Hy-Line

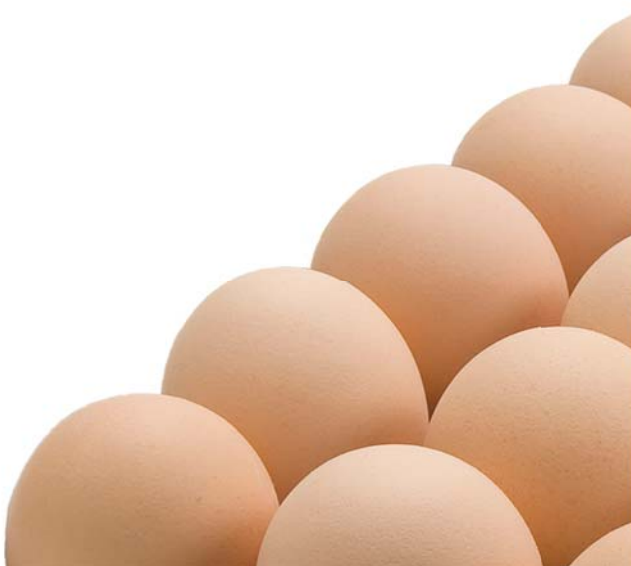
Commercial Layers

Edition 1

Hy-Line®

SONIA

Performance Standards Manual



General Management Recommendations

The genetic potential of Hy-Line varieties can only be realized if good poultry husbandry practices and management are used. This booklet outlines the results of successful flock management programs for Hy-Line's varieties based on field experience compiled by Hy-Line and extensive commercial flock records catalogued by Hy-Line from all parts of the world. Hy-Line International management recommendations and principles taken from industry technical literature are available in the Hy-Line Red Book, *an Online Management Guide*, which is found at http://www.hyline.com/redbook/RedBook.aspx.

The information and suggestions contained in this booklet should be used for guidance and educational purposes only, recognizing 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 cannot accept responsibility for any errors, omissions or inaccuracies in such information or management suggestions. Further, Hy-Line 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 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 booklet.

Hy-Line International Performance Standards Manuals are periodically updated as new performance data and/or nutrition information become available. To ensure you are using the latest Edition, please check at our website http://www.hyline.com/aspx/productsandservices/managementmanuals.aspx

Performance Summary

Growing Period (to 17 weeks):	
Livability	98%
Feed Consumed	5.96 kg
Body Weight at 17 Weeks	1.46 kg
Laying Period (to 80 weeks):	
Percent Peak	94%
Hen-Day Eggs to 60 Weeks	248
Hen-Day Eggs to 80 Weeks	353
Hen-Housed Eggs to 60 Weeks	245
Hen-Housed Eggs to 80 Weeks	347
Livability to 60 Weeks	98%
Livability to 80 Weeks	96%
Days to 50% Production (from hatch)	148
Egg Weight at 26 Weeks	57.0 g/egg
Egg Weight at 38 Weeks	63.0 g/egg
Egg Weight at 70 Weeks	66.0 g/egg
Total Egg Mass per Hen-Housed (19–80 weeks)	22.3 kg
Body Weight at 32 Weeks	1.86 kg
Body Weight at 70 Weeks	1.92 kg
Freedom from Egg Inclusions	Excellent
Shell Strength	Excellent
Shell Color at 38 Weeks	46
Shell Color at 56 Weeks	43
Shell Color at 70 Weeks	40
Haugh Units at 38 Weeks	93
Haugh Units at 56 Weeks	87
Haugh Units at 70 Weeks	83
Average Daily Feed Consumption (19–80 weeks)	108 g/day per bird
Feed Conversion Rate, kg Feed/kg Eggs (20–60 weeks)	2.01
Feed Conversion Rate, kg Feed/kg Eggs (20–80 weeks)	2.07
Feed Utilization, kg Egg/kg Feed (20-60 weeks)	0.50
Feed Utilization, kg Egg/kg Feed (20-80 weeks)	0.48
Feed per Dozen Eggs (20–60 weeks)	1.49
Feed per Dozen Eggs (20–80 weeks)	1.57
Feather Color	White with brown feathers
Skin Color	Yellow
Condition of Droppings	Dry

Growing Recommendations

Cage Growing

Chicks started in cages should be placed in the upper levels (decks), where the air is warmer and the light brighter. Intermingle seemingly weak and strong chicks (from different transport boxes) to allow the stronger chicks to 'train' the weaker chicks to find water and feed. The starter feed should be placed inside the cage on the cage paper after the chicks have had a chance to drink. Continue feeding on the paper for the first 7 to 10 days after arrival. The chicks can be distributed among all cage levels around 14 days of age when the space has become too restricted in the upper levels.

Place paper on the cage floor during the brooding period. This will allow supplemental feeding on the cage paper to quickly get chicks eating. Place feed on the cage paper in front of the permanent feeder to train chicks to move towards the feeders. Remove the paper by 14 days of age to avoid build up of feces that could lead to enteric disease or coccidia infections.

Water lines should be flushed prior to arrival of the chicks. Drinking water temperature should be 25 to 30°C for the first week. Adjusting water system pressure in nipple drinkers to create a hanging drip will help chicks find water. Cup drinkers should be manually filled during the first 3 days to train chicks to drink.

Floor Growing

Chicks started on the floor should be transferred from the transport boxes to the litter under the water lines or near drinkers to encourage drinking. To make it easier for the chicks to drink, use supplemental drinkers in addition to the automatic drinkers. The supplemental drinkers should be used for the first 10 to 14 days and can also be used for administering the first vaccination if given in the water. When used, gradually move supplemental feeders and drinkers towards the permanent feeders and drinkers in the room to train the chicks to find the permanent feeders and waterers.

