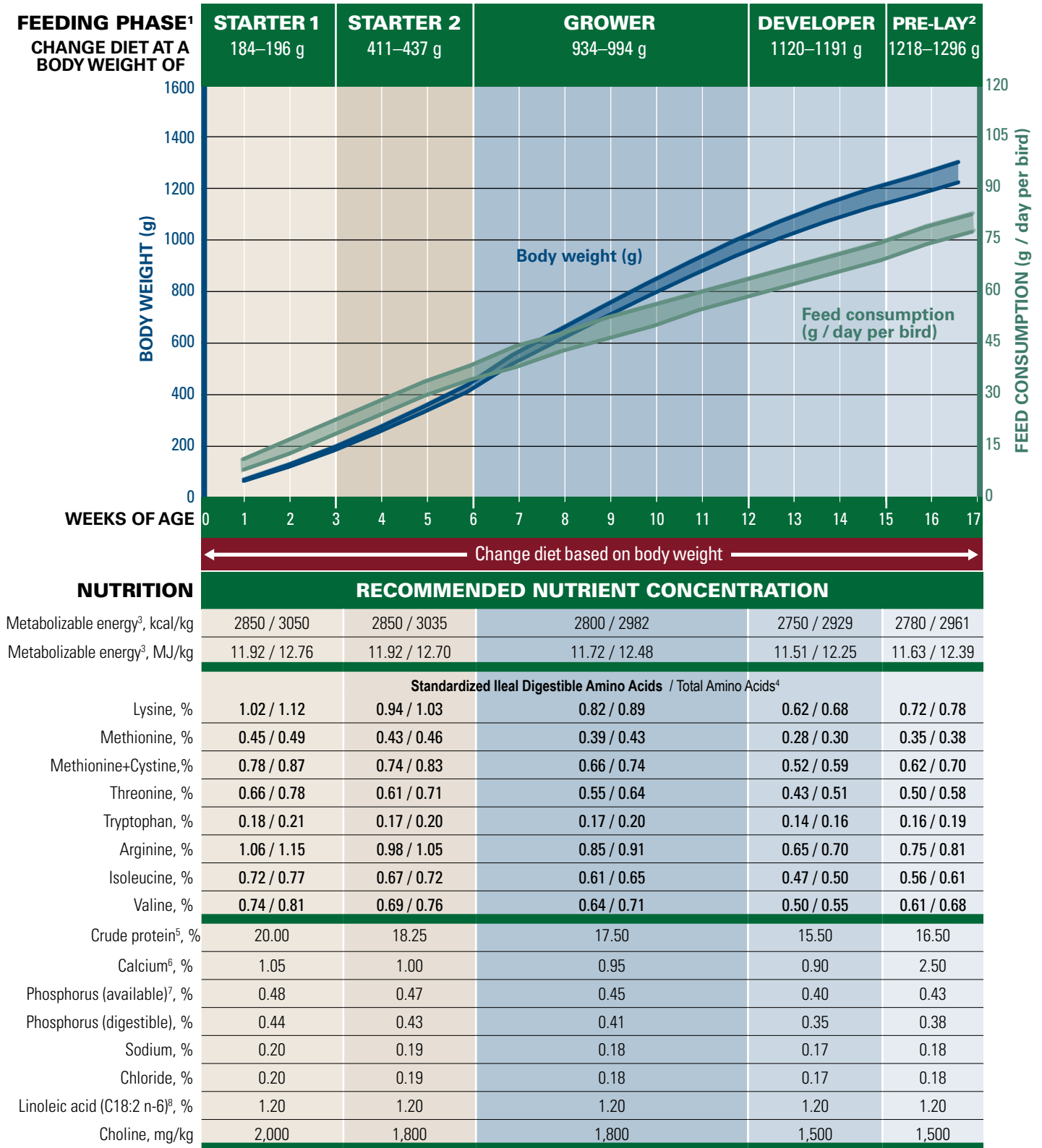


## Intermittent Lighting Program for Chicks

- 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.

