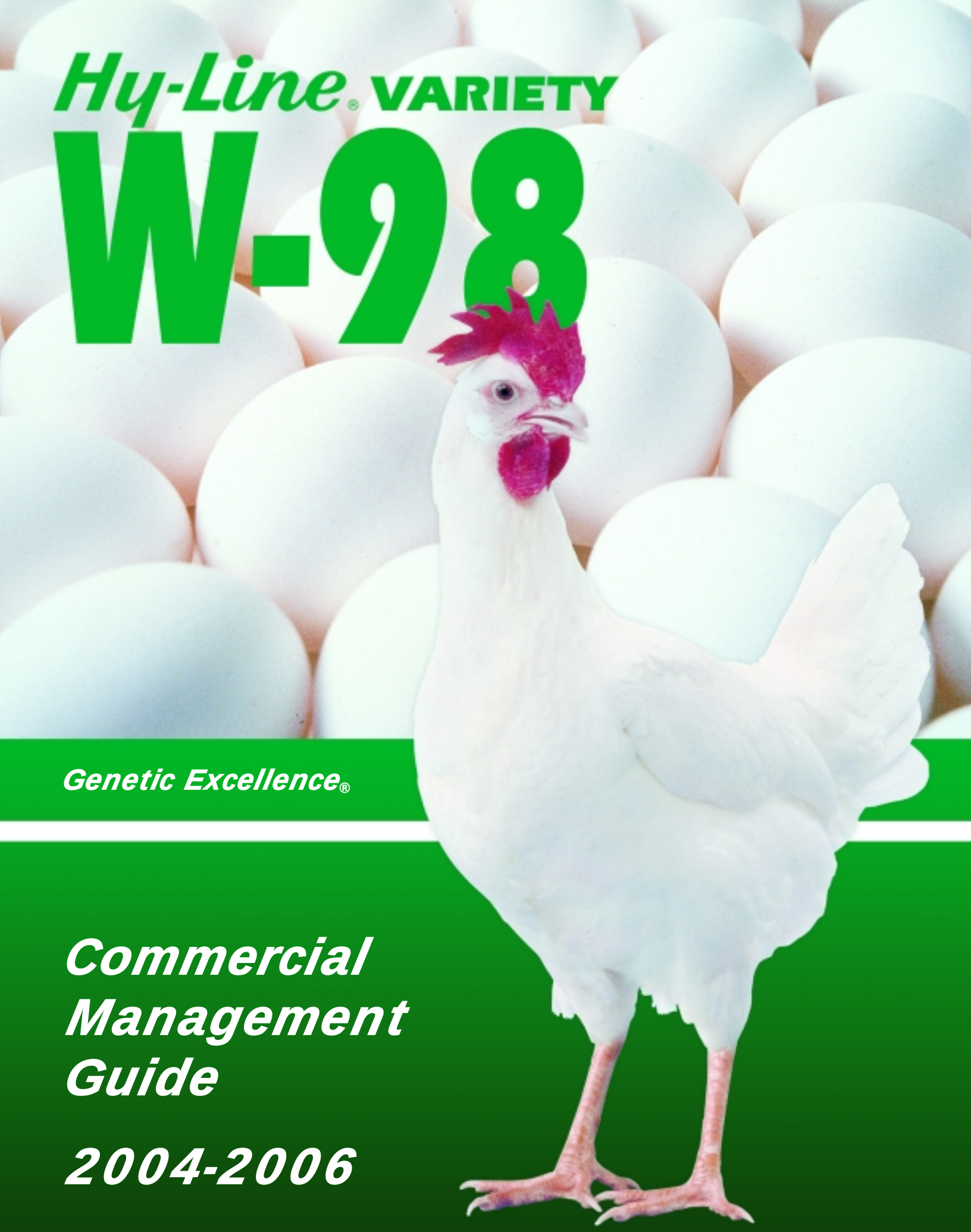
# Hy-Line® VARIETY W-98



*Genetic Excellence®*

# *Commercial Management Guide*

## *2004-2006*

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Hy-Line International is committed to providing proper care for its flocks. Hy-Line subscribes to the husbandry practices for egg laying chickens as outlined by the United Egg Producers (UEP). We believe that it is our obligation to provide good management and husbandry practices for poultry, including proper housing, feeding, watering, lighting, ventilation, sanitation and vaccination programs to protect the health and welfare of all our flocks.