Birds should be grown in housing that allows adjustment to the lighting program and the light intensity. The lighting programs are usually similar to those used for birds in cage production, but light intensity may be different. It is important to provide floor-grown birds with enough light intensity to allow them to navigate their environment. A light intensity of 20 to 30 lux (2 to 3 foot-candles) should be used during the first week of age, dropping down to 15 lux (1.5 foot-candles) by week 4 and remaining at the level until week 15 of age. At week 15 of age, gradually increase the light intensity, reaching 20 to 30 lux (2 to 3 foot-candles) by the time the pullets are transferred to the layer house. Birds moving into open-sided housing should have higher light intensities of 30 to 40 lux (3 to 4 foot-candles) at the time of housing.

Pullet Growing Space Recommendations

	Colony/Cage	Floor
Bird Space	310 cm^2/bird	835 cm^2/bird
Feeder	5 cm/bird	5 cm/bird or 1 pan per 50 birds
Cups or nipples drinking system	1 per 8 birds	1 per 15 birds
Fountain drinking system, 46 cm diameter	—	1 per 125 birds

Ambient Temperature and Relative Humidity

Observing the chicks will tell you whether or not the temperature is correct. If they are too cool, they will huddle near the heat source. If they are too warm, they will spread out away from the heat source. If there are drafts, they will huddle in groups to get away from the spot where the cool air enters the heated area. Comfortable chicks will spread out uniformly, without huddling, throughout the brooding area.

Look for signs of overheating (panting and drowsiness) or chilling (huddling and loud chirping) and make appropriate adjustments. Heat control is more critical in cage brooding because the chicks cannot move to find their comfort zone.

Birds are very sensitive to extremes of relative humidity. A relative humidity below 30% will cause increased agitation of the chicks and may cause aggressive behavior. Conversely, excessive moisture may cause wet litter conditions, associated with high ammonia concentrations, poor air quality, enteric diseases, and respiratory problems. Ideally, the relative humidity should be between 40 and 60%. Humidity control becomes increasingly important when warm-room brooding in cold climates. To increase the relative humidity, water can be sprayed on the walk ways or floors. Humidity will normally be lowered to 30 to 40% by the end of the growing period.

Recommended Brooding Temperatures[1]

Age (days)	Cage	Floor
1–3	32–33°C	33–35°C
4–7	30–32°C	31–33°C
8–14	28–30°C	29–31°C
15–21	26–28°C	27–29°C
22–28	23–26°C	24–27°C
29–35	21–23°C	22–24°C
36+	21°C	21°C

[1]Modify the temperatures as needed to meet the chicks' comfort needs.

Growing/Laying Recommendations

Water Consumption for Pullets and Layers

Drinking Water

Water is the most important nutrient and good-quality water must be available to the birds at all times. Only in special cases (e.g., prior to vaccine delivery through the drinking water), should drinking water be restricted, and then only for a short time and under careful monitoring.

Monitoring Drinking Water Intake

Water and feed consumption are directly related—when birds drink less water, they consume less feed, and production quickly declines accordingly. As a general rule, healthy adult birds will consume twice as much water as feed, although the ratio increases during periods of warm weather. Installation and use of water meters in each house or barn are recommended to monitor the flock's water intake on a daily basis. Such daily water-intake records can be used as an early warning of problems in the flock.

Water Consumed per 100 Birds per Day
Chicks should consume 0.83 liters per 100 birds on day one of age.

Age in Weeks	Liters
1	0.8–1.1
2	1.1–1.9
3	1.7–2.7
4	2.5–3.8
5	3.4–4.7
6	4.5–5.7
7	5.7–6.8
8	6.1–8.0
9	6.4–9.5
10–15	6.8–10.2
16–20	7.2–15.2
21–25*	9.9–18.2
Over 25*	15.2–20.8

* Chart shows an expected range of water consumption at normal environmental temperatures for bird comfort (21–27°C). At higher temperatures (32–38°C) water consumption may increase up to double the amounts shown.

Lighting Programs

Egg production is very closely related to the changes in day length. Body weight gain in grow, egg numbers, egg size, livability, and total profitability can be favorably influenced by a proper lighting program.

When open-type houses are used, which allow natural daylight to affect the flock, the lighting program must be planned in conjunction with changes in the natural day length. Because no two places have the same sunrise-sunset times year-round, custom lighting programs for any location worldwide are available.

A customizable lighting program is available in multiple languages and will create a downloadable spreadsheet with sunrise and sunset times for any location in the world and the lighting program for your flock. Visit www.hyline.com to access the customizable lighting program.

Controlling Egg Weight

It is recommended to closely monitor feed intake, body condition (through body weight and/or body scoring/fat-pad development), and egg weight of each flock and make nutritional changes as needed to ensure optimal production rate and egg weight. If smaller eggs are desired, the egg weight should be controlled even more aggressively at an early age.

Egg-weight control is achieved through a combination of limiting amino acid consumption and ensuring that the feed intake is not too high (achieved through control of the ambient temperature). To avoid excessively large eggs later in lay, use the peaking and second layer feeding phase diets for less time than shown in the Performance Standards Manual. This will provide a reduced level of added fat or oil, as well as amino acid contents, to control egg weight.

Control of ambient house temperature
At housing, an ambient temperature of 21 to 23˚C is desired. Increase the house temperature about 1˚C every 2 weeks until reaching a house temperature of 26 to 27˚C (assuming the ventilation systems are able to maintain adequate air quality at these temperatures). Lower (colder) house temperatures will lead to greater feed intakes and may be counterproductive to egg-weight control, as well as optimal feed efficiency and adult hen body weights.

