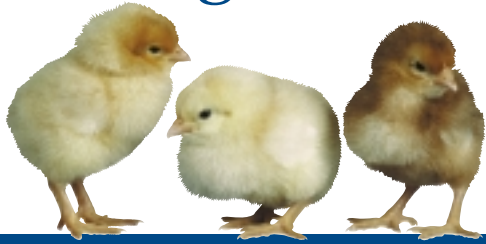


Parent Stock Management Guide



Hy-Line[®]
BRAND
LAYERS



VARIETY W-36



VARIETY BROWN



VARIETY W-98



Hy-Line
BRAND

**A publication of Hy-Line International
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Hy-Line is a brand name. Numbers and letters identify varieties.
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General Management Recommendations

The following general recommendations apply to all Hy-Line variety parent birds. When a difference exists it will be noted either in the text or in the separate section for each variety.

The genetic potential of Hy-Line breeders can only be realized if good husbandry practices and management are used. This

booklet outlines successful programs based on field experience compiled by Hy-Line International and is to be considered a guide, recognizing that local conditions may vary and a guide cannot cover all possible circumstances.

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Hy-Line Variety W-36 Parent Performance Summary

Female Livability	1-18 Wks.	97%
	19-70 Wks.	97%
Male Livability	1-18 Wks.	83%
	19-70 Wks.	93%
Age at 50% Production		143 Days
Peak % HD Production (Age)		90% (26 Wks.)
No. HH Eggs	19-70 Wks.	293
	19-75 Wks.	319
No. HD Eggs	19-70 Wks.	297
	19-75 Wks.	324
No. Settable HH Eggs	25-70 Wks.	260
	25-75 Wks.	285
No. Female Chicks Produced	25-70 Wks.	112
	25-75 Wks.	121
Avg. No. Female Chicks/Wk.	25-70 Wks.	2.4
	25-75 Wks.	2.4
Avg. % Hatchability	25-70 Wks.	86%
	25-75 Wks.	85%
Female Body Weight	18 Wks.	1.23 Kg (2.7 Lbs.)
	60 Wks. (Mature)	1.59 Kg (3.5 Lbs.)
Male Body Weight	18 Wks.	1.45 Kg (3.2 Lbs.)
	60 Wks. (Mature)	2.12 Kg (4.7 Lbs.)
Feed Consumption		
Per Bird Housed	1-18 Wks. (Cumulative)	5.84 Kg (12.9 Lbs.)
(Total of Males & Females)	19-70 Wks. (Avg. Daily)	95 g (.21 Lbs.)
Per Dozen	19-70 Wks.	1.39 Kg (3.1 Lbs.)

Hy-Line Variety W-98 Parent Performance Summary

Female Livability	1-18 Wks.	96%
	19-70 Wks.	95%
Male Livability	1-18 Wks.	85%
	19-70 Wks.	91%
Age at 50% Production		141 Days
Peak % HD Production (Age)		91% (28 Wks.)
No. HH Eggs	19-70 Wks.	285
	19-75 Wks.	307
No. HD Eggs	19-70 Wks.	290
	19-75 Wks.	314
No. Settable HH Eggs	24-70 Wks.	252
	24-75 Wks.	273
No. Female Chicks Produced	24-70 Wks.	107
	24-75 Wks.	114
Avg. No. Female Chicks/Wk.	24-70 Wks.	2.3
	24-75 Wks.	2.2
Avg. % Hatchability	24-70 Wks.	84%
	24-75 Wks.	83%
Female Body Weight	18 Wks.	1.24 Kg (2.7 Lbs.)
	60 Wks. (Mature)	1.59 Kg (3.5 Lbs.)
Male Body Weight	18 Wks.	1.91 Kg (4.2 Lbs.)
	60 Wks. (Mature)	2.40 Kg (5.3 Lbs.)
Feed Consumption		
Per Bird Housed	1-18 Wks. (Cumulative)	6.26 Kg (13.8 Lbs.)
(Total of Males & Females)	19-70 Wks. (Avg. Daily)	102 g (.22 Lbs.)
Per Dozen	19-70 Wks.	1.53 Kg (3.4 Lbs.)

Hy-Line Variety Brown Parent Performance Summary

Female Livability	1-18 Wks.	97%
	19-70 Wks.	93%
Male Livability	1-18 Wks.	96%
	19-70 Wks.	93%
Age at 50% Production		145 Days
Peak % HD Production (Age)		93% (30 Wks.)
No. HH Eggs	19-70 Wks.	280
No. HD Eggs	19-70 Wks.	289
No. Settable HH Eggs	24-70 Wks.	252
No. Female Chicks Produced	24-70 Wks.	101
Avg. No. Female Chicks/Wk.	24-70 Wks.	2.1
Avg. % Hatchability	24-70 Wks.	80%
Female Body Weight	18 Wks.	1.51 Kg (3.3 Lbs.)
	60 Wks. (Mature)	1.96 Kg (4.3 Lbs.)
Male Body Weight	18 Wks.	2.34 Kg (5.2 Lbs.)
	60 Wks. (Mature)	2.93 Kg (6.5 Lbs.)
Feed Consumption		
Per Bird Housed	1-18 Wks. (Cumulative)	6.75 Kg (14.9 Lbs.)
(Total of Males & Females)	19-70 Wks. (Avg. Daily)	112 g (.25 Lbs.)
Per Dozen	19-70 Wks.	1.69 Kg (3.7 Lbs.)

Parent Chick Management

A breeder flock has a major part of its potential performance determined during the first 20 weeks of its lifetime.

Encourage the chicks to drink before they eat. Vitamins, electrolytes and antibiotics may be used in the water the first 2-3 days.

Humidity is an important factor in chick comfort control. If possible, maintain between 40-60% relative humidity when chicks are started. Humidity control becomes increasingly important when warm room brooding in cold climates. Humidity will normally be lowered to 30-40% by the end of the growing period.

Brooding Temperatures		
	W-36 or W-98 Parent Stock	Hy-Line Brown Parent Stock
Temperature at Edge of Hover	32°C. (90°F.)	35°C. (95°F.)
Cage or Warm Room Temperature	29-32°C. (85-90°F.)	35-37°C. (95-99°F.)

Reduce temperatures 2-3°C. (3-5°F.) per week to 21°C. (70°F.).

Disease Control

The control of diseases common to your area is your responsibility. Your Hy-Line breeders originate from grandparent stock that are constantly monitored for the absence of disease and are carrying high titers against Newcastle, Gumboro, C.A.V., bronchitis and A.E. The suggested vaccination program is designed with knowledge of these high titers.

Isolation and sanitation are to be strictly adhered to. Hy-Line breeders must always be kept separate from other chickens to prevent against infections from which they are free. Horizontal

spread of such diseases as lymphoid leukosis, mycoplasmosis and salmonellosis from other birds to Hy-Line breeders should be strictly avoided.

We do not recommend the use of animal origin feed ingredients for breeders to prevent salmonella contamination.

Strict control of traffic (people, vehicles, equipment) on breeder farms and hatcheries is a must.

Vaccination Program

Vaccination programs need to be designed with consideration of maternal immunities of the chicks, disease exposure expected, vaccines available, routes of administration preferred, and planned use of inactivated injectable products. Hy-Line parent chicks are delivered with high levels of maternal antibody protection against Gumboro, Newcastle, and bronchitis resulting from the use of inactivated products against these diseases in the grandparent stock.

We recommend the use of these inactivated products in parent flocks not only for the added protection of the breeders, but also for the benefit of uniformly high maternal antibody titers in their progeny.

In the United States a typical vaccination program would be as follows:

1 Day	Marek's Disease vaccine.
18-20 Days	Intermediate strain IBD, Newcastle B ₁ strain, Mass.-Conn. bronchitis in water.
28-30 Days	Intermediate IBD in water.
6-8 Weeks	Newcastle B ₁ strain, Mass.-Conn. bronchitis in water or by spray.
10 Weeks	Pox and AE.
12 Weeks	Newcastle LaSota strain, bronchitis Holland strain by spray.
18 Weeks	Newcastle, bronchitis, IBD killed virus by injection.

Beak Trimming

Female breeders should be beak trimmed between 7-10 days of age. Males should be lightly tipped.

It is generally considered that it is more economical, and that less stress is placed on the bird, to trim at the younger ages.

Regardless of the time selected, the human element of making sure each beak is treated correctly is of utmost importance.

To help reduce the human error when 10-day trimming is done, a template including three hole sizes, 4.0, 4.37, and 4.75 mm. (10/64, 11/64, and 12/64 inch), used with the Lyon's precision power unit which allows two seconds for cauterization, is recommended. The size of hole to be used should be gauged to allow 2.0 mm. between the cauterized ring (burn ring) and the nostril. The proper hole size will depend both on size and age of chicks.

A cherry red blade has been recommended for proper cautery. However, a better way to measure blade temperature is by use

of a pyrometer to keep the blade at approximately 593°C. (1100°F.). The use of a line voltage meter and chart available from Lyon will facilitate maintaining the proper blade temperature at all times. Temperature variation is common due to external influences and cannot be detected by the human eye.

The following beak trimming precautions must be observed at all times.

1. Do not beak trim sick birds.
2. Do not hurry.
3. Use electrolytes and vitamins (containing vitamin K) in the water two days before and two days after beak trimming.
4. Provide deeper feed for several days after beak trimming. If a coccidiostat is being used, supplement it with water soluble coccidiostats until feed consumption returns to normal.
5. Use only well trained crews for beak trimming.

Monitoring Body Weights

Body weights should be monitored periodically during the growing period and until after peak. In floor houses, at least 100 birds should be weighed individually with a scale having increments no larger than 50 grams or 1/10 Lb. Weighing should be started at five weeks of age and continued weekly during the growing period and until after peak. It is most critical to weigh just prior to a scheduled feed change. If the flock is below target body weight it should be left on the higher protein feed formulation until the target weight per age is reached.

In addition to body weight averages, the uniformity of body weights within the flock is an indicator of normal flock

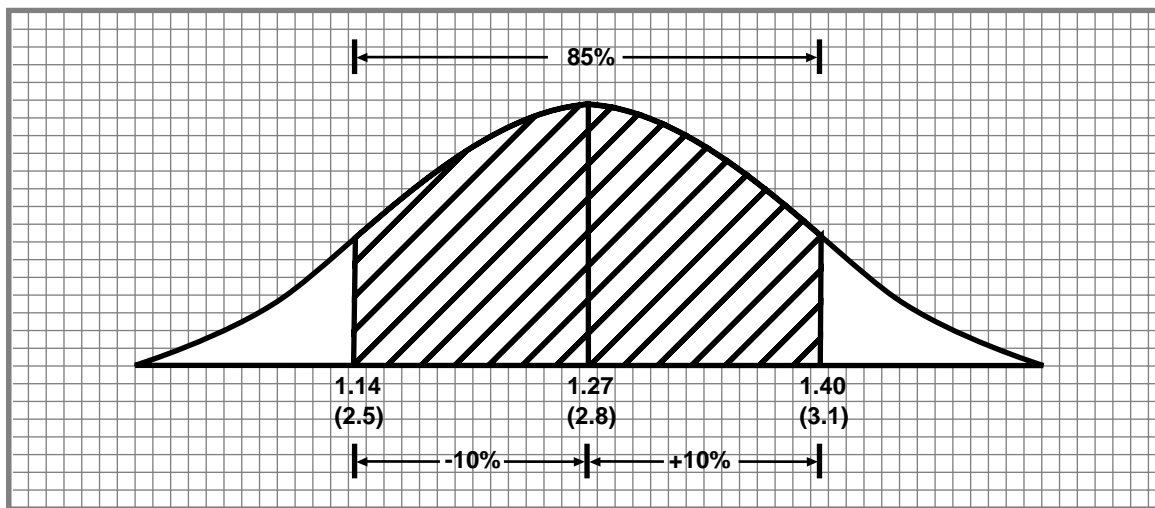
development. Uniformity is expressed as the percent of individual weights which occur within 10% of the current flock average. A realistic goal is for 85% uniformity.

Factors which can adversely affect body weight and uniformity are crowding, disease, poor beak trimming and inadequate nutritional intake. Weighing at frequent intervals will determine the age at which a flock is deviating from normal and thereby help identify a problem so that corrective measures can be taken.

Variability Between Individual Birds Within a Flock

Uniformity of individual birds is important as well as appropriate average flock weights. A desirable goal is 85% of all birds within 10% of the mean. For example, if the average flock weight at 18 weeks is 1.270 Kg (2.8 Lbs.), 85% of all birds should weigh

between 1.140 Kg (2.5 Lbs.) and 1.400 Kg (3.1 Lbs.). Graph individual weights to be sure there is a bell shaped or "normal" distribution as shown below. To evaluate uniformity, at least 100 birds should be weighed.



