Hy-Line

Commercial Layers

Edition 3

Hy-Line®

CV-22

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 16 weeks):	
Livability	98%
Feed Consumed	5.08 kg (11.2 lb)
Body Weight at 16 Weeks	1.19 kg (2.62 lb)
Laying Period (to 80 weeks):	
Percent Peak	94–96%
Hen-Day Eggs to 60 Weeks	259–265
Hen-Day Eggs to 80 Weeks	366–377
Hen-Housed Eggs to 60 Weeks	253–260
Hen-Housed Eggs to 80 Weeks	353–363
Livability to 60 Weeks	95%
Livability to 80 Weeks	92%
Days to 50% Production (from hatch)	133
Egg Weight at 26 Weeks	57.9 g/egg (46.0 lb/case)
Egg Weight at 38 Weeks	63.0 g/egg (50.0 lb/case)
Egg Weight at 70 Weeks	66.7 g/egg (52.9 lb/case)
Total Egg Mass per Hen-Housed (18–80 weeks)	22.2 kg (49.0 lb)
Body Weight at 32 Weeks	1.55 kg (3.42 lb)
Body Weight at 70 Weeks	1.61 kg (3.55 lb)
Shell Strength	Excellent
Haugh Units at 38 Weeks	96
Haugh Units at 56 Weeks	92
Haugh Units at 70 Weeks	89
Percent Solids at 38 Weeks	24.0
Percent Solids at 56 Weeks	24.3
Percent Solids at 70 Weeks	24.2
Average Daily Feed Consumption (17–80 weeks)	105.5 g/day per bird (23.3 lb/day per 100 birds)
Feed Conversion Rate, kg Feed/kg Eggs or lb Feed/lb Eggs (20–60 weeks)	1.90
Feed Conversion Rate, kg Feed/kg Eggs or lb Feed/lb Eggs (20–80 weeks)	1.98
Feed Utilization, kg Egg/kg Feed or lb Egg/lb Feed (20–60 weeks)	0.53
Feed Utilization, kg Egg/kg Feed or lb Egg/lb Feed (20–80 weeks)	0.51
Feed per Dozen Eggs (20–60 weeks)	1.41 kg (3.10 lb)
Feed per Dozen Eggs (20–80 weeks)	1.49 kg (3.30 lb)
Condition of Droppings	Dry

Nutrition and Management Recommendations

The Hy-Line CV-22 is an early maturing layer and comes into production very quickly. Proper nutrition and transition between diets are important to optimize her genetic capabilities. Routine monitoring of the hens' egg production, body weight, egg weight and feed intake is strongly recommended so dietary adjustments can be made to suit the needs of the individual flock. Your Hy-Line sales representative and Hy-Line Technical Service can help in this regard. In addition, the EggCel program can be helpful in plotting the flock's data against the standards; the EggCel program is free and available online at http://www.Hyline.com.

Pullet Nutrition and Management

It is important to develop a healthy, good-quality pullet with sufficient body reserves to sustain the high demands for egg production. Therefore, the body weight of the pullets should be monitored by weighing the birds weekly. Reaching the target weights between weeks 6 and 12 is especially important as maximum bone growth and weight gain occurs during this time. To reach target weights, adjustments in the dietary level of energy (and possibly nutrients such as amino acids) may be necessary. Diet (phase) changes should be based on both body weight and age.

The sexual maturity (50% production) at 133 days of age is earlier than that of the Hy-Line W-36 (146 days of age) and the Hy-Line W-98 (137 days of age), so customers should note the following changes in management:

1. Hy-Line CV-22 pullets should be moved to the layer barn by 16 weeks (112 days) (especially if the pullets are above target weights).
2. The pre-lay diet should be fed at 1150 grams (2.54 lbs) of body weight and/or 15 weeks.
3. The first high-calcium laying-hen diet (Peaking Diet) should be fed at the point of lay (when first eggs appear).

Note that if pullets are grown on the floor, it is essential that the barn is equipped with perches and that there is sufficient perch space (see http://www.Hyline.com/RedBook/Management/Perches). Perches will help ensure that all the birds are consuming adequately and that the leg and flight muscles develop correctly (which helps avoid eggs laid outside the nests).

Suggested Nutrition Program in Lay

Phase-feeding program

The diet program suggested in the Nutrition Recommendations for the Hy-Line CV-22 follows the principle of feeding based on daily feed intake and desired production and egg size. Feeding this program ensures high peak egg production, excellent persistence of lay, controlled egg weight, and therefore, a highly profitable business. Note that the diets should be formulated for the actual, observed feed intakes in each phase.

The Peaking Diet fed as the hens start lay is critical to sustain continued body weight gain and the high nutritional demands to allow both increasing egg size and egg production. Even though the flock's egg production is 50%, the individual birds in lay are producing one egg per day (which is nearly 100% daily egg production for the individual bird). It is recommended to start feeding a concentrated diet (i.e. formulated for a lower feed intake) to supply the needed energy and nutrients to meet the dietary demands of the hens that are laying, and then change to a less concentrated diet when feed intake has increased.

Because of the high nutrient density of the Peaking Diet, this diet may appear expensive when considering the price per ton. However, the diet is only fed a short time and because of the relatively low feed consumption, the actual investment pays for itself. The Peaking Diet ensures adequate energy and nutrient intake to achieve a high peak and prevents depletion of body reserves necessary for excellent persistency of lay.

The next diet is formulated for a feed intake of about 98 g/day (21.6 lb/day per 100 hens). The feed intake of the Hy-Line CV-22 does not change much after this time, so subsequent diet changes are governed mainly by need to control egg weight (through reduction in amino acid intakes), maintaining eggshell quality (through increases in calcium intakes) and reducing diet cost. That said, these diets should be reformulated to avoid under- or over-feeding the hens if the feed intake changes. It is recommended to change diet phases and formulate according to the recommended amino acid levels to control late egg size.

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

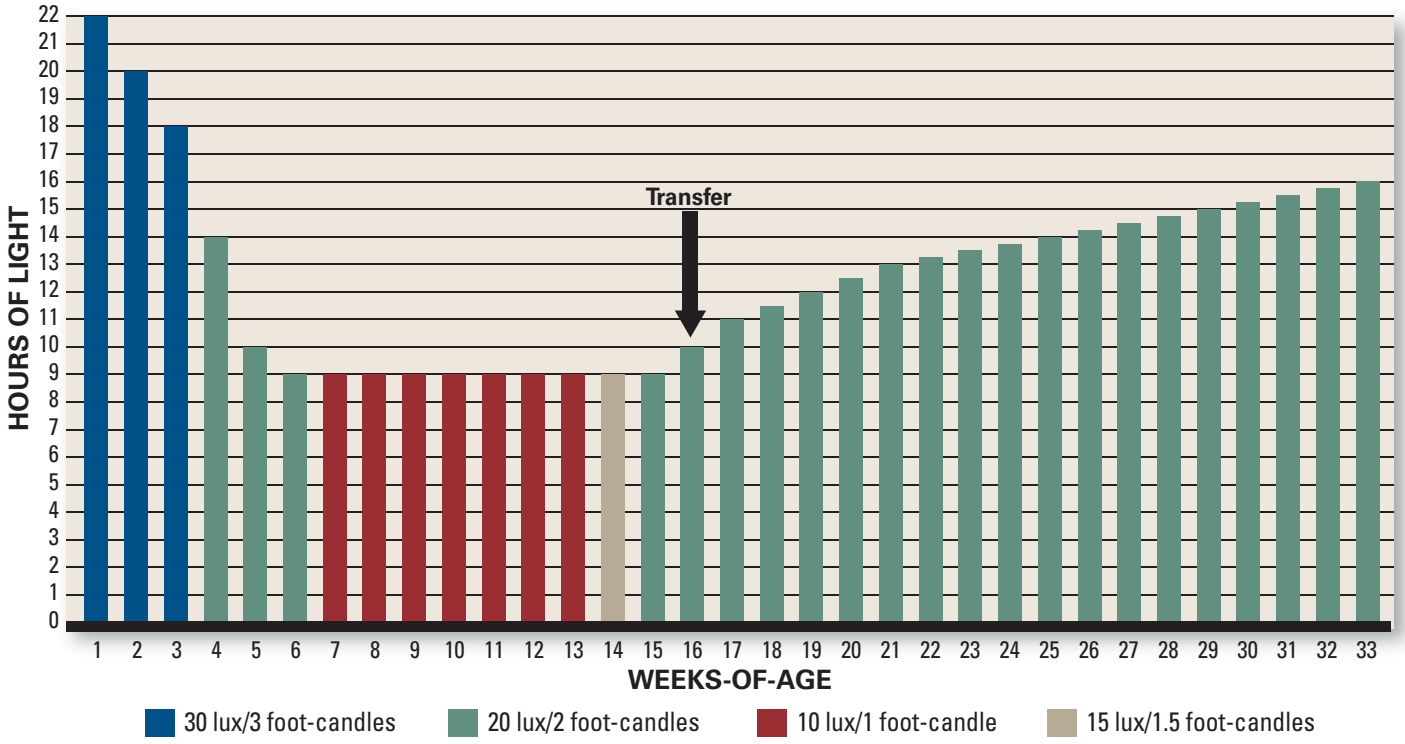
At housing, an ambient temperature of 21 to 23˚C (70 to 74˚F) is desired. Increase the house temperature about 1˚C every 2 weeks (1˚F weekly) until reaching a house temperature of 26 to 27˚C (79 to 81˚F) (assuming the ventilation systems are able to maintain adequate air quality at these temperatures). 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.