# Capabilities of the Hy-Line® Variety W-98

## GROWING PERIOD (to 16 weeks):

| | |
|---|---|
| Livability | 98% |
| Feed Consumed | 5.05 Kg (11.1 Lbs.) |
| Body Weight at 16 Weeks | 1.23 Kg (2.71 Lbs.) |

## LAYING PERIOD (to 80 weeks):

| | |
|---|---|
| Percent Peak | 93-94% |
| Hen-Day Eggs to 60 Weeks | 249-254 |
| Hen-Day Eggs to 80 Weeks | 350-359 |
| Hen-Housed Eggs to 60 Weeks | 245-250 |
| Hen-Housed Eggs to 80 Weeks | 342-350 |
| Livability to 60 Weeks | 97% |
| Livability to 80 Weeks | 93% |
| Days to 50% Production (from hatch) | 138 Days |
| Egg Weight at 32 Weeks | 60.6 g/Egg (48.1 Lbs./Case) |
| Egg Weight at 70 Weeks | 65.6 g/Egg (52.1 Lbs./Case) |
| Total Egg Mass per Hen-Day (17-80 weeks) | 21.8 Kg (48.1 Lbs.) |
| Body Weight at 32 Weeks | 1.61 Kg (3.55 Lbs.) |
| Body Weight at 70 Weeks | 1.67 Kg (3.68 Lbs.) |
| Shell Strength | Excellent |
| Haugh Units at 32 Weeks | 93 |
| Haugh Units at 70 Weeks | 82 |
| Average Daily Feed Consumption (17-80 weeks) | 98 Grams/Bird/Day (21.7 Lbs./100 Birds/Day) |
| Lbs. Feed/Lbs. Eggs or Kg Feed/Kg Eggs (20-60 weeks) | 1.87 |
| Lbs. Feed/Lbs. Eggs or Kg Feed/Kg Eggs (20-80 weeks) | 1.95 |
| Feed per Doz. Eggs (20-60 weeks) | 1.36 Kg (3.01 Lbs.) |
| Feed per Doz. Eggs (20-80 weeks) | 1.46 Kg (3.21 Lbs.) |
| Condition of Droppings | Dry |

Figures contained in this management guide have been compiled from extensive commercial flock records gathered from all parts of the world to the date of printing of this guide. Further management suggestions listed in this booklet are combined principles taken from industry technical literature and field experience with this variety. Neither the performance figures nor management suggestions are in any way a guarantee of performance. Productivity of a commercial flock of any variety layer will vary according to environment and disease conditions.

# Chick Management

Hy-Line W-98 chicks adapt equally well to floor and cage brooding systems. They require no special hatchery services except vaccination against Marek's disease.

## General Recommendations

**1. Prior to delivery of chicks:**

- **a.** Clean and disinfect cages or floor brooding area and equipment, the building interior and attached service areas and equipment.
- **b.** Check to make sure equipment is working properly and is adjusted to the right height.
- **c.** Remove all old feed from bins, hoppers, and troughs. Disinfect and allow to dry before new feed is delivered.
- **d.** Place rat/mouse poison where it will not be consumed by the chicks.

**2. One day before delivery:**

- **a.** Set heating system at 31–33°C (87–92°F.) for cage brooding or at 32–35°C (90–95°F.) at chick level for floor brooding.
- **b.** Check water system. Adjust to proper height for chicks. Disinfect and flush water lines.