Hy-Line Parent Body Weights - Growing Periods

Age in Weeks	Variety W-36				Variety W-98				Variety Brown			
	Female		Male		Female		Male		Female		Male	
	Grams	Lbs.	Grams	Lbs.	Grams	Lbs.	Grams	Lbs.	Grams	Lbs.	Grams	Lbs.
1	65	0.14	60	0.13	65	0.14	60	0.13	70	0.15	70	0.15
2	110	0.24	110	0.24	110	0.24	120	0.26	115	0.25	140	0.31
3	180	0.40	170	0.37	180	0.40	240	0.53	190	0.42	200	0.44
4	250	0.55	250	0.55	250	0.55	370	0.82	270	0.60	320	0.71
5	320	0.71	390	0.86	340	0.75	500	1.10	370	0.82	450	0.99
6	400	0.88	500	1.10	430	0.95	630	1.39	480	1.06	590	1.30
7	490	1.08	610	1.34	510	1.12	760	1.68	580	1.28	730	1.61
8	570	1.26	710	1.57	590	1.30	890	1.96	680	1.50	900	1.98
9	640	1.41	800	1.76	620	1.37	1010	2.23	770	1.70	1060	2.34
10	730	1.61	890	1.96	760	1.68	1140	2.51	860	1.90	1220	2.69
11	810	1.79	970	2.14	840	1.85	1270	2.80	960	2.12	1370	3.02
12	890	1.96	1050	2.31	910	2.01	1400	3.09	1060	2.34	1530	3.37
13	950	2.09	1130	2.49	980	2.16	1520	3.35	1150	2.54	1690	3.73
14	1010	2.23	1210	2.67	1050	2.32	1640	3.62	1230	2.71	1840	4.06
15	1070	2.36	1280	2.82	1090	2.40	1750	3.86	1310	2.89	1980	4.37
16	1120	2.47	1340	2.95	1120	2.47	1820	4.01	1380	3.04	2110	4.65
17	1160	2.56	1400	3.09	1160	2.56	1870	4.12	1450	3.20	2230	4.92
18	1230	2.71	1450	3.20	1240	2.73	1910	4.21	1510	3.33	2340	5.16

Ventilation

Ventilation should be used as a major management tool to provide the optimum micro-environment per bird. Controlled ventilation can do a great deal to dilute pathogenic organisms as well as provide an optimum environment when ventilation equipment is designed and operated to give correct air speed and direction.

A general rule for figuring required fan capacity is four cubic meters of air movement per Kg of body weight per hour (one cubic foot per minute per pound of body weight).

In the breeding house the temperature and humidity should be in the range of 18-27°C. (65-80°F.) and 40-60% relative humidity.

Suggested Minimum Ventilation Rates

Cubic Feet Per Minute Per Bird							Cubic Meters Per Hour Per Bird						
Age of Birds							Age of Birds						
Outside Temperature	First Week	3 Weeks	6 Weeks	12 Weeks	18 Weeks	Beyond 18 Weeks	Outside Temperature	First Week	3 Weeks	6 Weeks	12 Weeks	18 Weeks	Beyond 18 Weeks
90°F.	1.0	1.5	2.0	3.0	4.0	6-7	35°C.	2.0	3.0	4.0	6.0	8.0	12-14
70°F.	0.7	1.0	1.5	2.0	3.0	4-5	20°C.	1.4	2.0	3.0	4.0	6.0	8-10
50°F.	0.4	0.7	1.0	1.5	2.0	2.5-3	10°C.	0.8	1.4	2.0	3.0	4.0	5-6
30°F.	0.3	0.5	0.7	1.0	1.5	2-2.5	0°C.	0.6	1.0	1.5	2.0	3.0	4-5
10°F.	0.2	0.3	0.5	0.7	1.0	1.5-2	-10°C.	0.5	0.8	1.2	1.7	2.5	3-4
-10°F.	0.1	0.2	0.3	0.5	0.5	1-1.5	-20°C.	0.3	0.6	0.9	1.2	1.5	2-3

Lighting Program

Egg production is very closely related to the changes in day length to which the pullets are exposed. Egg numbers, egg size, livability and total profitability can be favorably influenced by a proper lighting program. The basic rules of lighting are:

1. Start chicks the first week with 20-22 hours of light per day at 10 lux (1 ftc.) intensity. Reduce day length weekly to reach 11-12 hours at 15 weeks of age or, if longer, the day length dictated by natural day length in open or brownout houses (see page 10). Reduce intensity to 5 lux (1/2 ftc.) after the first week.
2. Provide light stimulation at 17-19 weeks of age, depending on body weight, genetic rate of maturity, and desired control of egg size. Earlier stimulation at less body weight will produce more total eggs but a smaller average egg size. Later stimulation at a heavier body weight will produce a few less eggs, but of larger egg size. In open or brownout houses the initial increase should be no less than one hour. Increase 15-30 minutes per week or biweekly until 16 hours are reached. Preferably the period of stimulation should last until peak production. Light intensity should also be increased at housing to 10-20 lux (1-2 ftc.).
3. Allow no decrease in day length or light intensity in adult layers.

Local sunrise-sunset timetables should be obtained to accurately design individual programs. Guidelines for various housing styles are as follows:

1. **Light-controlled growing to light-controlled laying:**
 - a. Step-down day length from 20-22 hours the first week to 11-12 hours at 15 weeks of age and hold constant.
 - b. Increase day length one hour at the 18-week body weight target. Add 15-30 minutes per week until 16 hours total light is reached.
2. **Light-controlled growing to open or brownout laying:**
 - a. Step-down day length from 20-22 hours the first week to 11-12 hours at 15 weeks of age, or one hour less than the natural day length the flock will be exposed to after moving

to the layer house.

- b. Increase to natural day length or a minimum increase of one hour at the 18-week body weight target. Add 15-30 minutes per week or biweekly to reach 16 hours total light, or at least the longest natural day length of the year.
3. **Open or brownout growing to light-controlled laying:**
 - a. Step-down day length from 20-22 hours the first week to 11-12 hours at 15 weeks of age or, if longer, the longest natural day length the flock will be exposed to from 8 to 18 weeks.
 - b. Increase day length one hour at the 18-week body weight target. Add 15-30 minutes per week or biweekly until 16 hours of total light is reached.
 4. **Open or brownout growing to open or brownout laying:**
 - a. Step-down day length from 20-22 hours the first week to 11-12 hours at 15 weeks of age or, if longer, the longest natural day length the flock will be exposed to from 8 to 18 weeks.
 - b. Increase one hour at the 18-week body weight target. Add 15-30 minutes per week or biweekly until 16 hours of total light is reached, or at least the longest natural day length of the year.

Midnight Feeding – Optional

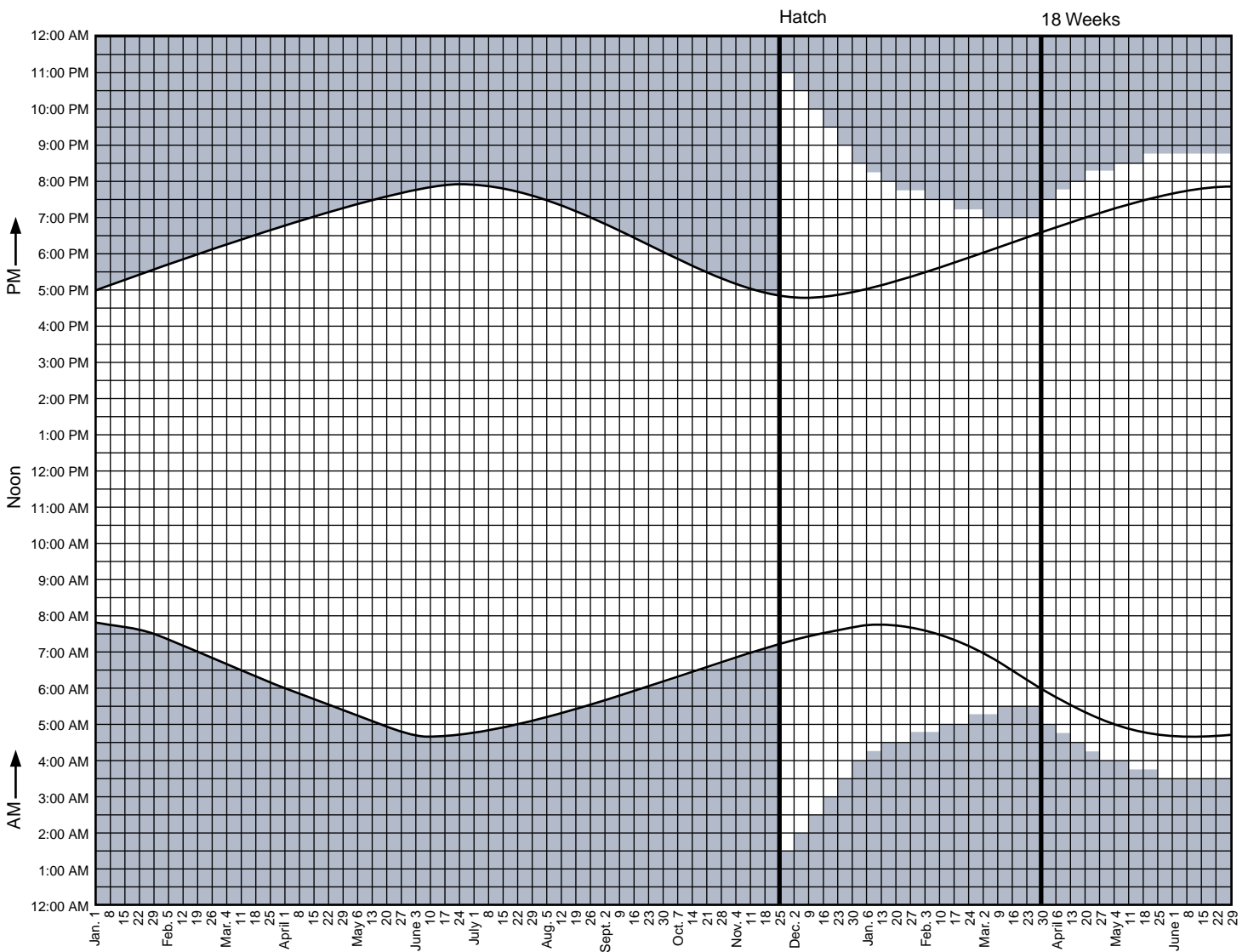
An optional lighting technique that will promote more feed consumption is termed "midnight feeding". The technique involves turning the lights on for one hour in the middle of the dark period and running the feeders during this time. For a typical layer daily program with 16 hours light and 8 hours dark, the night would consist of 3.5 hours of darkness, one hour of light, and 3.5 hours of darkness. The regular 16 hours light period should not be changed. The hour of light can be added all at once, but if it is removed at a later time, that should be done gradually, at the rate of 15 minutes per week. Midnight feeding will generally increase feed intake about 5 g/bird/day (1 lb./100/day). The technique is applicable for heat stress conditions, or any time more feed intake is desired in either growing or laying flocks.

Planning Individual Lighting Programs

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. For the most precise planning, it is necessary to obtain local sunrise-sunset times for the entire year and construct a graph as the following example demonstrates.

In this example, the growing flock is maturing in the spring when there is a naturally increasing day length. To prevent early sexual development, find the natural day length at 18 weeks of age and construct a stepdown program which will meet the natural day length at 18 weeks, allowing 30 minutes twilight before sunrise and after sunset.

Sunrise and Sunset – 42° Latitude Northern Hemisphere



Hy-Line Parent Stock Feed Consumption* - Growing Period

Age in Weeks	Variety W-36				Variety W-98				Variety Brown			
	Grams/ Bird/ Day	Lbs./ 100/ Day	Cumulative Kg	Cumulative Lbs.	Grams/ Bird/ Day	Lbs./ 100/ Day	Cumulative Kg	Cumulative Lbs.	Grams/ Bird/ Day	Lbs./ 100/ Day	Cumulative Kg	Cumulative Lbs.
1	13	2.8	0.09	0.2	13	2.9	0.09	0.2	13	2.9	0.09	0.2
2	16	3.5	0.20	0.4	17	3.7	0.21	0.5	20	4.4	0.23	0.5
3	19	4.2	0.33	0.7	22	4.9	0.36	0.8	25	5.5	0.41	0.9
4	29	6.3	0.53	1.2	30	6.6	0.57	1.3	29	6.4	0.61	1.3
5	38	8.4	0.80	1.8	40	8.8	0.85	1.9	34	7.5	0.85	1.9
6	41	9.0	1.08	2.4	43	9.5	1.16	2.5	39	8.6	1.12	2.5
7	43	9.5	1.39	3.1	45	9.9	1.47	3.2	44	9.7	1.43	3.1
8	46	10.1	1.71	3.8	48	10.6	1.81	4.0	50	11.0	1.78	3.9
9	48	10.6	2.04	4.5	51	11.2	2.16	4.8	56	12.3	2.17	4.8
10	51	11.2	2.40	5.3	54	11.9	2.54	5.6	62	13.7	2.60	5.7
11	53	11.6	2.77	6.1	56	12.3	2.93	6.5	67	14.8	3.07	6.8
12	54	12.0	3.15	6.9	57	12.6	3.33	7.3	72	15.9	3.58	7.9
13	56	12.3	3.54	7.8	59	13.0	3.75	8.3	73	16.1	4.09	9.0
14	57	12.6	3.94	8.7	62	13.7	4.18	9.2	74	16.3	4.61	10.2
15	59	13.0	4.35	9.6	66	14.6	4.64	10.2	75	16.5	5.13	11.3
16	64	14.1	4.80	10.6	71	15.7	5.14	11.3	76	16.8	5.66	12.5
17	71	15.7	5.30	11.7	77	17.0	5.68	12.5	77	17.0	6.20	13.7
18	78	17.2	5.84	12.9	83	18.3	6.26	13.8	78	17.2	6.75	14.9

* For the total flock (male and female)

Breeder Nutrition

Always use a well formulated ration, free of mold and foreign material, with sufficient energy, balanced amino acids and adequate fortification of minerals and vitamins.