Lighting

A Quick Step-Down Program is outlined in the chart below to best manage the Hy-Line CV-22. Before increasing day length for stimulation of lay, slowly increase the light intensity for two weeks and stimulate when the pullets weigh 1.19 kg/2.62 pounds during week sixteen. Continue to increase the day length by one hour during weeks 16 and 17, 30 minutes during weeks 18 to 21 and then in 15 minute increments until 15 or 16 hours of light are reached.

Floor birds require higher light intensity so they better learn and move about in their environment. For open-sided housing, the Hy-Line Lighting Program tool at http://www.hyline.com is useful utilizing the parameters shown below to develop an appropriate lighting program.

Recommended Lighting Program for Light-Controlled Housing



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.

Waterlines should be flushed prior to arrival of the chicks. Drinking water temperature should be 25 to 30°C (77 to 86°F) 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. It is important to provide floor-grown birds with enough light intensity to allow them to navigate their environment. A light intensity of 30 lux (3 foot-candles) should be used for the first three weeks of age, dropping down to 20 lux (2 foot-candles) for weeks 4-6 of age. At 7 weeks of age, change to 10 lux (1 foot-candle) and remain at that level through thirteen weeks of age. Increase to 15 lux (1.5 foot-candles) during the fourteenth week of age. At week 15 of age, increase the light intensity to 20 lux (2 foot-candles) and maintain that intensity for the lay period. Birds moving into open-sided housing should have higher light intensities of 30-40 lux (3-4 foot-candles) at the time of housing.

Pullet Growing Space Recommendations

	Colony/Cage	Floor
Bird Space	310 cm^2/bird (48 in^2/bird)	835 cm^2/bird (0.9 ft^2/bird)
Feeder	5 cm/bird (2 in/bird)	5 cm/bird (2 in/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 (18 in) 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 (90–91°F)	33–35°C (91–95°F)
4–7	30–32°C (86–90°F)	31–33°C (88–91°F)
8–14	28–30°C (82–86°F)	29–31°C (84–88°F)
15–21	26–28°C (79–82°F)	27–29°C (81–84°F)
22–28	23–26°C (73–79°F)	24–27°C (75–81°F)
29–35	21–23°C (70–73°F)	22–24°C (72–75°F)
36+	21°C (70°F)	21°C (70°F)

[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 (0.22 gallons) per 100 birds on day one of age.

Age in Weeks	Liters	Gallons (U.S.)
1	0.8–1.1	0.20–0.30
2	1.1–1.9	0.30–0.50
3	1.7–2.7	0.45–0.70
4	2.5–3.8	0.65–1.00
5	3.4–4.7	0.90–1.25
6	4.5–5.7	1.20–1.50
7	5.7–6.8	1.50–1.80
8	6.1–8.0	1.60–2.10
9	6.4–9.5	1.70–2.50
10–15	6.8–10.2	1.80–2.70
16–20	7.2–15.2	1.90–4.00
21–25*	9.9–18.2	2.60–4.80
Over 25*	15.2–20.8	4.00–5.50

* Chart shows an expected range of water consumption at normal environmental temperatures for bird comfort (21–27°C or 70–81°F). At higher temperatures (32–38°C or 90–100°F) water consumption may increase up to double the amounts shown.

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 (67–86 in^2/bird)	750 cm^2/bird (600 usable cm^2) (116 in^2/bird - (93 usable in^2)
Feeder	7.6 cm/bird (3 in/bird)	12 cm/bird (4.7 in/bird)
Cups or nipples drinking system	1 per 12 birds	2 within reach of each bird
Perches	—	15 cm/bird (5.9 in/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	Body Weight* lb
1	65	0.14
2	110	0.24
3	180	0.40
4	260	0.57
5	350	0.77
6	450	0.99
7	550	1.21
8	650	1.43
9	750	1.65
10	850	1.87
11	930	2.05
12	1000	2.20
13	1060	2.34
14	1110	2.45
15	1150	2.54
16**	1190	2.62
17	1230	2.71

* Pullets grown on the floor or in a tropical climate can be 50 g (0.1 lb) lighter than shown.
** Move to Lay House

Feed Consumption*

—Growing Period—

Age in Weeks	Daily g/day per bird	Daily lb/day per 100 birds	Cumulative g to date	Cumulative lb to date
1	14	3.09	98	0.22
2	17	3.75	217	0.48
3	21	4.63	364	0.80
4	29	6.39	567	1.25
5	39	8.60	840	1.85
6	43	9.48	1141	2.52
7	46	10.14	1463	3.23
8	49	10.80	1806	3.98
9	52	11.46	2170	4.78
10	54	11.90	2548	5.62
11	55	12.13	2933	6.47
12	57	12.57	3332	7.35
13	59	13.01	3745	8.26
14	60	13.23	4165	9.18
15	64	14.11	4613	10.17
16	67	14.77	5082	11.20