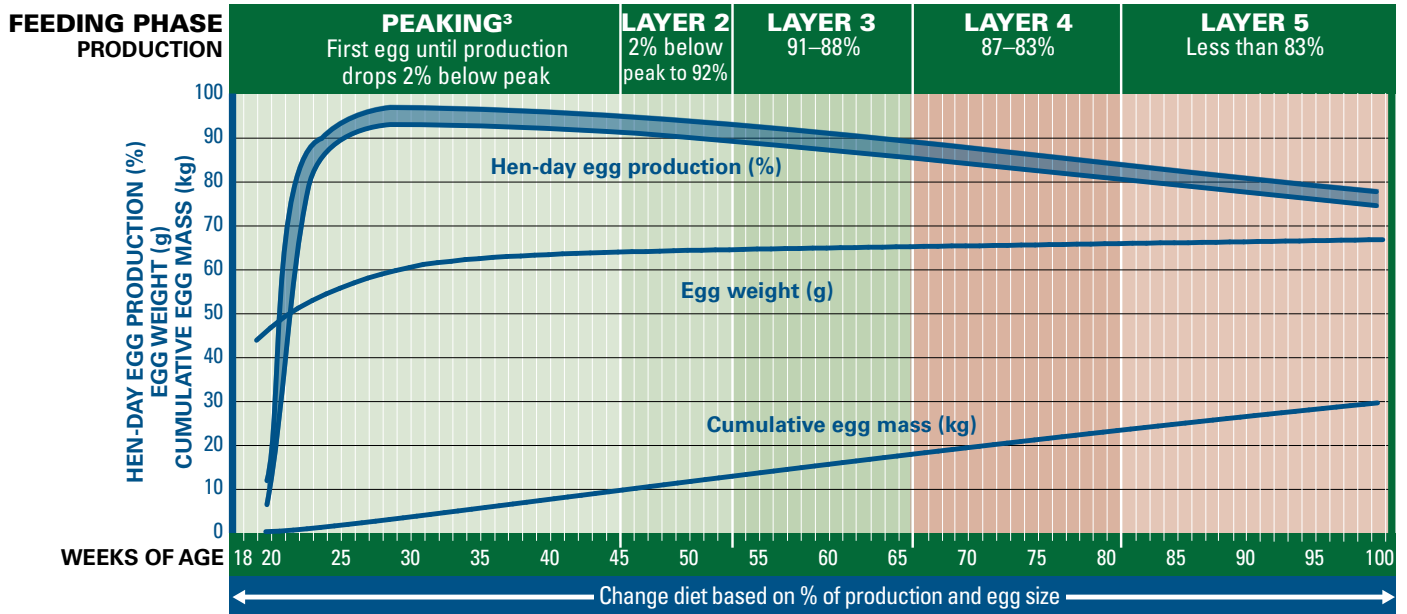


# Rearing Period Nutritional Recommendations



<sup>1</sup> 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.  
<sup>2</sup> 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.  
<sup>3</sup> 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.  
<sup>4</sup> Recommendation for Total Amino Acids is only appropriate to corn and soybean meal diet. Where diets utilise other ingredients, recommendations for Standardised Ileal Digestible Amino Acids must be followed.  
<sup>5</sup> 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.  
<sup>6</sup> 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.  
<sup>7</sup> Where other phosphorus systems are used, diets should contain recommended minimum level of available phosphorus.

# Production Period Nutritional Recommendations for Economical Performance<sup>1,2</sup>



NUTRITION	RECOMMENDED DAILY NUTRIENT INTAKE				
	PEAKING <sup>3</sup> First egg until production drops 2% below peak	LAYER 2 2% below peak to 92%	LAYER 3 91-88%	LAYER 4 87-83%	LAYER 5 Less than 83%
Metabolizable energy <sup>4</sup> , kcal/bird/day	295 / 310	290 / 305	285 / 300	280 / 295	275 / 290
Metabolizable energy <sup>4</sup> , 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 <sup>5</sup>				
Lysine, mg/day	820 / 898	810 / 887	790 / 865	760 / 832	730 / 799
Methionine, mg/day	410 / 441	401 / 431	391 / 420	376 / 405	361 / 389
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 / 767	669 / 738	642 / 709
Crude protein <sup>6</sup> , 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	2.00	1.60	1.50	1.40
Choline, mg/day	180	180	180	180	180

	CALCIUM AND PHOSPHORUS			
	Calcium <sup>7,8</sup> g/day	Phosphorus (available) <sup>7,9</sup> mg/day	Phosphorus (digestible) mg/day	Calcium Particle Size (fine : coarse)
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	50%	50%	50%	50%	50%
M+C	90%	90%	90%	90%	89%
Threonine	70%	70%	70%	70%	70%
Tryptophan	22%	22%	22%	22%	22%
Arginine	104%	104%	104%	104%	104%
Isoleucine	80%	80%	80%	80%	80%
Valine	88%	88%	88%	88%	88%