It is very difficult to recommend a particular ration for growing and laying birds as ingredient costs and nutritional values differ from area to area.

The laying ration should be available at 18 weeks of age for maximum sustained peak and production.

The following tables show nutrient levels which should be satisfactory for Hy-Line parent stock.

The accompanying breeder diet nutrient levels have been found useful in maintaining hatchability and preventing marginal vitamin and trace mineral deficiencies in the commercial chicks. Conditions in different areas of the world may necessitate a different nutritional balance for breeder flocks than that shown here.

Growing Period Nutrition Recommendations

	Starter 0-6 Wks.	Grower 6-8 Wks.	Developer 8-15 Wks.	Pre-Layer 15-18 Wks.	Pre-Peak 18 Wks. to 50% Production
W-36 Body Weight	to 400 g/to 0.88 Lbs.	to 570 g/to 1.26 Lbs.	to 1070 g/to 2.36 Lbs.	to 1230 g/to 2.71 Lbs.	
W-98 Body Weight	to 430 g/to 0.95 Lbs.	to 590 g/to 1.30 Lbs.	to 1090 g/to 2.40 Lbs.	to 1240 g/to 2.73 Lbs.	
Brown Body Weight	to 480 g/to 1.06 Lbs.	to 680 g/to 1.50 Lbs.	to 1310 g/to 2.89 Lbs.	to 1510 g/to 3.33 Lbs.	

Nutrients:

Protein, % (Min.)	20	18	16	15.5	17.5
Met. Energy, Kcal/Lb.	1325-1375	1350-1400	1375-1425	1350-1400	1340-1350
Met. Energy, Kcal/Kg ⁽¹⁾	2915-3025	2970-3080	3025-3135	2970-3080	2948-2970
Linoleic Acid, % (Min.)	1.0	1.0	1.0	1.0	1.5

Amino Acids ⁽²⁾ (Min.):

Arginine, %	1.20	1.10	0.95	0.90	1.15
Lysine, %	1.10	0.90	0.75	0.70	0.92
Methionine, %	0.46	0.44	0.40	0.36	0.51
Methionine + Cystine, %	0.82	0.73	0.66	0.60	0.82
Tryptophan, %	0.22	0.20	0.16	0.15	0.17
Threonine, %	0.75	0.70	0.60	0.55	0.68

Minerals (Min.):

Calcium, %	1.0	1.0	1.0	2.75 ⁽³⁾	3.75
Phosphorus					
Total, %	0.75±	0.72±	0.70±	0.60±	0.65±
Available, %	0.45	0.45	0.40	0.40	0.46
Sodium, % ⁽⁴⁾	0.18	0.18	0.17	0.18	0.21
Chloride, %	0.16	0.16	0.15	0.16	0.20
Potassium, %	0.50	0.50	0.50	0.50	0.60

(1) To convert Kcal/Kg to Megajoules, divide Kcal/Kg by 239.5.

(2) When the level of Met. energy in the ration is increased or decreased from stated levels, amino acid levels should be adjusted accordingly.

(3) Calcium level should be raised to a minimum of 2.75% for pre-layer feed beginning about three (3) weeks prior to 5% egg production.

(4) 0.35 to 0.4% added salt (NaCl) will usually provide adequate levels of sodium and chloride.

Laying Period Nutrition VARIETY W-36

Minimum Daily Intake Recommendations per Bird

	Peaking ⁽²⁾			
	50% Prod. - 32 Wks.	32-44 Wks. ⁽²⁾	44-55 Wks. ⁽²⁾	55 Wks.+ ⁽²⁾
Protein, g/bird ⁽¹⁾	16.0	15.75	15.5	15.25
Methionine, mg/bird	440	420	380	364
Methionine + Cystine, mg/bird	720	890	620	600
Lysine, mg/bird	830	800	770	740
Tryptophan, mg/bird	180	180	170	165
Calcium, g/bird	3.65	3.80	4.00	4.20
Phosphorus, (Total) g/bird	0.67±	0.65±	0.55±	0.48±
Phosphorus, (Available) g/bird	0.45	0.42	0.40	0.32
Sodium, mg/bird	175	175	175	175
Chloride, mg/bird	165	165	165	165

Formula Nutrition Profiles

Minimum Recommendations for First Lay Period

50% to 32 Weeks - Peaking⁽²⁾
Recommended Feed Energy 1290-1325 Kcal./Lb. or 2838-2915 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine Lysine Tryptophan Calcium Phosphorus Total Avg. Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Phos.	Sodium
77	0.17	20.75	0.57	0.94	1.08	0.23	4.75	0.87±	0.58	0.22
82	0.18	19.60	0.54	0.89	1.01	0.22	4.45	0.82±	0.55	0.21
86	0.19	18.55	0.51	0.84	0.96	0.21	4.25	0.78±	0.52	0.20
91	0.20	17.60	0.48	0.80	0.91	0.20	4.05	0.74±	0.49	0.19
95	0.21	16.75	0.46	0.76	0.87	0.19	3.85	0.70±	0.47	0.18

32 to 44 Weeks⁽²⁾
Recommended Feed Energy 1290-1335 Kcal./Lb. or 2838-2935 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine Lysine Tryptophan Calcium Phosphorus Total Avg. Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Phos.	Sodium
82	0.18	19.30	0.51	0.85	0.98	0.22	4.65	0.81±	0.50	0.22
86	0.19	18.25	0.48	0.80	0.93	0.21	4.40	0.78±	0.48	0.20
91	0.20	17.35	0.46	0.76	0.88	0.20	4.20	0.74±	0.46	0.19
95	0.21	16.50	0.44	0.73	0.84	0.19	4.00	0.70±	0.44	0.18
100	0.22	15.75	0.42	0.69	0.80	0.18	3.80	0.65±	0.42	0.18

44 to 55 Weeks⁽²⁾
Recommended Feed Energy 1280-1325 Kcal./Lb. or 2816-2915 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine Lysine Tryptophan Calcium Phosphorus Total Avg. Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Phos.	Sodium
91	0.20	17.05	0.42	0.69	0.85	0.19	4.40	0.61±	0.44	0.19
95	0.21	16.25	0.40	0.66	0.81	0.18	4.20	0.58±	0.42	0.18
100	0.22	15.50	0.38	0.62	0.77	0.17	4.00	0.55±	0.40	0.18
104	0.23	14.85	0.37	0.61	0.74	0.16	4.05	0.53±	0.38	0.17
109	0.24	14.25	0.35	0.58	0.71	0.16	4.10	0.50±	0.37	0.16

55 Weeks and Older⁽²⁾
Recommended Feed Energy 1270-1290 Kcal./Lb. or 2794-2840 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine Lysine Tryptophan Calcium Phosphorus Total Avg. Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Phos.	Sodium
95	0.21	16.00	0.38	0.62	0.78	0.17	4.40	0.49±	0.34	0.18
100	0.22	15.25	0.36	0.59	0.74	0.17	4.20	0.47±	0.32	0.18
104	0.23	14.60	0.34	0.52	0.71	0.16	4.25	0.45±	0.31	0.17
109	0.24	14.00	0.33	0.55	0.68	0.15	4.35	0.43±	0.29	0.16
113	0.25	13.45	0.32	0.52	0.65	0.15	4.40	0.41±	0.28	0.15

- (1) Protein grams/bird/day may be increased or decreased in conjunction with methionine + cystine and energy to optimize egg size.
 (2) Breeder feeds should be formulated to provide suggested nutrient intake on a per bird per day basis depending on feed intake.
 (3) The lower dietary feed energy recommendations generally are for the higher feed intakes.

Laying Period Nutrition VARIETY W-98

Minimum Daily Intake Recommendations per Bird

	Peaking ⁽²⁾			
	50% Prod. - 32 Wks.	32-44 Wks. ⁽²⁾	44-55 Wks. ⁽²⁾	55 Wks.+ ⁽²⁾
Protein, g/bird ⁽¹⁾	16.5	16.0	15.5	15.0
Methionine, mg/bird	400	376	350	327
Methionine + Cystine, mg/bird	660	620	580	540
Lysine, mg/bird	900	860	800	785
Tryptophan, mg/bird	190	175	165	160
Calcium, g/bird	4.00	4.25	4.40	4.50
Phosphorus, (Total) g/bird	0.78±	0.70±	0.62±	0.54±
Phosphorus, (Available) g/bird	0.50	0.45	0.40	0.35
Sodium, mg/bird	170	170	170	170
Chloride, mg/bird	160	160	160	155

Formula Nutrition Profiles

Minimum Recommendations for First Lay Period

50% to 32 Weeks - Peaking⁽²⁾
Recommended Feed Energy 1290-1325 Kcal./Lb. or 2838-2915 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine + Lysine + Tryptophan + Calcium + Phosphorus + Avg. Phos. + Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Avg. Phos.	Sodium
82	0.18	20.20	0.48	0.81	1.10	0.23	4.70	0.90±	0.58	0.21
86	0.19	19.10	0.46	0.76	1.04	0.22	4.50	0.87±	0.56	0.20
91	0.20	18.15	0.44	0.73	0.99	0.21	4.30	0.84±	0.54	0.19
95	0.21	17.30	0.42	0.69	0.94	0.20	4.10	0.81±	0.52	0.18
100	0.22	16.50	0.40	0.66	0.90	0.19	3.90	0.78±	0.50	0.17

32 to 44 Weeks⁽²⁾
Recommended Feed Energy 1290-1335 Kcal./Lb. or 2838-2935 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine + Lysine + Tryptophan + Calcium + Phosphorus + Avg. Phos. + Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Avg. Phos.	Sodium
86	0.19	18.55	0.44	0.72	1.00	0.21	4.85	0.81±	0.51	0.20
91	0.20	17.60	0.42	0.68	0.95	0.20	4.65	0.77±	0.49	0.19
95	0.21	16.80	0.40	0.65	0.90	0.19	4.45	0.73±	0.47	0.18
100	0.22	16.00	0.38	0.62	0.86	0.18	4.25	0.70±	0.45	0.17
104	0.23	15.35	0.36	0.59	0.82	0.17	4.30	0.67±	0.43	0.16

44 to 55 Weeks⁽²⁾
Recommended Feed Energy 1280-1325 Kcal./Lb. or 2816-2915 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine + Lysine + Tryptophan + Calcium + Phosphorus + Avg. Phos. + Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Avg. Phos.	Sodium
91	0.20	17.05	0.39	0.64	0.88	0.19	4.80	0.68±	0.44	0.19
95	0.21	16.25	0.37	0.61	0.84	0.18	4.60	0.65±	0.42	0.18
100	0.22	15.50	0.35	0.58	0.80	0.17	4.40	0.62±	0.40	0.17
104	0.23	14.85	0.34	0.56	0.77	0.16	4.45	0.59±	0.38	0.16
109	0.24	14.25	0.32	0.53	0.73	0.15	4.50	0.57±	0.37	0.15

55 Weeks and Older⁽²⁾
Recommended Feed Energy 1270-1290 Kcal./Lb. or 2794-2840 Kcal/Kg⁽³⁾

Consumption Bird/Day		% Methionine + Cystine + Lysine + Tryptophan + Calcium + Phosphorus + Avg. Phos. + Sodium								
Grams	Lbs.	Protein	Methionine	Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Avg. Phos.	Sodium
95	0.21	15.75	0.35	0.57	0.82	0.17	4.70	0.57±	0.37	0.18
100	0.22	15.00	0.33	0.54	0.78	0.16	4.50	0.54±	0.35	0.17
104	0.23	14.35	0.32	0.52	0.75	0.15	4.55	0.52±	0.34	0.16
109	0.24	13.75	0.30	0.50	0.72	0.14	4.60	0.50±	0.32	0.15
113	0.25	13.20	0.29	0.48	0.69	0.13	4.65	0.48±	0.31	0.14

- (1) Protein grams/bird/day may be increased or decreased in conjunction with methionine + cystine and energy to optimize egg size.
 (2) Breeder feeds should be formulated to provide suggested nutrient intake on a per bird per day basis depending on feed intake.
 (3) The lower dietary feed energy recommendations generally are for the higher feed intakes.