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

Growing Period Nutrition Recommendations

Item[1]	Starter 1	Starter 2	Grower	Developer	Pre-Lay[5]
Feed to a body weight of	180 g	450 g	1000 g	1150 g	1230 g
Approximate age	0–3 weeks	4–6 weeks	7–12 weeks	13–15 weeks	16–17 weeks
Recommended concentration[2]					
Metabolizable energy, kcal/lb	1325–1375	1325–1375	1325–1375	1300–1375	1315–1340
Metabolizable energy, kcal/kg	2922–3032	2922–3032	2922–3032	2867–3032	2900–2955
Metabolizable energy, MJ/kg	12.23–12.69	12.23–12.69	12.23–12.69	12.00–12.69	12.14–12.37
Minimum recommended concentration					
Standardized (true) ileal digestible amino acids					
Lysine, %	1.00	0.92	0.82	0.74	0.76
Methionine, %	0.45	0.43	0.40	0.38	0.37
Methionine+cystine, %	0.70	0.69	0.64	0.61	0.60
Threonine, %	0.65	0.60	0.53	0.49	0.50
Tryptophan, %	0.17	0.17	0.16	0.15	0.15
Arginine, %	1.07	0.98	0.88	0.79	0.81
Isoleucine, %	0.70	0.66	0.61	0.56	0.61
Valine, %	0.72	0.68	0.64	0.59	0.65
Total amino acids[3]					
Lysine, %	1.09	1.01	0.90	0.81	0.83
Methionine, %	0.48	0.46	0.43	0.41	0.40
Methionine+cystine, %	0.79	0.78	0.72	0.68	0.68
Threonine, %	0.76	0.70	0.63	0.57	0.59
Tryptophan, %	0.20	0.20	0.19	0.18	0.18
Arginine, %	1.15	1.06	0.94	0.85	0.87
Isoleucine, %	0.75	0.71	0.65	0.60	0.65
Valine, %	0.79	0.75	0.71	0.65	0.71
Crude protein (nitrogen × 6.25),[3] %	20.00	19.00	18.00	16.50	16.25
Calcium,[4] %	1.00	1.00	1.00	1.40	2.75
Phosphorus (available), %	0.50	0.49	0.48	0.46	0.50
Sodium, %	0.19	0.19	0.18	0.18	0.18
Chloride, %	0.19	0.19	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]	Peaking	96% to 90% egg production	89% to 86% egg production	Less than 86% egg production
Recommended concentration[2]				
Metabolizable energy, kcal/lb	1299–1340	1293–1336	1283–1324	1279–1315
Metabolizable energy, kcal/kg	2865–2955	2850–2945	2830–2920	2820–2900
Metabolizable energy, MJ/kg	11.99–12.37	11.93 –12.33	11.84–12.22	11.80–12.14
Minimum recommended concentration Standardized (true) ileal digestible amino acids				
Lysine, mg/day	770	760	740	700
Methionine, mg/day	377	350	318	280
Methionine+cystine, mg/day	647	616	577	525
Threonine, mg/day	539	524	503	469
Tryptophan, mg/day	162	152	141	126
Arginine, mg/day	824	813	792	749
Isoleucine, mg/day	608	578	540	490
Valine, mg/day	678	661	636	602
Total amino acids[3]				
Lysine, mg/day	843	832	810	766
Methionine, mg/day	406	376	342	301
Methionine+cystine, mg/day	729	694	651	592
Threonine, mg/day	634	617	592	552
Tryptophan, mg/day	193	182	168	151
Arginine, mg/day	886	874	851	805
Isoleucine, mg/day	654	621	581	527
Valine, mg/day	747	729	702	664
Crude protein (nitrogen × 6.25),[3] g/day	16.25	15.75	15.25	14.75
Calcium,[4] g/day	4.10	4.25	4.40	4.55
Phosphorus (available), mg/day	500	470	430	370
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.

Laying Period Nutrition Recommendations

Item[1]	Peaking					96% to 90% egg production					89% to 86% egg production					Less than 86% egg production				
Recommended concentration[2]																				
Metabolizable energy, kcal/lb	1299–1340					1293–1336					1283–1324					1279–1315				
Metabolizable energy, kcal/kg	2865–2955					2850–2945					2830–2920					2820–2900				
Metabolizable energy, MJ/kg	11.99–12.37					11.93 –12.33					11.84–12.22					11.80–12.14				
Feed consumption																				
g/day per bird	89	94	**99**	104	109	98	103	**108***	113	118	100	105	**110***	115	120	101	106	**111***	116	121
lb/day per 100 birds	19.6	20.7	**21.8**	22.9	24.0	21.6	22.7	**23.8**	24.9	26.0	22.1	23.2	**24.3**	25.4	26.5	22.3	23.4	**24.5**	25.6	26.7
Standardized (true) ileal digestible amino acids																				
Lysine, %	0.87	0.82	**0.78**	0.74	0.71	0.78	0.74	**0.70**	0.67	0.64	0.74	0.70	**0.67**	0.64	0.62	0.69	0.66	**0.63**	0.60	0.58
Methionine, %	0.42	0.40	**0.38**	0.36	0.35	0.36	0.34	**0.32**	0.31	0.30	0.32	0.30	**0.29**	0.28	0.27	0.28	0.26	**0.25**	0.24	0.23
Methionine+cystine, %	0.73	0.69	**0.65**	0.62	0.59	0.63	0.60	**0.57**	0.55	0.52	0.58	0.55	**0.52**	0.50	0.48	0.52	0.50	**0.47**	0.45	0.43
Threonine, %	0.61	0.57	**0.54**	0.52	0.49	0.53	0.51	**0.49**	0.46	0.44	0.50	0.48	**0.46**	0.44	0.42	0.46	0.44	**0.42**	0.40	0.39
Tryptophan, %	0.18	0.17	**0.16**	0.16	0.15	0.16	0.15	**0.14**	0.13	0.13	0.14	0.13	**0.13**	0.12	0.12	0.12	0.12	**0.11**	0.11	0.10
Arginine, %	0.93	0.88	**0.83**	0.79	0.76	0.83	0.79	**0.75**	0.72	0.69	0.79	0.75	**0.72**	0.69	0.66	0.74	0.71	**0.67**	0.65	0.62
Isoleucine, %	0.68	0.65	**0.61**	0.58	0.56	0.59	0.56	**0.54**	0.51	0.49	0.54	0.51	**0.49**	0.47	0.45	0.49	0.46	**0.44**	0.42	0.40
Valine, %	0.76	0.72	**0.68**	0.65	0.62	0.67	0.64	**0.61**	0.58	0.56	0.64	0.61	**0.58**	0.55	0.53	0.60	0.57	**0.54**	0.52	0.50
Total amino acids[3]																				
Lysine, %	0.95	0.90	**0.85**	0.81	0.77	0.85	0.81	**0.77**	0.74	0.71	0.81	0.77	**0.74**	0.70	0.68	0.76	0.72	**0.69**	0.66	0.63
Methionine, %	0.46	0.43	**0.41**	0.39	0.37	0.38	0.37	**0.35**	0.33	0.32	0.34	0.33	**0.31**	0.30	0.29	0.30	0.28	**0.27**	0.26	0.25
Methionine+cystine, %	0.82	0.78	**0.74**	0.70	0.67	0.71	0.67	**0.64**	0.61	0.59	0.65	0.62	**0.59**	0.57	0.54	0.59	0.56	**0.53**	0.51	0.49
Threonine, %	0.71	0.67	**0.64**	0.61	0.58	0.63	0.60	**0.57**	0.55	0.52	0.59	0.56	**0.54**	0.51	0.49	0.55	0.52	**0.50**	0.48	0.46
Tryptophan, %	0.22	0.21	**0.19**	0.19	0.18	0.19	0.18	**0.17**	0.16	0.15	0.17	0.16	**0.15**	0.15	0.14	0.15	0.14	**0.14**	0.13	0.12
Arginine, %	1.00	0.94	**0.89**	0.85	0.81	0.89	0.85	**0.81**	0.77	0.74	0.85	0.81	**0.77**	0.74	0.71	0.80	0.76	**0.73**	0.69	0.67
Isoleucine, %	0.73	0.70	**0.66**	0.63	0.60	0.63	0.60	**0.58**	0.55	0.53	0.58	0.55	**0.53**	0.51	0.48	0.52	0.50	**0.47**	0.45	0.44
Valine, %	0.84	0.79	**0.75**	0.72	0.69	0.74	0.71	**0.68**	0.65	0.62	0.70	0.67	**0.64**	0.61	0.59	0.66	0.63	**0.60**	0.57	0.55
Crude protein (nitrogen × 6.25),[3] %	18.26	17.29	**16.41**	15.63	14.91	16.07	15.29	**14.58**	13.94	13.35	15.25	14.52	**13.86**	13.26	12.71	14.60	13.92	**13.29**	12.72	12.19
Calcium,[4] %	4.61	4.36	**4.14**	3.94	3.76	4.34	4.13	**3.94**	3.76	3.60	4.40	4.19	**4.00**	3.83	3.67	4.50	4.29	**4.10**	3.92	3.76
Phosphorus (available),%	0.56	0.53	**0.51**	0.48	0.46	0.48	0.46	**0.44**	0.42	0.40	0.43	0.41	**0.39**	0.37	0.36	0.37	0.35	**0.33**	0.32	0.31
Sodium, %	0.20	0.19	**0.18**	0.17	0.17	0.18	0.17	**0.17**	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	0.17	0.18	0.17	**0.17**	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), %	1.12	1.06	**1.01**	0.96	0.92	1.02	0.97	**0.93**	0.88	0.85	1.00	0.95	**0.91**	0.87	0.83	0.99	0.94	**0.90**	0.86	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.