**3. On delivery day:**

- **a.** Have waterers full or water system in operation. Check brooder temperatures.
- **b.** As chicks are placed, trigger water cups or nipples to encourage drinking.
- **c.** When nipple drinkers are used, reduce the water pressure so birds can see the drop of water hanging on the drinker.
- **d.** Feed should be placed on paper in cage. Operate feeders at highest feed level.
- **e.** Keep lights at high intensity 22 hours per day for the first two days.

# Growing Period Management

The first 16 weeks of a pullet's life are critical. Astute management during this period can assure that she reaches the laying house ready to deliver her bred-in performance potential. Mistakes made during the first 16 weeks generally cannot be corrected in the laying house.

## General Recommendations

1. Grow pullets in strict isolation from older birds. Maintain good sanitation. As much as possible, plan work routines so that disease organisms cannot be carried from older birds to the growing pullets.
2. During the first six weeks, operate feeders to provide feed at least twice daily, or more often. After six weeks, check feed consumption and body weights against the charts on page 9 & 10. (Weigh 100 pullets to get a meaningful average.)
3. Check water availability in each cage row daily. Check for and repair leaks. Raise waterers as the birds grow (nipples higher than the birds' heads; cups or troughs level with their backs).
4. Plan and follow a vaccination schedule to fit the area. (See page 6.) A Hy-Line representative can be of assistance in making recommendations.
5. Remove mortality daily and dispose of properly. Examine for causes of excessive mortality.
6. Three days before moving pullets to the laying house, begin using water-soluble vitamins and electrolytes in the drinking water. Continue for three days after housing. This helps minimize the stress of moving. Gentle handling will pay big dividends.
7. Pullets should be housed at 16 weeks of age, before the onset of sexual maturity.

## Growing Space Recommendations

| CAGE | | FLOOR | |
|---|---|---|---|
| **Floor Space:** | 310 sq. cm (48 sq. in.) | **Floor Space:** | 930 sq. cm (1 sq. ft.) |
| **Feeder Space:** | 5 cm/bird (2"/bird) | **Feeder Space:** | 8.0 cm/bird (3"/bird)<br>1 pan/20 birds |
| **Water Space:** | | **Water Space:** | |
| **Trough:** | 2.5 cm/bird (1"/bird) | **Trough:** | 2.5 cm/bird (1"/bird) |
| **Cups/Nipples:** | 1 per 8 birds | **Cups/Nipples:** | 1 per 8 birds |
| **Fountains:** | — | **Fountains:** | 1 per 50 birds |

# Cage Brooding

**Before the birds arrive, prepare the house as follows:**

1. Put nonskid paper on the bottom of the cage. This paper may disintegrate and fall through the cage bottom or it should be removed at beak trimming time (10 days).
2. Start the heating system 24 hours before the birds arrive. Adjust the temperature to 31–33°C (87–92°F.).
3. Keep the relative humidity at 40-60%. In cage brooding, adequate humidity is very important.

## Temperature Management

In a cage or warm room brooding system, reduce the temperature 2°C (4°F.) per week from 31°C (87°F.) until 21°C (70°F.) is reached. Look for signs of overheating (panting and drowsiness) or chilling (huddling) and make appropriate adjustments. Heat control is more critical in cage brooding because the chicks cannot move to find their comfort zone.

Maintain adequate humidity if you brood in cages. Relative humidity for cage brooding must be maintained at 40-60%. If necessary, sprinkle water on the walks or floors to increase humidity.

# Floor Brooding

**Twenty-four hours before delivery of the chicks, prepare the house as follows:**

1. Place a brooder ring around each brooder unit.
2. Adjust temperature to 32-35°C (90-95°F.)
3. Fill jug waterers — two 4-liter (one gallon) waterers per 100 chicks.
4. Eliminate all drafts from the house.

## Temperature Management

When using a gas fired hover, reduce the temperature under the hover by 3°C (5°F.) per week until 21°C (70°F.) is reached. Maintain adequate relative humidity for birds brooded on the floor. The chicks seem to be comfortable and do better when relative humidity is between 40 and 60%.