Laying Period Nutrition — VARIETY BROWN

Minimum Daily Intake Recommendations per Bird

	Peaking ⁽²⁾			
	50% Prod. - 32 Wks.	32-44 Wks. ⁽²⁾	44-55 Wks. ⁽²⁾	55 Wks.+ ⁽²⁾
Protein, g/bird ⁽¹⁾	18.0	17.75	17.0	16.0
Methionine, mg/bird	460	440	400	380
Methionine + Cystine, mg/bird	760	726	660	627
Lysine, mg/bird	925	900	860	820
Tryptophan, mg/bird	190	185	175	160
Calcium, g/bird	4.00	4.10	4.25	4.40
Phosphorus, (Total) g/bird	0.72±	0.64±	0.61±	0.54±
Phosphorus, (Available) g/bird	0.45	0.40	0.38	0.34
Sodium, mg/bird	180	180	180	180
Chloride, mg/bird	170	170	170	160

Formula Nutrition Profiles

Minimum Recommendations for First Lay Period

50% to 32 Weeks - Peaking⁽²⁾
Recommended Feed Energy 1270-1320 Kcal./Lb. or 2795-2905 Kcal/Kg⁽³⁾

Consumption Bird/Day		% ⁽¹⁾									
Grams	Lbs.	Protein	Methionine	Methionine + Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Total	Avg. Phos.	% Sodium
91	0.20	19.80	0.50	0.83	1.02	0.21	4.40	0.80±	0.50	0.20	
95	0.21	18.86	0.48	0.79	0.97	0.20	4.20	0.75±	0.47	0.19	
100	0.22	18.00	0.46	0.76	0.93	0.19	4.00	0.72±	0.45	0.18	
104	0.23	17.22	0.44	0.73	0.89	0.18	4.05	0.69±	0.43	0.17	
109	0.24	16.50	0.42	0.69	0.85	0.17	4.05	0.66±	0.41	0.16	

32 to 44 Weeks⁽²⁾
Recommended Feed Energy 1260-1310 Kcal./Lb. or 2770-2880 Kcal/Kg⁽³⁾

Consumption Bird/Day		% ⁽¹⁾									
Grams	Lbs.	Protein	Methionine	Methionine + Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Total	Avg. Phos.	% Sodium
100	0.22	17.75	0.44	0.73	0.90	0.19	4.10	0.64±	0.40	0.17	
104	0.23	17.00	0.42	0.70	0.86	0.18	4.15	0.61±	0.38	0.17	
109	0.24	16.30	0.40	0.67	0.83	0.17	4.20	0.59±	0.37	0.17	
113	0.25	15.60	0.39	0.64	0.80	0.16	4.25	0.56±	0.35	0.16	

44 to 55 Weeks⁽²⁾
Recommended Feed Energy 1250-1300 Kcal./Lb. or 2750-2860 Kcal/Kg⁽³⁾

Consumption Bird/Day		% ⁽¹⁾									
Grams	Lbs.	Protein	Methionine	Methionine + Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Total	Avg. Phos.	% Sodium
100	0.22	17.00	0.40	0.66	0.86	0.18	4.25	0.61±	0.38	0.18	
104	0.23	16.30	0.38	0.63	0.82	0.17	4.30	0.58±	0.36	0.17	
109	0.24	15.60	0.37	0.61	0.79	0.16	4.35	0.56±	0.35	0.17	
113	0.25	15.00	0.35	0.58	0.76	0.15	4.44	0.54±	0.34	0.16	

55 Weeks and Older⁽²⁾
Recommended Feed Energy 1235-1285 Kcal./Lb. or 2720-2830 Kcal/Kg⁽³⁾

Consumption Bird/Day		% ⁽¹⁾									
Grams	Lbs.	Protein	Methionine	Methionine + Cystine	Lysine	Tryptophan	Calcium	Phosphorus	Total	Avg. Phos.	% Sodium
100	0.22	16.00	0.38	0.63	0.82	0.16	4.40	0.54±	0.34	0.18	
104	0.23	15.35	0.36	0.59	0.79	0.15	4.45	0.52±	0.33	0.17	
109	0.24	14.70	0.35	0.58	0.75	0.15	4.50	0.50±	0.31	0.17	
113	0.25	14.10	0.33	0.55	0.72	0.14	4.55	0.48±	0.30	0.16	

- (1) Protein grams/bird/day may be increased or decreased in conjunction with methionine + cystine and energy to optimize egg size.
 (2) Breeder feeds should be formulated to provide suggested nutrient intake on a per bird per day basis depending on feed intake.
 (3) The lower dietary feed energy recommendations generally are for the higher feed intakes.

Added Minerals and Vitamins for Breeder Pullet and Layer Rations

Added Minerals per Ton:	Growing Period		Laying Period	
	1,000 Kg.	2,000 Lbs.	1,000 Kg.	2,000 Lbs.
Manganese (g) as MnO or Mn SO ₄	66	60	66	60
Zinc (g) as ZnO	66	60	66	60
Iron (g) FeSO ₄	44	40	66	60
Copper (g) CuO or CuSO ₄	4.4	4.0	9.0	8.0
Iodine (g) Iodate or EDDI	0.9	0.8	0.9	0.8
Selenium (g) Selenite or Selenate	0.30	0.27	0.30	0.27
Added Vitamins per Ton:				
Vitamin A (IU.)	8,800,000	8,000,000	11,000,000	10,000,000
Vitamin D ₃ (IU.)	2,200,000	3,000,000	3,300,000	3,000,000
Vitamin E (IU.)	11,000	10,000	66,000	60,000
Vitamin K (g) (Menadione)	1.6	1.5	1.6	1.5
Thiamine (g)	0.6	0.5	2.2	2.0
Riboflavin (g)	4.4	4.0	6.6	6.0
Pyridoxine (g)	0.6	0.5	4.4	4.0
Vitamin B ₁₂ (mg.)	8.8	8.0	20.0	18.0
Pantothenic Acid (g)	6.6	6.0	11.0	10.0
Folic Acid (mg)	220	200	900	800
Niacin (g)	22	20	33	30
Choline (g)	275*	250*	440	400
d-Biotin (mg)	55	50	165	150

Based on 100 g/bird/day (22 Lbs. per 100 birds/day) daily feed intake.

* May be reduced by one half after 8 weeks.

Water Consumption

Water consumption is related to temperature and feed consumption. Feed consumption (calorie intake) is also related to temperature. A rule of thumb is that in the normal temperature range of bird comfort, 20-25°C. (68-77°F.), birds

drink twice as much water as the feed eaten. The ratio changes as temperatures are higher because less feed is eaten and more water is required to cool the birds.

Water Consumption for Leghorn Pullets and Layers

Water Consumed per 100 Birds

Chicks should consume .83 liters (.22 gallons) per 100 on day one

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

*Higher temperatures tend to elevate consumption by 1.9 liters (.5 gallons) per 100.

Energy Management

Energy requirements of growing and laying flocks need to be determined and managed with the same concern as other nutrients. Although birds do tend to adjust consumption to meet energy need, this is not always done precisely enough to insure optimum growth or performance. Additional energy in the feed will at times result in better body weight gain, egg production, and increased egg size, particularly when nutrients such as protein and amino acids are proportionally increased.

The energy need of layers under a moderate temperature range can be estimated with the following equation:

$$\text{Kcal/bird/day} = W (170 - 2.2T) + 2E + 5 \Delta W \text{ (White)}$$

$$\text{Kcal/bird/day} = W (140 - 2.0T) + 2E + 5 \Delta W \text{ (Brown)}$$

where W = current body weight in kilograms

T = average ambient temperature in degrees celsius.

E = daily egg mass in g/bird/day

$$\frac{(\% \text{ production} \times \text{egg weight in grams})}{100}$$

ΔW = body weight gain in g/bird/day

The current energy consumption of a flock can be determined as follows:

$$\text{Kcal/Lb. feed} \times \text{Lb./100/day} \div 100 = \text{Kcal/bird/day}$$

$$\text{Kcal/Kg feed} \times \text{g/bird/day} \div 1000 = \text{Kcal/bird/day}$$

Likewise the calorie content needed in the feed to achieve a certain daily intake can be calculated as follows:

$$\text{Kcal/Lb. feed} = \frac{\text{Kcal/bird/day (desired)} \times 100}{\text{current Lbs./100/day}}$$

$$\text{Kcal/Kg feed} = \frac{\text{Kcal/bird/day (desired)} \times 1000}{\text{current g/bird/day}}$$

Increased nutrient density feed is useful at certain times when energy consumption may be a limiting factor. This includes the critical period between housing and peak production. Flocks consuming less than 255-265 Kcal/bird/day at peak production tend to suffer post-peak dips in production and reduced egg size. Heat stress will also result in lower feed and energy consumption. Increased nutrient density, to include energy (added fat) will typically help maintain production and egg size when environmental temperatures are high.

Fat is a concentrated source of energy which can be used to raise feed energy. It also has the benefit of a relatively low heat increment which is useful during heat stress. Vegetable oil is high in linoleic acid which generally benefits egg size, although often a blend of vegetable oil and animal fat is acceptable.

The table below is a guideline for using fat at different ages and environmental temperatures. As fat is added to the ration (and thus an increase in dietary energy), care should be exercised to increase the other nutrients in proportion to energy so as to maintain a minimum intake of such critical nutrients as protein, amino acid and minerals.

Daily Highs	Added Fat (%)		
	Growing	Housing To Peak	Post Peak
Above 35°C. (95°F.)	3%	3%	2%
30°C. (86°F.) to 35°C. (95°F.)	2%	2%	1%
Below 30°C. (86°F.)	0	1%	0

Egg Size Management

Egg size potential is genetically determined, but within this given range, we can manage to either increase or decrease it to suit the needs for optimum hatching egg size. The following management areas should be given particular attention.

- 1. Body weight at maturity** — The larger the body weight at first egg, the larger that hen's eggs will be for her entire life. For maximum egg size, do not stimulate maturity with lights until the 18-week body weight target is attained.
- 2. Rate of maturity** — This also relates to body size, but in general the earlier the age a flock begins production, the

smaller the egg size will be, and likewise, the later the maturity, the larger the egg size. Lighting programs can be manipulated to influence rate of maturity. A decreasing light pattern during growing will delay maturity and increase average egg size (See example on page 10.)

- 3. Nutrition** — Egg size is greatly affected by the intake of crude protein, specific amino acids such as methionine and cystine, energy, total fat, and the essential fatty acids such as linoleic acid. Levels of these nutrients can be increased to improve early egg size and gradually reduced to control late egg size. (See feeding program, page 13-15.)