# Production Period Dietary Nutrient Concentrations for Economical Performance<sup>1,2</sup>

FEEDING PHASE PRODUCTION	PEAKING <sup>3</sup> First egg until production drops 2% below peak					LAYER 2 2% below peak to 92%					LAYER 3 91–88%					LAYER 4 87–83%					LAYER 5 Less than 83%				
	RECOMMENDED CONCENTRATION																								
Metabolizable energy <sup>4</sup> , kcal/bird/day	295 / 310					290 / 305					285 / 300					280 / 295					275 / 290				
Metabolizable energy <sup>4</sup> , 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	<b>95*</b>	100	105	95	100	<b>105*</b>	110	115	95	100	<b>105*</b>	110	115	95	100	<b>105*</b>	110	115	95	100	<b>105*</b>	110	115
Standardized Ileal Digestible Amino Acids																									
Lysine, %	0.96	0.91	<b>0.86</b>	0.82	0.78	0.90	0.85	<b>0.81</b>	0.77	0.74	0.83	0.79	<b>0.75</b>	0.72	0.69	0.80	0.76	<b>0.72</b>	0.69	0.66	0.77	0.73	<b>0.70</b>	0.66	0.63
Methionine, %	0.48	0.46	<b>0.43</b>	0.41	0.39	0.45	0.42	<b>0.40</b>	0.38	0.36	0.41	0.39	<b>0.37</b>	0.36	0.34	0.40	0.38	<b>0.36</b>	0.34	0.33	0.38	0.36	<b>0.34</b>	0.33	0.31
Methionine+Cystine, %	0.88	0.83	<b>0.79</b>	0.75	0.71	0.81	0.77	<b>0.73</b>	0.69	0.66	0.75	0.71	<b>0.68</b>	0.65	0.62	0.72	0.68	<b>0.65</b>	0.62	0.59	0.69	0.66	<b>0.63</b>	0.60	0.57
Threonine, %	0.68	0.64	<b>0.60</b>	0.57	0.55	0.63	0.60	<b>0.57</b>	0.54	0.52	0.58	0.55	<b>0.53</b>	0.50	0.48	0.56	0.53	<b>0.51</b>	0.48	0.46	0.54	0.51	<b>0.49</b>	0.46	0.44
Tryptophan, %	0.21	0.20	<b>0.19</b>	0.18	0.17	0.20	0.19	<b>0.18</b>	0.17	0.16	0.18	0.17	<b>0.17</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15	0.17	0.16	<b>0.15</b>	0.15	0.14
Arginine, %	1.00	0.95	<b>0.90</b>	0.85	0.81	0.94	0.89	<b>0.84</b>	0.80	0.77	0.87	0.82	<b>0.78</b>	0.75	0.71	0.83	0.79	<b>0.75</b>	0.72	0.69	0.80	0.76	<b>0.72</b>	0.69	0.66
Isoleucine, %	0.79	0.75	<b>0.71</b>	0.67	0.64	0.73	0.69	<b>0.66</b>	0.62	0.60	0.67	0.63	<b>0.60</b>	0.57	0.55	0.64	0.61	<b>0.58</b>	0.55	0.53	0.61	0.58	<b>0.56</b>	0.53	0.51
Valine, %	0.87	0.82	<b>0.78</b>	0.74	0.70	0.80	0.76	<b>0.72</b>	0.69	0.66	0.73	0.70	<b>0.66</b>	0.63	0.60	0.70	0.67	<b>0.64</b>	0.61	0.58	0.68	0.64	<b>0.61</b>	0.58	0.56
Total Amino Acids <sup>5</sup>																									
Lysine, %	1.06	1.00	<b>0.95</b>	0.90	0.86	0.99	0.93	<b>0.89</b>	0.84	0.81	0.91	0.87	<b>0.82</b>	0.79	0.75	0.88	0.83	<b>0.79</b>	0.76	0.72	0.84	0.80	<b>0.76</b>	0.73	0.69
Methionine, %	0.52	0.49	<b>0.46</b>	0.44	0.42	0.48	0.45	<b>0.43</b>	0.41	0.39	0.44	0.42	<b>0.40</b>	0.38	0.37	0.43	0.41	<b>0.39</b>	0.37	0.35	0.41	0.39	<b>0.37</b>	0.35	0.34
Methionine+Cystine, %	0.99	0.94	<b>0.89</b>	0.84	0.80	0.91	0.87	<b>0.82</b>	0.78	0.75	0.84	0.80	<b>0.76</b>	0.73	0.70	0.81	0.77	<b>0.73</b>	0.70	0.67	0.78	0.74	<b>0.71</b>	0.67	0.64
Threonine, %	0.79	0.75	<b>0.71</b>	0.68	0.64	0.74	0.70	<b>0.67</b>	0.64	0.61	0.69	0.65	<b>0.62</b>	0.59	0.57	0.66	0.63	<b>0.60</b>	0.57	0.54	0.63	0.60	<b>0.57</b>	0.55	0.52
Tryptophan, %	0.25	0.24	<b>0.23</b>	0.22	0.21	0.24	0.22	<b>0.21</b>	0.20	0.19	0.22	0.21	<b>0.20</b>	0.19	0.18	0.21	0.20	<b>0.19</b>	0.18	0.17	0.20	0.19	<b>0.18</b>	0.17	0.17
Arginine, %	1.08	1.02	<b>0.97</b>	0.92	0.87	1.01	0.95	<b>0.91</b>	0.86	0.82	0.93	0.88	<b>0.84</b>	0.80	0.77	0.89	0.85	<b>0.81</b>	0.77	0.74	0.86	0.82	<b>0.78</b>	0.74	0.71
Isoleucine, %	0.85	0.80	<b>0.76</b>	0.72	0.69	0.78	0.74	<b>0.71</b>	0.67	0.64	0.72	0.68	<b>0.65</b>	0.62	0.59	0.69	0.65	<b>0.62</b>	0.59	0.57	0.66	0.63	<b>0.60</b>	0.57	0.55
Valine, %	0.96	0.90	<b>0.86</b>	0.81	0.78	0.88	0.84	<b>0.80</b>	0.76	0.72	0.81	0.77	<b>0.73</b>	0.70	0.67	0.78	0.74	<b>0.70</b>	0.67	0.64	0.75	0.71	<b>0.68</b>	0.64	0.62
Crude protein <sup>6</sup> , %	20.71	19.56	<b>18.53</b>	17.60	16.76	19.33	18.32	<b>17.40</b>	16.57	15.82	17.79	16.90	<b>16.10</b>	15.36	14.70	17.16	16.30	<b>15.52</b>	14.82	14.17	16.53	15.70	<b>14.95</b>	14.27	13.65
Sodium, %	0.21	0.20	<b>0.19</b>	0.18	0.17	0.19	0.18	<b>0.17</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15
Chloride, %	0.21	0.20	<b>0.19</b>	0.18	0.17	0.19	0.18	<b>0.17</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15	0.18	0.17	<b>0.16</b>	0.15	0.15
Linoleic acid (C18:2 n-6), %	2.35	2.22	<b>2.11</b>	2.00	1.90	2.22	2.11	<b>2.00</b>	1.90	1.82	1.68	1.60	<b>1.52</b>	1.45	1.39	1.58	1.50	<b>1.43</b>	1.36	1.30	1.47	1.40	<b>1.33</b>	1.27	1.22
Choline, mg/kg	2118	2000	<b>1895</b>	1800	1714	2000	1895	<b>1800</b>	1714	1636	1895	1800	<b>1714</b>	1636	1565	1895	1800	<b>1714</b>	1636	1565	1895	1800	<b>1714</b>	1636	1565