Colony/Cage Space Recommendations in Laying House

	U.S. Recommendations (United Egg Producers)	E.U. Recommendations Enriched Colony Systems*
Bird Space	432–555 cm^2/bird	750 cm^2/bird (600 usable cm^2)
Feeder	7.6 cm/bird	12 cm/bird
Cups or nipples drinking system	1 per 12 birds	2 within reach of each bird
Perches	—	15 cm/bird

* See regulations for other requirements such as nests, litter area, clearance, etc. Some countries have more specific requirements.

Target Weights

—Growing Period—

Age in Weeks	Body Weight* g
1	70
2	115
3	190
4	280
5	380
6	490
7	590
8	710
9	810
10	920
11	1020
12	1120
13	1190
14	1260
15	1330
16	1400
17**	1460
18	1500

* Pullets grown on the floor or in a tropical climate can be 50 g lighter than shown.
** Move to Lay house

Feed Consumption*

—Growing Period—

Age in Weeks	Daily g/day per bird	Cumulative g to date
1	13	91
2	20	231
3	25	406
4	29	609
5	33	840
6	37	1099
7	41	1386
8	46	1708
9	51	2065
10	56	2457
11	61	2884
12	66	3346
13	70	3836
14	73	4347
15	75	4872
16	77	5411
17	78	5957

* Pullet feed consumption varies with feed formulation and environmental temperatures.

Added Vitamins and Trace Minerals

	—Growing Period—	—Laying Period—
Item[1]	In 1000 kg complete diet	In 1000 kg complete diet
Vitamin A, IU	9,900,000	8,800,000
Vitamin D_3, IU	3,300,000	3,300,000
25-hydroxy Vitamin D_3,[2] mg	55	55
Vitamin E, IU	22,100	16,500
Vitamin K (menadione), g	3.3	2.2
Thiamin (B_1), g	2.2	1.7
Riboflavin (B_2), g	6.6	5.5
Niacin (B_3), g	33	28
Pantothenic acid (B_5), g	11.0	6.6
Pyridoxine (B_6), g	4.4	3.3
Biotin (B_7), mg	55	55
Folic acid (B_9), g	0.9	0.6
Cobalamine (B_{12}), mg	22.1	22.1
Choline, g	110	110
Manganese[3], g	88	88
Zinc[3], g	88	88
Iron, g	55	55
Copper, g	11.0	5.5
Iodine, g	1.7	1.7
Selenium, g	0.30	0.30

[1] Minimum recommendations for growing and laying periods. Local regulations may limit the dietary content of individual vitamins or minerals.
[2] If 25-OH Vitamin D_3 is added to the diet, the levels of 'regular' Vitamin D_3 in the premix could be lowered in accordance with the manufacturer's recommendations or to comply with local laws regulating the total amount of Vitamin D_3 added to the diet.
[3] 20% of Manganese or Zinc may be in organic form.

Growing Period Nutrition Recommendations

Item[1]	Starter 1	Starter 2	Grower	Developer	Pre-Lay[5]
Feed to a body weight of	190 g	490 g	1120 g	1330 g	1460 g
Approximate age	0–3 weeks	4–6 weeks	7–12 weeks	13–15 weeks	16–17 weeks
Recommended concentration[2]					
Metabolizable energy, kcal/kg	2756–2999	2756–2999	2734–2999	2734–2999	2734–2999
Metabolizable energy, MJ/kg	11.54–12.55	11.54–12.55	11.44–12.55	11.44–12.55	11.44–12.55
Minimum recommended concentration					
Standardized (true) ileal digestible amino acids					
Lysine, %	1.00	0.91	0.82	0.69	0.73
Methionine, %	0.45	0.41	0.38	0.32	0.34
Methionine+cystine, %	0.73	0.68	0.64	0.57	0.60
Threonine, %	0.66	0.61	0.56	0.48	0.51
Tryptophan, %	0.17	0.16	0.16	0.14	0.15
Arginine, %	1.07	0.97	0.88	0.74	0.78
Isoleucine, %	0.70	0.66	0.61	0.52	0.58
Valine, %	0.72	0.67	0.64	0.55	0.62
Total amino acids[3]					
Lysine, %	1.09	1.00	0.90	0.76	0.80
Methionine, %	0.48	0.44	0.41	0.35	0.37
Methionine+cystine, %	0.82	0.77	0.72	0.65	0.68
Threonine, %	0.78	0.72	0.66	0.56	0.60
Tryptophan, %	0.20	0.20	0.19	0.16	0.18
Arginine, %	1.15	1.05	0.94	0.79	0.84
Isoleucine, %	0.75	0.70	0.65	0.56	0.63
Valine, %	0.79	0.74	0.71	0.61	0.68
Crude protein (nitrogen × 6.25),[3] %	20.00	19.00	17.50	15.50	16.00
Calcium,[4] %	1.00	1.00	1.00	1.40	2.50
Phosphorus (available), %	0.48	0.49	0.45	0.41	0.45
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), %	1.00	1.00	1.00	1.00	1.00

[1] Change diets at the recommended target body weight—the approximate age is a guide only.
[2] Differences in the metabolizable energy value assigned to feed ingredients of the same name can differ substantially; in some cases, the recommended dietary energy content may have to be adjusted accordingly (see the Hy-Line Red Book, *an Online Management Guide* for additional information).
[3] The minimum recommendations for total amino acids and crude protein are only appropriate with a corn and soybean meal diet; please formulate the diet on digestible amino acid basis instead.
[4] Calcium should be supplied as a fine calcium carbonate source (mean particle size less than 2 mm).
[5] Feed the Pre-Lay Diet for one or two weeks before the onset of egg production, when most pullets show some enlargement and reddening of their combs. Be prepared to change to the Peaking Diet at no later than 0.5–1.0% daily egg production, as the Pre-Lay Diet does not contain sufficient calcium to sustain egg production.