Hy-Line Parent Stock Feed Consumption* - Laying Period

Age in Weeks	Variety W-36				Variety W-98				Variety Brown			
	Grams/ Bird/ Day	Lbs./ 100/ Day	Cumulative Kg	Lbs.	Grams/ Bird/ Day	Lbs./ 100/ Day	Cumulative Kg	Lbs.	Grams/ Bird/ Day	Lbs./ 100/ Day	Cumulative Kg	Lbs.
19	84	18.5	0.59	1.3	87	19.2	0.61	1.3	83	18.3	0.58	1.3
20	87	19.1	1.20	2.6	89	19.6	1.23	2.7	90	19.8	1.21	2.7
21	88	19.4	1.81	4.0	90	19.8	1.86	4.1	93	20.5	1.86	4.1
22	89	19.7	2.44	5.4	91	20.1	2.50	5.5	95	20.9	2.53	5.6
23	90	19.8	3.07	6.8	93	20.5	3.15	6.9	97	21.4	3.21	7.1
24	90	19.9	3.70	8.2	94	20.7	3.81	8.4	99	21.8	3.90	8.6
25	91	20.1	4.34	9.6	95	20.9	4.47	9.9	101	22.3	4.61	10.2
26	91	20.1	4.97	11.0	97	21.4	5.15	11.4	103	22.7	5.33	11.7
27	91	20.1	5.61	12.4	98	21.6	5.84	12.9	105	23.1	6.06	13.4
28	91	20.1	6.25	13.8	99	21.8	6.53	14.4	107	23.6	6.81	15.0
29	92	20.2	6.89	15.2	99	21.8	7.22	15.9	109	24.0	7.57	16.7
30	92	20.2	7.53	16.6	99	21.8	7.92	17.5	110	24.3	8.34	18.4
31	92	20.2	8.17	18.0	100	22.0	8.62	19.0	110	24.3	9.11	20.1
32	92	20.3	8.82	19.4	100	22.0	9.32	20.5	111	24.5	9.89	21.8
33	92	20.3	9.46	20.9	100	22.0	10.02	22.1	111	24.5	10.67	23.5
34	93	20.4	10.11	22.3	100	22.0	10.72	23.6	112	24.7	11.45	25.3
35	93	20.4	10.76	23.7	100	22.0	11.42	25.2	112	24.7	12.24	27.0
36	93	20.5	11.41	25.2	101	22.3	12.12	26.7	113	24.9	13.03	28.7
37	93	20.5	12.06	26.6	101	22.3	12.83	28.3	113	24.9	13.82	30.5
38	93	20.6	12.72	28.0	101	22.3	13.54	29.8	114	25.1	14.62	32.2
39	94	20.6	13.37	29.5	101	22.3	14.25	31.4	114	25.1	15.41	34.0
40	94	20.7	14.03	30.9	102	22.5	14.96	33.0	115	25.4	16.22	35.8
41	94	20.7	14.69	32.4	102	22.5	15.67	34.6	115	25.4	17.02	37.5
42	94	20.8	15.35	33.8	102	22.5	16.39	36.1	115	25.4	17.83	39.3
43	94	20.8	16.01	35.3	102	22.5	17.10	37.7	116	25.6	18.64	41.1
44	95	20.9	16.67	36.8	102	22.5	17.82	39.3	116	25.6	19.45	42.9
45	95	20.9	17.34	38.2	103	22.7	18.54	40.9	116	25.6	20.27	44.7
46	95	21.0	18.00	39.7	103	22.7	19.26	42.5	116	25.6	21.08	46.5
47	95	21.0	18.67	41.2	103	22.7	19.98	44.0	117	25.8	21.90	48.3
48	96	21.1	19.34	42.6	103	22.7	20.70	45.6	117	25.8	22.72	50.1
49	96	21.1	20.01	44.1	103	22.7	21.42	47.2	117	25.8	23.53	51.9
50	96	21.2	20.68	45.6	104	22.9	22.15	48.8	117	25.8	24.35	53.7
51	96	21.2	21.35	47.1	104	22.9	22.88	50.4	117	25.8	25.17	55.5
52	96	21.3	22.03	48.6	104	22.9	23.60	52.0	117	25.8	25.99	57.3
53	97	21.3	22.71	50.1	104	22.9	24.33	53.6	117	25.8	26.81	59.1
54	97	21.4	23.38	51.6	105	23.1	25.07	55.3	117	25.8	27.63	60.9
55	97	21.4	24.06	53.1	105	23.1	25.80	56.9	117	25.8	28.45	62.7
56	97	21.5	24.74	54.6	105	23.1	26.54	58.5	117	25.8	29.27	64.5
57	98	21.5	25.43	56.1	105	23.1	27.27	60.1	117	25.8	30.09	66.3
58	98	21.5	26.11	57.6	105	23.1	28.01	61.7	117	25.8	30.91	68.1
59	98	21.6	26.80	59.1	106	23.4	28.75	63.4	117	25.8	31.72	70.0
60	98	21.6	27.48	60.6	106	23.4	29.49	65.0	117	25.8	32.54	71.8
61	98	21.7	28.17	62.1	106	23.4	30.23	66.7	117	25.8	33.36	73.6
62	99	21.7	28.86	63.6	106	23.4	30.98	68.3	117	25.8	34.18	75.4
63	99	21.8	29.56	65.2	106	23.4	31.72	69.9	117	25.8	35.00	77.2
64	99	21.8	30.25	66.7	106	23.4	32.46	71.6	117	25.8	35.82	79.0
65	99	21.8	30.94	68.2	107	23.6	33.21	73.2	118	26.0	36.65	80.8
66	99	21.9	31.64	69.8	107	23.6	33.96	74.9	118	26.0	37.47	82.6
67	99	21.9	32.33	71.3	107	23.6	34.71	76.5	118	26.0	38.30	84.4
68	100	22.0	33.03	72.8	107	23.6	35.46	78.2	118	26.0	39.12	86.3
69	100	22.0	33.73	74.4	107	23.6	36.20	79.8	118	26.0	39.95	88.1
70	100	22.0	34.43	75.9	107	23.6	36.95	81.5	118	26.0	40.78	89.9
71	100	22.0	35.13	77.5	108	23.8	37.71	83.1				
72	100	22.0	35.83	79.0	108	23.8	38.47	84.8				
73	100	22.0	36.53	80.6	108	23.8	39.22	86.5				
74	100	22.1	37.23	82.1	108	23.8	39.98	88.1				
75	100	22.2	37.94	83.7	108	23.8	40.73	89.8				

* For the total flock (male and female)

Breeder Hen Management

Removal of Culls and Sex Errors is Imperative

All breeders should be handled at housing time and any cull birds or sex slips removed. It is extremely important to remove all sex errors to maintain sexing accuracy and performance in the progeny. In addition to sex slips, physical defects, as well as extremely light birds should be removed.

All male Hy-Line breeders regardless of variety are dubbed at the Production Center as chicks and all females are left full combed. Inspection of the breeder flock post housing should also be made with an effort to detect sex slips missed on the initial inspection. There should be no full combed males nor dubbed females in any Hy-Line breeder flock.

Housing Ratios

The number of males and females in any breeding flock is important. If there are too few males, overall fertility may suffer. Likewise, if there are too many males they may fight and fertility may also suffer. The viability of the males may vary from flock to flock and the exact number of males must be left to the judgement of the production manager. See table below:

Housing Breeders in Cages

Cage systems have been specifically designed for housing adult breeder flocks. Advantages include cleaner hatching eggs, better control of enteric diseases (coccidiosis, worms, salmonella), better egg production, and greater efficiency in use of house space and labor. Disadvantages are a slightly reduced fertility (2-3% lower), potentially more cracked eggs, and higher equipment cost per bird.

Breeder cages require special design considerations to allow for proper male/female ratios and mating activity. Generally, relatively large-size colony cages are used with two males per cage. Cage height should be 25 in. (63.5 cm) to allow enough space for the larger males. One commercial system uses cages 71 in. (181 cm) wide and 34 in. (87 cm) deep and provides space recommended for 20 brown variety hens and 2 males, 111 in² (716 cm²) per bird. The same cage could house 23 white variety hens and 2 males at 98 in² (630 cm²) per bird.

Although most layer breeders are still housed in traditional open-floor houses, breeder cages may provide an economical alternative as we gain experience with their use in the future.

Hy-Line Breeder Housing Ratios

(Excess males should not be immediately discarded.)

Brown Breeder		White Breeder			
Variety Brown		Variety W-36		Variety W-98	
<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	<u>Male</u>
100	8	100	12	100	8

Floor Space Requirements for Growing and Laying Periods

Age	Space Allotment			
	Brown		White	
	sq. cm	sq. ft.	sq. cm	sq. ft.
to 8 weeks	700	0.75	700	0.75
8 to 18 weeks	1150	1.25	1000	1.10
18 weeks +	1625	1.75	1200	1.30

Hatching Egg Care

Chick weight at hatch is directly related to the weight of the hatching egg. Flock sizes are becoming so large it is difficult to supply the number of chicks required in a single hatch or from a single parent source. Uniformity of commercial started pullets is extremely important in attaining future production goals. To assist in attaining uniformity, it is suggested that eggs be set according to parent source flock and this grouping be maintained until chicks are placed in the brooder house. Research indicates that grouping hatching eggs by four gram increments and maintaining chicks hatched from each group separately, significantly reduces the size variability of chicks at four weeks.

Hatching eggs should be gathered a minimum of twice daily or more during extremely hot weather. They should be stored at 18.3°C. (65°F.) with a relative humidity between 70% and 80%. Hatching eggs should be sanitized using products specifically developed for this purpose.

Hatching eggs should not be kept longer than ten days from the day they were laid. Best hatches result when eggs of from three to seven days of age are used. When it is necessary to save

eggs longer than ten days, a temperature of 13°C. (55°F.) with a relative humidity of between 70% and 80% is recommended. Temperatures below this will result in an unsatisfactory hatch.

Hy-Line W-36 hatching eggs should come from a flock that is at least 25 weeks of age and weigh a minimum of 49 g per egg. Hy-Line W-98 hatching eggs should come from a flock that is 24 weeks or older and weigh a minimum of 49 g per egg. Hy-Line Brown hatching eggs should come from a flock that is at least 24 weeks of age and weigh a minimum of 49 g per egg. Smaller eggs from young flocks can be used, although it should be realized that chick size and early livability will not be optimum.

It is extremely important that once eggs are cooled they be maintained at a temperature that does not allow them to “sweat” (gather moisture from being exposed to warm humid air). The truck taking them from a cooler at the farm to the hatchery should be capable of keeping the eggs cool enough to avoid sweating.

Incubation and Hatching

Prewarming of all Hy-Line hatching eggs is recommended to achieve maximum yield and uniformity of hatch time. This is accomplished by removing the eggs from the cooler eight to twelve hours prior to setting and storing at a temperature of 24.1°C. (75°F.) during this time.

Under normal conditions W-36 eggs would achieve optimum hatch in 21 days and 6 hours. The Hy-Line W-98 and Brown may require 21 days and 8 hours.

Age of eggs will influence hatch times. Allow one additional hour for every day beyond 10 days of age.

Color Sexing

Color sexing of Hy-Line Brown can be conducted when the chicks are taken from the hatchery before other processing is started.

The sex is determined on the basis of the down color. The males are generally pure white (Fig. 1) although occasionally they may show some red over the head and neck.

The females are a buffy-red color (Fig. 2). In perhaps 1% of the

chicks some confusion may occur wherein females will show nearly white heads. However, they will have the red-buffy color on the back and still be distinguishable from the males.

The occasional male may show some red on the head (Fig. 3), but this will occur as a round spot. Females showing red on the head (Fig. 4) will have it concentrated around the base of the beak and around the eyes.

Feather Sexing

Hy-Line white egg commercial chicks are sexable by means of the wing feathers. The female commercial chicks show fast feathering (primary wing feathers are longer than the covert feathers) and male chicks are slow feathering (primary and

covert feathers are the same length). In a small percentage of chicks covert feathers may be longer than the primary feathers (super slow feathering). These chicks may be males.



The wing appearing on the left of the above picture has primary wing feathers, which are longer and thicker than the covert feathers, indicating fast feathering—a female. For the wing appearing on the right, the primary and covert feathers appear to be the same length and thickness.



Fig. 1—Cockerels



Fig. 3—Cockerels with red spot on head.



Fig. 2—Pullets



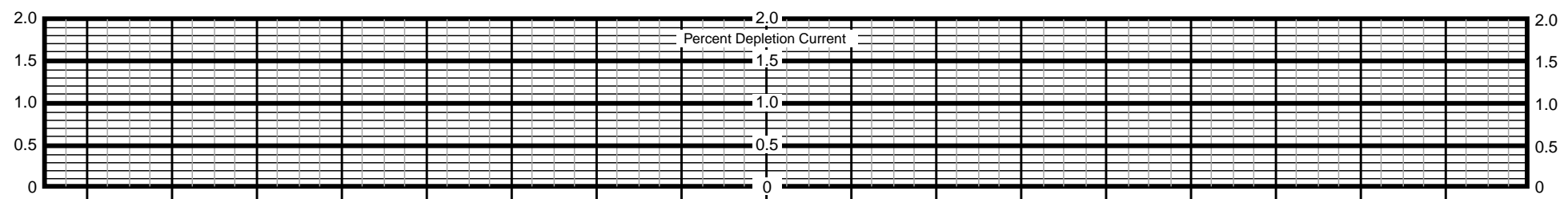
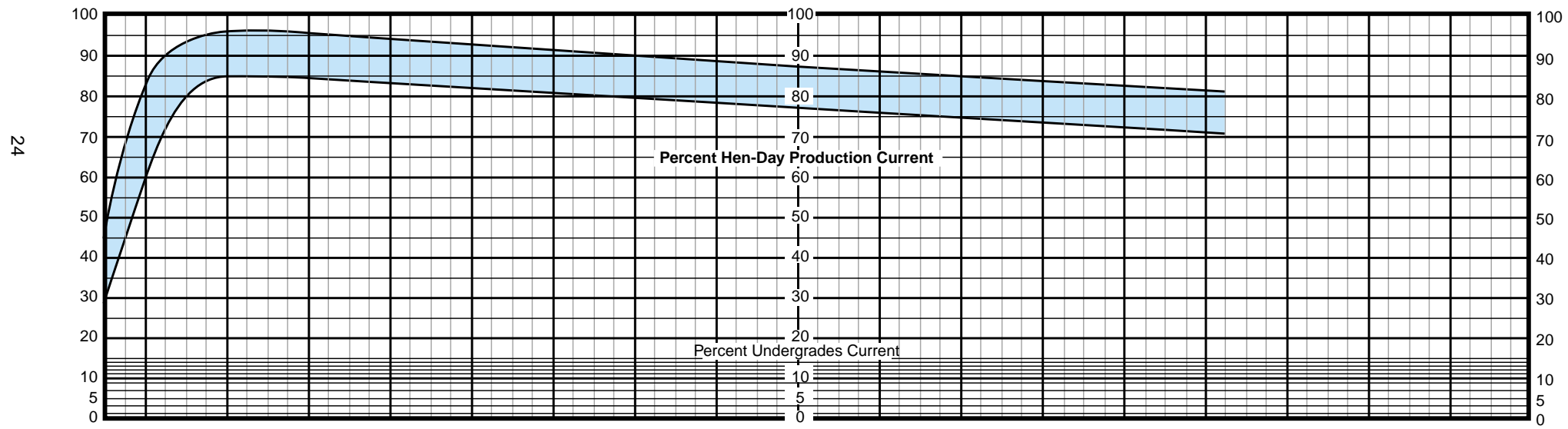
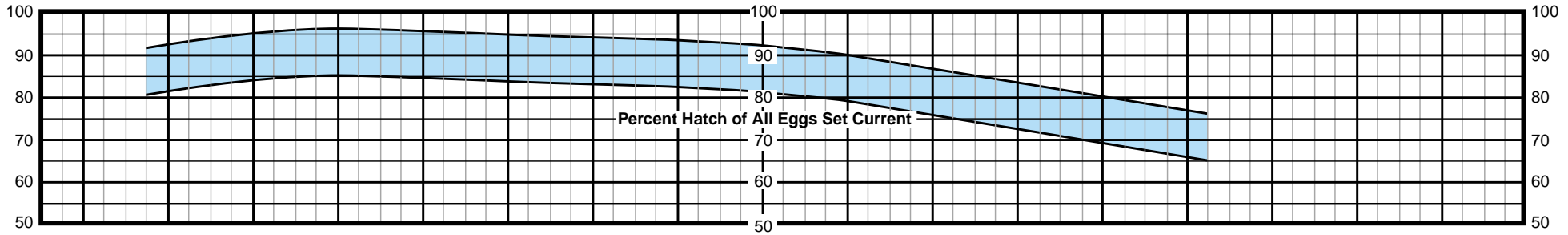
Fig. 4—Pullets with red around the eyes.