## CALCIUM AND PHOSPHORUS CHANGES BASED ON FEED INTAKE

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

<sup>1</sup> All nutrient requirements are based on the [Feed Ingredient Tables](#).

<sup>2</sup> Crude protein, methionine+cystine, fat, linoleic acid, and / or energy may be changed to optimise egg size.

<sup>3</sup> Peaking nutrient levels are calculated for birds at peak egg production. Prior to achieving peak egg production, the nutrient requirements will be lower.

<sup>4</sup> 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.

<sup>5</sup> Recommendation for Total Amino Acids is only appropriate to corn and soybean meal diet. Where diets utilise other ingredients, recommendations for Standardised Ileal Digestible Amino Acids must be followed.

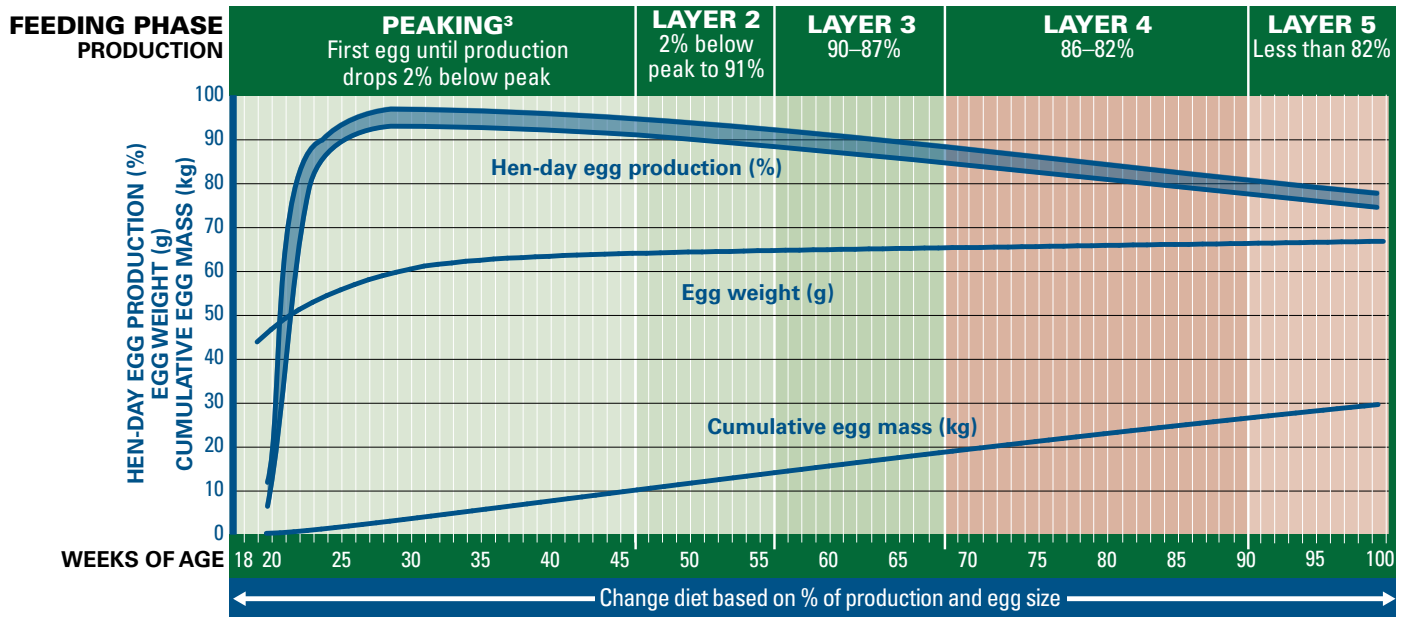
<sup>6</sup> Diets should always be formulated to provide required intake of amino acid. Concentration of crude protein in diet will vary with raw material used. Crude protein value provided is an estimated typical value only.