Non-Fast Molting Recommendations

Non-Fast Molting

Many producers use a Non-Fast Molting Program to induce molting. The Hy-Line laying hens will perform very well after a rest, particularly in the latter weeks of the molt cycle with excellent shell quality and persistency. The optimum age for molting depends on the current flocks' performance, local egg markets, and scheduling of the next pullet flock, but is usually between 65 to 75 weeks of age.

Induced molting can extend the productive life of a flock by improving rate of lay, shell quality, and albumen height. However, these levels will be somewhat lower than the best pre-molt values. Egg size will essentially remain unaffected and will continue to increase after egg production resumes.

Free access to water at all times during the non-fast molt is essential. It is important to know the sodium (Na) content of the drinking water. High sodium levels (i.e., 100 ppm or higher) can adversely affect this molt program.

The best post-molt egg production is achieved after a complete cessation of egg production that lasts for at least 2 weeks and a concomitant loss of body weight to the 18 week target weight. After the initial body weight loss, the body weight can be held steady by a combination of adjusting the number of feedings per day and/or a shift to a higher-energy (laying-hen-type) diet.

Because of the importance of the body weight loss during molt, it is recommeded to closely monitor the body weight of the flock during the molt process. Body weights should be collected twice per week from the same cages every time. The cages should be selected from bottom, middle, and top tiers; all rows; and from the front, middle, and end of the house.

The following table outlines the recommendations for the Non-Fast Molting Program recommended by Hy-Line.

Molt day	Light	Feed type	Feed modification[1]	Feed intake[2]	House temperature[3]	Comments
	Hours per day			g/day per bird (lb/day per 100 birds)	°C (°F)	
-7 to -5	16	Layer diet	Fine-particle $CaCO_3$	Full feed	24–25 (75–77)	Fine-particle $CaCO_3$ diet: Remove all large-particle size $CaCO_3$ and replace with fine-particle $CaCO_3$ (less than 2 mm mean diameter). Do NOT change the percent calcium in the laying-hen diet.
-4 to -1	24	Layer diet	Fine-particle $CaCO_3$, no added salt (NaCl)	Full feed	24–25 (75–77)	
0–6	6–8[4]	Molt diet[5]	Fine-particle $CaCO_3$	54–64 (12–14)	27–28 (80–82)	The higher house temperatures will help reduce feed intake and, in turn, facilitate a reduction in body weight to the 18 week target weight (note that white laying hens should not lose more than 24–25% of their pre-molt body weight).
7–17	6–8	Molt diet	—	54-64 (12–14)	27–28 (80–82)	Maintain body weight.
18–19	12 or 16[6]	Layer diet[7]	Mixture of fine- and coarse-particle $CaCO_3$ as in a normal layer diet	64–73 (14–16)	27–28 (80–82)	Control (limit) feed intake to avoid fat birds.
20–21	16[6]	Layer diet[7]	—	Full feed	26–27 (78–80)	Lower house temperature as needed to increase feed intake.
22–24	16	Layer diet[7]	—	Full feed[7]	24–25 (75–77)	Lower the ambient temperature to "normal."

[1] Include a probiotic or a complex-carbohydrate product (e.g., mannan-oligo-saccharide; MOS) at 0.5 kg per metric ton (1 lb per 2000 lb) finished diet through all stages of the molt program.
[2] Feed intake depends on house temperature. Lower temperatures (colder) may require more feed.
[3] Depends on air quality in house. The suggested house temperatures may not be achievable in cold weather.
[4] Set lights at 8 hours or natural day length in open-sided houses. Normally, it is not necessary to change the light intensity.
[5] The Molt Diet is high in fiber (low in energy) and contains no added sodium (Na) (i.e., no added NaCl or $NaHCO_3$).
[6] Light-stimulate the birds to bring the birds into production by increasing the light hours to the number of hours they were given before the molt (e.g., 15 or 16 hours). This increase can be performed over 1 week (i.e., from 8 hours to 16 hours in a single day) or over 2 weeks (i.e., from 8 to 12 hours and then from 12 to 16 hours). Monitor and control feed intake for the first few days after light stimulation to avoid fat birds as they are getting back into lay (which would significantly increase egg weight in the second cycle).
[7] According to the post-molt nutrition recommendations.

Molt Nutrition Recommendations

Recommended concentration[1]	Molt Diet
Metabolizable energy, kcal/lb	1180–1270
Metabolizable energy, kcal/kg	2600–2800
Metabolizable energy, MJ/kg	10.90–11.70
Minimum recommended concentration	
Standardized (true) ileal digestibility	
Lysine, %	0.30
Methionine, %	0.15
Methionine+cystine, %	0.32
Threonine, %	0.18
Tryptophan, %	0.10
Arginine, %	0.38
Isoleucine, %	0.18
Valine, %	0.23
Total amino acids[2]	
Lysine, %	0.33
Methionine, %	0.16
Methionine+cystine, %	0.36
Threonine, %	0.21
Tryptophan, %	0.12
Arginine, %	0.41
Isoleucine, %	0.20
Valine, %	0.26
Crude protein (nitrogen × 6.25),[2] %	8.50
Calcium,[3] %	1.3–2.0
Phosphorus (available), %	0.25
Sodium,[4] %	0.03
Chloride, %	0.03

[1] 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).

[2] 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.

[3] The added calcium carbonate (limestone) should be in particle sizes of less than 2 mm.

[4] The sodium content in the Molt Diet should not exceed 0.035%.

Post-Molt Nutrition Recommendations

After the Molt Diet, when egg production commences, formulate diets according to level of desired percentage egg production and egg weight. The Post-Molt Diets are formulated similar to that of the last Laying Diet fed, albeit with the following modifications:

- 20 kcal/kg (9 kcal/lb, 0.08 MJ/kg) less energy
- 5% reduction in amino acid levels (corresponding to about 0.25 percentage points less crude protein)
- increased calcium content (see tables below)
- decreased available-phosphorus content (see tables below)

Minimum recommended daily consumption	Peaking	86% to 79% egg production	78% to 73% egg production	Less than 73% egg production
Calcium, g/day	4.40	4.55	4.70	5.00
Phosphorus (available),mg/day	470	420	370	320