Hy-Line Variety W-36 Parent Stock Performance Projection

Age in Weeks	%HD Curr.	Female % Mort.		Male % Mort.		No. Hen-Day Eggs		No. HH Eggs		Female BW		Average Egg Weight		% Settable	No. Settable HH Eggs		% Hatch	No. Female Chicks	
		Cum.	Cum.	Cum.	Cum.	Curr.	Accum.	Curr.	Accum.	Kg	Lbs.	g/Egg	30 Dz. Cs.		Curr.	Accum.		Curr.	Accum.
19	18	0.1	0.3	1.3	1.3	1.3	1.3	1.29	2.84	40.3	32.0								
20	40	0.1	0.5	2.8	4.1	2.8	4.1	1.32	2.92	43.3	34.4								
21	64	0.2	0.7	4.5	8.6	4.5	8.5	1.36	2.99	45.9	36.4								
22	79	0.2	0.9	5.6	14.1	5.5	14.1	1.38	3.05	48.0	38.1								
23	87	0.3	1.1	6.1	20.2	6.0	20.1	1.41	3.10	49.6	39.4								
24	89	0.3	1.3	6.3	26.4	6.2	26.4	1.42	3.14	51.0	40.5								
25	90	0.4	1.5	6.3	32.7	6.3	32.6	1.44	3.17	52.2	41.4	85	5.3	5.3	86	2.3	2.3		
26	90	0.4	1.6	6.3	39.0	6.2	38.9	1.45	3.20	53.0	42.1	91	5.7	11.0	87	2.5	4.8		
27	89	0.5	1.8	6.3	45.2	6.2	45.1	1.46	3.22	53.7	42.6	96	6.0	17.0	88	2.6	7.4		
28	89	0.5	2.0	6.2	51.5	6.2	51.3	1.47	3.24	54.2	43.0	97	6.0	23.0	89	2.7	10.1		
29	89	0.5	2.1	6.2	57.7	6.2	57.5	1.47	3.25	54.7	43.4	97	6.0	29.0	90	2.7	12.8		
30	89	0.6	2.3	6.2	63.9	6.2	63.7	1.48	3.26	55.2	43.8	97	6.0	35.1	90	2.7	15.5		
31	88	0.6	2.5	6.2	70.1	6.1	69.8	1.48	3.27	55.7	44.2	97	6.0	41.1	91	2.7	18.2		
32	88	0.7	2.6	6.2	76.3	6.1	75.9	1.49	3.28	56.2	44.6	98	6.0	47.1	91	2.7	21.0		
33	88	0.7	2.8	6.2	82.4	6.1	82.0	1.49	3.29	56.7	45.0	98	6.0	53.1	91	2.7	23.7		
34	88	0.8	2.9	6.1	88.5	6.1	88.1	1.50	3.30	57.2	45.4	98	6.0	59.0	91	2.7	26.4		
35	87	0.8	3.1	6.1	94.7	6.1	94.2	1.50	3.31	57.6	45.7	98	6.0	65.0	91	2.7	29.1		
36	87	0.9	3.2	6.1	100.8	6.0	100.2	1.51	3.33	58.0	46.0	98	5.9	70.9	91	2.7	31.8		
37	87	0.9	3.4	6.1	106.8	6.0	106.3	1.51	3.34	58.3	46.3	98	5.9	76.9	90	2.7	34.5		
38	87	1.0	3.5	6.1	112.9	6.0	112.3	1.52	3.34	58.7	46.6	98	5.9	82.8	90	2.7	37.1		
39	86	1.0	3.6	6.0	118.9	6.0	118.2	1.52	3.36	59.0	46.8	98	5.9	88.7	90	2.6	39.8		
40	86	1.1	3.8	6.0	125.0	6.0	124.2	1.53	3.37	59.2	47.0	98	5.9	94.5	90	2.6	42.4		
41	86	1.1	3.9	6.0	131.0	5.9	130.1	1.53	3.38	59.5	47.2	98	5.8	100.4	90	2.6	45.1		
42	86	1.2	4.0	6.0	136.9	5.9	136.1	1.54	3.39	59.7	47.4	98	5.8	106.2	90	2.6	47.7		
43	85	1.2	4.2	6.0	142.9	5.9	141.9	1.54	3.40	60.0	47.6	98	5.8	112.0	89	2.6	50.3		
44	85	1.3	4.3	6.0	148.9	5.9	147.8	1.55	3.41	60.2	47.8	98	5.8	117.8	89	2.6	52.8		
45	85	1.3	4.4	5.9	154.8	5.9	153.7	1.55	3.42	60.5	48.0	98	5.8	123.5	89	2.6	55.4		
46	84	1.4	4.5	5.9	160.7	5.8	159.5	1.56	3.43	60.6	48.1	98	5.7	129.3	89	2.6	58.0		
47	84	1.5	4.6	5.9	166.6	5.8	165.3	1.56	3.44	60.8	48.2	98	5.7	135.0	88	2.5	60.5		
48	84	1.5	4.7	5.9	172.5	5.8	171.1	1.57	3.45	60.9	48.3	98	5.7	140.7	88	2.5	63.0		
49	84	1.6	4.8	5.9	178.3	5.8	176.9	1.57	3.46	61.0	48.4	98	5.7	146.4	88	2.5	65.5		
50	83	1.7	5.0	5.8	184.2	5.7	182.6	1.57	3.47	61.1	48.5	98	5.7	152.0	88	2.5	68.0		
51	83	1.7	5.1	5.8	190.0	5.7	188.3	1.57	3.47	61.1	48.5	98	5.6	157.6	88	2.5	70.4		
52	83	1.8	5.2	5.8	195.8	5.7	194.0	1.58	3.48	61.2	48.6	98	5.6	163.2	87	2.4	72.9		
53	83	1.9	5.2	5.8	201.6	5.7	199.7	1.58	3.48	61.2	48.6	98	5.6	168.8	87	2.4	75.3		
54	82	1.9	5.3	5.8	207.4	5.7	205.4	1.58	3.48	61.4	48.7	98	5.6	174.4	86	2.4	77.7		
55	82	2.0	5.4	5.7	213.1	5.6	211.0	1.58	3.49	61.4	48.7	98	5.5	179.9	86	2.4	80.1		
56	82	2.1	5.5	5.7	218.8	5.6	216.6	1.58	3.49	61.5	48.8	98	5.5	185.4	85	2.3	82.4		
57	82	2.2	5.6	5.7	224.6	5.6	222.2	1.58	3.49	61.5	48.8	98	5.5	190.9	85	2.3	84.7		
58	81	2.3	5.7	5.7	230.3	5.6	227.8	1.58	3.49	61.6	48.9	98	5.5	196.3	84	2.3	87.0		
59	81	2.4	5.8	5.7	235.9	5.5	233.3	1.58	3.49	61.6	48.9	98	5.4	201.8	83	2.3	89.3		
60	81	2.4	5.9	5.7	241.6	5.5	238.8	1.59	3.50	61.7	49.0	97	5.4	207.2	81	2.2	91.5		
61	81	2.5	6.0	5.6	247.2	5.5	244.3	1.59	3.50	61.7	49.0	97	5.4	212.5	80	2.1	93.6		
62	80	2.6	6.1	5.6	252.9	5.5	249.8	1.59	3.50	61.9	49.1	97	5.3	217.9	79	2.1	95.7		
63	80	2.7	6.2	5.6	258.5	5.5	255.3	1.59	3.50	61.9	49.1	97	5.3	223.2	78	2.1	97.8		
64	80	2.8	6.3	5.6	264.0	5.4	260.7	1.59	3.50	62.0	49.2	97	5.3	228.5	78	2.1	99.8		
65	80	2.9	6.3	5.6	269.6	5.4	266.1	1.59	3.50	62.0	49.2	97	5.3	233.7	77	2.0	101.9		
66	79	3.0	6.4	5.5	275.2	5.4	271.5	1.59	3.50	62.0	49.2	97	5.2	238.9	77	2.0	103.9		
67	79	3.1	6.5	5.5	280.7	5.4	276.8	1.59	3.50	62.1	49.3	96	5.2	244.1	76	2.0	105.9		
68	79	3.2	6.6	5.5	286.2	5.3	282.2	1.59	3.50	62.1	49.3	96	5.2	249.3	76	2.0	107.8		
69	78	3.3	6.7	5.5	291.7	5.3	287.5	1.59	3.50	62.1	49.3	96	5.1	254.4	75	1.9	109.7		
70	78	3.4	6.7	5.5	297.2	5.3	292.8	1.59	3.50	62.1	49.3	96	5.1	259.5	75	1.9	111.7		
71	78	3.5	6.8	5.5	302.6	5.3	298.0	1.59	3.50	62.1	49.3	96	5.1	264.6	74	1.9	113.5		
72	78	3.6	6.9	5.4	308.1	5.2	303.3	1.59	3.50	62.1	49.3	96	5.0	269.6	73	1.8	115.4		
73	77	3.7	7.0	5.4	313.5	5.2	308.5	1.59	3.50	62.1	49.3	96	5.0	274.6	72	1.8	117.2		
74	77	3.9	7.1	5.4	318.9	5.2	313.7	1.59	3.50	62.1	49.3	95	5.0	279.6	71	1.8	118.9		
75	77	4.0	7.1	5.4	324.3	5.2	318.9	1.59	3.50	62.1	49.3	95	4.9	284.6	70	1.7	120.7		

Performance figures listed above were compiled from actual field performance. The figures are in no way a guarantee of performance. Performance of any parent flock will vary according to the management and disease conditions.