<sup>7</sup> 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.

<sup>8</sup> Calcium carbonate particle size recommendation varies throughout lay. Refer to [Calcium Particle Size](#) at [hyline.com](#). Dietary calcium levels and fine to coarse ratio may need to be adjusted based on limestone solubility.

<sup>9</sup> Where other phosphorus systems are used, diets should contain recommended minimum level of available phosphorus.

# Production Period Nutritional Recommendations for Optimal Performance<sup>1,2</sup>



**NUTRITION**

**RECOMMENDED DAILY NUTRIENT INTAKE**

	PEAKING <sup>3</sup> First egg until production drops 2% below peak	LAYER 2 2% below peak to 91%	LAYER 3 90-87%	LAYER 4 86-82%	LAYER 5 Less than 82%
Metabolizable energy <sup>4</sup> , kcal/bird/day	290 / 305	285 / 300	280 / 295	280 / 295	280 / 295
Metabolizable energy <sup>4</sup> , MJ/bird/day	1.21 / 1.28	1.19 / 1.26	1.17 / 1.23	1.17 / 1.23	1.17 / 1.23
<b>Standardized Ileal Digestible Amino Acids / Total Amino Acids<sup>5</sup></b>					
Lysine, mg/day	865 / 947	853 / 933	840 / 920	828 / 906	815 / 892
Methionine, mg/day	433 / 465	426 / 458	420 / 452	414 / 445	408 / 438
Methionine+Cystine, mg/day	796 / 898	776 / 875	756 / 853	745 / 840	734 / 827
Threonine, mg/day	606 / 712	597 / 702	588 / 692	579 / 681	571 / 671
Tryptophan, mg/day	190 / 227	188 / 224	185 / 221	182 / 218	179 / 214
Arginine, mg/day	899 / 967	887 / 953	873 / 939	861 / 925	848 / 911
Isoleucine, mg/day	709 / 763	691 / 743	672 / 723	662 / 712	652 / 701
Valine, mg/day	779 / 859	759 / 837	739 / 815	728 / 803	717 / 791
Crude protein <sup>6</sup> , g/day	18.40	18.18	17.95	17.73	17.50
Sodium, mg/day	190	180	180	180	180
Chloride, mg/day	190	180	180	180	180
Linoleic acid (C18:2 n-6), g/day	2.00	2.00	1.60	1.50	1.40
Choline, mg/day	160	180	180	180	180

**CALCIUM AND PHOSPHORUS**

	Calcium <sup>7,8</sup> g/day	Phosphorus (available) <sup>7,9</sup> mg/day	Phosphorus (digestible) mg/day	Calcium Particle Size (fine : coarse)
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	50%	50%	50%	50%	50%
M+C	92%	91%	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 Optimal Performance<sup>1,2</sup>

