

Hy-Line[®]

BROWN MAX

ALTERNATIVE SYSTEMS



Hy-Line

**COMMERCIAL LAYERS
PERFORMANCE GUIDE**

Use of the Performance Guide

The genetic potential of Hy-Line Brown Max 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 Brown Max 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.



**Alternative Systems
Online Management Guide**

Table of Contents

Variety Standards

Summary of Performance Standards	3
Rearing Period Performance Table	4
Rearing Period Space Recommendations	4
Production Period Performance Table	5–8
Production Period Space Recommendations	9
Performance Graph	9
Egg Quality	10
Egg Size Distribution	10–11

Management

Brooding Period

Brooding Temperatures and Lighting	11
Development of the Organ Systems in Pullets	12
Body Score Chart	12

Transition Period

Transition Period from Rear to Peak Egg Production	13
--	----

Lighting

Lighting Programs	14–16
-----------------------------------	-------

Nutrition

Rearing Period

Nutritional Recommendations	17
---	----

Production Period

Nutritional Recommendations (for Egg Numbers)	18
Dietary Nutrient Concentrations (for Egg Numbers)	19
Nutritional Recommendations (for Egg Weight)	20
Dietary Nutrient Concentrations (for Egg Weight)	21
Vitamins and Trace Minerals	22
Water Quality	23

Summary of Performance Standards

REARING PERIOD (TO 17 WEEKS):	
Livability	97.73%
Feed Consumed	6.24 kg
Body Weight at 18 Weeks	1434–1601 g
LAYING PERIOD (TO 100 WEEKS):	
Percent Peak	94.8–96.6%
Hen-Day Eggs to 60 Weeks	257.4–269.0
Hen-Day Eggs to 100 Weeks	479.1–500.4
Hen-Housed Eggs to 60 Weeks	253.0–264.4
Hen-Housed Eggs to 100 Weeks	459.6–480.2
Livability to 60 Weeks	96.53%
Livability to 100 Weeks	88.77%
Days to 50% Production (from hatch)	142
Egg Weight at 26 Weeks	56.7–59.7 g
Egg Weight at 32 Weeks	59.1–62.2 g
Egg Weight at 70 Weeks	62.5–65.7 g
Egg Weight at 100 Weeks	63.8–67.1 g
Total Egg Mass per Hen-Housed (18–80 weeks)	23.0 kg
Total Egg Mass per Hen-Housed (18–100 weeks)	29.4 kg
Body Weight at 26 Weeks	1744–1882 g
Body Weight at 32 Weeks	1826–1974 g
Body Weight at 70 Weeks	1924–2075 g
Body Weight at 100 Weeks	1973–2127 g
Freedom From Egg Inclusions	Excellent
Shell Strength	Excellent
Shell Color Score at 38 Weeks	91
Shell Color Score at 56 Weeks	88
Shell Color Score at 72 Weeks	84
Shell Color Score at 90 Weeks	81
Haugh Units at 38 Weeks	90
Haugh Units at 56 Weeks	84
Haugh Units at 72 Weeks	81
Haugh Units at 90 Weeks	80
Average Daily Feed Consumption (19–100 weeks)	113.7–124.3 g/day per bird
Feed Conversion Rate, kg Feed/kg Eggs (20–60 weeks)	2.19–2.28
Feed Conversion Rate, kg Feed/kg Eggs (20–100 weeks)	2.30–2.39
Feed Utilization, kg Egg/kg Feed (20–60 weeks)	0.44–0.46
Feed Utilization, kg Egg/kg Feed (20–100 weeks)	0.42–0.44
Feed Consumption per 10 Eggs (20–60 weeks)	1.32–1.37 kg
Feed Consumption per 10 Eggs (20–100 weeks)	1.38–1.43 kg
Feed Consumption per Dozen Eggs (20–60 weeks)	1.58–1.64 kg
Feed Consumption per Dozen Eggs (20–100 weeks)	1.65–1.72 kg
Skin Color	Yellow
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 hyline.com.

Rearing Period Performance Table

AGE (weeks)	MORTALITY Cumulative (%)	BODY WEIGHT (g)			WATER INTAKE (ml/bird/day)			FEED INTAKE (g/bird/day)			CUMULATIVE FEED INTAKE (g/bird to date)			UNIFORMITY %
		Low	High	Target	Low	High	Target	Low	High	Target	Low	High	Target	
1	0.45	70	76	73	18	30	23.8	12	15	13.5	84	105	90	>85%
2	0.62	127	138	132	26	45	35.2	17	22	19.7	203	262	230	
3	0.74	192	208	200	30	53	41.7	20	27	23.3	343	449	400	
4	0.85	267	289	278	38	64	50.7	25	32	28.5	518	672	600	>80%
5	0.96	353	383	368	44	77	60.0	29	38	33.6	721	940	830	
6	1.08	447	485	466	53	93	72.9	35	47	40.8	966	1267	1120	
7	1.19	546	591	569	62	104	82.7	41	52	46.5	1253	1630	1440	>85%
8	1.30	646	700	673	71	118	94.5	47	59	53.1	1582	2045	1810	
9	1.42	747	809	778	78	129	103.4	52	64	58.2	1946	2496	2220	
10	1.53	845	916	880	84	135	109.5	56	67	61.7	2338	2968	2650	
11	1.64	940	1018	979	90	145	117.6	60	73	66.3	2758	3476	3120	
12	1.76	1029	1114	1072	93	151	122.1	62	76	68.8	3192	4006	3600	
13	1.85	1111	1203	1157	96	155	125.6	64	78	70.8	3640	4549	4090	
14	1.93	1186	1285	1236	99	161	130.1	66	81	73.3	4102	5113	4610	
15	2.02	1257	1362	1310	102	165	133.6	68	83	75.3	4578	5691	5130	
16	2.10	1326	1437	1381	105	171	138.1	70	86	77.8	5068	6290	5680	
17	2.27	1393	1509	1451	108	177	142.6	72	89	80.3	5572	6910	6240	>90%

Rearing Period Space Recommendations

(check local regulations concerning space requirements)

- Useable space is calculated as litter floor and raised slat areas, not including perch space.
- Rearing density depends on age of transfer to the laying facility. Use the approximation at right.

Week of Transfer	Birds/m ² of Useable Space
15	15
16	14
17	13
18	12

	MULTI-TIER	FLOOR
Floor space	< 20 kg live weight per m ² of useable space at 16 weeks when transferred to the laying facility. Adjust stocking density if birds are transferred at other ages.	< 20 kg live weight per m ² floor space at end of rearing period
Feeder space	2.5 cm/bird with access on both sides; 5 cm/bird with side access; 2.0 cm/bird with circular feeders	2.5 cm/bird with access on both sides; 5 cm/bird with side access; 2.0 cm/bird with circular feeders
Drinking systems, cups or nipples	12.5 birds per nipple drinker; 20 birds per cup	12.5 birds per nipple drinker; 20 birds per cup; 125 birds per bell drinker
Perch space	10–15 cm/bird	10–15 cm/bird

Production Period Performance Table

AGE (weeks)	% HEN-DAY Current			HEN-DAY EGGS Cumulative			HEN-HOUSED EGGS Cumulative			MORT- ALITY Cumulative (%)	BODY WEIGHT (g)		
	Low	High	Target	Low	High	Target	Low	High	Target		Low	High	Target
18	1.1	7.7	4.4	0.1	0.5	0.31	0.1	0.5	0.3	0.14	1458	1580	1519
19	8.2	27.1	17.7	0.7	2.4	1.54	0.7	2.4	1.5	0.14	1518	1644	1581
20	30.8	57.3	44.1	2.8	6.4	4.63	2.8	6.4	4.6	0.14	1570	1701	1636
21	61.4	80.5	71.0	7.1	12.1	9.59	7.1	12.1	9.6	0.27	1614	1749	1681
22	82.4	90.6	86.5	12.9	18.4	15.65	12.8	18.4	15.6	0.40	1650	1788	1719
23	90.6	94.1	92.4	19.2	25.0	22.11	19.2	24.9	22.0	0.40	1679	1819	1749
24	93.2	95.5	94.4	25.7	31.7	28.72	25.6	31.6	28.6	0.53	1703	1845	1774
25	94.2	96.2	95.2	32.3	38.4	35.38	32.2	38.3	35.2	0.67	1723	1867	1795
26	94.6	96.4	95.5	39.0	45.2	42.07	38.8	45.0	41.9	0.67	1742	1887	1814
27	94.8	96.6	95.7	45.6	51.9	48.77	45.4	51.7	48.5	0.81	1758	1905	1832
28	94.8	96.6	95.7	52.2	58.7	55.46	51.9	58.4	55.2	0.81	1774	1922	1848
29	94.8	96.6	95.7	58.9	65.5	62.16	58.5	65.1	61.8	0.94	1788	1937	1863
30	94.8	96.5	95.7	65.5	72.2	68.86	65.1	71.8	68.4	0.94	1801	1951	1876
31	94.7	96.5	95.6	72.1	79.0	75.55	71.6	78.5	75.1	1.07	1814	1965	1889
32	94.7	96.5	95.6	78.8	85.7	82.24	78.2	85.1	81.7	1.07	1825	1977	1901
33	94.6	96.3	95.5	85.4	92.5	88.92	84.7	91.8	88.3	1.20	1834	1987	1911
34	94.4	96.1	95.3	92.0	99.2	95.59	91.3	98.5	94.9	1.20	1843	1996	1919
35	94.2	96.0	95.1	98.6	105.9	102.25	97.8	105.1	101.4	1.34	1849	2004	1927
36	94.0	95.8	94.9	105.2	112.6	108.89	104.3	111.7	108.0	1.34	1855	2010	1933
37	93.7	95.7	94.7	111.7	119.3	115.52	110.7	118.3	114.5	1.47	1860	2015	1937
38	93.5	95.5	94.5	118.3	126.0	122.14	117.2	124.9	121.0	1.47	1863	2019	1941
39	93.3	95.3	94.3	124.8	132.7	128.74	123.6	131.5	127.5	1.60	1866	2021	1944
40	93.1	95.0	94.1	131.3	139.3	135.32	130.0	138.0	134.0	1.60	1868	2023	1945
41	92.8	94.9	93.9	137.8	146.0	141.89	136.4	144.5	140.5	1.74	1869	2025	1947
42	92.5	94.6	93.6	144.3	152.6	148.44	142.8	151.0	146.9	1.87	1871	2027	1949
43	92.1	94.4	93.3	150.7	159.2	154.97	149.1	157.5	153.3	1.87	1873	2029	1951
44	91.8	94.1	93.0	157.2	165.8	161.47	155.4	164.0	159.7	2.01	1874	2030	1952
45	91.5	93.8	92.7	163.6	172.4	167.96	161.7	170.4	166.0	2.01	1876	2032	1954
46	91.2	93.5	92.4	169.9	178.9	174.42	167.9	176.8	172.3	2.14	1877	2034	1956
47	90.9	93.3	92.1	176.3	185.4	180.87	174.1	183.2	178.7	2.14	1879	2036	1957
48	90.7	93.1	91.9	182.7	191.9	187.30	180.3	189.6	184.9	2.27	1881	2037	1959
49	90.4	92.8	91.6	189.0	198.4	193.71	186.5	195.9	191.2	2.40	1882	2039	1961
50	90.0	92.7	91.4	195.3	204.9	200.11	192.7	202.2	197.4	2.40	1884	2041	1962
51	89.8	92.4	91.1	201.6	211.4	206.49	198.8	208.5	203.7	2.54	1885	2043	1964
52	89.6	92.2	90.9	207.8	217.9	212.85	204.9	214.8	209.9	2.68	1887	2044	1966
53	89.4	91.9	90.7	214.1	224.3	219.19	211.0	221.1	216.0	2.68	1889	2046	1967
54	89.3	91.7	90.5	220.4	230.7	225.53	217.1	227.3	222.2	2.81	1890	2048	1969
55	88.9	91.5	90.2	226.6	237.1	231.84	223.1	233.5	228.3	2.94	1892	2050	1971
56	88.7	91.4	90.1	232.8	243.5	238.15	229.1	239.7	234.4	2.94	1894	2051	1972
57	88.4	91.2	89.8	239.0	249.9	244.43	235.1	245.9	240.5	3.07	1895	2053	1974
58	88.2	91.0	89.6	245.1	256.3	250.71	241.1	252.1	246.6	3.21	1897	2055	1976
59	87.9	90.8	89.4	251.3	262.6	256.96	247.0	258.2	252.6	3.35	1898	2057	1978
60	87.6	90.5	89.1	257.4	269.0	263.19	253.0	264.4	258.7	3.47	1900	2058	1979

Production Period Performance Table (cont.)