Hy-Line W-36 Parent Performance Graph



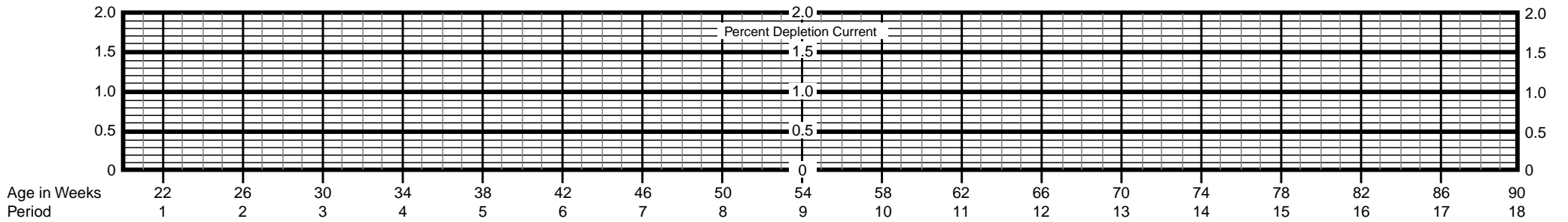
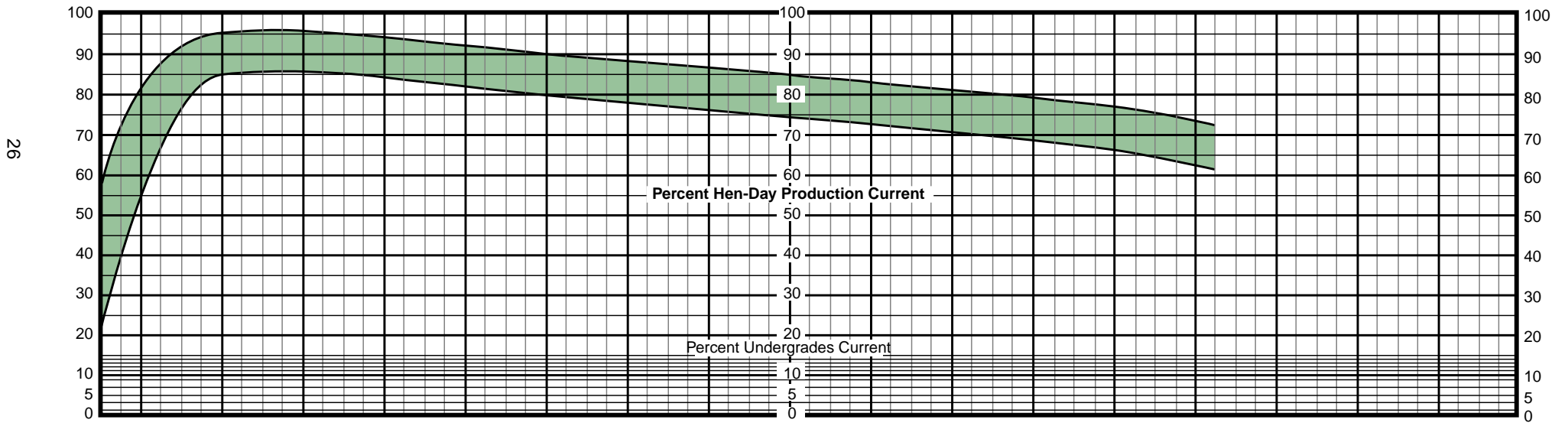
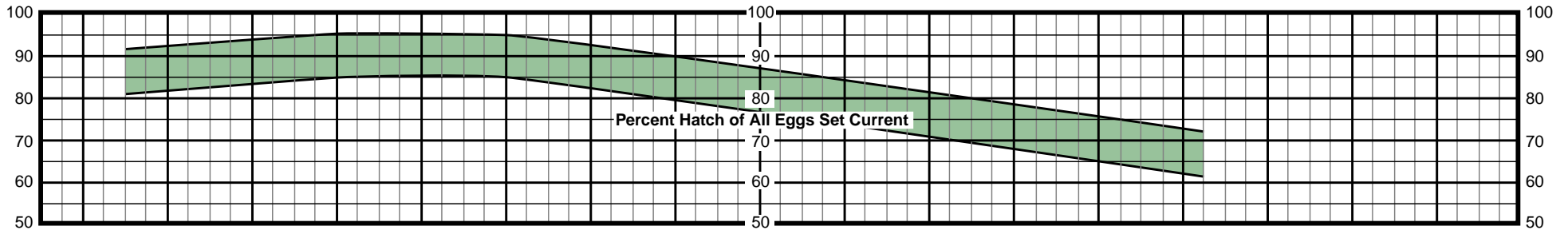
Age in Weeks Period 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Hy-Line Variety W-98 Parent Stock Performance Projection

Age in Weeks	%HD Curr.	Female % Mort.		Male % Mort.		No. Hen-Day Eggs		No. HH Eggs		Female BW		Average Egg Weight		% Settable	No. Settable HH Eggs		% Hatch	No. Female Chicks	
		Cum.	Cum.	Cum.	Cum.	Curr.	Accum.	Curr.	Accum.	Kg	Lbs.	g/Egg	Net Lbs./30 Dz. Cs.		Curr.	Accum.		Curr.	Accum.
19	16	0.1	0.3	1.1	1.1	1.1	1.1	1.33	2.93										
20	36	0.2	0.6	2.5	3.6	2.5	3.6	1.38	3.03			44.1	35.0						
21	58	0.2	0.9	4.1	7.7	4.1	7.7	1.41	3.10			47.3	37.5						
22	76	0.3	1.2	5.3	13.0	5.3	13.0	1.44	3.17			48.9	38.8						
23	85	0.4	1.4	6.0	19.0	5.9	18.9	1.47	3.23			50.5	40.1						
24	88	0.5	1.7	6.2	25.1	6.1	25.0	1.50	3.30			51.9	41.2	76	4.5	4.5	86	1.9	1.9
25	89	0.6	1.9	6.2	31.4	6.2	31.2	1.53	3.37			52.9	42.0	82	5.0	9.5	87	2.2	4.1
26	90	0.6	2.1	6.3	37.7	6.3	37.5	1.56	3.43			53.7	42.6	87	5.4	14.9	88	2.4	6.5
27	90	0.7	2.4	6.3	44.0	6.3	43.8	1.57	3.45			54.2	43.0	91	5.7	20.6	89	2.5	9.0
28	91	0.7	2.6	6.4	50.3	6.3	50.1	1.57	3.46			54.7	43.4	96	6.0	26.6	90	2.7	11.7
29	91	0.8	2.8	6.4	56.7	6.3	56.4	1.57	3.46			55.2	43.8	96	6.1	32.7	90	2.7	14.5
30	90	0.8	3.0	6.3	63.0	6.2	62.6	1.57	3.46			55.7	44.2	97	6.1	38.8	90	2.8	17.2
31	90	0.9	3.1	6.3	69.3	6.2	68.9	1.57	3.47			56.2	44.6	97	6.1	44.9	90	2.7	20.0
32	89	0.9	3.3	6.2	75.5	6.2	75.1	1.57	3.47			56.7	45.0	97	6.1	50.9	90	2.7	22.7
33	89	1.0	3.5	6.2	81.8	6.2	81.2	1.57	3.47			57.1	45.3	97	6.0	56.9	90	2.7	25.4
34	88	1.0	3.7	6.2	87.9	6.1	87.3	1.57	3.47			57.5	45.6	97	6.0	62.9	91	2.7	28.1
35	88	1.1	3.8	6.2	94.1	6.1	93.4	1.58	3.48			57.7	45.8	97	5.9	68.8	91	2.7	30.8
36	87	1.1	4.0	6.1	100.2	6.0	99.4	1.58	3.48			58.0	46.0	97	5.9	74.7	91	2.7	33.5
37	87	1.2	4.2	6.1	106.3	6.0	105.5	1.58	3.48			58.2	46.2	97	5.8	80.6	91	2.7	36.1
38	86	1.2	4.3	6.0	112.3	5.9	111.4	1.58	3.48			58.5	46.4	97	5.8	86.4	91	2.7	38.8
39	86	1.3	4.5	6.0	118.3	5.9	117.3	1.58	3.48			58.8	46.7	97	5.8	92.2	90	2.6	41.4
40	86	1.3	4.7	6.0	124.3	5.9	123.3	1.58	3.48			59.2	47.0	96	5.7	97.9	90	2.6	43.9
41	85	1.4	4.8	6.0	130.3	5.9	129.2	1.58	3.49			59.5	47.2	96	5.7	103.6	89	2.5	46.5
42	85	1.4	5.0	6.0	136.2	5.9	135.0	1.58	3.49			59.7	47.4	96	5.6	109.2	89	2.5	49.0
43	84	1.5	5.2	5.9	142.1	5.8	140.8	1.58	3.49			60.0	47.6	96	5.6	114.8	89	2.5	51.5
44	84	1.6	5.3	5.9	148.0	5.8	146.6	1.58	3.49			60.2	47.8	96	5.6	120.4	89	2.5	54.0
45	84	1.6	5.5	5.9	153.9	5.8	152.4	1.58	3.49			60.4	47.9	96	5.6	126.0	89	2.5	56.4
46	83	1.7	5.7	5.8	159.7	5.7	158.1	1.58	3.49			60.6	48.1	96	5.6	131.5	88	2.4	58.9
47	83	1.7	5.8	5.8	165.5	5.7	163.8	1.58	3.49			60.9	48.3	96	5.5	137.0	87	2.4	61.3
48	83	1.8	6.0	5.8	171.3	5.7	169.5	1.58	3.49			61.0	48.4	96	5.5	142.5	86	2.4	63.6
49	82	1.9	6.1	5.7	177.0	5.6	175.1	1.59	3.50			61.1	48.5	96	5.5	148.0	86	2.4	66.0
50	82	2.0	6.3	5.7	182.8	5.6	180.8	1.59	3.50			61.2	48.6	96	5.4	153.4	85	2.3	68.3
51	81	2.0	6.5	5.7	188.4	5.6	186.3	1.59	3.50			61.4	48.7	96	5.4	158.8	85	2.3	70.6
52	80	2.1	6.6	5.6	194.0	5.5	191.8	1.59	3.50			61.5	48.8	96	5.3	164.1	85	2.3	72.8
53	80	2.2	6.8	5.6	199.6	5.5	197.3	1.59	3.50			61.7	49.0	96	5.3	169.4	85	2.2	75.1
54	79	2.3	6.9	5.5	205.2	5.4	202.7	1.59	3.50			61.9	49.1	95	5.2	174.6	84	2.2	77.3
55	79	2.4	7.1	5.5	210.7	5.4	208.1	1.59	3.50			62.0	49.2	95	5.1	179.7	83	2.1	79.4
56	78	2.5	7.3	5.5	216.2	5.3	213.4	1.59	3.50			62.1	49.3	95	5.1	184.8	82	2.1	81.5
57	78	2.6	7.4	5.5	221.6	5.3	218.7	1.59	3.51			62.2	49.4	95	5.1	189.9	81	2.0	83.5
58	77	2.7	7.6	5.4	227.0	5.2	224.0	1.59	3.51			62.4	49.5	95	5.1	194.9	80	2.0	85.6
59	77	2.9	7.7	5.4	232.4	5.2	229.2	1.59	3.51			62.5	49.6	95	5.0	199.9	79	2.0	87.5
60	77	3.0	7.9	5.4	237.8	5.2	234.4	1.59	3.51			62.6	49.7	95	5.0	204.9	78	1.9	89.5
61	76	3.1	8.0	5.3	243.1	5.2	239.6	1.59	3.51			62.6	49.7	95	5.0	209.9	77	1.9	91.4
62	76	3.2	8.2	5.3	248.4	5.1	244.7	1.59	3.51			62.8	49.8	95	4.9	214.8	76	1.9	93.2
63	75	3.4	8.3	5.3	253.7	5.1	249.8	1.59	3.51			62.8	49.8	95	4.9	219.6	75	1.8	95.1
64	75	3.5	8.5	5.3	258.9	5.1	254.9	1.59	3.51			62.9	49.9	94	4.8	224.4	75	1.8	96.9
65	75	3.7	8.6	5.3	264.2	5.1	259.9	1.60	3.52			62.9	49.9	94	4.8	229.2	74	1.8	98.6
66	74	3.8	8.8	5.2	269.4	5.0	264.9	1.60	3.52			62.9	49.9	93	4.7	233.9	74	1.7	100.4
67	74	4.0	8.9	5.2	274.5	5.0	269.9	1.60	3.52			62.9	49.9	93	4.6	238.5	73	1.7	102.1
68	73	4.1	9.1	5.1	279.7	4.9	274.8	1.60	3.52			63.0	50.0	92	4.6	243.1	73	1.7	103.7
69	73	4.3	9.2	5.1	284.8	4.9	279.7	1.60	3.52			63.0	50.0	92	4.5	247.6	72	1.6	105.4
70	72	4.5	9.4	5.0	289.8	4.8	284.5	1.60	3.52			63.0	50.0	91	4.4	252.0	71	1.6	106.9
71	71	4.7	9.5	5.0	294.8	4.7	289.2	1.60	3.52			63.0	50.0	91	4.4	256.4	70	1.5	108.5
72	70	4.8	9.7	4.9	299.7	4.7	293.9	1.60	3.52			63.0	50.0	90	4.3	260.7	69	1.5	109.9
73	69	5.0	9.8	4.8	304.5	4.6	298.5	1.60	3.53			63.0	50.0	90	4.2	264.9	68	1.4	111.4
74	68	5.2	10.0	4.8	309.3	4.5	303.0	1.60	3.53			63.0	50.0	89	4.1	269.0	67	1.4	112.7
75	67	5.4	10.1	4.7	314.0	4.4	307.4	1.60	3.53			63.0	50.0	89	4.0	273.0	66	1.3	114.1

Performance figures listed above were compiled from actual field performance. The figures are in no way a guarantee of performance. Performance of any parent flock will vary according to management and disease conditions.