Laying Period Nutrition Recommendations

Item[1]	First Egg to Peak of Egg Production[5]	Post-peak to 90% Egg Production[6]	89% to 85% Egg Production	Less than 85% Egg Production
Recommended concentration[2]				
Metabolizable energy, kcal/kg	2778–2867	2756–2867	2701–2867	2701–2867
Metabolizable energy, MJ/kg	11.63–12.00	11.54–12.00	11.31–12.00	11.31–12.00
Minimum recommended concentration Standardized (true) ileal digestible amino acids				
Lysine, mg/day	810	775	740	705
Methionine, mg/day	397	357	340	317
Methionine+cystine, mg/day	664	605	570	529
Threonine, mg/day	567	543	518	494
Tryptophan, mg/day	170	163	155	148
Arginine, mg/day	867	829	792	754
Isoleucine, mg/day	640	612	585	557
Valine, mg/day	729	698	666	635
Total amino acids[3]				
Lysine, mg/day	887	849	810	772
Methionine, mg/day	427	383	366	341
Methionine+cystine, mg/day	749	682	643	596
Threonine, mg/day	667	638	609	581
Tryptophan, mg/day	203	195	186	177
Arginine, mg/day	932	892	851	811
Isoleucine, mg/day	688	658	629	599
Valine, mg/day	804	769	735	700
Crude protein (nitrogen × 6.25),[3] g/day	17.50	17.00	16.00	15.00
Calcium,[4] g/day	4.00	4.25	4.45	4.60
Phosphorus (available), mg/day	460	420	380	360
Sodium, mg/day	180	180	180	180
Chloride, mg/day	180	180	180	180
Linoleic acid (C18:2 n-6), g/day	1.00	1.00	1.00	1.00
Choline, mg/day	100	100	100	100

[1] Consumption of amino acids, fat, linoleic acid, and/or energy may be changed to optimize egg size.
[2] The recommended energy range is based on the energy values shown in the Hy-Line Red Book, *an Online Management Guide*. Differences in the metabolizable energy value assigned to feed ingredients of the same name can differ substantially; in some cases, the recommended dietary energy content may have to be adjusted accordingly (see the Hy-Line Red Book, *an Online Management Guide* for additional information).
[3] Total amino acids are only appropriate with a corn and soybean meal diet; please formulate the diet on digestible amino acid basis if a substantial amount of other protein-supplying ingredients are used.
[4] Approximately 65% of the added calcium carbonate (limestone) should be in particle sizes of 2–4 mm.
[5] This Peaking Diet should immediately follow the Pre-Lay Diet.
[6] Change to Post-peak Diet when egg production has decreased 2% from peak egg production.