Recommended post-molt dietary calcium and available phosphorus contents					
Peaking					
Feed consumption, g/day per bird	90	95	100	105	110
Feed consumption, lb/day per 100 birds	19.8	20.9	22.1	23.2	24.3
Calcium,[1] %	4.89	4.63	4.40	4.19	4.00
Phosphorus (available), %	0.52	0.49	0.47	0.45	0.43
86% to 79% egg production					
Feed consumption, g/day per bird	90	95	100	105	110
Feed consumption, lb/day per 100 birds	19.8	20.9	22.1	23.2	24.3
Calcium,[1] %	5.06	4.79	4.55	4.33	4.14
Phosphorus (available), %	0.47	0.44	0.42	0.40	0.38
78% to 73% egg production					
Feed consumption, g/day per bird	90	95	100	105	110
Feed consumption, lb/day per 100 birds	19.8	20.9	22.1	23.2	24.3
Calcium,[1] %	5.22	4.95	4.70	4.48	4.27
Phosphorus (available), %	0.41	0.39	0.37	0.35	0.34
Less than 73% egg production					
Feed consumption, g/day per bird	90	95	100	105	110
Feed consumption, lb/day per 100 birds	19.8	20.9	22.1	23.2	24.3
Calcium,[1] %	5.56	5.26	5.00	4.76	4.55
Phosphorus (available), %	0.36	0.34	0.32	0.30	0.29

** Typical feed consumption based on available data.*

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

Performance Table

Age in Weeks	% Hen-Day Production		Mortality Cumulative	Hen-Day Eggs Cumulative		Hen-Housed Eggs Cumulative		Body Weight		Average Egg Weight*		% Grade A Large and Above	Feed Consumption		Hen-Housed Egg Mass Cumulative		Egg Quality		
	Optimum Conditions	Average Conditions	%	Optimum Conditions	Average Conditions	Optimum Conditions	Average Conditions	kg	lb	g/egg	Net lb/30 dozen case	23 oz/ dozen	g/day per bird	lb/day per 100 birds	kg	lb	Haugh Units	% Solids**	Breaking Strength
17	5	2	0.1	0.4	0.1	0.3	0.1	1.23	2.71	44.1	35.0	0	72	15.9	0.0	0.0	99.2	22.8	4830
18	26	23	0.2	2.2	1.8	2.2	1.7	1.28	2.82	46.3	36.7	2	81	17.9	0.1	0.2	99.0	22.9	4850
19	50	47	0.3	5.7	5.0	5.7	5.0	1.33	2.93	48.2	38.3	6	87	19.2	0.2	0.5	98.8	23.0	4870
20	74	71	0.4	10.9	10.0	10.8	10.0	1.39	3.06	49.9	39.6	13	91	20.1	0.5	1.1	98.6	23.0	4850
21	88	84	0.5	17.0	15.9	17.0	15.8	1.43	3.15	51.5	40.9	23	93	20.5	0.8	1.7	98.5	23.1	4830
22	92	90	0.6	23.5	22.2	23.4	22.1	1.46	3.22	53.0	42.1	36	95	20.9	1.1	2.5	98.4	23.1	4810
23	94	92	0.6	30.0	28.6	29.9	28.5	1.48	3.26	54.4	43.2	49	97	21.4	1.5	3.2	98.3	23.2	4790
24	95	92	0.7	36.7	35.1	36.5	34.9	1.50	3.31	55.7	44.2	61	97	21.4	1.8	4.0	98.2	23.2	4770
25	95	93	0.8	43.3	41.6	43.1	41.4	1.51	3.33	56.9	45.2	71	98	21.6	2.2	4.8	98.1	23.3	4750
26	95	93	0.9	50.0	48.1	49.7	47.8	1.52	3.35	57.9	46.0	78	99	21.8	2.6	5.7	98.0	23.3	4730
27	96	93	1.0	56.7	54.6	56.3	54.3	1.53	3.37	58.5	46.4	82	100	22.0	2.9	6.5	97.8	23.4	4710
28	96	94	1.1	63.4	61.2	63.0	60.8	1.54	3.40	59.0	46.8	84	101	22.3	3.3	7.3	97.7	23.4	4690
29	96	94	1.2	70.1	67.8	69.6	67.3	1.54	3.40	59.5	47.2	87	102	22.5	3.7	8.2	97.6	23.5	4670
30	95	94	1.3	76.8	74.3	76.2	73.8	1.55	3.42	60.0	47.6	89	103	22.7	4.1	9.0	97.4	23.5	4650
31	95	93	1.4	83.4	80.9	82.8	80.2	1.55	3.42	60.5	48.0	90	103	22.7	4.5	9.9	97.2	23.6	4630
32	94	93	1.5	90.0	87.4	89.2	86.6	1.55	3.42	60.9	48.3	92	103	22.7	4.9	10.8	97.0	23.6	4610
33	94	92	1.5	96.6	93.8	95.7	92.9	1.55	3.42	61.3	48.7	93	104	22.9	5.3	11.6	96.8	23.7	4590
34	94	92	1.6	103.2	100.2	102.2	99.3	1.55	3.42	61.7	49.0	93	105	23.1	5.7	12.5	96.6	23.7	4570
35	93	92	1.7	109.7	106.7	108.6	105.6	1.56	3.44	62.1	49.3	94	106	23.4	6.1	13.4	96.4	23.8	4550
36	93	91	1.8	116.2	113.1	115.0	111.9	1.56	3.44	62.4	49.5	95	107	23.6	6.4	14.2	96.2	23.8	4530
37	93	91	1.9	122.7	119.4	121.4	118.1	1.56	3.44	62.7	49.8	96	108	23.8	6.8	15.1	96.0	23.8	4510
38	92	91	2.0	129.2	125.8	127.7	124.4	1.56	3.44	63.0	50.0	96	108	23.8	7.2	15.9	95.8	24.0	4500
39	92	90	2.1	135.6	132.1	134.0	130.5	1.57	3.46	63.2	50.2	96	108	23.8	7.6	16.8	95.6	24.0	4480
40	92	90	2.2	142.0	138.4	140.3	136.7	1.57	3.46	63.4	50.3	97	108	23.8	8.0	17.7	95.4	24.1	4460
41	91	90	2.3	148.4	144.7	146.5	142.9	1.57	3.46	63.6	50.5	97	108	23.8	8.4	18.5	95.2	24.1	4440
42	91	89	2.4	154.8	150.9	152.7	148.9	1.57	3.46	63.8	50.6	97	108	23.8	8.8	19.4	95.0	24.1	4425
43	91	89	2.5	161.1	157.2	159.0	155.0	1.58	3.48	64.0	50.8	97	108	23.8	9.2	20.2	94.8	24.1	4405
44	90	89	2.6	167.4	163.4	165.1	161.1	1.58	3.48	64.2	51.0	97	108	23.8	9.6	21.1	94.6	24.2	4390
45	90	88	2.7	173.7	169.5	171.2	167.1	1.58	3.48	64.4	51.1	97	110	24.3	10.0	22.0	94.4	24.2	4370
46	90	88	2.8	180.0	175.7	177.3	173.1	1.58	3.48	64.6	51.3	97	110	24.3	10.3	22.8	94.2	24.3	4350
47	89	88	3.0	186.3	181.9	183.4	179.0	1.58	3.48	64.7	51.3	97	110	24.3	10.7	23.7	94.0	24.3	4335
48	89	87	3.1	192.5	188.0	189.4	184.9	1.59	3.51	64.8	51.4	96	110	24.3	11.1	24.5	93.8	24.3	4315
49	89	87	3.2	198.7	194.0	195.5	190.8	1.59	3.51	64.9	51.5	96	110	24.3	11.5	25.3	93.6	24.3	4300
50	88	87	3.3	204.9	200.1	201.4	196.7	1.59	3.51	65.0	51.6	96	110	24.3	11.9	26.2	93.4	24.3	4280
51	88	86	3.4	211.1	206.2	207.4	202.5	1.59	3.51	65.1	51.7	96	110	24.3	12.3	27.0	93.2	24.4	4260
52	88	86	3.6	217.2	212.2	213.3	208.4	1.59	3.51	65.2	51.7	96	110	24.3	12.6	27.9	93.0	24.4	4240
53	87	85	3.7	223.3	218.1	219.2	214.1	1.59	3.51	65.3	51.8	96	110	24.3	13.0	28.7	92.8	24.4	4220
54	87	85	3.8	229.4	224.1	225.0	219.8	1.59	3.51	65.4	51.9	95	110	24.3	13.4	29.5	92.6	24.4	4200
55	87	84	4.0	235.5	230.0	230.9	225.5	1.60	3.53	65.5	52.0	95	111	24.5	13.8	30.3	92.4	24.3	4190
56	86	84	4.1	241.5	235.8	236.7	231.1	1.60	3.53	65.6	52.1	95	111	24.5	14.1	31.1	92.2	24.3	4170
57	86	83	4.3	247.5	241.6	242.4	236.7	1.60	3.53	65.7	52.1	95	111	24.5	14.5	31.9	92.0	24.3	4160
58	86	83	4.4	253.5	247.5	248.2	242.2	1.60	3.53	65.8	52.2	95	111	24.5	14.9	32.8	91.8	24.3	4150
59	85	82	4.6	259.5	253.2	253.9	247.7	1.60	3.53	65.9	52.3	95	111	24.5	15.2	33.5	91.6	24.3	4140
60	85	82	4.7	265.4	258.9	259.5	253.2	1.60	3.53	66.0	52.4	94	111	24.5	15.6	34.3	91.4	24.3	4130