AGE (weeks)	% HEN-DAY Current			HEN-DAY EGGS Cumulative			HEN-HOUSED EGGS Cumulative			MORT- ALITY Cumulative (%)	BODY WEIGHT (g)		
	Low	High	Target	Low	High	Target	Low	High	Target		Low	High	Target
61	87.3	90.2	88.8	263.5	275.3	269.41	258.8	270.4	264.6	3.61	1902	2060	1981
62	87.0	90.0	88.5	269.6	281.6	275.60	264.7	276.5	270.6	3.74	1903	2062	1983
63	86.7	89.8	88.3	275.7	287.9	281.78	270.5	282.5	276.5	3.88	1905	2064	1984
64	86.5	89.7	88.1	281.8	294.1	287.94	276.4	288.6	282.5	3.88	1907	2065	1986
65	86.3	89.5	87.9	287.8	300.4	294.10	282.2	294.6	288.4	4.02	1908	2067	1988
66	85.9	89.3	87.6	293.8	306.6	300.22	287.9	300.6	294.3	4.14	1910	2069	1989
67	85.4	89.0	87.2	299.8	312.9	306.33	293.7	306.6	300.1	4.14	1911	2071	1991
68	84.9	88.7	86.8	305.7	319.1	312.41	299.3	312.5	305.9	4.28	1913	2072	1993
69	84.3	88.5	86.4	311.6	325.3	318.46	305.0	318.4	311.7	4.41	1915	2074	1994
70	83.8	88.2	86.0	317.5	331.5	324.48	310.6	324.3	317.4	4.55	1916	2076	1996
71	83.4	87.7	85.5	323.3	337.6	330.46	316.1	330.2	323.1	4.81	1918	2078	1998
72	82.7	87.2	85.0	329.1	343.7	336.41	321.6	336.0	328.8	4.95	1919	2079	1999
73	82.2	86.7	84.4	334.9	349.8	342.32	327.1	341.7	334.4	5.22	1921	2081	2001
74	81.6	86.1	83.9	340.6	355.8	348.19	332.5	347.4	340.0	5.34	1923	2083	2003
75	81.1	85.6	83.3	346.3	361.8	354.02	337.9	353.1	345.5	5.61	1924	2085	2004
76	80.5	85.1	82.8	351.9	367.7	359.82	343.2	358.7	350.9	5.75	1926	2086	2006
77	80.0	84.6	82.3	357.5	373.7	365.58	348.4	364.3	356.3	6.01	1928	2088	2008
78	79.5	84.0	81.8	363.1	379.5	371.30	353.7	369.8	361.7	6.15	1929	2090	2010
79	78.9	83.5	81.2	368.6	385.4	376.99	358.8	375.2	367.0	6.42	1931	2092	2011
80	78.4	83.0	80.7	374.1	391.2	382.64	364.0	380.7	372.3	6.56	1932	2093	2013
81	78.0	82.5	80.2	379.5	397.0	388.25	369.0	386.0	377.5	6.82	1934	2095	2015
82	77.5	81.9	79.7	385.0	402.7	393.84	374.1	391.4	382.7	6.95	1936	2097	2016
83	77.1	81.4	79.3	390.4	408.4	399.38	379.1	396.7	387.9	7.21	1937	2099	2018
84	76.8	80.9	78.8	395.7	414.1	404.90	384.1	401.9	393.0	7.35	1939	2100	2020
85	76.4	80.3	78.4	401.1	419.7	410.39	389.0	407.1	398.1	7.62	1940	2102	2021
86	76.1	79.8	78.0	406.4	425.3	415.85	393.9	412.3	403.1	7.76	1942	2104	2023
87	75.8	79.3	77.5	411.7	430.8	421.27	398.8	417.4	408.1	8.02	1944	2106	2025
88	75.4	78.7	77.1	417.0	436.3	426.67	403.7	422.4	413.0	8.16	1945	2107	2026
89	75.2	78.3	76.7	422.3	441.8	432.04	408.5	427.4	418.0	8.43	1947	2109	2028
90	75.0	77.8	76.4	427.5	447.3	437.39	413.3	432.4	422.9	8.69	1949	2111	2030
91	74.7	77.4	76.1	432.7	452.7	442.71	418.0	437.4	427.7	8.96	1950	2113	2031
92	74.5	77.1	75.8	438.0	458.1	448.02	422.8	442.3	432.5	9.22	1952	2114	2033
93	74.3	76.7	75.5	443.2	463.4	453.30	427.5	447.1	437.3	9.49	1953	2116	2035
94	74.0	76.4	75.2	448.3	468.8	458.57	432.2	451.9	442.0	9.76	1955	2118	2036
95	73.8	76.1	74.9	453.5	474.1	463.81	436.8	456.7	446.8	10.03	1957	2120	2038
96	73.5	75.7	74.6	458.7	479.4	469.04	441.4	461.5	451.5	10.16	1958	2121	2040
97	73.3	75.4	74.3	463.8	484.7	474.24	446.0	466.2	456.1	10.42	1960	2123	2041
98	73.1	75.0	74.1	468.9	489.9	479.42	450.6	470.9	460.8	10.70	1961	2125	2043
99	72.8	74.7	73.8	474.0	495.2	484.59	455.1	475.6	465.4	10.96	1963	2127	2045
100	72.6	74.4	73.5	479.1	500.4	489.73	459.6	480.2	469.9	11.23	1965	2128	2047

Production Period Performance Table (cont.)

AGE (weeks)	WATER INTAKE (ml/bird/day)			FEED INTAKE (g/bird/day)			HH EGG MASS Cumulative (kg)			EGG WEIGHT (g/egg)		
	Low	High	Target	Low	High	Target	Low	High	Target	Low	High	Target
18	114	189	151.6	76	95	85.3	0.0	0.0	0.0	44.8	47.2	46.0
19	132	202	166.9	88	101	94.4	0.0	0.1	0.1	47.6	49.9	48.8
20	140	212	175.8	93	106	99.5	0.1	0.3	0.2	49.7	52.3	51.0
21	147	220	183.7	98	110	104.1	0.4	0.6	0.5	51.5	54.1	52.8
22	153	229	190.9	102	114	108.2	0.7	1.0	0.8	52.9	55.6	54.3
23	158	237	197.3	105	119	111.8	1.0	1.3	1.2	54.2	57.0	55.6
24	164	243	203.4	109	122	115.3	1.4	1.7	1.6	55.2	58.0	56.6
25	167	245	206.0	111	123	116.9	1.8	2.1	1.9	56.0	58.9	57.4
26	168	248	207.8	112	124	117.9	2.2	2.5	2.3	56.7	59.7	58.2
27	169	248	208.5	113	124	118.3	2.5	2.9	2.7	57.3	60.3	58.8
28	170	249	209.3	113	124	118.8	2.9	3.3	3.1	57.8	60.7	59.2
29	171	249	210.1	114	125	119.3	3.3	3.7	3.5	58.2	61.2	59.7
30	172	250	210.9	114	125	119.7	3.7	4.1	3.9	58.5	61.6	60.1
31	173	251	211.7	115	125	120.2	4.1	4.5	4.3	58.9	61.9	60.4
32	173	251	211.7	115	125	120.2	4.5	4.9	4.7	59.1	62.2	60.6
33	173	251	211.7	115	125	120.2	4.9	5.3	5.1	59.4	62.4	60.9
34	173	251	211.7	115	125	120.2	5.3	5.7	5.5	59.5	62.6	61.1
35	173	251	211.7	115	125	120.2	5.7	6.1	5.9	59.6	62.8	61.2
36	173	251	211.7	115	125	120.2	6.1	6.5	6.3	59.9	62.9	61.4
37	173	251	211.7	115	125	120.2	6.5	6.9	6.7	60.0	63.1	61.6
38	173	251	211.7	115	125	120.2	6.9	7.3	7.1	60.1	63.2	61.6
39	173	251	211.7	115	125	120.2	7.3	7.7	7.5	60.2	63.2	61.7
40	173	251	211.7	115	125	120.2	7.7	8.1	7.9	60.2	63.3	61.8
41	173	251	211.7	115	125	120.2	8.1	8.5	8.3	60.3	63.4	61.9
42	173	251	211.7	115	125	120.2	8.5	8.9	8.7	60.5	63.6	62.1
43	173	251	211.7	115	125	120.2	8.9	9.3	9.1	60.6	63.7	62.2
44	173	251	211.7	115	125	120.2	9.3	9.7	9.5	60.7	63.8	62.3
45	173	251	211.7	115	125	120.2	9.7	10.2	9.9	60.8	64.0	62.4
46	173	251	211.7	115	125	120.2	10.1	10.6	10.3	60.9	64.0	62.5
47	173	251	211.7	115	125	120.2	10.5	11.0	10.7	61.0	64.1	62.6
48	173	251	211.7	115	125	120.2	10.8	11.4	11.1	61.0	64.2	62.6
49	173	251	211.7	115	125	120.2	11.2	11.8	11.5	61.2	64.3	62.8
50	173	251	211.7	115	125	120.2	11.6	12.1	11.9	61.2	64.3	62.8
51	173	251	211.7	115	125	120.2	12.0	12.5	12.3	61.3	64.5	62.9
52	173	251	211.7	115	125	120.2	12.4	12.9	12.7	61.3	64.5	62.9
53	173	251	211.7	115	125	120.2	12.8	13.3	13.1	61.5	64.6	63.1
54	173	251	211.7	115	125	120.2	13.2	13.7	13.4	61.5	64.6	63.1
55	173	251	211.7	115	125	120.2	13.5	14.1	13.8	61.5	64.7	63.1
56	173	251	211.7	115	125	120.2	13.9	14.5	14.2	61.7	64.8	63.2
57	173	251	211.7	115	125	120.2	14.3	14.9	14.6	61.7	64.8	63.2
58	173	251	211.7	115	125	120.2	14.7	15.3	15.0	61.7	64.9	63.3
59	173	251	211.7	115	125	120.2	15.1	15.7	15.4	61.8	65.0	63.4
60	173	251	211.7	115	125	120.2	15.4	16.1	15.8	61.9	65.0	63.4

Production Period Performance Table (cont.)

AGE (weeks)	WATER INTAKE (ml/bird/day)			FEED INTAKE (g/bird/day)			HH EGG MASS Cumulative (kg)			EGG WEIGHT (g/egg)		
	Low	High	Target	Low	High	Target	Low	High	Target	Low	High	Target
61	173	251	211.7	115	125	120.2	15.8	16.5	16.1	62.0	65.2	63.6
62	173	251	211.7	115	125	120.2	16.2	16.9	16.5	62.0	65.2	63.6
63	173	251	211.7	115	125	120.2	16.6	17.2	16.9	62.1	65.2	63.6
64	173	251	211.7	115	125	120.2	16.9	17.6	17.3	62.1	65.3	63.7
65	173	251	211.7	115	125	120.2	17.3	18.0	17.7	62.2	65.4	63.8
66	173	251	211.7	115	125	120.2	17.7	18.4	18.0	62.2	65.4	63.8
67	173	251	211.7	115	125	120.2	18.0	18.8	18.4	62.3	65.5	63.9
68	173	251	211.7	115	125	120.2	18.4	19.1	18.8	62.3	65.5	63.9
69	173	251	211.7	115	125	120.2	18.8	19.5	19.1	62.4	65.6	64.0
70	173	251	211.7	115	125	120.2	19.1	19.9	19.5	62.5	65.7	64.1
71	173	251	211.7	115	125	120.2	19.5	20.3	19.9	62.5	65.7	64.1
72	173	251	211.7	115	125	120.2	19.8	20.7	20.2	62.6	65.8	64.2
73	173	251	211.7	115	125	120.2	20.2	21.0	20.6	62.6	65.8	64.2
74	173	251	211.7	115	125	120.2	20.5	21.4	21.0	62.7	65.9	64.3
75	173	251	211.7	115	125	120.2	20.9	21.8	21.3	62.7	65.9	64.3
76	173	251	211.7	115	125	120.2	21.2	22.1	21.7	62.7	65.9	64.3
77	173	251	211.7	115	125	120.2	21.5	22.5	22.0	62.8	66.1	64.4
78	173	251	211.7	115	125	120.2	21.9	22.8	22.4	62.9	66.1	64.5
79	173	251	211.7	115	125	120.2	22.2	23.2	22.7	62.9	66.1	64.5
80	173	251	211.7	115	125	120.2	22.6	23.5	23.0	62.9	66.2	64.5
81	173	251	211.7	115	125	120.2	22.9	23.9	23.4	63.0	66.2	64.6
82	173	251	211.7	115	125	120.2	23.2	24.2	23.7	63.1	66.3	64.7
83	173	251	211.7	115	125	120.2	23.5	24.6	24.1	63.1	66.3	64.7
84	173	251	211.7	115	125	120.2	23.9	24.9	24.4	63.1	66.3	64.7
85	173	251	211.7	115	125	120.2	24.2	25.2	24.7	63.1	66.3	64.7
86	173	251	211.7	115	125	120.2	24.5	25.6	25.0	63.2	66.4	64.8
87	173	251	211.7	115	125	120.2	24.8	25.9	25.4	63.2	66.4	64.8
88	173	251	211.7	115	125	120.2	25.1	26.2	25.7	63.2	66.5	64.9
89	173	251	211.7	115	125	120.2	25.4	26.6	26.0	63.3	66.5	64.9
90	173	251	211.7	115	125	120.2	25.8	26.9	26.3	63.4	66.6	65.0
91	173	251	211.7	115	125	120.2	26.1	27.2	26.6	63.4	66.7	65.1
92	173	251	211.7	115	125	120.2	26.4	27.5	27.0	63.4	66.7	65.1
93	173	251	211.7	115	125	120.2	26.7	27.8	27.3	63.4	66.7	65.1
94	173	251	211.7	115	125	120.2	27.0	28.2	27.6	63.5	66.7	65.1
95	173	251	211.7	115	125	120.2	27.3	28.5	27.9	63.6	66.9	65.3
96	173	251	211.7	115	125	120.2	27.6	28.8	28.2	63.6	66.9	65.3
97	173	251	211.7	115	125	120.2	27.9	29.1	28.5	63.6	66.9	65.3
98	173	251	211.7	115	125	120.2	28.2	29.4	28.8	63.7	66.9	65.3
99	173	251	211.7	115	125	120.2	28.5	29.7	29.1	63.7	67.0	65.4
100	173	251	211.7	115	125	120.2	28.8	30.0	29.4	63.8	67.1	65.5