Laying Period Nutrition Recommendations

Item[1]	First Egg to Peak of Egg Production[5]					Post-peak to 90% Egg Production[6]					89% to 85% Egg Production					Less than 85% Egg Production				
Recommended concentration[2]																				
Metabolizable energy, kcal/kg	2778–2867					2756–2867					2701–2867					2701–2867				
Metabolizable energy, MJ/kg	11.63–12.00					11.54–12.00					11.31–12.00					11.31–12.00				
Feed consumption																				
g/day per bird	90	95	**100***	105	110	100	105	**110***	115	120	100	105	**110***	115	120	100	105	**110***	115	120
Standardized (true) ileal digestible amino acids																				
Lysine, %	0.90	0.85	**0.81**	0.77	0.74	0.78	0.74	**0.70**	0.67	0.65	0.74	0.70	**0.67**	0.64	0.62	0.71	0.67	**0.64**	0.61	0.59
Methionine, %	0.44	0.42	**0.40**	0.38	0.36	0.36	0.34	**0.32**	0.31	0.30	0.34	0.32	**0.31**	0.30	0.28	0.32	0.30	**0.29**	0.28	0.26
Methionine+cystine, %	0.74	0.70	**0.66**	0.63	0.60	0.61	0.58	**0.55**	0.53	0.50	0.57	0.54	**0.52**	0.50	0.48	0.53	0.50	**0.48**	0.46	0.44
Threonine, %	0.63	0.60	**0.57**	0.54	0.52	0.54	0.52	**0.49**	0.47	0.45	0.52	0.49	**0.47**	0.45	0.43	0.49	0.47	**0.45**	0.43	0.41
Tryptophan, %	0.19	0.18	**0.17**	0.16	0.15	0.16	0.16	**0.15**	0.14	0.14	0.16	0.15	**0.14**	0.13	0.13	0.15	0.14	**0.13**	0.13	0.12
Arginine, %	0.96	0.91	**0.87**	0.83	0.79	0.83	0.79	**0.75**	0.72	0.69	0.79	0.75	**0.72**	0.69	0.66	0.75	0.72	**0.69**	0.66	0.63
Isoleucine, %	0.71	0.67	**0.64**	0.61	0.58	0.61	0.58	**0.56**	0.53	0.51	0.59	0.56	**0.53**	0.51	0.49	0.56	0.53	**0.51**	0.48	0.46
Valine, %	0.81	0.77	**0.73**	0.69	0.66	0.70	0.66	**0.63**	0.61	0.58	0.67	0.63	**0.61**	0.58	0.56	0.64	0.60	**0.58**	0.55	0.53
Total amino acids[3]																				
Lysine, %	0.99	0.93	**0.89**	0.84	0.81	0.85	0.81	**0.77**	0.74	0.71	0.81	0.77	**0.74**	0.70	0.68	0.77	0.74	**0.70**	0.67	0.64
Methionine, %	0.47	0.45	**0.43**	0.41	0.39	0.38	0.36	**0.35**	0.33	0.32	0.37	0.35	**0.33**	0.32	0.31	0.34	0.32	**0.31**	0.30	0.28
Methionine+cystine, %	0.83	0.79	**0.75**	0.71	0.68	0.68	0.65	**0.62**	0.59	0.57	0.64	0.61	**0.58**	0.56	0.54	0.60	0.57	**0.54**	0.52	0.50
Threonine, %	0.74	0.70	**0.67**	0.64	0.61	0.64	0.61	**0.58**	0.55	0.53	0.61	0.58	**0.55**	0.53	0.51	0.58	0.55	**0.53**	0.51	0.48
Tryptophan, %	0.23	0.21	**0.20**	0.19	0.18	0.20	0.19	**0.18**	0.17	0.16	0.19	0.18	**0.17**	0.16	0.16	0.18	0.17	**0.16**	0.15	0.15
Arginine, %	1.04	0.98	**0.93**	0.89	0.85	0.89	0.85	**0.81**	0.78	0.74	0.85	0.81	**0.77**	0.74	0.71	0.81	0.77	**0.74**	0.71	0.68
Isoleucine, %	0.76	0.72	**0.69**	0.66	0.63	0.66	0.63	**0.60**	0.57	0.55	0.63	0.60	**0.57**	0.55	0.52	0.60	0.57	**0.54**	0.52	0.50
Valine, %	0.89	0.85	**0.80**	0.77	0.73	0.77	0.73	**0.70**	0.67	0.64	0.74	0.70	**0.67**	0.64	0.61	0.70	0.67	**0.64**	0.61	0.58
Crude protein (nitrogen × 6.25),[3] %	19.44	18.42	**17.50**	16.67	15.91	17.00	16.19	**15.45**	14.78	14.17	16.00	15.24	**14.55**	13.91	13.33	15.00	14.29	**13.64**	13.04	12.50
Calcium,[4] %	4.44	4.21	**4.00**	3.81	3.64	4.25	4.05	**3.86**	3.70	3.54	4.45	4.24	**4.05**	3.87	3.71	4.60	4.38	**4.18**	4.00	3.83
Phosphorus (available),%	0.51	0.48	**0.46**	0.44	0.42	0.42	0.40	**0.38**	0.37	0.35	0.38	0.36	**0.35**	0.33	0.32	0.36	0.34	**0.33**	0.31	0.30
Sodium, %	0.20	0.19	**0.18**	0.17	0.16	0.18	0.17	**0.16**	0.16	0.15	0.18	0.17	**0.16**	0.16	0.15	0.18	0.17	**0.16**	0.16	0.15
Chloride, %	0.20	0.19	**0.18**	0.17	0.16	0.18	0.17	**0.16**	0.16	0.15	0.18	0.17	**0.16**	0.16	0.15	0.18	0.17	**0.16**	0.16	0.15
Linoleic acid, (C18:2 n-6), %	1.11	1.05	**1.00**	0.95	0.91	1.00	0.95	**0.91**	0.87	0.83	1.00	0.95	**0.91**	0.87	0.83	1.00	0.95	**0.91**	0.87	0.83

**Typical feed consumption for the age based on available data.*

[1] Consumption of amino acids, fat, linoleic acid, and/or energy may be changed to optimize egg size.

[2] The recommended energy range is based on the energy values shown in the Hy-Line Red Book, *an Online Management Guide*. Differences in the metabolizable energy value assigned to feed ingredients of the same name can differ substantially; in some cases, the recommended dietary energy content may have to be adjusted accordingly (see the Hy-Line Red Book, *an Online Management Guide* for additional information).

[3] Total amino acids are only appropriate with a corn and soybean meal diet; please formulate the diet on digestible amino acid basis if a substantial amount of other protein-supplying ingredients are used.

[4] Approximately 65% of the added calcium carbonate (limestone) should be in particle sizes of 2–4 mm.

[5] This Peaking Diet should immediately follow the Pre-Lay Diet.

[6] Change to Post-peak Diet when egg production has decreased 2% from peak egg production.