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.

# Beak Trimming

Beak trimming is not necessary in all management systems, however, if beak trimming is done, proper procedures should be followed.

The Hy-Line W-98 pullet is most successfully beak trimmed between seven and 10 days of age using a precision cam activated beak trimmer with guide plate holes of 4.0, 4.37 and 4.75 mm (10/64, 11/64 and 12/64 inches). The proper size hole should be selected to provide the width of 2 mm between the nostrils and the cauterizing ring. The proper size hole 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 595°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. A variation of 56°C or 100°F. is common due to external influences and cannot be detected by the human eye.

The following 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.

# Disease Control

A flock of pullets or layers can only perform up to its genetic potential when disease influence is minimized. The appearance of various diseases can vary from a subclinical effect on performance to outright severe mortality. The diseases of economic importance vary widely between locations, but in every case the challenge is to identify and control those diseases.

## Biosecurity and Eradication

Obviously the best way to deal with a disease is to avoid it. Care should always be exercised to prevent introducing new diseases onto a pullet or layer farm. Common disease carriers include people, vehicles, equipment, wild birds, animals, and chickens themselves. New flocks should be tested before being brought onto a farm and should have a known vaccination program. Houses should be cleaned and disinfected between flocks to reduce disease exposure for the new flock.

Some diseases are best controlled by eradication. Examples include *Mycoplasma gallisepticum,* cholera, coryza and typhoid. The continuing cost of medicating or vaccinating for these diseases often justifies some extra one-time effort and expense for eradication. These bacterial diseases are more easily eradicated than most viral diseases.

## Vertically Transmitted Diseases

Some diseases are known to be transmitted from infected breeders to their progeny. This requires the production and maintenance of disease-free breeders as a first step in the control of these diseases at the commercial level. All breeders directly under Hy-Line's control are free of *Mycoplasma gallisepticum, Mycoplasma synoviae, S. pullorum, S. gallinarum* (typhoid), *S. enteritidis*, and lymphoid leukosis. Due to the possibility of horizontal transmission of any of these diseases, later generations may not remain free. It is the responsibility of the breeding and commercial flock owner to prevent horizontal transmission of these diseases and to continue testing to be assured of a negative status.

## Vaccination

Certain diseases are too widespread or difficult to eradicate and require a routine vaccination program. In general, all layer flocks should be vaccinated against Newcastle, bronchitis, IBD and AE. The exact vaccination schedule depends upon many things such as disease exposures expected, maternal immunities, vaccine types available and routes of administration preferred. Therefore, no one program can be recommended for all locations. Following is a basic program typical for the United States where breeders receive an inactivated Newcastle-bronchitis-IBD vaccine.

| | |
|---|---|
| **Day one** | Marek's Disease, HVT, SB-1, ± Rispen's |
| **18–20 days** | IBD intermediate strain in water |
| **25 days** | Newcastle B-1 and bronchitis, mild Mass. in water |
| **28–30 days** | IBD intermediate strain in water |
| **7–8 weeks** | Newcastle B-1 and bronchitis, regular Mass. in water or spray |
| **10 weeks** | Pox wingweb and AE wingweb, water or spray |
| **14 weeks** | Newcastle LaSota and bronchitis, mild Holland spray or Newcastle-bronchitis killed virus injection |

## Infectious Bursal Disease

Special attention should be paid to IBD control. This disease can have many subtle effects which are detrimental to pullet health. The primary feature of IBD is immuno-suppression caused by damage to the bursa of Fabricius which leaves the bird unable to fend off other disease challenges. Secondary diseases such as gangrenous dermatitis, bacterial arthritis and even Marek's often result. Virtually all flocks are exposed to IBD and therefore, should be protected by vaccination. Most breeding stock receives a killed IBD vaccine to boost maternal titers in the chicks. Research at Hy-Line International has shown the optimum time to vaccinate such chicks with intermediate strain live vaccines is at 18–20 days and again at 28–30 days of age. Extremely severe IBD challenge may require even more frequent vaccination during this period. Bursas can be examined later to determine the extent of protection.