FEEDING PHASE PRODUCTION	PEAKING <sup>3</sup> First egg until production drops 2% below peak					LAYER 2 2% below peak to 91%					LAYER 3 90–857%					LAYER 4 86–82%					LAYER 5 Less than 82%				
	RECOMMENDED CONCENTRATION																								
Metabolizable energy <sup>4</sup> , kcal/bird/day	290 / 305					285 / 300					280 / 295					280 / 295					280 / 295				
Metabolizable energy <sup>4</sup> , MJ/bird/day	1.21 / 1.28					1.19 / 1.26					1.17 / 1.23					1.17 / 1.23					1.17 / 1.23				
FEED CONSUMPTION (*Typical Feed Consumption)																									
g/day per bird	90	95	<b>100*</b>	105	110	100	105	<b>110*</b>	115	120	100	105	<b>110*</b>	115	120	100	105	<b>110*</b>	115	120	100	105	<b>110*</b>	115	120
Standardized Ileal Digestible Amino Acids																									
Lysine, %	0.96	0.91	<b>0.87</b>	0.82	0.79	0.85	0.81	<b>0.78</b>	0.74	0.71	0.84	0.80	<b>0.76</b>	0.73	0.70	0.83	0.79	<b>0.75</b>	0.72	0.69	0.82	0.78	<b>0.74</b>	0.71	0.68
Methionine, %	0.48	0.46	<b>0.43</b>	0.41	0.39	0.43	0.41	<b>0.39</b>	0.37	0.36	0.42	0.40	<b>0.38</b>	0.37	0.35	0.41	0.39	<b>0.38</b>	0.36	0.35	0.41	0.39	<b>0.37</b>	0.35	0.34
Methionine+Cystine, %	0.88	0.84	<b>0.80</b>	0.76	0.72	0.78	0.74	<b>0.71</b>	0.67	0.65	0.76	0.72	<b>0.69</b>	0.66	0.63	0.75	0.71	<b>0.68</b>	0.65	0.62	0.73	0.70	<b>0.67</b>	0.64	0.61
Threonine, %	0.67	0.64	<b>0.61</b>	0.58	0.55	0.60	0.57	<b>0.54</b>	0.52	0.50	0.59	0.56	<b>0.53</b>	0.51	0.49	0.58	0.55	<b>0.53</b>	0.50	0.48	0.57	0.54	<b>0.52</b>	0.50	0.48
Tryptophan, %	0.21	0.20	<b>0.19</b>	0.18	0.17	0.19	0.18	<b>0.17</b>	0.16	0.16	0.19	0.18	<b>0.17</b>	0.16	0.15	0.18	0.17	<b>0.17</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15
Arginine, %	1.00	0.95	<b>0.90</b>	0.86	0.82	0.89	0.84	<b>0.81</b>	0.77	0.74	0.87	0.83	<b>0.79</b>	0.76	0.73	0.86	0.82	<b>0.78</b>	0.75	0.72	0.85	0.81	<b>0.77</b>	0.74	0.71
Isoleucine, %	0.79	0.75	<b>0.71</b>	0.68	0.64	0.69	0.66	<b>0.63</b>	0.60	0.58	0.67	0.64	<b>0.61</b>	0.58	0.56	0.66	0.63	<b>0.60</b>	0.58	0.55	0.65	0.62	<b>0.59</b>	0.57	0.54
Valine, %	0.87	0.82	<b>0.78</b>	0.74	0.71	0.76	0.72	<b>0.69</b>	0.66	0.63	0.74	0.70	<b>0.67</b>	0.64	0.62	0.73	0.69	<b>0.66</b>	0.63	0.61	0.72	0.68	<b>0.65</b>	0.62	0.60
Total Amino Acids <sup>5</sup>																									
Lysine, %	1.05	1.00	<b>0.95</b>	0.90	0.86	0.93	0.89	<b>0.85</b>	0.81	0.78	0.92	0.88	<b>0.84</b>	0.80	0.77	0.91	0.86	<b>0.82</b>	0.79	0.76	0.89	0.85	<b>0.81</b>	0.78	0.74
Methionine, %	0.52	0.49	<b>0.47</b>	0.44	0.42	0.46	0.44	<b>0.42</b>	0.40	0.38	0.45	0.43	<b>0.41</b>	0.39	0.38	0.45	0.42	<b>0.40</b>	0.39	0.37	0.44	0.42	<b>0.40</b>	0.38	0.37
Methionine+Cystine, %	1.00	0.95	<b>0.90</b>	0.86	0.82	0.88	0.83	<b>0.80</b>	0.76	0.73	0.85	0.81	<b>0.78</b>	0.74	0.71	0.84	0.80	<b>0.76</b>	0.73	0.70	0.83	0.79	<b>0.75</b>	0.72	0.69
Threonine, %	0.79	0.75	<b>0.71</b>	0.68	0.65	0.70	0.67	<b>0.64</b>	0.61	0.59	0.69	0.66	<b>0.63</b>	0.60	0.58	0.68	0.65	<b>0.62</b>	0.59	0.57	0.67	0.64	<b>0.61</b>	0.58	0.56
Tryptophan, %	0.25	0.24	<b>0.23</b>	0.22	0.21	0.22	0.21	<b>0.20</b>	0.19	0.19	0.22	0.21	<b>0.20</b>	0.19	0.18	0.22	0.21	<b>0.20</b>	0.19	0.18	0.21	0.20	<b>0.19</b>	0.19	0.18
Arginine, %	1.07	1.02	<b>0.97</b>	0.92	0.88	0.95	0.91	<b>0.87</b>	0.83	0.79	0.94	0.89	<b>0.85</b>	0.82	0.78	0.93	0.88	<b>0.84</b>	0.80	0.77	0.91	0.87	<b>0.83</b>	0.79	0.76
Isoleucine, %	0.85	0.80	<b>0.76</b>	0.73	0.69	0.74	0.71	<b>0.68</b>	0.65	0.62	0.72	0.69	<b>0.66</b>	0.63	0.60	0.71	0.68	<b>0.65</b>	0.62	0.59	0.70	0.67	<b>0.64</b>	0.61	0.58
Valine, %	0.95	0.90	<b>0.86</b>	0.82	0.78	0.84	0.80	<b>0.76</b>	0.73	0.70	0.82	0.78	<b>0.74</b>	0.71	0.68	0.80	0.76	<b>0.73</b>	0.70	0.67	0.79	0.75	<b>0.72</b>	0.69	0.66
Crude protein <sup>6</sup> , %	20.44	19.37	<b>18.40</b>	17.52	16.73	18.18	17.31	<b>16.52</b>	15.80	15.15	17.95	17.10	<b>16.32</b>	15.61	14.96	17.73	16.88	<b>16.11</b>	15.41	14.77	17.50	16.67	<b>15.91</b>	15.22	14.58
Sodium, %	0.21	0.20	<b>0.19</b>	0.18	0.17	0.18	0.17	<b>0.16</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15
Chloride, %	0.21	0.20	<b>0.19</b>	0.18	0.17	0.18	0.17	<b>0.16</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15	0.18	0.17	<b>0.16</b>	0.16	0.15
Linoleic acid (C18:2 n-6), %	2.22	2.11	<b>2.00</b>	1.90	1.82	2.00	1.90	<b>1.82</b>	1.74	1.67	1.60	1.52	<b>1.45</b>	1.39	1.33	1.50	1.43	<b>1.36</b>	1.30	1.25	1.40	1.33	<b>1.27</b>	1.22	1.17
Choline, mg/kg	1778	1684	<b>1600</b>	1524	1455	1800	1714	<b>1636</b>	1565	1500	1800	1714	<b>1636</b>	1565	1500	1800	1714	<b>1636</b>	1565	1500	1800	1714	<b>1636</b>	1565	1500