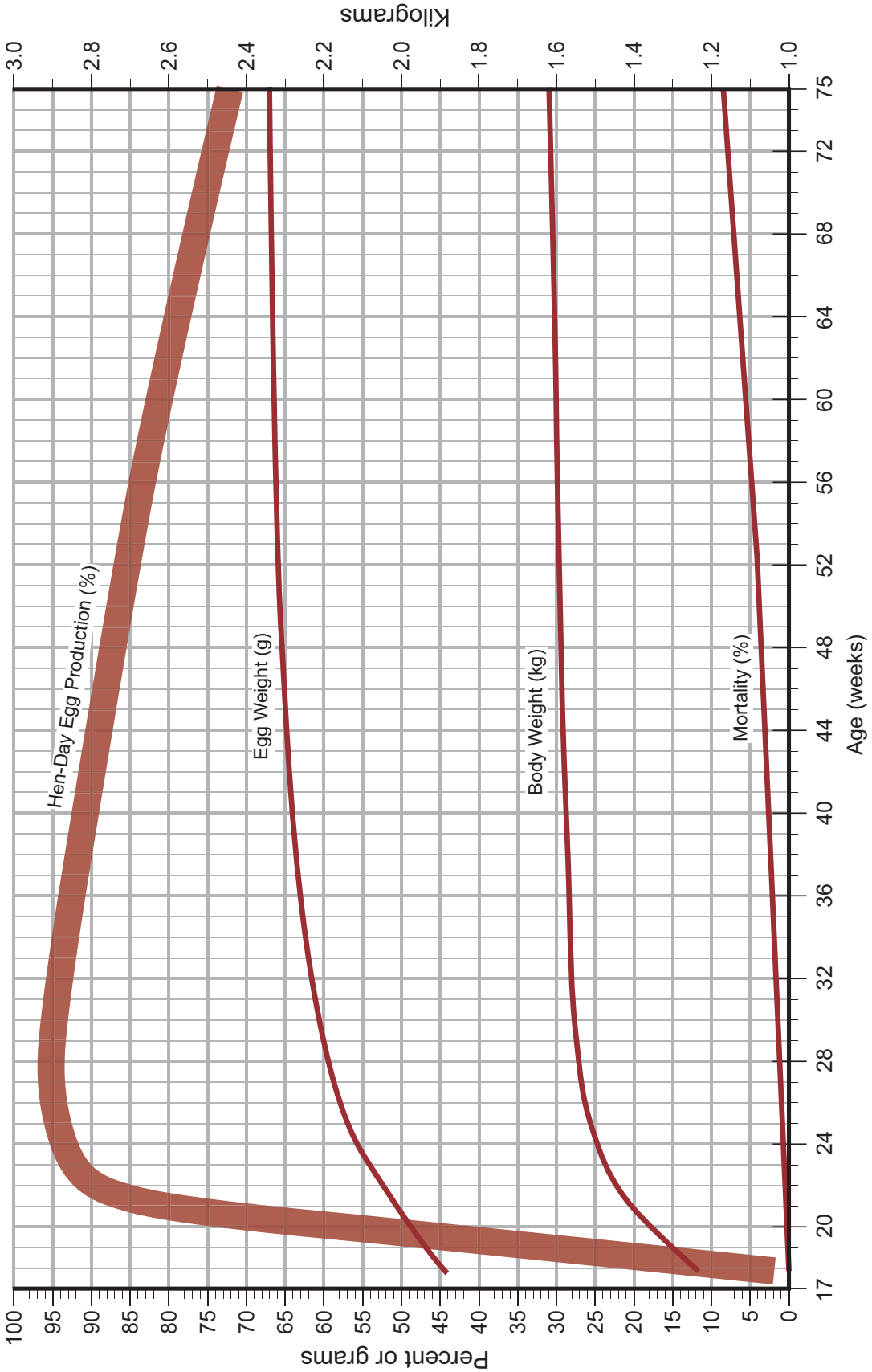
* Egg weights after 40 weeks of age assume phase feeding of protein to limit egg size.
** Percent solids in liquid egg mix of white and yolk.

Performance Table

Age in Weeks	% Hen-Day Production		Mortality Cumulative	Hen-Day Eggs Cumulative		Hen-Housed Eggs Cumulative		Body Weight		Average Egg Weight*		% Grade A Large and Above	Feed Consumption		Hen-Housed Egg Mass Cumulative		Egg Quality		
	Optimum Conditions	Average Conditions	%	Optimum Conditions	Average Conditions	Optimum Conditions	Average Conditions	kg	lb	g/egg	Net lb/30 dozen case	23 oz/ dozen	g/day per bird	lb/day per 100 birds	kg	lb	Haugh Units	% Solids**	Breaking Strength
61	84	81	4.9	271.3	264.6	265.1	258.6	1.60	3.53	66.1	52.5	94	110	24.3	15.9	35.1	91.2	24.3	4115
62	84	81	5.0	277.2	270.3	270.7	263.9	1.60	3.53	66.2	52.5	94	110	24.3	16.3	35.9	91.0	24.3	4100
63	83	80	5.2	283.0	275.9	276.2	269.2	1.60	3.53	66.3	52.6	94	110	24.3	16.6	36.7	90.8	24.3	4085
64	83	80	5.4	288.8	281.5	281.7	274.5	1.60	3.53	66.3	52.6	94	110	24.3	17.0	37.5	90.6	24.3	4065
65	82	79	5.5	294.6	287.0	287.1	279.8	1.60	3.53	66.4	52.7	94	110	24.3	17.3	38.2	90.4	24.2	4045
66	82	79	5.7	300.3	292.5	292.6	285.0	1.60	3.53	66.5	52.8	94	110	24.3	17.7	39.0	90.2	24.2	4020
67	81	78	5.9	306.0	298.0	297.9	290.1	1.60	3.53	66.5	52.8	94	109	24.0	18.0	39.8	90.0	24.2	4005
68	81	78	6.1	311.6	303.5	303.2	295.3	1.61	3.55	66.6	52.9	94	109	24.0	18.4	40.5	89.8	24.2	3990
69	80	77	6.2	317.2	308.8	308.5	300.3	1.61	3.55	66.7	52.9	93	109	24.0	18.7	41.2	89.6	24.2	3980
70	80	77	6.4	322.8	314.2	313.7	305.4	1.61	3.55	66.7	52.9	93	109	24.0	19.0	42.0	89.4	24.2	3970
71	79	76	6.6	328.4	319.6	318.9	310.3	1.61	3.55	66.8	53.0	93	109	24.0	19.4	42.7	89.2	24.2	3960
72	79	76	6.8	333.9	324.9	324.0	315.3	1.61	3.55	66.8	53.0	93	109	24.0	19.7	43.5	89.0	24.2	3950
73	78	75	7.0	339.4	330.1	329.1	320.2	1.61	3.55	66.8	53.0	93	108	23.8	20.0	44.2	88.8	24.2	3940
74	78	75	7.2	344.8	335.4	334.2	325.0	1.61	3.55	66.9	53.1	93	108	23.8	20.4	44.9	88.6	24.2	3930
75	77	74	7.4	350.2	340.6	339.2	329.8	1.61	3.55	66.9	53.1	93	108	23.8	20.7	45.6	88.4	24.2	3920
76	77	73	7.6	355.6	345.7	344.2	334.6	1.61	3.55	66.9	53.1	93	108	23.8	21.0	46.3	88.2	24.2	3910
77	76	73	7.8	360.9	350.8	349.1	339.3	1.61	3.55	66.9	53.1	93	108	23.8	21.3	47.0	88.0	24.2	3900
78	75	72	8.0	366.2	355.8	353.9	343.9	1.62	3.57	66.9	53.1	93	108	23.8	21.6	47.7	87.8	24.2	3890
79	74	72	8.2	371.4	360.9	358.7	348.5	1.62	3.57	67.0	53.2	93	107	23.6	21.9	48.4	87.6	24.1	3880
80	73	71	8.4	376.5	365.8	363.3	353.1	1.62	3.57	67.0	53.2	92	107	23.6	22.2	49.0	87.4	24.1	3870