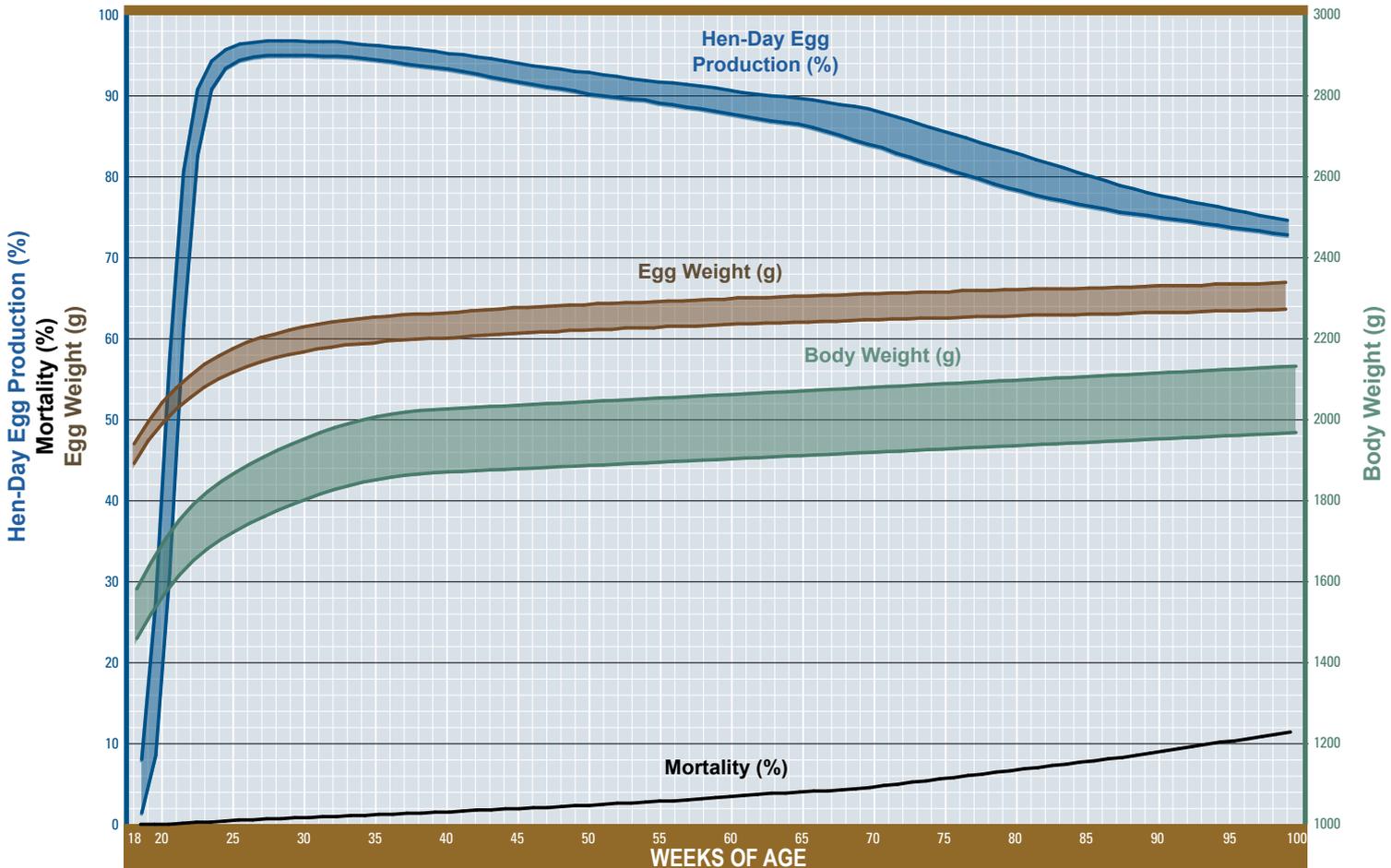
Production Period Space Recommendations

(check local regulations concerning space requirements)

- Useable space is calculated as litter floor and raised slat areas, not including perch space.
- Rearing density depends on age of transfer to the laying facility.

Floor	7–9 birds/m ² of useable space. Higher stocking densities can be used in aviary systems. Consult equipment manufacturers.
Feeders	5cm/bird (with access on both sides); 10 cm/bird (with access on one side); 4 cm/bird with circular feeders
Drinkers	Nipples/cups: 1 per 10 birds; circular drinkers: 1 cm/bird; linear drinker: 2.5 cm per bird
Perches	10–15 cm/bird
Nests	5 birds/nest or 120 birds per m ² in colony nests

Performance Graph



Egg Quality and Egg Size Distribution

EU Standards–Weekly*

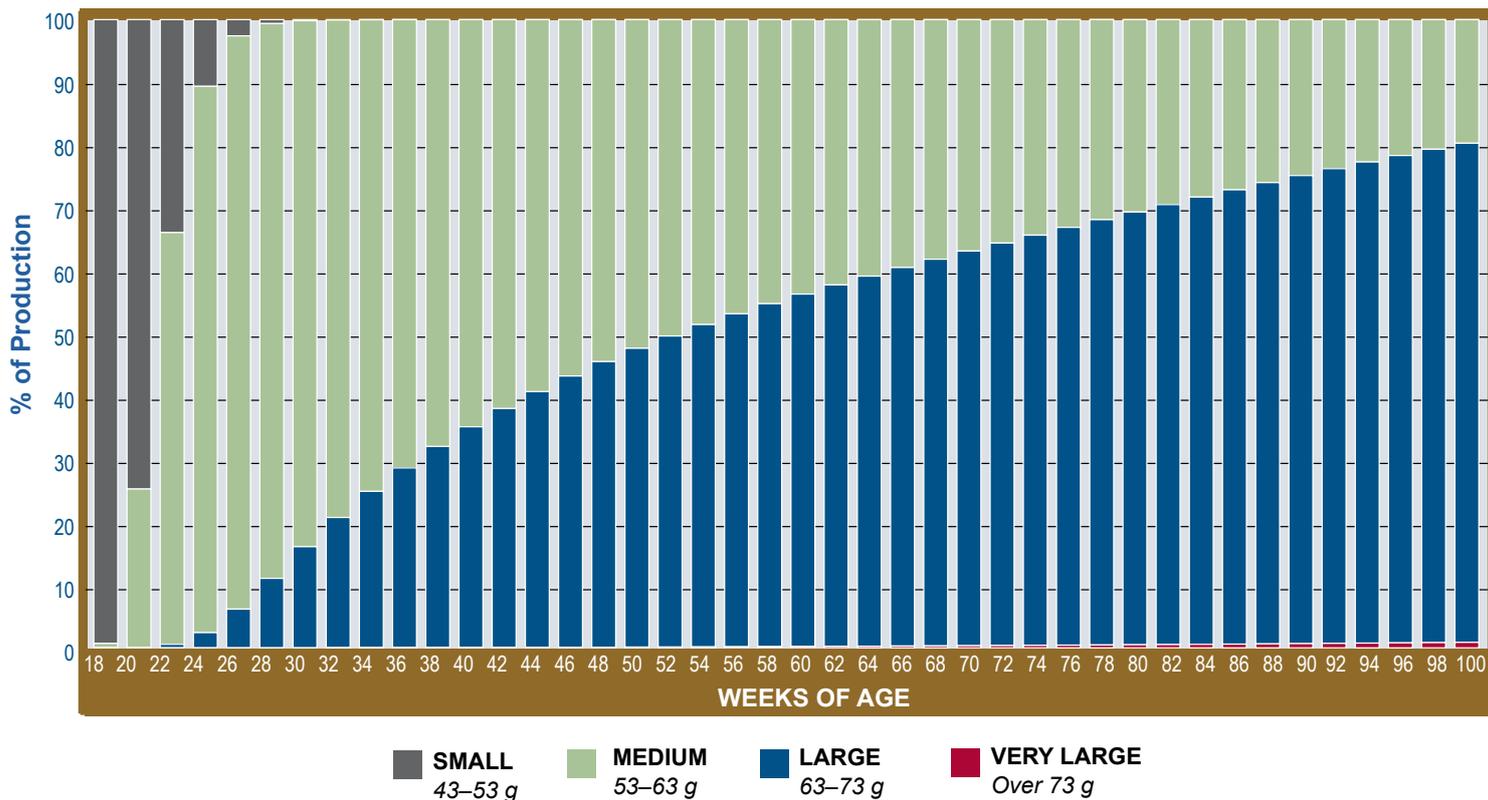
AGE (weeks)	HAUGH UNITS	BREAKING STRENGTH	SHELL COLOR
20	97.8	4605	93
22	97.0	4590	93
24	96.0	4580	93
26	95.1	4570	92
28	94.2	4560	92
30	93.3	4540	92
32	92.2	4515	92
34	91.5	4490	92
36	90.6	4450	91
38	90.0	4425	91
40	89.3	4405	91
42	88.5	4375	91
44	87.8	4355	91
46	87.1	4320	91
48	86.4	4305	91
50	85.6	4280	90
52	85.0	4250	89
54	84.6	4225	89
56	84.0	4190	88
58	83.1	4170	88
60	82.6	4150	88
62	82.2	4130	87
64	81.9	4110	86
66	81.6	4095	86
68	81.5	4085	85
70	81.1	4075	84
72	81.0	4065	84
74	80.8	4055	83
76	80.5	4040	83
78	80.2	4020	83
80	80.1	3995	83
82	80.0	3985	82
84	79.9	3975	81
86	79.8	3965	81
88	79.7	3960	81
90	79.7	3955	81

AGE (weeks)	AVG. EGG WT. (g)	%VERY LARGE Over 73 g	% LARGE 63–73 g	% MEDIUM 53–63 g	% SMALL 43–53 g
18	46.0	0.00	0.01	0.69	99.30
20	51.0	0.00	0.09	25.19	74.73
22	54.3	0.00	0.56	65.54	33.90
24	56.6	0.00	2.42	86.96	10.62
26	58.2	0.00	6.16	91.26	2.58
28	59.2	0.00	11.06	88.31	0.63
30	60.1	0.00	16.10	83.72	0.18
32	60.6	0.01	20.74	79.19	0.06
34	61.1	0.02	24.89	75.07	0.02
36	61.4	0.03	28.61	71.35	0.01
38	61.6	0.04	32.01	67.95	0.00
40	61.8	0.05	35.14	64.81	0.00
42	62.1	0.06	38.03	61.91	0.00
44	62.3	0.07	40.71	59.22	0.00
46	62.5	0.09	43.18	56.73	0.00
48	62.6	0.10	45.46	54.44	0.00
50	62.8	0.12	47.56	52.32	0.00
52	62.9	0.13	49.51	50.36	0.00
54	63.1	0.15	51.31	48.54	0.00
56	63.2	0.17	53.00	46.83	0.00
58	63.3	0.19	54.59	45.22	0.00
60	63.4	0.21	56.10	43.69	0.00
62	63.6	0.24	57.53	42.23	0.00
64	63.7	0.26	58.91	40.83	0.00
66	63.8	0.29	60.25	39.47	0.00
68	63.9	0.31	61.55	38.14	0.00
70	64.1	0.34	62.82	36.84	0.00
72	64.2	0.37	64.06	35.57	0.00
74	64.3	0.40	65.29	34.31	0.00
76	64.3	0.43	66.50	33.07	0.00
78	64.5	0.46	67.70	31.85	0.00
80	64.5	0.49	68.88	30.63	0.00
82	64.7	0.52	70.04	29.44	0.00
84	64.7	0.56	71.19	28.25	0.00
86	64.8	0.59	72.32	27.09	0.00
88	64.9	0.63	73.43	25.94	0.00
90	65.0	0.67	74.51	24.82	0.00
92	65.1	0.71	75.57	23.73	0.00
94	65.1	0.75	76.59	22.66	0.00
96	65.3	0.79	77.58	21.63	0.00
98	65.3	0.83	78.53	20.64	0.00
100	65.5	0.87	79.45	19.68	0.00