Performance Table

Age in Weeks	% Hen-Day	% Mortality Cumulative	Hen-Day Eggs Cumulative	Hen-Housed Eggs Cumulative	Body Weight kg	Average Egg Weight* g/egg	Feed Consumption g/day per bird	Egg Mass Cumulative kg	Egg Quality		
									Haugh Units	Breaking Strength	Shell Color
19	6	0.1	0.4	0.4	1.51	43.0	81	0.0	100.6	4440	49
20	20	0.1	1.8	1.8	1.61	46.0	85	0.1	100.1	4440	50
21	46	0.1	5.0	5.0	1.69	49.0	90	0.2	99.7	4450	50
22	69	0.2	9.8	9.8	1.73	51.0	95	0.5	99.2	4450	50
23	83	0.2	15.7	15.6	1.75	54.0	98	0.8	98.8	4460	49
24	89	0.3	21.9	21.9	1.76	55.0	100	1.1	98.4	4460	49
25	92	0.3	28.4	28.3	1.78	56.0	102	1.5	98.0	4450	49
26	93	0.4	34.9	34.8	1.79	57.0	104	1.9	97.6	4440	49
27	94	0.4	41.5	41.3	1.80	58.0	106	2.3	97.2	4430	49
28	94	0.5	48.1	47.9	1.82	59.0	107	2.6	96.8	4420	48
29	94	0.5	54.6	54.5	1.83	60.0	108	3.0	96.4	4410	48
30	94	0.6	61.2	61.0	1.84	60.0	108	3.4	96.0	4400	48
31	94	0.6	67.8	67.5	1.85	61.0	109	3.8	95.6	4390	48
32	94	0.7	74.4	74.1	1.86	61.0	109	4.2	95.2	4380	48
33	94	0.7	80.9	80.6	1.87	61.0	109	4.6	94.8	4370	48
34	94	0.8	87.5	87.1	1.87	62.0	109	5.0	94.5	4360	47
35	93	0.8	94.0	93.5	1.88	62.0	110	5.4	94.1	4350	47
36	93	0.9	100.5	100.0	1.88	62.0	110	5.9	93.7	4340	47
37	93	0.9	107.0	106.4	1.88	63.0	110	6.3	93.3	4330	47
38	93	1.0	113.5	112.9	1.89	63.0	110	6.7	93.0	4320	46
39	92	1.0	120.0	119.2	1.89	63.0	110	7.1	92.6	4310	46
40	92	1.1	126.4	125.6	1.89	63.0	110	7.5	92.2	4300	46
41	92	1.2	132.8	132.0	1.89	63.0	110	7.9	91.8	4290	46
42	91	1.2	139.2	138.3	1.89	64.0	110	8.3	91.5	4280	46
43	91	1.3	145.5	144.5	1.89	64.0	110	8.7	91.1	4270	45
44	90	1.3	151.8	150.8	1.90	64.0	110	9.1	90.7	4260	45
45	89	1.4	158.1	156.9	1.90	64.0	110	9.5	90.4	4250	45
46	89	1.4	164.3	163.1	1.90	64.0	110	9.9	90.0	4240	45
47	88	1.5	170.5	169.2	1.90	64.0	110	10.3	89.7	4230	45
48	88	1.6	176.7	175.2	1.90	64.0	110	10.7	89.4	4220	44
49	88	1.6	182.8	181.3	1.90	64.0	110	11.1	89.0	4210	44
50	87	1.7	188.9	187.2	1.90	64.0	110	11.5	88.7	4200	44
51	86	1.8	195.0	193.2	1.90	65.0	110	11.9	88.4	4190	44
52	86	1.9	201.0	199.1	1.90	65.0	110	12.3	88.1	4180	44
53	85	1.9	206.9	204.9	1.90	65.0	110	12.7	87.8	4170	43
54	85	2.0	212.9	210.8	1.91	65.0	110	13.0	87.4	4160	43
55	84	2.1	218.8	216.5	1.91	65.0	110	13.4	87.1	4150	43
56	84	2.1	224.6	222.2	1.91	65.0	110	13.8	86.9	4140	43
57	83	2.2	230.4	227.9	1.91	65.0	110	14.2	86.5	4130	43
58	83	2.3	236.2	233.6	1.91	65.0	110	14.6	86.3	4120	42
59	82	2.3	241.9	239.2	1.91	65.0	110	14.9	86.0	4110	42
60	82	2.4	247.6	244.7	1.91	65.0	110	15.3	85.7	4100	42

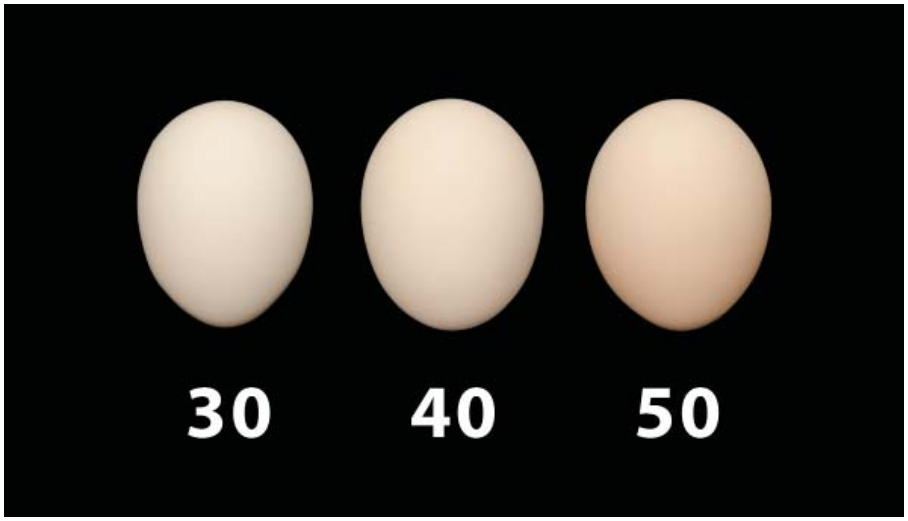
* Egg weights after 40 weeks of age assume phase feeding of protein to limit egg size.