* Egg weights after 40 weeks of age assume phase feeding of protein to limit egg size.
** Percent solids in liquid egg mix of white and yolk.

Performance Graph

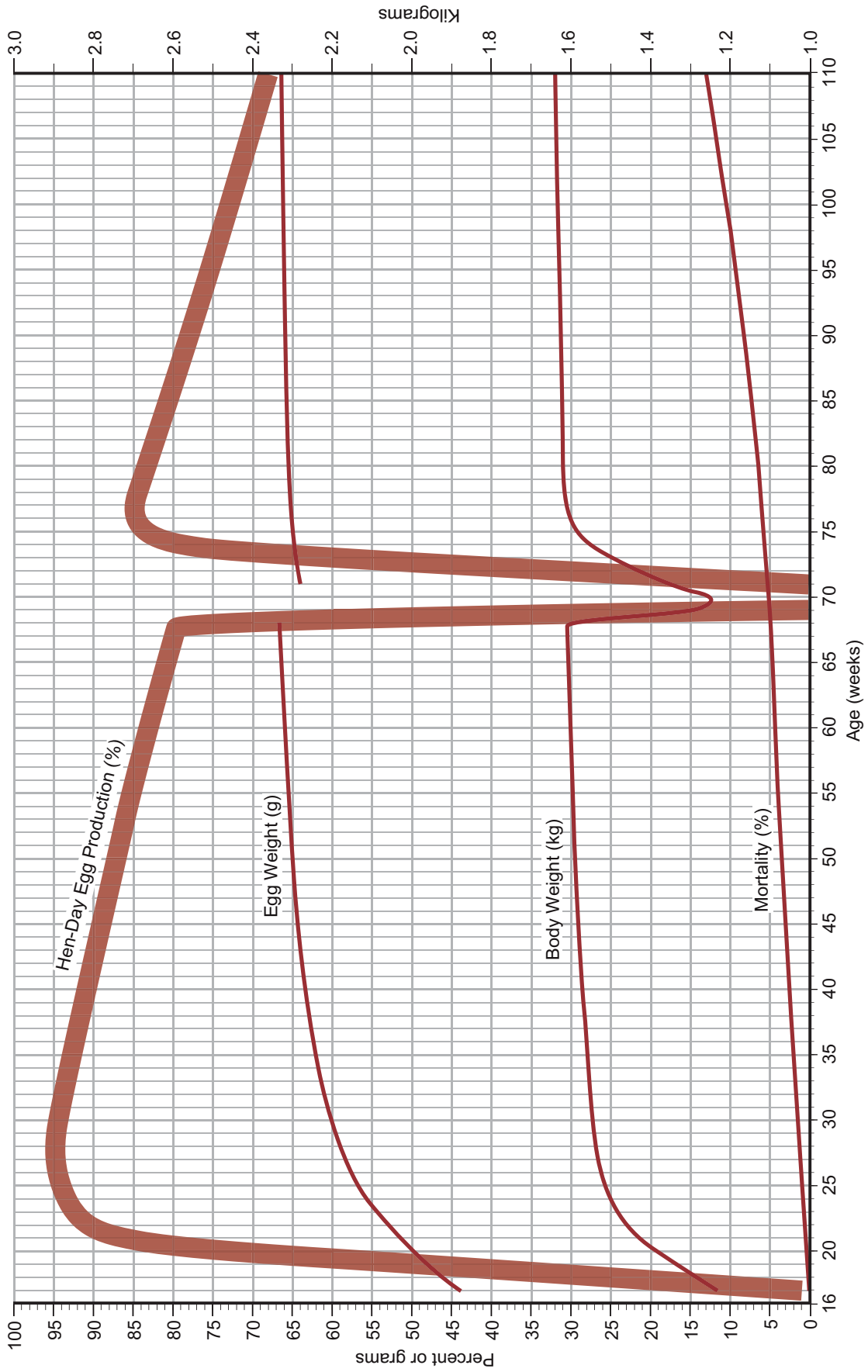


Post-Molt Performance Table

Age in Weeks	% Hen-Day Production	% Mortality Cumulative	Eggs Cumulative		Body Weight		Average Egg Weight*		% Grade A Large and Above	Feed Consumption		Hen-Housed Egg Mass Cumulative	
			Hen-Day	Hen-Housed	kg	lb	g/egg	Net lb/30 dozen case	23 oz/dozen	g/day per bird	lb/day per 100 birds	kg	lb
69	0	4.9	289.5	284.0	1.27	2.80	-	-	-	36	7.9	17.8	39.3
70	0	5.1	289.5	284.0	1.24	2.73	-	-	-	70	15.4	17.8	39.3
71	5	5.3	289.8	284.4	1.38	3.04	64.0	50.8	96	94	20.7	17.8	39.3
72	26	5.4	291.7	286.1	1.45	3.20	64.2	51.0	96	98	21.6	17.9	39.5
73	64	5.6	296.1	290.3	1.50	3.31	64.5	51.2	95	100	22.0	18.2	40.2
74	79	5.7	301.7	295.5	1.55	3.42	64.8	51.4	95	102	22.5	18.6	40.9
75	82	5.8	307.4	300.9	1.59	3.51	65.0	51.6	95	103	22.7	18.9	41.8
76	85	6.0	313.4	306.5	1.60	3.53	65.2	51.7	95	101	22.3	19.3	42.6
77	86	6.1	319.4	312.2	1.61	3.55	65.4	51.9	95	100	22.0	19.7	43.5
78	85	6.2	325.3	317.8	1.61	3.55	65.5	52.0	95	100	22.0	20.1	44.4
79	84	6.4	331.2	323.3	1.61	3.55	65.6	52.1	95	100	22.0	20.5	45.2
80	83	6.5	337.0	328.7	1.62	3.57	65.6	52.1	95	100	22.0	20.9	46.0
81	82	6.7	342.8	334.1	1.62	3.57	65.6	52.1	95	100	22.0	21.3	46.9
82	82	6.9	348.5	339.4	1.62	3.57	65.7	52.1	95	100	22.0	21.6	47.7
83	81	7.0	354.2	344.7	1.62	3.57	65.7	52.1	95	99	21.8	22.0	48.5
84	81	7.2	359.8	349.9	1.62	3.57	65.7	52.1	94	99	21.8	22.4	49.3
85	81	7.4	365.5	355.2	1.62	3.57	65.7	52.1	94	99	21.8	22.8	50.2
86	80	7.5	371.1	360.4	1.62	3.57	65.8	52.2	94	99	21.8	23.1	51.0
87	80	7.7	376.7	365.5	1.62	3.57	65.8	52.2	94	99	21.8	23.5	51.8
88	80	7.9	382.3	370.7	1.62	3.57	65.8	52.2	94	99	21.8	23.9	52.6
89	79	8.1	387.8	375.8	1.63	3.59	65.9	52.3	94	99	21.8	24.2	53.4
90	78	8.3	393.3	380.8	1.63	3.59	65.9	52.3	94	98	21.6	24.6	54.2
91	78	8.5	398.8	385.8	1.63	3.59	65.9	52.3	94	98	21.6	24.9	55.0
92	77	8.7	404.1	390.7	1.63	3.59	66.0	52.4	94	98	21.6	25.3	55.8
93	77	8.9	409.5	395.6	1.63	3.59	66.0	52.4	94	98	21.6	25.7	56.6
94	75	9.1	414.8	400.4	1.63	3.59	66.0	52.4	93	99	21.8	26.0	57.3
95	75	9.3	420.0	405.2	1.63	3.59	66.1	52.5	93	99	21.8	26.3	58.1
96	75	9.5	425.3	409.9	1.63	3.59	66.1	52.5	93	99	21.8	26.7	58.9
97	74	9.7	430.5	414.6	1.63	3.59	66.1	52.5	93	99	21.8	27.0	59.6
98	74	10.0	435.6	419.3	1.63	3.59	66.1	52.5	93	99	21.8	27.4	60.4
99	73	10.2	440.8	423.8	1.63	3.59	66.2	52.5	93	100	22.0	27.7	61.1
100	73	10.4	445.9	428.4	1.63	3.59	66.2	52.5	93	100	22.0	28.1	61.9
101	72	10.7	450.9	432.9	1.63	3.59	66.2	52.5	93	100	22.0	28.4	62.6
102	71	10.9	455.9	437.3	1.64	3.62	66.2	52.5	93	100	22.0	28.7	63.3
103	71	11.2	460.8	441.8	1.64	3.62	66.3	52.6	92	101	22.3	29.0	64.0
104	71	11.4	465.8	446.2	1.64	3.62	66.3	52.6	92	101	22.3	29.4	64.8