## CALCIUM AND PHOSPHORUS CHANGES BASED ON FEED INTAKE

Feed Consumption, g/day per bird	Weeks 18–32					Weeks 33–55					Weeks 56–72					Weeks 73–85					Weeks 86+				
	90	95	<b>100</b>	105	110	100	105	<b>110</b>	115	120	100	105	<b>110</b>	115	120	100	105	<b>110</b>	115	120	100	105	<b>110</b>	115	120
Calcium <sup>7,8</sup> , %	4.44	4.21	<b>4.00</b>	3.81	3.64	4.15	3.95	<b>3.77</b>	3.61	3.46	4.30	4.10	<b>3.91</b>	3.74	3.58	4.45	4.24	<b>4.05</b>	3.87	3.71	4.84	4.60	<b>4.38</b>	4.18	3.83
Phosphorus (available) <sup>7,9</sup> , %	0.50	0.47	<b>0.45</b>	0.43	0.41	0.42	0.40	<b>0.38</b>	0.37	0.35	0.38	0.38	<b>0.36</b>	0.34	0.33	0.37	0.35	<b>0.34</b>	0.32	0.31	0.34	0.33	<b>0.31</b>	0.30	0.29
Phosphorus (digestible), %	0.45	0.42	<b>0.40</b>	0.38	0.36	0.38	0.36	<b>0.35</b>	0.33	0.32	0.36	0.34	<b>0.32</b>	0.31	0.30	0.33	0.32	<b>0.30</b>	0.29	0.28	0.31	0.29	<b>0.28</b>	0.27	0.26

<sup>1</sup> All nutrient requirements are based on the [Feed Ingredient Tables](#).

<sup>2</sup> Crude protein, methionine+cystine, fat, linoleic acid, and / or energy may be changed to optimise egg size.

<sup>3</sup> Peaking nutrient levels are calculated for birds at peak egg production. Prior to achieving peak egg production, the nutrient requirements will be lower.

<sup>4</sup> 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.

<sup>5</sup> Recommendation for Total Amino Acids is only appropriate to corn and soybean meal diet. Where diets utilise other ingredients, recommendations for Standardised Ileal Digestible Amino Acids must be followed.

<sup>6</sup> 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.

<sup>7</sup> 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.

<sup>8</sup> Calcium carbonate particle size recommendation varies throughout lay. Refer to [Calcium Particle Size](#) at hyline.com. Dietary calcium levels and fine to coarse ratio may need to be adjusted based on limestone solubility.

<sup>9</sup> Where other phosphorus systems are used, diets should contain recommended minimum level of available phosphorus.

# Vitamins and Trace Minerals

ITEM <sup>1,2,3,4</sup>	IN 1000 KG COMPLETE DIET	
	Rearing Period	Production Period
Vitamin A, IU	10,000,000	8,000,000
Vitamin D <sub>3</sub> <sup>5</sup> , IU	3,300,000	3,300,000
Vitamin E, g	30.00	25.00
Vitamin K (menadione), g	3.50	3.00
Thiamin (B <sub>1</sub> ), g	2.20	2.50
Riboflavin (B <sub>2</sub> ), g	6.60	5.50
Niacin (B <sub>3</sub> ) <sup>6</sup> , g	40.00	30.00
Pantothenic acid (B <sub>5</sub> ), g	10.00	10.00
Pyridoxine (B <sub>6</sub> ), g	4.50	5.00
Biotin (B <sub>7</sub> ), mg	100.00	75.00
Folic acid (B <sub>9</sub> ), g	1.00	0.90
Cobalamine (B <sub>12</sub> ), mg	23.00	23.00
Manganese <sup>7</sup> , g	100.00	100.00
Zinc <sup>7</sup> , g	85.00	80.00
Iron <sup>7</sup> , g	30.00	40.00
Copper <sup>7</sup> , g	15.00	8.00
Magnesium <sup>7</sup> , g	600.00	500.00
Iodine, g	1.50	1.20
Selenium <sup>7</sup> , g	0.25	0.25

<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> Vitamin and mineral recommendations vary according to activity.