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

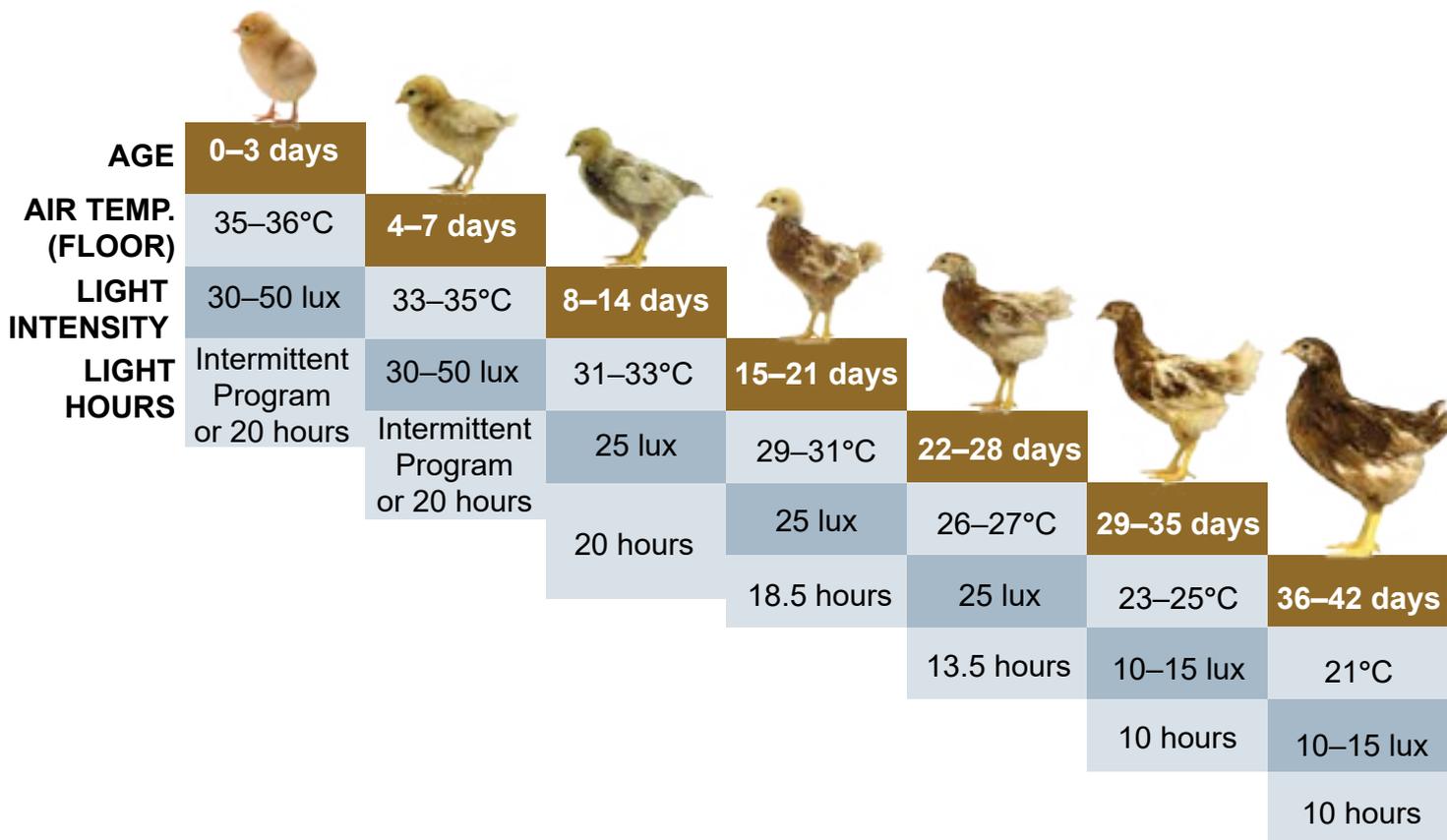
Egg Size Distribution (cont.)

EU Standards–Weekly*

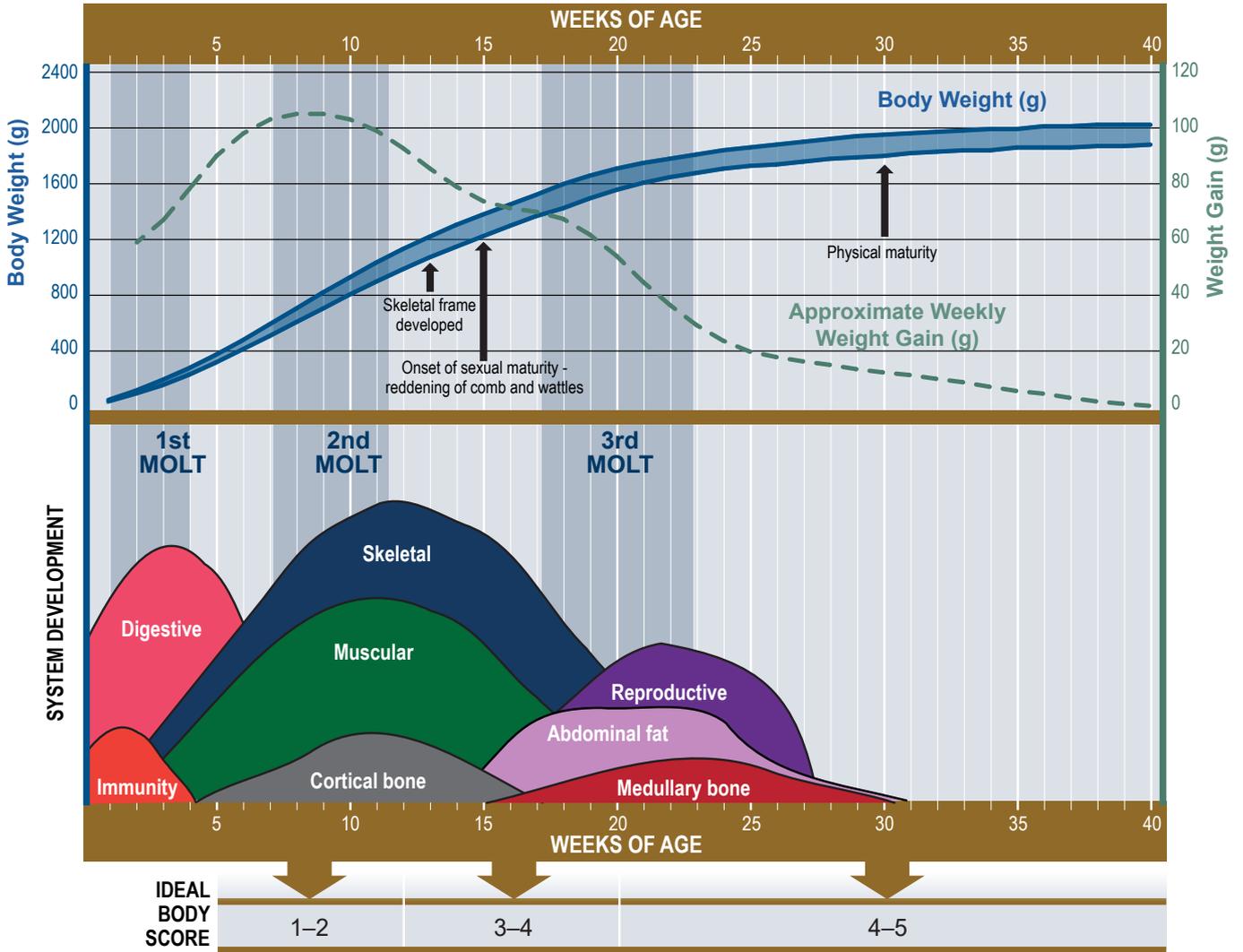


* Distribution of egg sizes based on weekly (not cumulative) average egg weights.

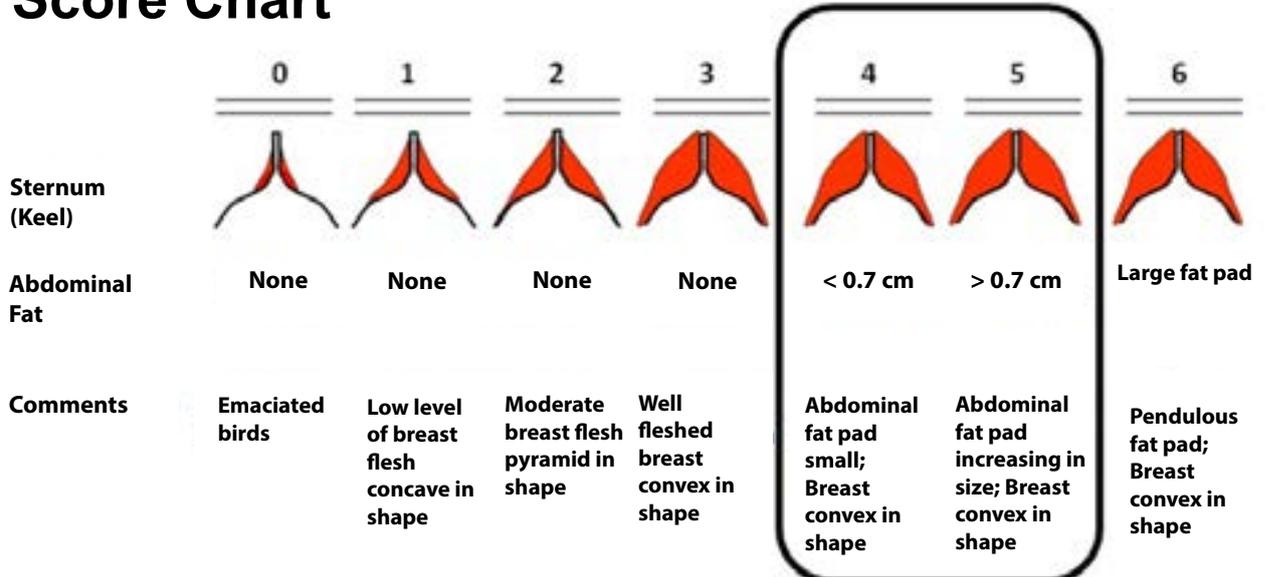
Brooding Temperature and Lighting Recommendations