105	71	11.7	470.8	450.6	1.64	3.62	66.3	52.6	92	101	22.3	29.7	65.5
106	70	12.0	475.7	454.9	1.64	3.62	66.3	52.6	92	101	22.3	30.0	66.2
107	70	12.2	480.6	459.2	1.64	3.62	66.4	52.7	92	102	22.5	30.4	66.9
108	69	12.5	485.4	463.4	1.64	3.62	66.4	52.7	92	102	22.5	30.7	67.6
109	69	12.8	490.2	467.6	1.64	3.62	66.5	52.8	91	102	22.5	31.0	68.4
110	68	13.0	495.0	471.8	1.64	3.62	66.5	52.8	91	102	22.5	31.3	69.0

* These egg weights are those which can be achieved through controlled feeding of protein. Larger egg sizes can be achieved by feeding higher protein levels.

Performance Graph for Two Lay Cycles



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	53.0	0.0	0.6	49.4	50.0
24	55.7	0.0	3.4	71.6	25.0
26	57.9	0.0	10.7	77.7	11.6
28	59.0	0.0	16.4	76.4	7.2
30	60.0	0.1	23.1	72.4	4.4
32	60.9	0.2	30.3	66.9	2.7
34	61.7	0.4	37.5	60.2	1.9
36	62.4	0.6	43.7	54.4	1.3
38	63.0	0.9	49.1	49.1	0.9
40	63.4	1.1	52.7	45.5	0.7
42	63.8	1.4	56.1	41.9	0.5
44	64.2	1.8	59.4	38.4	0.4
46	64.6	2.3	62.6	34.9	0.3
48	64.8	2.5	64.0	33.2	0.3
50	65.0	2.8	65.5	31.5	0.2
52	65.2	3.2	66.8	29.8	0.2
54	65.4	3.5	68.1	28.2	0.2
56	65.6	3.9	69.3	26.7	0.1
58	65.8	4.3	70.4	25.1	0.1
60	66.0	4.8	71.5	23.7	0.1
62	66.2	5.1	72.6	22.2	0.1
64	66.3	5.2	73.8	21.0	0.1
66	66.5	5.6	74.7	19.6	0.1
68	66.6	5.9	75.1	19.0	0.1
70	66.7	6.1	75.6	18.3	0.0
72	66.8	6.2	76.7	17.1	0.0
74	66.9	6.3	77.2	16.5	0.0
76	66.9	6.4	77.2	16.4	0.0
78	66.9	6.4	78.2	15.4	0.0
80	67.0	6.5	78.6	15.0	0.0

Egg Size Distribution—U.S. Standards

Age in Weeks	Average Egg Weight (lb/case)	Jumbo Over 30 oz/dozen	Extra Large 27–30 oz/dozen	Large 24–27 oz/dozen	Medium 21–24 oz/dozen	Small 18–21 oz/dozen	Peewee Under 18 oz/dozen
22	42.1	0.0	0.4	17.4	62.5	19.3	0.4
24	44.2	0.0	2.2	38.0	53.5	6.3	0.1
26	46.0	0.1	7.5	54.0	36.3	2.1	0.0
28	46.8	0.2	12.0	59.1	27.7	1.1	0.0
30	47.6	0.4	17.4	61.2	20.5	0.6	0.0
32	48.3	0.8	23.3	60.7	15.0	0.3	0.0
34	49.0	1.4	29.5	57.4	11.5	0.2	0.0
36	49.5	2.2	34.9	54.2	8.6	0.1	0.0
38	50.0	3.0	39.5	50.8	6.6	0.1	0.0
40	50.3	3.8	42.6	48.2	5.5	0.1	0.0
42	50.6	4.6	45.5	45.4	4.5	0.0	0.0
44	51.0	5.6	48.3	42.4	3.7	0.0	0.0
46	51.3	6.7	50.9	39.4	3.0	0.0	0.0
48	51.4	7.4	52.1	37.8	2.7	0.0	0.0
50	51.6	8.1	53.3	36.3	2.4	0.0	0.0
52	51.7	8.8	54.3	34.7	2.1	0.0	0.0
54	51.9	9.6	55.3	33.2	1.9	0.0	0.0
56	52.1	10.4	56.2	31.6	1.7	0.0	0.0
58	52.2	11.3	57.1	30.1	1.5	0.0	0.0
60	52.4	12.3	57.8	28.6	1.3	0.0	0.0
62	52.5	13.3	58.4	27.1	1.2	0.0	0.0
64	52.6	13.5	59.8	26.0	0.8	0.0	0.0
66	52.8	14.3	60.3	24.6	0.8	0.0	0.0
68	52.9	14.8	60.5	23.9	0.8	0.0	0.0
70	52.9	15.4	60.7	23.2	0.7	0.0	0.0
72	53.0	15.4	62.0	22.0	0.6	0.0	0.0
74	53.1	16.0	62.2	21.3	0.5	0.0	0.0
76	53.1	16.0	62.2	21.3	0.5	0.0	0.0
78	53.1	16.0	63.3	20.5	0.4	0.0	0.0
80	53.2	16.0	63.5	20.1	0.4	0.0	0.0

Notes

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

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