Performance Table

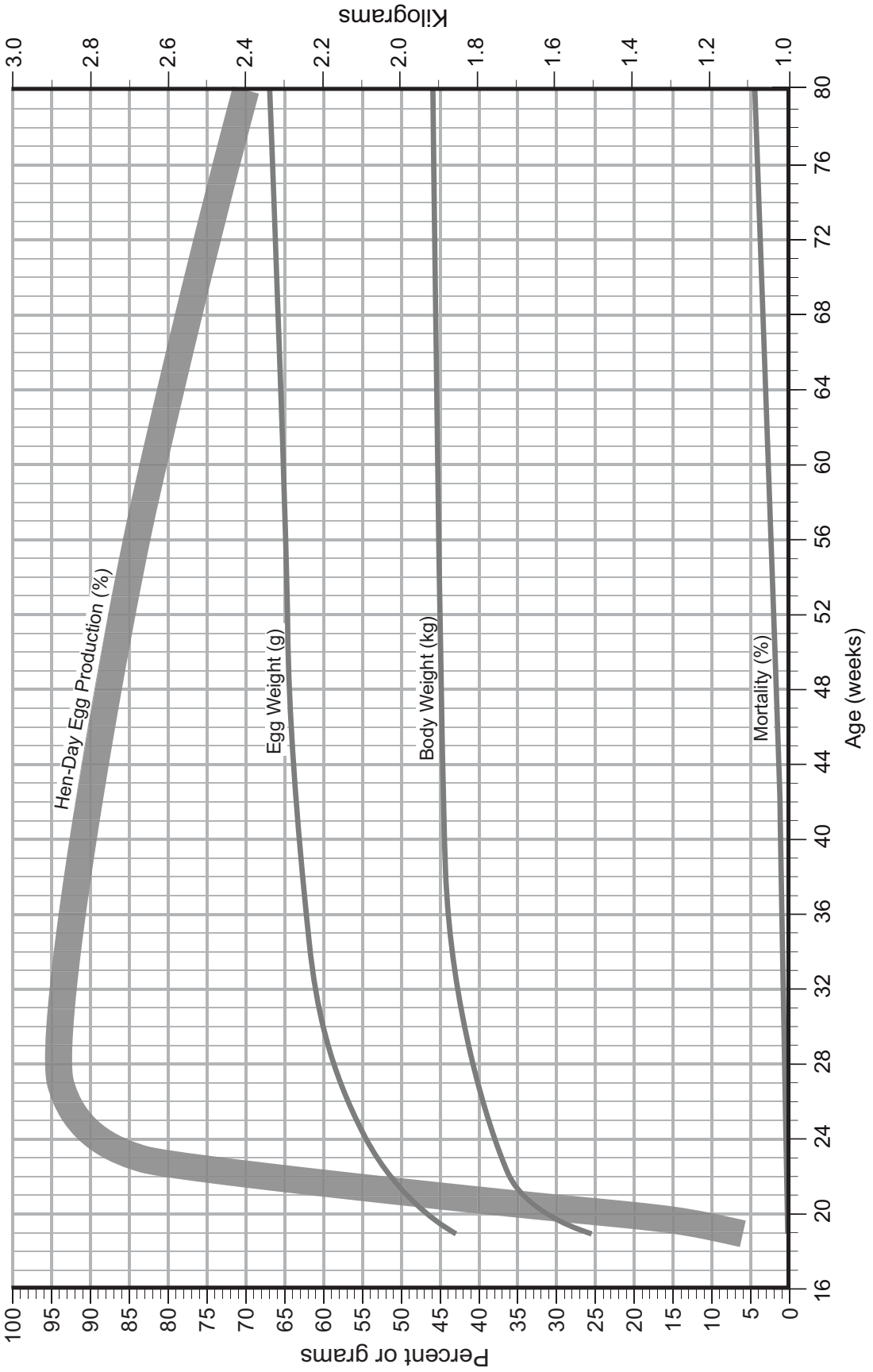
Age in Weeks	% Hen-Day	% Mortality Cumulative	Hen-Day Eggs Cumulative	Hen-Housed Eggs Cumulative	Body Weight kg	Average Egg Weight* g/egg	Feed Consumption g/day per bird	Egg Mass Cumulative kg	Egg Quality		
									Haugh Units	Breaking Strength	Shell Color
61	81	2.5	253.3	250.3	1.91	65.0	110	15.7	85.4	4090	42
62	81	2.6	258.9	255.7	1.91	65.0	110	16.0	85.2	4080	42
63	80	2.7	264.5	261.2	1.91	65.0	110	16.4	84.9	4070	41
64	79	2.7	270.1	266.6	1.91	65.0	110	16.8	84.7	4060	41
65	79	2.8	275.6	272.0	1.91	65.0	110	17.1	84.4	4050	41
66	78	2.9	281.1	277.3	1.91	66.0	110	17.5	84.1	4040	41
67	78	3.0	286.5	282.5	1.92	66.0	110	17.8	83.8	4030	41
68	77	3.1	291.9	287.8	1.92	66.0	110	18.2	83.5	4020	40
69	76	3.2	297.2	292.9	1.92	66.0	110	18.5	83.3	4010	40
70	76	3.3	302.6	298.1	1.92	66.0	110	18.9	83.0	4000	40
71	75	3.4	307.8	303.2	1.92	66.0	110	19.2	82.8	3990	40
72	75	3.5	313.0	308.2	1.92	66.0	110	19.6	82.6	3980	40
73	74	3.6	318.2	313.2	1.92	67.0	110	19.9	82.4	3970	40
74	73	3.8	323.4	318.1	1.92	67.0	110	20.3	82.1	3960	39
75	73	3.9	328.5	323.0	1.92	67.0	110	20.6	81.9	3950	39
76	72	4.0	333.5	327.9	1.92	67.0	110	21.0	81.7	3940	39
77	72	4.1	338.5	332.7	1.92	67.0	110	21.3	81.4	3930	39
78	71	4.2	343.5	337.4	1.92	67.0	110	21.6	81.2	3920	39
79	70	4.4	348.4	342.2	1.92	67.0	110	22.0	81.0	3910	38
80	70	4.5	353.3	346.8	1.92	67.0	110	22.3	80.8	3900	38

* Egg weights after 40 weeks of age assume phase feeding of protein to limit egg size.