Development of the Organ Systems in Pullets

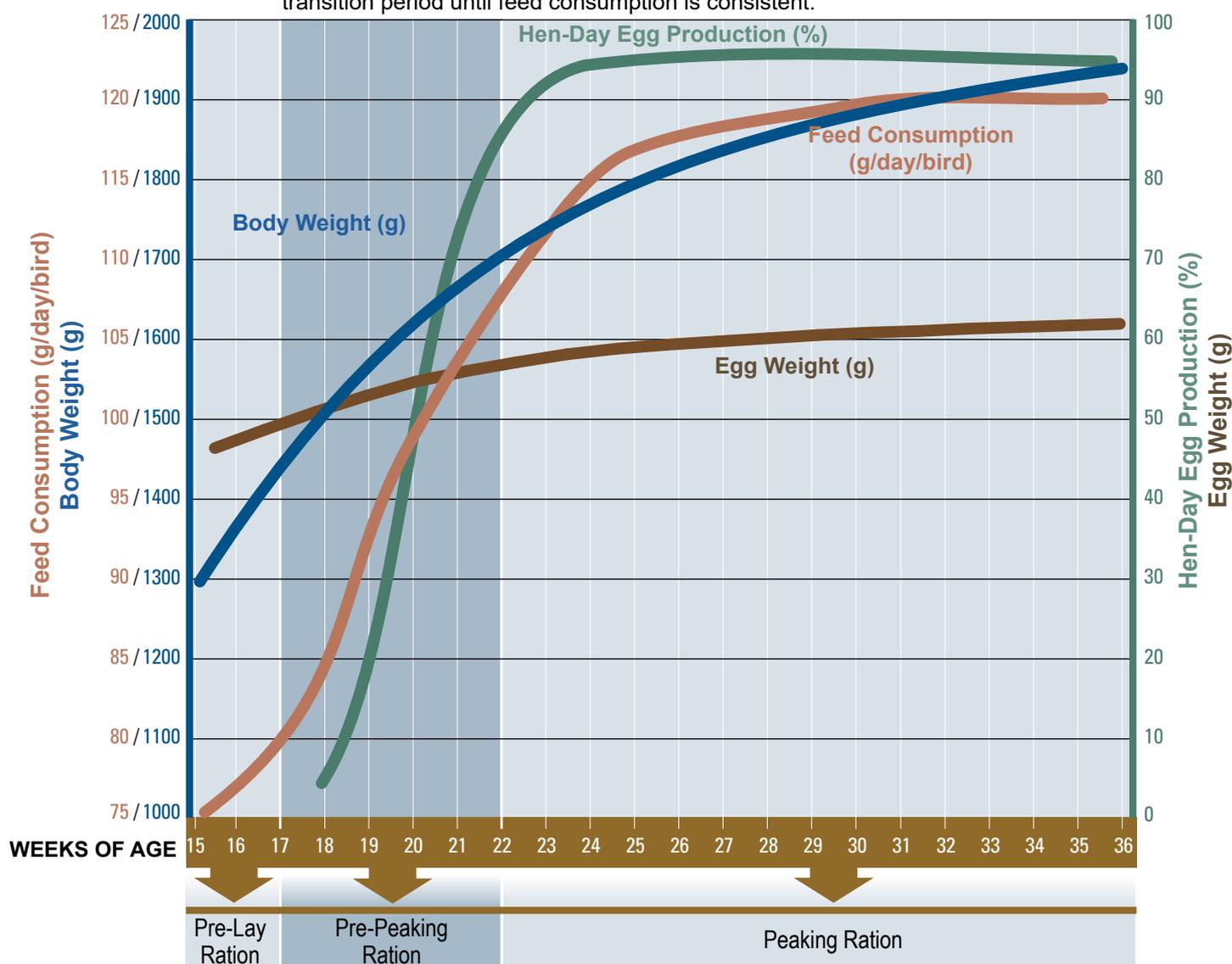


Body Score Chart



Transition Period from Rear to Peak Egg Production

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



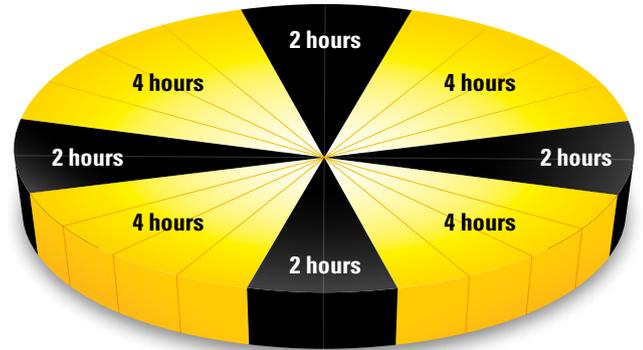
Pre-Peak

- 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 utilised 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.

Lighting Programs

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.



Basic Rules for Lighting Programs

Age at Stimulation (weeks)

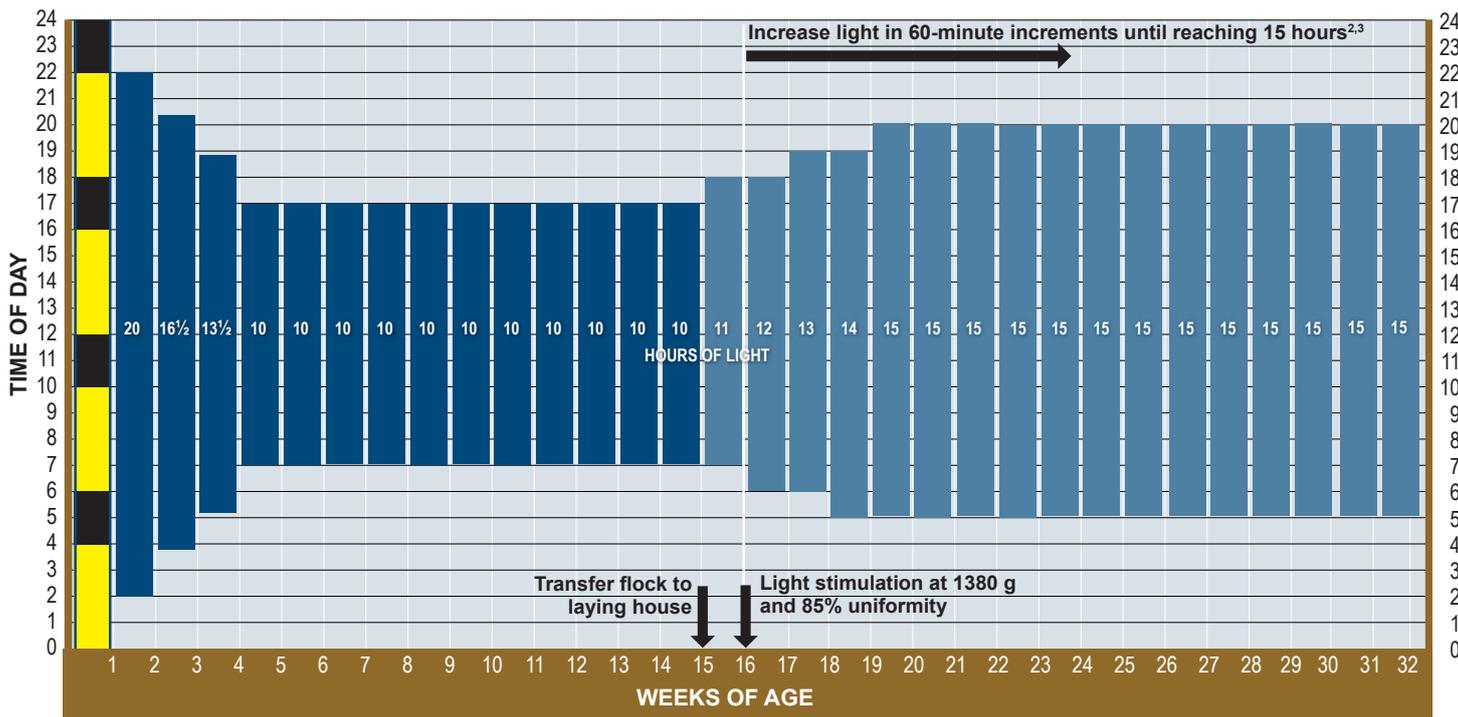
	15	16	17	18	19	20
1360		Open-sided				
1380		Controlled				
1420			Controlled			
1450			Open-sided			

Egg Numbers

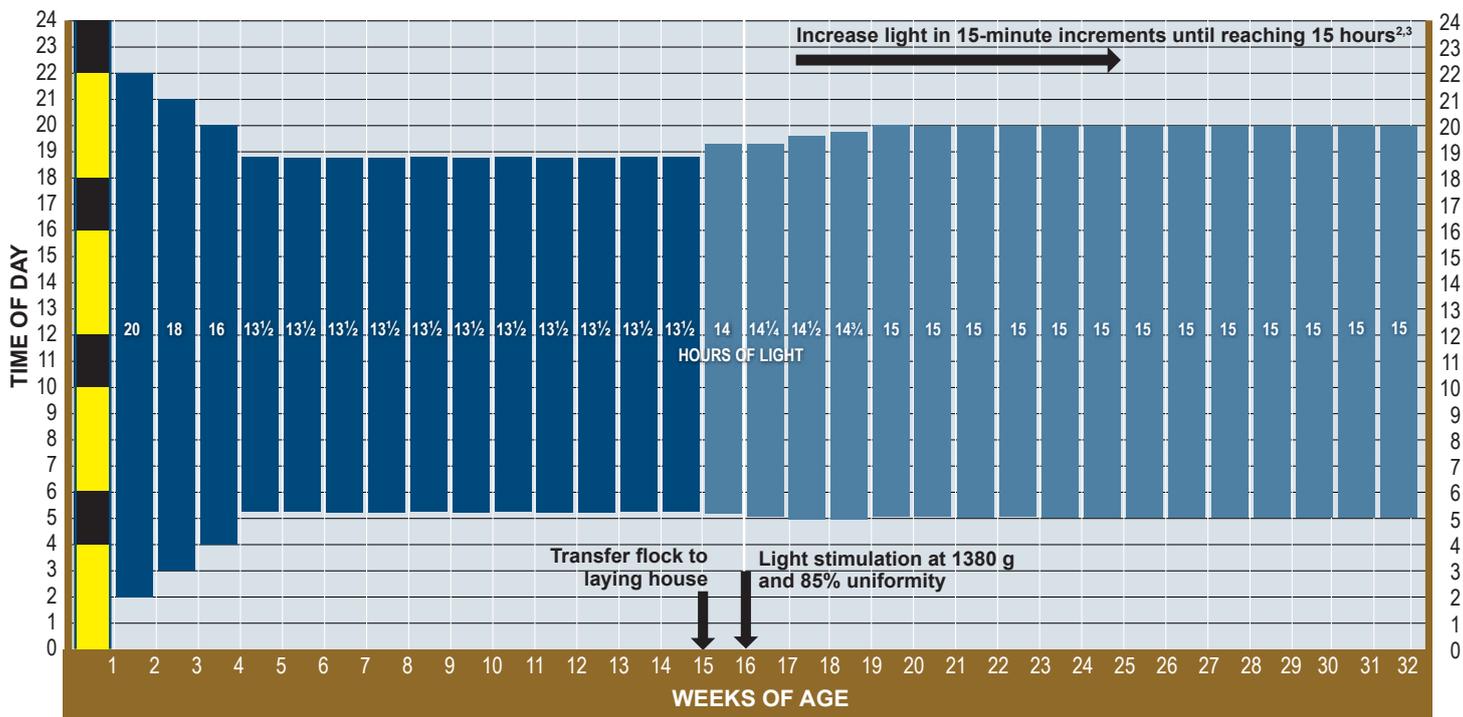
Egg Weight

Lighting Programs (continued)

CONTROLLED ENVIRONMENT - LIGHT STIMULATION FOR EGG NUMBERS¹



OPEN-SIDED - LIGHT STIMULATION FOR EGG NUMBERS¹



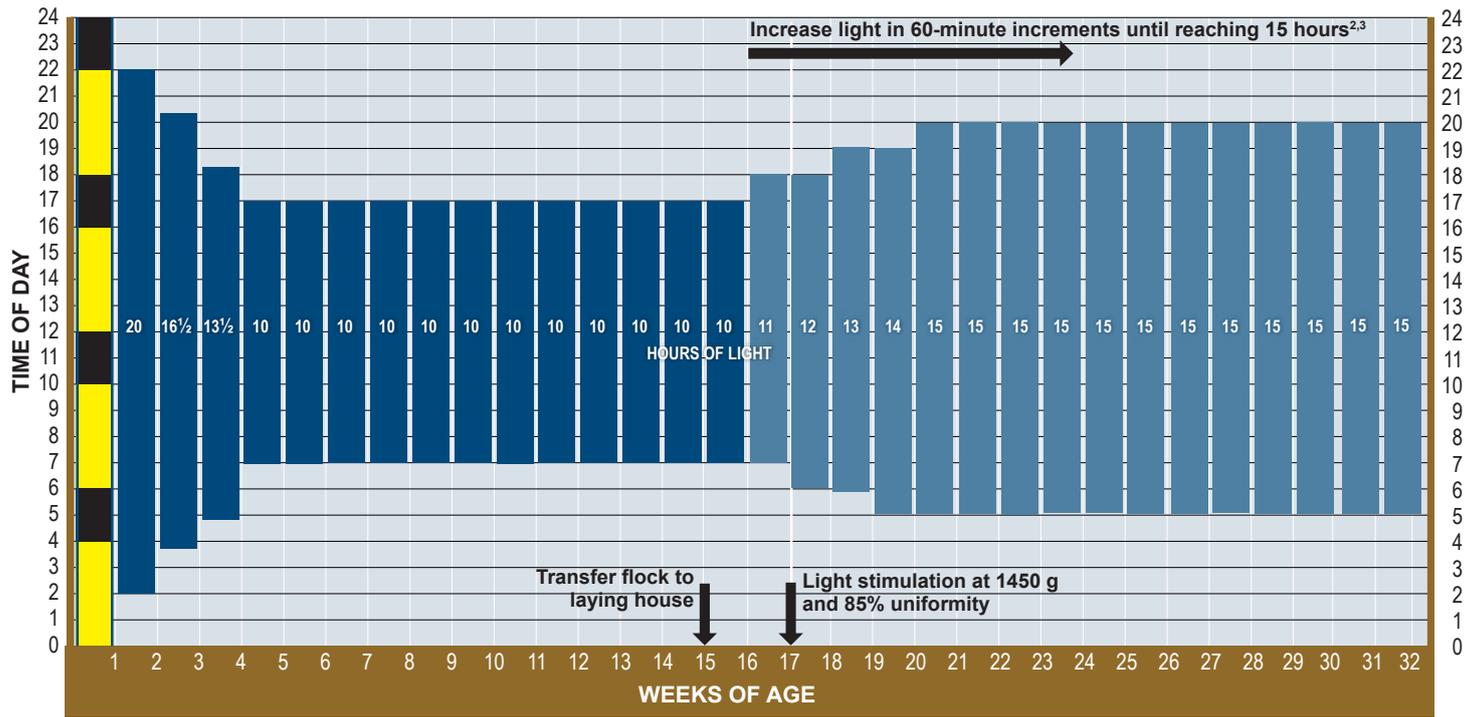
¹ Especially during the transition from rearing in a controlled environment to open-sided production, it is recommended to utilize the [Hy-Line lighting application](#) to establish a lighting program that ensures adequate stimulation for your flock.