Hy-Line W-98 Parent Performance Graph



Age in Weeks
Period

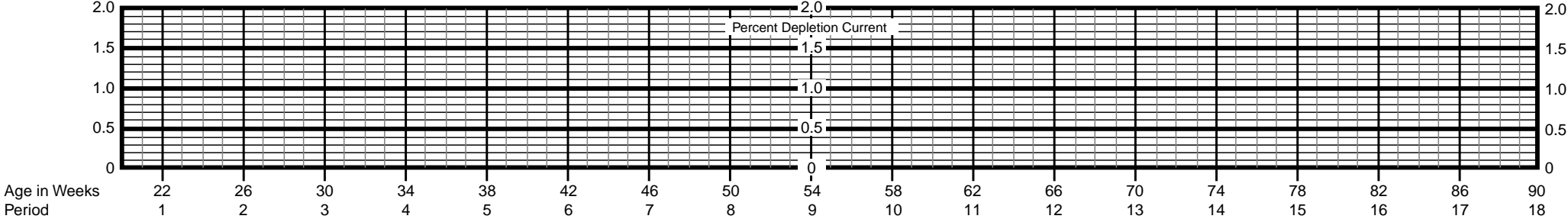
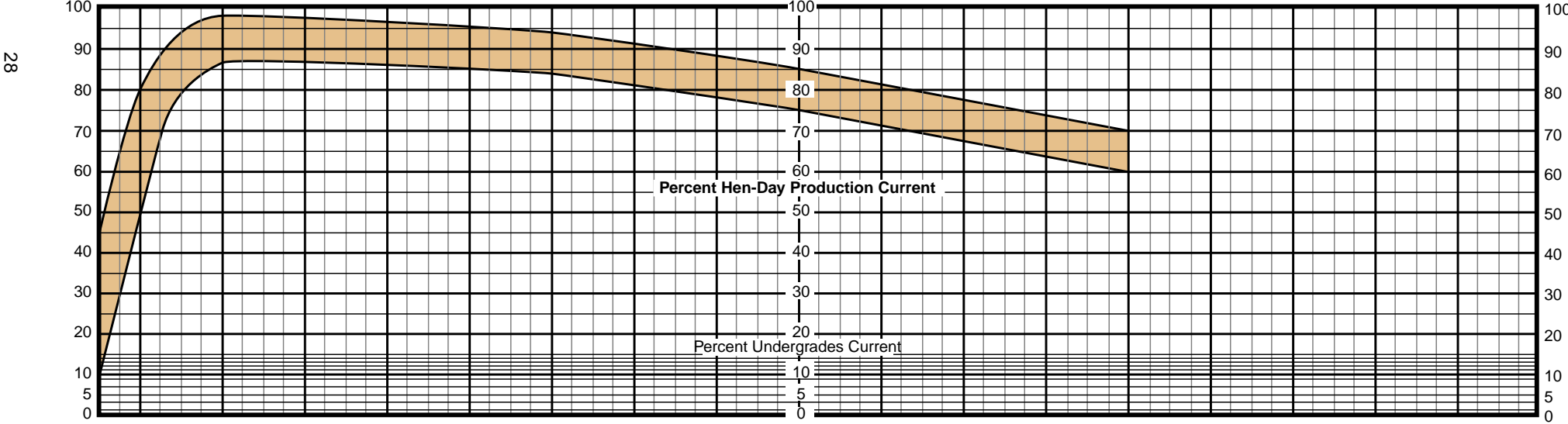
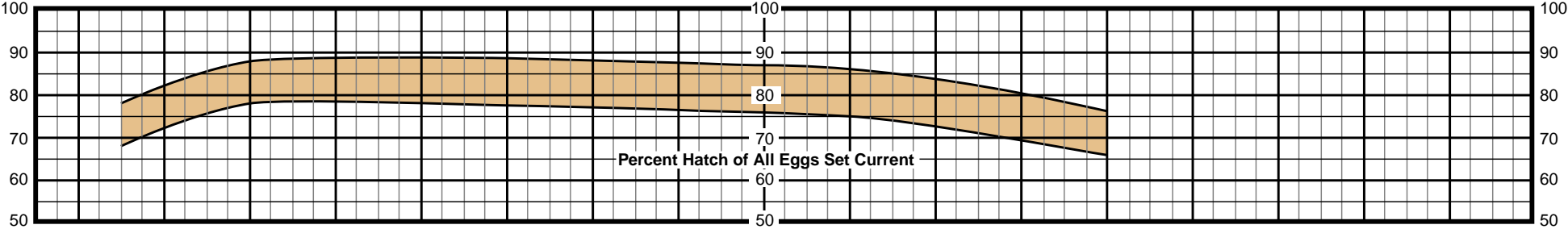
22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

Hy-Line Variety Brown Parent Stock Performance Projection

Age in Weeks	%HD Curr.	Female % Mort.		Male % Mort.		No. Hen-Day Eggs		No. HH Eggs		Female BW		Average Egg Weight		% Settable	No. Settable HH Eggs		% Hatch	No. Female Chicks	
		Cum.	Cum.	Cum.	Cum.	Curr.	Accum.	Curr.	Accum.	Kg	Lbs.	g/Egg	30 Dz. Cs.		Curr.	Accum.		Curr.	Accum.
19	3	0.1	0.3	0.2	0.2	0.2	0.2	1.55	3.42										
20	17	0.2	0.5	1.2	1.4	1.2	1.4	1.63	3.59										
21	45	0.3	0.7	3.2	4.6	3.1	4.5	1.71	3.77	47.6	37.8								
22	75	0.4	0.9	5.3	9.8	5.2	9.8	1.77	3.90	51.0	40.5								
23	87	0.5	1.2	6.1	15.9	6.1	15.8	1.81	3.99	52.5	41.7								
24	90	0.6	1.4	6.3	22.2	6.3	22.1	1.82	4.01	53.6	42.5	93	5.8	5.8	74	2.2	2.2		
25	91	0.7	1.6	6.4	28.6	6.3	28.4	1.83	4.04	54.4	43.2	95	6.0	11.8	75	2.3	4.4		
26	91	0.7	1.8	6.4	34.9	6.3	34.7	1.84	4.05	55.2	43.8	96	6.1	17.9	76	2.3	6.7		
27	92	0.8	2.0	6.4	41.4	6.4	41.1	1.84	4.06	55.9	44.4	97	6.2	24.1	77	2.4	9.1		
28	92	0.9	2.2	6.4	47.8	6.4	47.5	1.84	4.07	56.7	45.0	98	6.2	30.4	79	2.5	11.6		
29	92	1.0	2.3	6.4	54.3	6.4	53.9	1.85	4.07	57.5	45.6	98	6.3	36.6	82	2.6	14.1		
30	93	1.1	2.5	6.5	60.8	6.4	60.3	1.85	4.08	58.1	46.1	98	6.3	42.9	82	2.6	16.7		
31	93	1.2	2.7	6.5	67.3	6.4	66.8	1.86	4.09	58.5	46.4	98	6.3	49.2	82	2.6	19.3		
32	93	1.3	2.9	6.5	73.8	6.4	73.2	1.86	4.10	58.7	46.6	98	6.3	55.5	82	2.6	21.9		
33	93	1.4	3.1	6.5	80.3	6.4	79.6	1.86	4.11	59.0	46.8	98	6.3	61.8	82	2.6	24.5		
34	92	1.6	3.2	6.4	86.7	6.3	85.9	1.87	4.11	59.2	47.0	98	6.2	68.0	83	2.6	27.0		
35	92	1.7	3.4	6.4	93.2	6.3	92.3	1.87	4.12	59.5	47.2	98	6.2	74.2	83	2.6	29.6		
36	92	1.8	3.6	6.4	99.6	6.3	98.6	1.87	4.13	59.7	47.4	98	6.2	80.4	83	2.6	32.2		
37	92	1.9	3.7	6.4	106.1	6.3	104.9	1.88	4.14	60.0	47.6	98	6.2	86.6	83	2.6	34.8		
38	91	2.0	3.9	6.4	112.4	6.2	111.1	1.88	4.15	60.2	47.8	98	6.1	92.7	83	2.5	37.3		
39	91	2.1	4.1	6.4	118.8	6.2	117.4	1.88	4.16	60.5	48.0	98	6.1	98.8	83	2.5	39.8		
40	90	2.3	4.2	6.3	125.1	6.2	123.5	1.89	4.16	60.7	48.2	98	6.0	104.9	83	2.5	42.3		
41	89	2.4	4.4	6.2	131.3	6.1	129.6	1.89	4.17	61.0	48.4	98	6.0	110.8	83	2.5	44.8		
42	89	2.5	4.5	6.2	137.6	6.1	135.7	1.90	4.18	61.2	48.6	98	6.0	116.8	83	2.5	47.3		
43	88	2.6	4.7	6.2	143.7	6.0	141.7	1.90	4.19	61.5	48.8	98	5.9	122.7	83	2.4	49.7		
44	87	2.8	4.8	6.1	149.8	5.9	147.6	1.90	4.20	61.6	48.9	98	5.8	128.5	83	2.4	52.1		
45	87	2.9	4.9	6.1	155.9	5.9	153.5	1.91	4.20	61.7	49.0	97	5.7	134.2	83	2.4	54.5		
46	86	3.0	5.1	6.0	161.9	5.8	159.4	1.91	4.21	61.9	49.1	97	5.7	139.9	82	2.3	56.8		
47	86	3.2	5.2	6.0	167.9	5.8	165.2	1.91	4.22	61.9	49.1	97	5.7	145.5	82	2.3	59.2		
48	85	3.3	5.3	6.0	173.9	5.8	171.0	1.92	4.23	62.0	49.2	97	5.6	151.1	82	2.3	61.4		
49	84	3.4	5.5	5.9	179.8	5.7	176.6	1.92	4.24	62.0	49.2	97	5.5	156.6	82	2.3	63.7		
50	83	3.6	5.6	5.8	185.6	5.6	182.2	1.93	4.25	62.1	49.3	96	5.4	162.0	81	2.2	65.9		
51	82	3.7	5.7	5.7	191.3	5.5	187.8	1.93	4.25	62.1	49.3	96	5.3	167.3	81	2.1	68.0		
52	81	3.9	5.8	5.7	197.0	5.4	193.2	1.93	4.26	62.2	49.4	96	5.2	172.5	81	2.1	70.1		
53	80	4.0	5.9	5.6	202.6	5.4	198.6	1.94	4.27	62.2	49.4	95	5.1	177.6	81	2.1	72.2		
54	79	4.2	6.0	5.5	208.1	5.3	203.9	1.94	4.28	62.4	49.5	95	5.0	182.7	81	2.0	74.2		
55	78	4.3	6.2	5.5	213.6	5.2	209.1	1.94	4.29	62.4	49.5	95	5.0	187.6	81	2.0	76.3		
56	77	4.5	6.3	5.4	219.0	5.1	214.2	1.95	4.29	62.5	49.6	94	4.8	192.5	81	2.0	78.2		
57	77	4.7	6.4	5.4	224.4	5.1	219.4	1.95	4.30	62.5	49.6	94	4.8	197.3	81	2.0	80.2		
58	76	4.8	6.4	5.3	229.7	5.1	224.5	1.96	4.31	62.6	49.7	93	4.7	202.0	80	1.9	82.1		
59	76	5.0	6.5	5.3	235.0	5.1	229.5	1.96	4.32	62.6	49.7	93	4.7	206.7	79	1.9	83.9		
60	75	5.1	6.6	5.3	240.2	5.0	234.5	1.96	4.33	62.8	49.8	92	4.6	211.3	78	1.8	85.7		
61	74	5.3	6.7	5.2	245.4	4.9	239.4	1.97	4.34	62.8	49.8	92	4.5	215.8	78	1.8	87.5		
62	73	5.5	6.8	5.1	250.5	4.8	244.2	1.97	4.34	62.9	49.9	91	4.4	220.2	77	1.7	89.2		
63	72	5.7	6.9	5.0	255.6	4.8	249.0	1.97	4.35	62.9	49.9	91	4.3	224.5	77	1.7	90.8		
64	71	5.8	7.0	5.0	260.5	4.7	253.7	1.98	4.36	63.0	50.0	90	4.2	228.7	76	1.6	92.4		
65	70	6.0	7.0	4.9	265.4	4.6	258.3	1.98	4.37	63.0	50.0	89	4.1	232.8	75	1.5	94.0		
66	69	6.2	7.1	4.8	270.3	4.5	262.8	1.98	4.38	63.1	50.1	88	4.0	236.8	74	1.5	95.4		
67	68	6.4	7.2	4.8	275.0	4.5	267.3	1.99	4.38	63.1	50.1	87	3.9	240.7	73	1.4	96.8		
68	67	6.5	7.2	4.7	279.7	4.4	271.6	1.99	4.39	63.3	50.2	86	3.8	244.5	72	1.4	98.2		
69	66	6.7	7.3	4.6	284.3	4.3	275.9	2.00	4.40	63.3	50.2	85	3.7	248.1	71	1.3	99.5		
70	65	6.9	7.3	4.6	288.9	4.2	280.2	2.00	4.41	63.4	50.3	84	3.6	251.7	70	1.2	100.8		

Performance figures listed above were compiled from actual field performance. The figures are in no way a guarantee of performance. Performance of any parent flock will vary according to management and disease conditions.

Hy-Line Brown Parent Performance Graph



Age in Weeks
Period

22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18