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

<sup>5</sup> A proportion of Vitamin D<sub>3</sub> can be supplemented as 25-hydroxy D<sub>3</sub> according to supplier's recommendations and applicable limits.

<sup>6</sup> Higher levels of Niacin are recommended in non-cage systems.

<sup>7</sup> 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 $\text{NO}_3^-$ <sup>1</sup>	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 ( $\text{NO}_3\text{-N}$ ) <sup>1</sup>	6	
Nitrite $\text{NO}_2^-$ <sup>1</sup>	4	Nitrite is considerably more toxic than Nitrate, especially for young birds, where 1 ppm Nitrite may be considered toxic.
Nitrite Nitrogen ( $\text{NO}_2\text{-N}$ ) <sup>1</sup>	1	
Total dissolved solids <sup>2</sup>	1000	Levels up to 3000 ppm may not affect performance but could increase manure moisture.
Chloride ( $\text{Cl}^-$ ) <sup>1</sup>	250	Levels as low as 14 mg may be problematic if sodium is higher than 50 ppm.
Sulphate ( $\text{SO}_4^-$ ) <sup>1</sup>	250	Higher levels may be laxative.
Iron ( $\text{Fe}$ ) <sup>1</sup>	<0.3	Higher levels result in bad odour and taste.
Magnesium ( $\text{Mg}$ ) <sup>1</sup>	125	Higher levels may be laxative. Levels above 50 ppm may be problematic if sulphate levels are high.
Potassium ( $\text{K}$ ) <sup>2</sup>	20	Higher levels may be acceptable depending on sodium level, alkalinity, and pH.
Sodium ( $\text{Na}$ ) <sup>1,2</sup>	50	Higher concentration is acceptable but concentrations above 50 ppm should be avoided if high levels of chloride, sulphate, or potassium exist.
Manganese ( $\text{Mn}$ ) <sup>3</sup>	0.05	Higher levels may be laxative.
Arsenic ( $\text{As}$ ) <sup>2</sup>	0.5	
Fluoride ( $\text{F}^-$ ) <sup>2</sup>	2	
Aluminium ( $\text{Al}$ ) <sup>2</sup>	5	
Boron ( $\text{B}$ ) <sup>2</sup>	5	
Cadmium ( $\text{Cd}$ ) <sup>2</sup>	0.02	
Cobalt ( $\text{Co}$ ) <sup>2</sup>	1	
Copper ( $\text{Cu}$ ) <sup>1</sup>	0.6	Higher levels result in bitter taste.
Lead ( $\text{Pb}$ ) <sup>1</sup>	0.02	Higher levels are toxic.
Mercury ( $\text{Hg}$ ) <sup>2</sup>	0.003	Higher levels are toxic.
Zinc ( $\text{Zn}$ ) <sup>1</sup>	1.5	Higher levels are toxic.
pH <sup>1</sup>	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 <sup>3</sup>	1000 CFU/ml	This is likely to indicate dirty water.
Total Coliform bacteria <sup>3</sup>	50 CFU/ml	
Faecal Coliform bacteria <sup>3</sup>	0 CFU/ml	
Oxygen Reduction Potential (ORP) <sup>3</sup>	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.

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

<sup>2</sup> 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

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



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## Hy-Line W-80 Online Management Guide

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## TECHNICAL UPDATES

### Diseases

An Overview of Focal Duodenal Necrosis (FDN)  
MG Control in Commercial Layers  
Colibacillosis in Layers: An Overview  
Fowl Pox in Layers  
Avian Urolithiasis (Visceral Gout)  
Infectious Bursal Disease (IBD, Gumboro)  
Fatty Liver Hemorrhagic Syndrome  
Infectious Laryngotracheitis (ILT)  
Intestinal Dilation Syndrome (IDS)  
Newcastle Disease  
*Mycoplasma Synoviae* (MS)  
Low Pathogenic Avian Influenza (LPAI)

### Diagnostic Samples and Breeder Flock Monitoring

*Salmonella*, *Mycoplasma*, and Avian Influenza  
Monitoring in Parent Breeder Flocks  
Proper Collection and Handling of Diagnostic Samples

### Management

Growing Management of Commercial Pullets  
Understanding the Role of the Skeleton in Egg Production  
The Science of Egg Quality  
Understanding Poultry Lighting  
Understanding Heat Stress in Layers  
Infrared Beak Treatment  
Feed Granulometry and the Importance of Feed Particle Size in Layers  
Impact of Tarp Colour on Poultry Lighting  
SPIDES (Short Period Incubation During Egg Storage)  
Fly Management: Surveillance and Control  
Optimising Egg Size in Commercial Layers  
Vaccination Recommendations  
Egg Drop Syndrome (EDS)  
Managing Fully Beaked Flocks  
Thiamin Deficiency in Pullets  
Understanding Nesting Behaviour

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