² Day length of 14 hours can also work well.

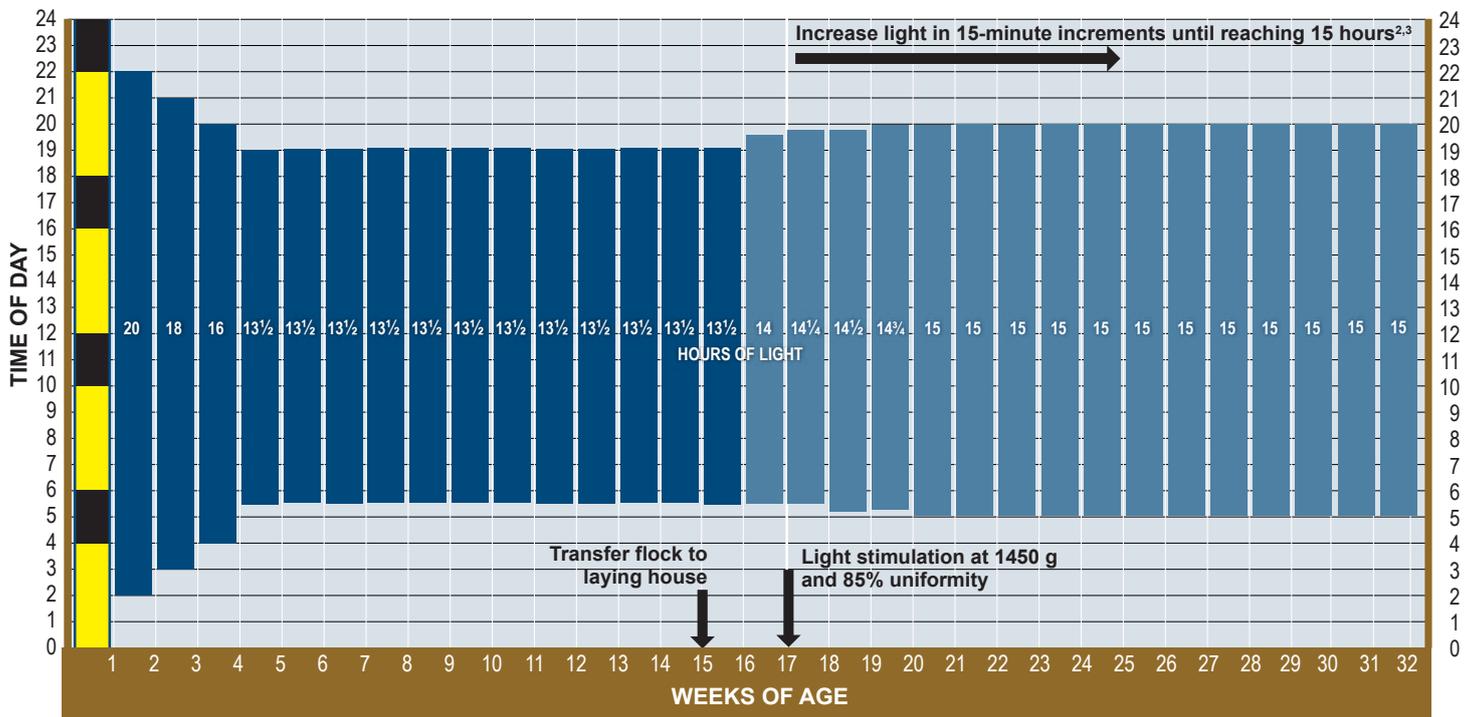
³ Day length should be aligned as closely as possible with labour availability. Minimum light hours should be adjusted in accordance with natural day length variations between summer and winter. For a tailored lighting schedule, please refer to the [Hy-Line lighting application](#).

Lighting Programs (continued)

CONTROLLED ENVIRONMENT - LIGHT STIMULATION FOR EGG WEIGHT¹



OPEN-SIDED - LIGHT STIMULATION FOR EGG WEIGHT¹

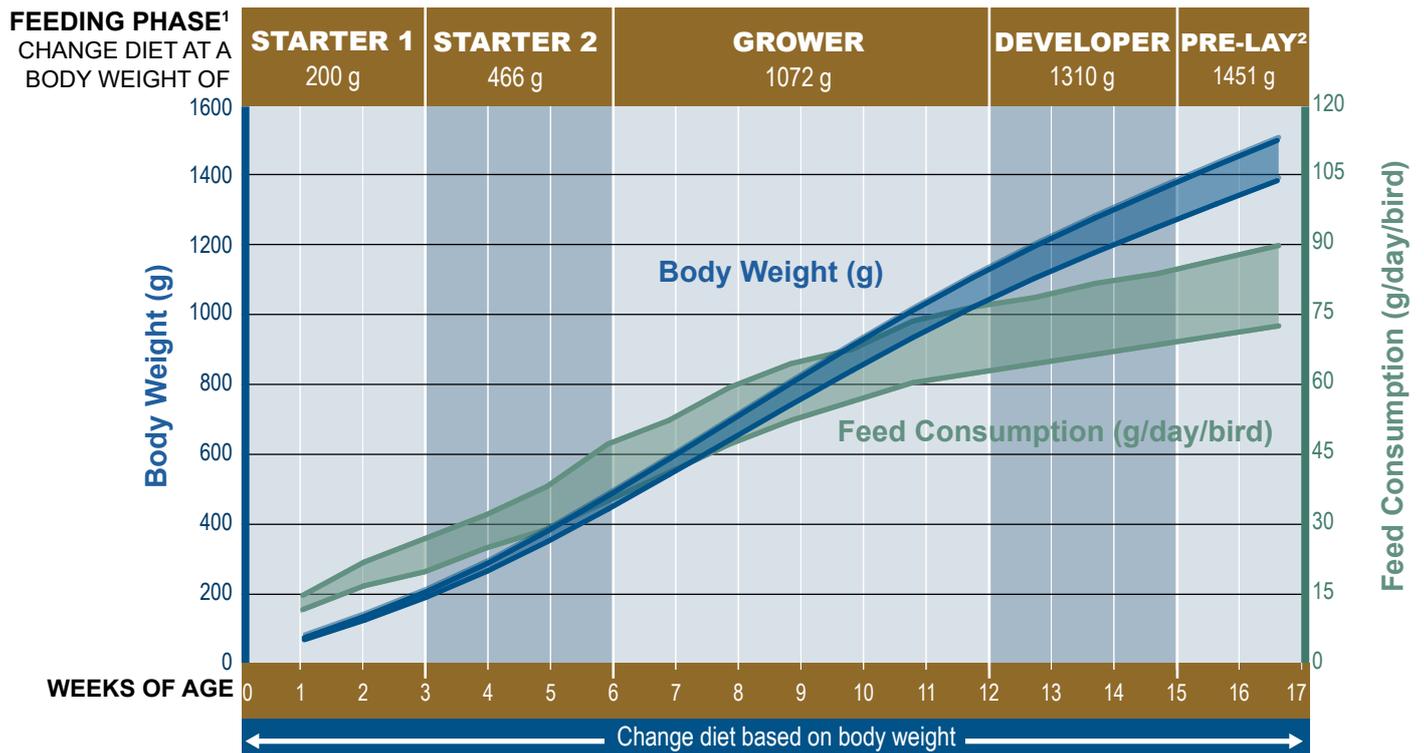


¹ Especially during the transition from rearing in a controlled environment to open-sided production, it is recommended to utilize the [Hy-Line lighting application](#) to establish a lighting program that ensures adequate stimulation for your flock.

² Day length of 14 hours can also work well.

³ Day length should be aligned as closely as possible with labour availability. Minimum light hours should be adjusted in accordance with natural day length variations between summer and winter. For a tailored lighting schedule, please refer to the [Hy-Line lighting application](#).

Rearing Period Nutritional Recommendations



NUTRITION

RECOMMENDED NUTRIENT CONCENTRATION

Metabolisable energy ³ , kcal/kg	2900 / 3100	2850 / 3050	2750 / 2900	2700 / 2850	2750 / 2900
Metabolisable energy ³ , MJ/kg	12.13 / 12.97	11.92 / 12.76	11.51 / 12.13	11.30 / 11.92	11.51 / 12.13
	Standardised Ileal Digestible Amino Acids / Total Amino Acids⁴				
Lysine, %	1.15 / 1.26	0.97 / 1.06	0.88 / 0.96	0.65 / 0.71	0.75 / 0.82
Methionine, %	0.51 / 0.56	0.44 / 0.47	0.42 / 0.46	0.30 / 0.32	0.36 / 0.39
Methionine+Cystine, %	0.88 / 0.98	0.76 / 0.85	0.71 / 0.79	0.54 / 0.62	0.65 / 0.72
Threonine, %	0.74 / 0.88	0.63 / 0.74	0.59 / 0.69	0.44 / 0.53	0.52 / 0.61
Tryptophan, %	0.20 / 0.24	0.18 / 0.21	0.18 / 0.21	0.14 / 0.17	0.17 / 0.21
Arginine, %	1.20 / 1.29	1.01 / 1.09	0.91 / 0.98	0.68 / 0.73	0.78 / 0.85
Isoleucine, %	0.81 / 0.86	0.70 / 0.74	0.65 / 0.70	0.49 / 0.52	0.58 / 0.63
Valine, %	0.83 / 0.91	0.72 / 0.79	0.69 / 0.76	0.52 / 0.57	0.64 / 0.70
Crude protein ⁵ , %	21.30	18.65	17.96	15.00	16.30
Calcium ⁶ , %	1.05	1.00	0.95	0.90	2.50
Phosphorus (available) ⁷ , %	0.45	0.44	0.43	0.38	0.42
Phosphorus (digestible), %	0.41	0.40	0.39	0.34	0.38
Sodium, %	0.18	0.18	0.18	0.18	0.18
Chloride, %	0.18	0.18	0.18	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	1,500	1,800

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. Ration changes through rear must be based on body weight rather than age.

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.