Hy-Line Sonia Egg Shell Color Range



Performance Graph



Egg Size Distribution—E.U. Standards					
Age in Weeks	**Average Egg Weight (g)**	**% Very Large Over 73 g**	**% Large 63–73 g**	**% Medium 53–63 g**	**% Small 43–53 g**
22	51.0	0.00	0.62	33.23	61.37
24	55.0	0.02	5.82	59.42	33.82
26	57.0	0.13	12.75	64.60	22.11
28	59.0	0.41	22.11	64.60	12.75
30	60.0	0.62	27.58	62.89	8.86
32	61.0	0.82	33.64	60.06	5.46
34	62.0	1.24	40.68	54.77	3.31
36	62.0	1.24	40.68	54.77	3.31
38	63.0	1.86	48.14	48.14	1.86
40	63.0	1.86	48.14	48.14	1.86
42	64.0	3.04	50.21	45.01	1.74
44	64.0	3.31	54.12	41.14	1.43
46	64.0	3.31	54.12	41.14	1.43
48	64.0	3.59	54.33	40.68	1.39
50	64.0	3.59	54.33	40.68	1.39
52	65.0	5.84	57.42	35.62	1.12
54	65.0	5.84	57.42	35.62	1.12
56	65.0	6.20	57.78	34.97	1.05
58	65.0	6.20	57.78	34.97	1.05
60	65.0	6.56	57.78	34.61	1.05
62	65.0	6.56	57.78	34.61	1.05
64	65.0	6.56	57.78	34.61	1.05
66	66.0	9.74	60.90	28.56	0.80
68	66.0	9.74	60.90	28.56	0.80
70	66.0	10.16	60.48	28.56	0.80
72	66.3	11.16	61.42	26.65	0.78
74	66.6	12.23	61.42	25.64	0.71
76	66.8	13.41	61.31	24.59	0.69
78	67.1	14.60	61.24	23.49	0.67
80	67.3	15.87	61.20	22.31	0.63

Egg Size Distribution—Japanese Standards									
Age in Weeks	Average Egg Weight (g)	% Over 76 g	% LL 70–76 g	% L 64–70 g	% M 58–64 g	% MS 52–58 g	% S 46–52 g	% SS 40–46 g	% Under 40 g
20	46.0	0.00	0.00	0.00	0.45	9.15	40.39	40.39	9.61
22	51.0	0.00	0.00	0.33	6.90	34.51	43.37	13.78	1.10
24	55.0	0.00	0.16	3.72	23.94	44.36	23.94	3.72	0.16
26	57.0	0.02	0.69	8.62	33.19	40.21	15.38	1.83	0.07
28	59.0	0.07	1.83	15.38	40.21	33.19	8.62	0.69	0.02
30	60.0	0.10	2.62	19.36	42.89	28.83	5.84	0.35	0.01
32	61.0	0.16	3.46	23.83	45.15	23.81	3.46	0.13	0.00
34	62.0	0.21	4.91	29.03	45.13	18.65	2.01	0.05	0.00
36	62.0	0.21	4.91	29.03	45.13	18.65	2.01	0.05	0.00
38	63.0	0.34	6.54	34.51	43.37	14.15	1.08	0.02	0.00
40	63.0	0.34	6.90	34.51	43.37	13.78	1.08	0.02	0.00
42	64.0	0.62	9.94	38.96	39.44	10.22	0.80	0.02	0.00
44	64.0	0.72	10.32	38.96	38.96	10.22	0.80	0.02	0.00
46	64.0	0.72	10.32	38.96	38.96	10.22	0.80	0.02	0.00
48	64.0	0.82	10.69	38.96	38.49	10.22	0.80	0.02	0.00
50	64.0	0.82	10.69	38.96	38.49	10.22	0.80	0.02	0.00
52	65.0	1.55	14.79	41.43	33.73	7.95	0.53	0.01	0.00
54	65.0	1.55	14.79	41.43	33.73	7.95	0.53	0.01	0.00
56	65.0	1.72	15.09	40.81	33.54	8.29	0.53	0.01	0.00
58	65.0	1.72	15.09	40.81	33.54	8.29	0.53	0.01	0.00
60	65.0	1.90	15.38	40.21	33.25	8.72	0.53	0.01	0.00
62	65.0	1.90	15.38	40.21	33.25	8.72	0.53	0.01	0.00
64	65.0	1.90	15.38	40.21	33.25	8.72	0.53	0.01	0.00
66	66.0	3.20	19.74	41.50	28.63	6.45	0.47	0.01	0.00
68	66.0	3.20	19.74	41.50	28.63	6.45	0.47	0.01	0.00
70	66.0	3.45	19.90	41.20	28.52	6.45	0.47	0.01	0.00
72	66.3	3.89	21.17	41.06	27.23	6.18	0.45	0.01	0.00
74	66.6	4.37	22.45	41.06	25.93	5.78	0.40	0.01	0.00
76	66.8	5.02	23.36	40.73	25.05	5.42	0.40	0.01	0.00
78	67.1	5.60	24.63	40.73	23.79	4.90	0.34	0.01	0.00
80	67.3	6.35	25.44	40.16	22.99	4.73	0.32	0.01	0.00

Hy-Line International Welfare Goals and Principles

To promote animal well-being and produce birds of the highest quality, we adhere to the following welfare goals and principles. These goals and principles are the essential building blocks for the humane and professional care of our birds:

- Feed and Water
  Provide access to good quality water and nutritionally balanced diets at all times
- Health and Veterinary Care
  Provide science-based health programs and prompt veterinary care
- Environment
  Provide shelter that is designed, maintained and operated to meet the bird's needs and to facilitate daily inspection
- Husbandry and Handling Practices
  Provide comprehensive care and handling procedures that ensure the bird's well-being throughout its life
- Transportation
  Provide transportation that minimizes travel time and stress

Hy-Line

www.hyline.com

info@hyline.com