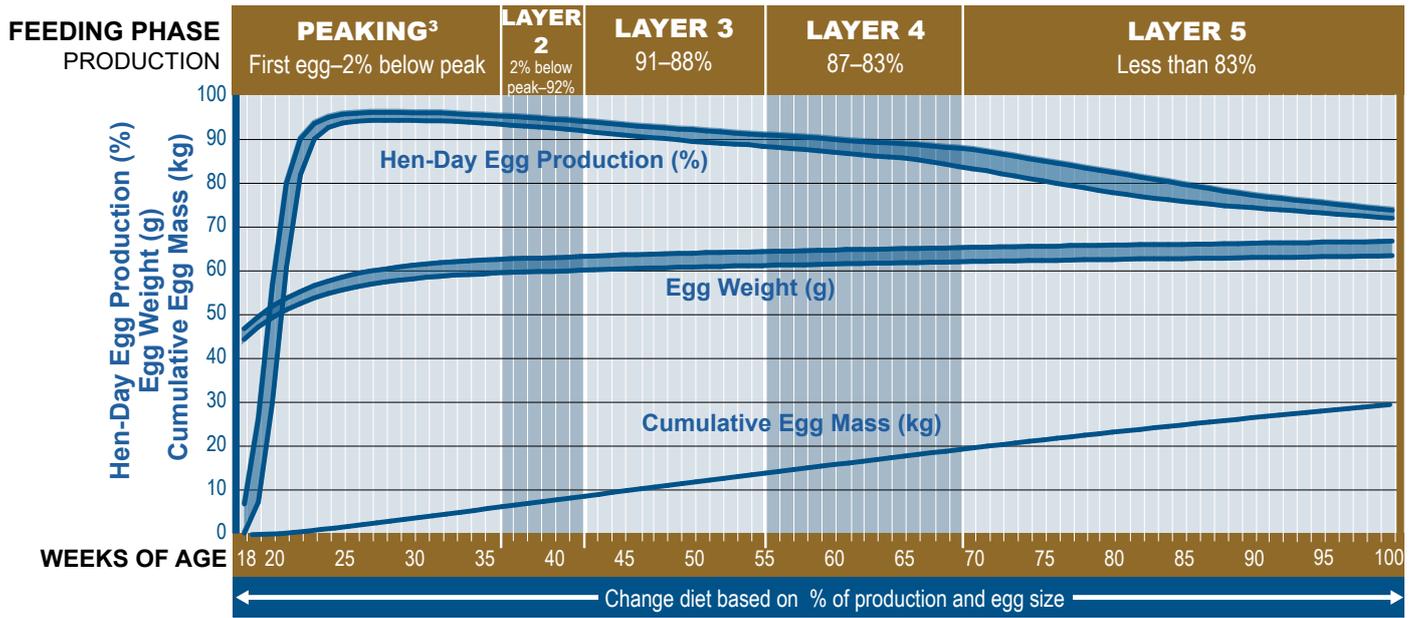
⁴ Recommendation for Total Amino Acids is only appropriate to corn and soybean meal diet. Where diets utilise other ingredients, recommendations for Standardised Ileal Digestible Amino Acids must be followed.

⁵ Diets should always be formulated to provide required intake of amino acid. Concentration of crude protein in diet will vary with raw material 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. Introduction of up to 50% coarse limestone of the pre-lay diet can help familiarize the bird to a coarser form of limestone and help support positive behaviour.

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

Production Period Nutritional Recommendations for Egg Numbers^{1,2}



NUTRITION	RECOMMENDED DAILY NUTRIENT INTAKE				
	PEAKING ³ First egg-2% below peak	LAYER 2 2% below peak-92%	LAYER 3 91-88%	LAYER 4 87-83%	LAYER 5 Less than 83%
Metabolisable energy ⁴ , kcal/bird/day	325 / 335	320 / 330	315 / 325	310 / 320	310 / 320
Metabolisable energy ⁴ , MJ/bird/day	1.36 / 1.40	1.34 / 1.38	1.32 / 1.36	1.30 / 1.34	1.30 / 1.34
	Standardised ileal Digestible Amino Acids / Total Amino Acids ⁵				
Lysine, mg/day	840 / 920	810 / 887	780 / 854	750 / 821	720 / 788
Methionine, mg/day	420 / 452	405 / 435	390 / 419	375 / 403	360 / 387
M+C, mg/day	756 / 853	729 / 822	702 / 792	675 / 761	648 / 731
Threonine, mg/day	588 / 692	567 / 667	546 / 642	525 / 618	504 / 593
Tryptophan, mg/day	181 / 216	174 / 208	168 / 200	161 / 193	155 / 185
Arginine, mg/day	873 / 939	842 / 906	811 / 872	780 / 839	749 / 805
Isoleucine, mg/day	672 / 723	648 / 697	624 / 671	600 / 645	576 / 619
Valine, mg/day	739 / 815	713 / 786	686 / 757	660 / 728	634 / 699
Crude protein ⁶ , g/day	17.50	17.00	16.50	16.00	15.00
Sodium, mg/day	180	170	170	170	170
Chloride, mg/day	180	170	170	170	170
Linoleic acid (C18:2 n-6), g/day	1.60	1.50	1.40	1.40	1.40
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)
Weeks 18-33	4.00	432	389	40% : 60%
Weeks 34-48	4.20	405	366	35% : 65%
Weeks 49-62	4.40	373	337	30% : 70%
Weeks 63-76	4.60	347	314	25% : 75%
Weeks 77+	4.70	324	291	25% : 75%

	IDEAL PROTEIN REFERENCE				
	PEAKING	LAYER 2	LAYER 3	LAYER 4	LAYER 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 Egg Numbers^{1,2}

FEEDING PHASE PRODUCTION NUTRITION	PEAKING ³ First egg until production drops 2% below peak					LAYER 2 2% below peak to 92%					LAYER 3 91–88%					LAYER 4 87–82%					LAYER 5 Less than 83%				
	RECOMMENDED CONCENTRATION																								
ME ⁴ , kcal/bird/day	325 / 335					320 / 330					315 / 325					310 / 320					310 / 320				
ME ⁴ , MJ/bird/day	1.36 / 1.40					1.34 / 1.38					1.32 / 1.36					1.30 / 1.34					1.30 / 1.34				
FEED CONSUMPTION (*Typical Feed Consumption)																									
g/day/bird	90	95	100*	105	110	105	110	115*	120	125	105	111	117*	123	129	105	111	117*	123	129	105	111	117*	123	129
Standardised Ileal Digestible Amino Acids																									
Lysine, %	0.93	0.88	0.84	0.80	0.76	0.77	0.74	0.70	0.68	0.65	0.74	0.70	0.67	0.63	0.60	0.71	0.68	0.64	0.61	0.58	0.69	0.65	0.62	0.59	0.56
Methionine, %	0.47	0.44	0.42	0.40	0.38	0.39	0.37	0.35	0.34	0.32	0.37	0.35	0.33	0.32	0.30	0.36	0.34	0.32	0.30	0.29	0.34	0.32	0.31	0.29	0.28
M+C, %	0.84	0.80	0.76	0.72	0.69	0.69	0.66	0.63	0.61	0.58	0.67	0.63	0.60	0.57	0.54	0.64	0.61	0.58	0.55	0.52	0.62	0.58	0.55	0.53	0.50
Threonine, %	0.65	0.62	0.59	0.56	0.53	0.54	0.52	0.49	0.47	0.45	0.52	0.49	0.47	0.44	0.42	0.50	0.47	0.45	0.43	0.41	0.48	0.45	0.43	0.41	0.39
Tryptophan, %	0.20	0.19	0.18	0.17	0.16	0.17	0.16	0.15	0.15	0.14	0.16	0.15	0.14	0.14	0.13	0.15	0.15	0.14	0.13	0.12	0.15	0.14	0.13	0.13	0.12
Arginine, %	0.97	0.92	0.87	0.83	0.79	0.80	0.77	0.73	0.70	0.67	0.77	0.73	0.69	0.66	0.63	0.74	0.70	0.67	0.63	0.60	0.71	0.67	0.64	0.61	0.58
Isoleucine, %	0.75	0.71	0.67	0.64	0.61	0.62	0.59	0.56	0.54	0.52	0.59	0.56	0.53	0.51	0.48	0.57	0.54	0.51	0.49	0.47	0.55	0.52	0.49	0.47	0.45
Valine, %	0.82	0.78	0.74	0.70	0.67	0.68	0.65	0.62	0.59	0.57	0.65	0.62	0.59	0.56	0.53	0.63	0.59	0.56	0.54	0.51	0.60	0.57	0.54	0.52	0.49
Total Amino Acids ⁵																									
Lysine, %	1.02	0.97	0.92	0.88	0.84	0.84	0.81	0.77	0.74	0.71	0.81	0.77	0.73	0.69	0.66	0.78	0.74	0.70	0.67	0.64	0.75	0.71	0.67	0.64	0.61
Methionine, %	0.50	0.48	0.45	0.43	0.41	0.41	0.40	0.38	0.36	0.35	0.40	0.38	0.36	0.34	0.32	0.38	0.36	0.34	0.33	0.31	0.37	0.35	0.33	0.31	0.30
M+C, %	0.95	0.90	0.85	0.81	0.78	0.78	0.75	0.71	0.69	0.66	0.75	0.71	0.68	0.64	0.61	0.72	0.69	0.65	0.62	0.59	0.70	0.66	0.62	0.59	0.57
Threonine, %	0.77	0.73	0.69	0.66	0.63	0.64	0.61	0.58	0.56	0.53	0.61	0.58	0.55	0.52	0.50	0.59	0.56	0.53	0.50	0.48	0.56	0.53	0.51	0.48	0.46
Tryptophan, %	0.24	0.23	0.22	0.21	0.20	0.20	0.19	0.18	0.17	0.17	0.19	0.18	0.17	0.16	0.16	0.18	0.17	0.16	0.16	0.15	0.18	0.17	0.16	0.15	0.14
Arginine, %	1.04	0.99	0.94	0.89	0.85	0.86	0.82	0.79	0.76	0.72	0.83	0.79	0.75	0.71	0.68	0.80	0.76	0.72	0.68	0.65	0.77	0.73	0.69	0.65	0.62
Isoleucine, %	0.80	0.76	0.72	0.69	0.66	0.66	0.63	0.61	0.58	0.56	0.64	0.60	0.57	0.55	0.52	0.61	0.58	0.55	0.52	0.50	0.59	0.56	0.53	0.50	0.48
Valine, %	0.91	0.86	0.82	0.78	0.74	0.75	0.71	0.68	0.66	0.63	0.72	0.68	0.65	0.62	0.59	0.69	0.66	0.62	0.59	0.56	0.67	0.63	0.60	0.57	0.54
Cr. protein ⁶ , %	19.44	18.42	17.50	16.67	15.91	16.19	15.45	14.78	14.17	13.60	15.71	14.86	14.10	13.41	12.79	15.24	14.41	13.68	13.01	12.40	14.29	13.51	12.82	12.20	11.63
Sodium, %	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15	0.14	0.14	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13
Chloride, %	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15	0.14	0.14	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13
Linoleic acid (C18:2 n-6), %	1.78	1.68	1.60	1.52	1.45	1.43	1.36	1.30	1.25	1.20	1.33	1.26	1.20	1.14	1.09	1.33	1.26	1.20	1.14	1.09	1.33	1.26	1.20	1.14	1.09
Choline, mg/kg	2000	1895	1800	1714	1636	1714	1636	1565	1500	1440	1714	1622	1538	1463	1395	1714	1622	1538	1463	1395	1714	1622	1538	1463	1395

CALCIUM AND PHOSPHORUS CHANGES BASED ON FEED INTAKE

Feed Consumption, g/day per bird	Weeks 18–33					Weeks 34–48					Weeks 49–62					Weeks 63–76					Weeks 77+						
	90	95	100	106	112	118	124	100	106	112	118	124	100	106	112	118	124	100	106	112	118	124	100	106	112	118	124
Calcium ^{7,8} , %	4.44	4.21	4.00	3.81	3.64	3.48	3.33	4.20	4.00	3.82	3.65	3.50	4.40	4.19	4.00	3.83	3.67	4.60	4.38	4.18	4.00	3.83	4.70	4.48	4.27	4.09	3.92
Phosphorus (available) ^{7,9} , %	0.48	0.46	0.43	0.41	0.39	0.38	0.36	0.41	0.39	0.37	0.35	0.34	0.37	0.36	0.34	0.32	0.31	0.35	0.33	0.32	0.30	0.29	0.32	0.31	0.29	0.28	0.27
Phosphorus (digestible), %	0.43	0.41	0.39	0.37	0.35	0.34	0.32	0.37	0.35	0.33	0.32	0.31	0.34	0.32	0.31	0.29	0.28	0.31	0.30	0.29	0.27	0.26	0.29	0.28	0.26	0.25	0.24

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 optimise 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 utilise other ingredients, recommendations for Standardised Ileal Digestible Amino Acids must be followed.

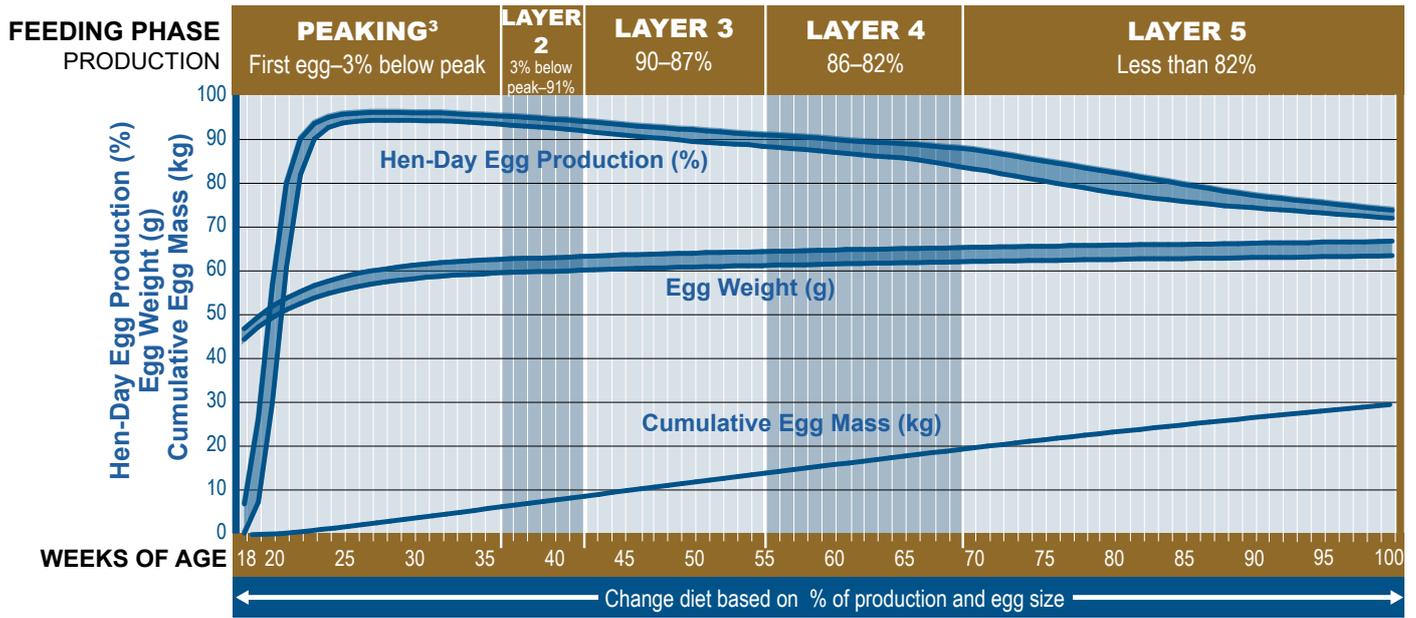
⁶ Diets should always be formulated to provide required intake of amino acid. Concentration of crude protein in diet will vary with raw material used. Crude protein value provided is an estimated typical value only.

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](#) at hyline.com. 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.

Production Period Nutritional Recommendations for Egg Weight^{1,2}



NUTRITION	RECOMMENDED DAILY NUTRIENT INTAKE				
	PEAKING	LAYER 2	LAYER 3	LAYER 4	LAYER 5
Metabolisable energy ⁴ , kcal/bird/day	325 / 335	320 / 330	315 / 325	310 / 320	310 / 320
Metabolisable energy ⁴ , MJ/bird/day	1.36 / 1.40	1.34 / 1.38	1.32 / 1.36	1.30 / 1.34	1.30 / 1.34
	Standardised ileal Digestible Amino Acids / Total Amino Acids⁵				
Lysine, mg/day	880 / 964	850 / 931	810 / 887	780 / 854	750 / 821
Methionine, mg/day	440 / 473	425 / 457	405 / 435	390 / 419	375 / 403
M+C, mg/day	810 / 913	774 / 872	729 / 822	702 / 792	675 / 761
Threonine, mg/day	616 / 725	595 / 700	567 / 667	546 / 642	525 / 618
Tryptophan, mg/day	194 / 231	187 / 224	178 / 213	172 / 205	165 / 197
Arginine, mg/day	915 / 984	884 / 951	842 / 906	811 / 872	780 / 839
Isoleucine, mg/day	722 / 776	689 / 740	648 / 697	624 / 671	600 / 645
Valine, mg/day	792 / 874	757 / 834	713 / 786	686 / 757	660 / 728
Crude protein ⁶ , g/day	18.25	17.85	17.42	16.30	15.50
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	160	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)
Weeks 18–33	4.00	432	389	40% : 60%
Weeks 34–48	4.20	405	366	35% : 65%
Weeks 49–62	4.40	373	337	30% : 70%
Weeks 63–76	4.60	347	314	25% : 75%
Weeks 77+	4.70	324	291	25% : 75%

	IDEAL PROTEIN REFERENCE				
	PEAKING	LAYER 2	LAYER 3	LAYER 4	LAYER 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 Egg Weight^{1,2}

FEEDING PHASE PRODUCTION NUTRITION	PEAKING ³ First egg until production drops 3% below peak					LAYER 2 3% below peak to 91%					LAYER 3 90–87%					LAYER 4 86–82%					LAYER 5 Less than 82%				
	RECOMMENDED CONCENTRATION																								
ME ⁴ , kcal/bird/day	325 / 335					320 / 330					315 / 325					310 / 320					310 / 320				
ME ⁴ , MJ/bird/day	1.36 / 1.40					1.34 / 1.38					1.32 / 1.36					1.30 / 1.34					1.30 / 1.34				
FEED CONSUMPTION (*Typical Feed Consumption)																									
g/day/bird	90	95	100*	105	110	105	110	115*	120	125	105	111	117*	123	129	105	111	117*	123	129	105	111	117*	123	129
Standardised Ileal Digestible Amino Acids																									
Lysine, %	0.98	0.93	0.88	0.84	0.80	0.81	0.77	0.74	0.71	0.68	0.77	0.73	0.69	0.66	0.63	0.74	0.70	0.67	0.63	0.60	0.71	0.68	0.64	0.61	0.58
Methionine, %	0.49	0.46	0.44	0.42	0.40	0.40	0.39	0.37	0.35	0.34	0.39	0.36	0.35	0.33	0.31	0.37	0.35	0.33	0.32	0.30	0.36	0.34	0.32	0.30	0.29
M+C, %	0.90	0.85	0.81	0.77	0.74	0.74	0.70	0.67	0.65	0.62	0.69	0.66	0.62	0.59	0.57	0.67	0.63	0.60	0.57	0.54	0.64	0.61	0.58	0.55	0.52
Threonine, %	0.68	0.65	0.62	0.59	0.56	0.57	0.54	0.52	0.50	0.48	0.54	0.51	0.48	0.46	0.44	0.52	0.49	0.47	0.44	0.42	0.50	0.47	0.45	0.43	0.41
Tryptophan, %	0.22	0.20	0.19	0.18	0.18	0.18	0.17	0.16	0.16	0.15	0.17	0.16	0.15	0.14	0.14	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.14	0.13	0.13
Arginine, %	1.02	0.96	0.92	0.87	0.83	0.84	0.80	0.77	0.74	0.71	0.80	0.76	0.72	0.68	0.65	0.77	0.73	0.69	0.66	0.63	0.74	0.70	0.67	0.63	0.60
Isoleucine, %	0.80	0.76	0.72	0.69	0.66	0.66	0.63	0.60	0.57	0.55	0.62	0.58	0.55	0.53	0.50	0.59	0.56	0.53	0.51	0.48	0.57	0.54	0.51	0.49	0.47
Valine, %	0.88	0.83	0.79	0.75	0.72	0.72	0.69	0.66	0.63	0.61	0.68	0.64	0.61	0.58	0.55	0.65	0.62	0.59	0.56	0.53	0.63	0.59	0.56	0.54	0.51
Total Amino Acids ⁵																									
Lysine, %	1.07	1.01	0.96	0.92	0.88	0.89	0.85	0.81	0.78	0.74	0.84	0.80	0.76	0.72	0.69	0.81	0.77	0.73	0.69	0.66	0.78	0.74	0.70	0.67	0.64
Methionine, %	0.53	0.50	0.47	0.45	0.43	0.44	0.42	0.40	0.38	0.37	0.41	0.39	0.37	0.35	0.34	0.40	0.38	0.36	0.34	0.32	0.38	0.36	0.34	0.33	0.31
M+C, %	1.01	0.96	0.91	0.87	0.83	0.83	0.79	0.76	0.73	0.70	0.78	0.74	0.70	0.67	0.64	0.75	0.71	0.68	0.64	0.61	0.72	0.69	0.65	0.62	0.59
Threonine, %	0.81	0.76	0.73	0.69	0.66	0.67	0.64	0.61	0.58	0.56	0.64	0.60	0.57	0.54	0.52	0.61	0.58	0.55	0.52	0.50	0.59	0.56	0.53	0.50	0.48
Tryptophan, %	0.26	0.24	0.23	0.22	0.21	0.21	0.20	0.19	0.19	0.18	0.20	0.19	0.18	0.17	0.17	0.20	0.18	0.18	0.17	0.16	0.19	0.18	0.17	0.16	0.15
Arginine, %	1.09	1.04	0.98	0.94	0.89	0.91	0.86	0.83	0.79	0.76	0.86	0.82	0.77	0.74	0.70	0.83	0.79	0.75	0.71	0.68	0.80	0.76	0.72	0.68	0.65
Isoleucine, %	0.86	0.82	0.78	0.74	0.71	0.70	0.67	0.64	0.62	0.59	0.66	0.63	0.60	0.57	0.54	0.64	0.60	0.57	0.55	0.52	0.61	0.58	0.55	0.52	0.50
Valine, %	0.97	0.92	0.87	0.83	0.79	0.79	0.76	0.73	0.70	0.67	0.75	0.71	0.67	0.64	0.61	0.72	0.68	0.65	0.62	0.59	0.69	0.66	0.62	0.59	0.56
Cr. protein ⁶ , %	20.28	19.21	18.25	17.38	16.59	17.00	16.23	15.52	14.88	14.28	16.59	15.69	14.89	14.16	13.50	15.52	14.68	13.93	13.25	12.64	14.76	13.96	13.25	12.60	12.02
Sodium, %	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15	0.14	0.14	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13
Chloride, %	0.20	0.19	0.18	0.17	0.16	0.16	0.15	0.15	0.14	0.14	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13	0.16	0.15	0.15	0.14	0.13
Linoleic acid (C18:2 n-6), %	2.22	2.11	2.00	1.90	1.82	1.90	1.82	1.74	1.67	1.60	1.52	1.44	1.37	1.30	1.24	1.43	1.35	1.28	1.22	1.16	1.33	1.26	1.20	1.14	1.09
Choline, mg/kg	1778	1684	1600	1524	1455	1714	1636	1565	1500	1440	1714	1622	1538	1463	1395	1714	1622	1538	1463	1395	1714	1622	1538	1463	1395

CALCIUM AND PHOSPHORUS CHANGES BASED ON FEED INTAKE

Feed Consumption, g/day per bird	Weeks 18–33					Weeks 34–48					Weeks 49–62					Weeks 63–76					Weeks 77+						
	90	95	100	106	112	118	124	100	106	112	118	124	100	106	112	118	124	100	106	112	118	124	100	106	112	118	124
Calcium ^{7,8} , %	4.44	4.21	4.00	3.81	3.64	3.48	3.33	4.20	4.00	3.82	3.65	3.50	4.40	4.19	4.00	3.83	3.67	4.60	4.38	4.18	4.00	3.83	4.70	4.48	4.27	4.09	3.92
Phosphorus (available) ^{7,9} , %	0.48	0.46	0.43	0.41	0.39	0.38	0.36	0.41	0.39	0.37	0.35	0.34	0.37	0.36	0.34	0.32	0.31	0.35	0.33	0.32	0.30	0.29	0.32	0.31	0.29	0.28	0.27
Phosphorus (digestible), %	0.43	0.41	0.39	0.37	0.35	0.34	0.32	0.37	0.35	0.33	0.32	0.31	0.34	0.32	0.31	0.29	0.28	0.31	0.30	0.29	0.27	0.26	0.29	0.28	0.26	0.25	0.24

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 optimise 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 utilise other ingredients, recommendations for Standardised 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](#) at hyline.com. 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.

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
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 150-200 mg/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 D₃ can be supplemented as 25-hydroxy D₃ 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.

⁸ Supplementing with up to 500 ppm of magnesium may be beneficial to support eggshell quality, particularly in aged hens or during periods of increased metabolic demand.

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 ($\text{NO}_3\text{-N}$) 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 ($\text{NO}_2\text{-N}$) 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



Alternative Systems Online Management Guide

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

RESOURCES AVAILABLE AT WWW.HYLINE.COM

[Corporate Information](#) | [Technical Updates](#) | [Videos](#) | [Interactive Management Guides](#)
[Hy-Line International Lighting Programme](#) | [Hy-Line EggCel](#) | [Body Weight Uniformity Calculator](#)

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



Hy-Line International | www.hyline.com

Hy-Line is a brand name.

® Registered trademark of Hy-Line International.

© Copyright 2025 Hy-Line International.

MAX ALT STD 031926