# 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 pullets with 20–22 hours of light the first week at 30 lux (3 ftc.) intensity. Reduce light to 20 hours the second week at 5 lux (½ ftc.). The following weeks, reduce light duration to reach 8–9 hours day length by 7–9 weeks of age or, in open houses, the longest natural day length between 6 and 17 weeks of age. (see example page 8)
2. Provide light stimulation when body weight is 1.27 Kg (2.8 Lbs.). The initial increase should be no less than one hour. Increase light by 15–30 minutes per week or biweekly until 16 hours of light is reached. Preferably the period of stimulation should last until 28–32 weeks of age. Light intensity should also be increased at housing to 10–30 lux (1–3 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 8–9 hours by 7–9 weeks of age. Then maintain a constant day length to 17 weeks.
   b. Increase day length 1 hour at 1.27 Kg (2.8 Lbs.). 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 8–9 hours by 7–9 weeks of age, or one hour less than natural day length at 17 weeks of age.
   b. Increase to natural day length or a minimum increase of 1 hour at 1.27 Kg (2.8 Lbs.). 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 8–9 hours by 7–9 weeks of age or, if longer, the longest natural day length between 6 and 17 weeks of age.
   b. Increase day length one hour at 1.27 Kg (2.8 Lbs.). 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 8–9 hours by 7–9 weeks of age or the longest natural day length between 6 and 17 weeks of age.
   b. Increase one hour at 1.27 Kg (2.8 Lbs.). 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.

## Timing of Light Stimulation

Onset of sexual maturity or egg production generally depends on four requirements:

1. A minimum chronological age which is genetically determined (17 weeks).
2. A minimum body weight (1270–1320 grams or 2.8–2.9 pounds).
3. A nutrient intake to support production.
4. A constant or increasing day length of at least 12 hours.

Light stimulation should not be provided until flocks reach the optimum body weight of 1270 grams (2.8 pounds). Flocks which are light-stimulated into production at lower body weights will likely produce below normal egg size and suffer from reduced peak production and post-peak drops in production.

Timing of light stimulation can be used as a tool to help attain desired egg size. In general, earlier light stimulation will result in a few more eggs per hen, but at a tradeoff for slightly reduced egg size. Later light stimulation will result in a few less total eggs, but a slightly larger egg size earlier in production.

In this way, lighting programs can be customized to best meet the egg size demand of a particular market.

## Intermittent Lighting

Intermittent lighting can be used in light-controlled housing after 40 weeks of age to improve flock efficiency. The following effects have been shown:

1. Improved feed conversion of 5–7%.
2. Reduced feed intake of 5–7%.
3. Reduced egg size of 1–1.5%.
4. Reduced lighting power usage of 75%.
5. Slight improvement in shell strength.
6. Reduced heat stress morbidity and mortality.
7. Reduced cannibalism and activity problems.

A number of variations on intermittent lighting have been tried, but a commonly used one is to provide 15 minutes of light and 45 minutes of darkness for each hour of scheduled light in the day (15 Light/45 Darkness). The hens continue to recognize this as a full hour of light.

The program should be introduced gradually, starting with 45 L/15 D for every hour of light the first week, followed by 30 L/30 D for one week, and then 15 L/45 D thereafter. The final hour in the day should always end with 15 minutes of light (15 L/30 D/15 L) so that the total day length does not decrease while instituting the program.

## Midnight Feeding

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 Light 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.Because no two places have the same sunrise-sunset times year-round, it is impractical to suggest timeclock settings that would apply to all locations. For the most precise planning, it is necessary to obtain local sunrise-sunset times for the entire year and construct a graph as the example on the following page 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 17 weeks of age and hold that day length constant with artificial lights from 8 to 17 weeks.

# Egg Size Management

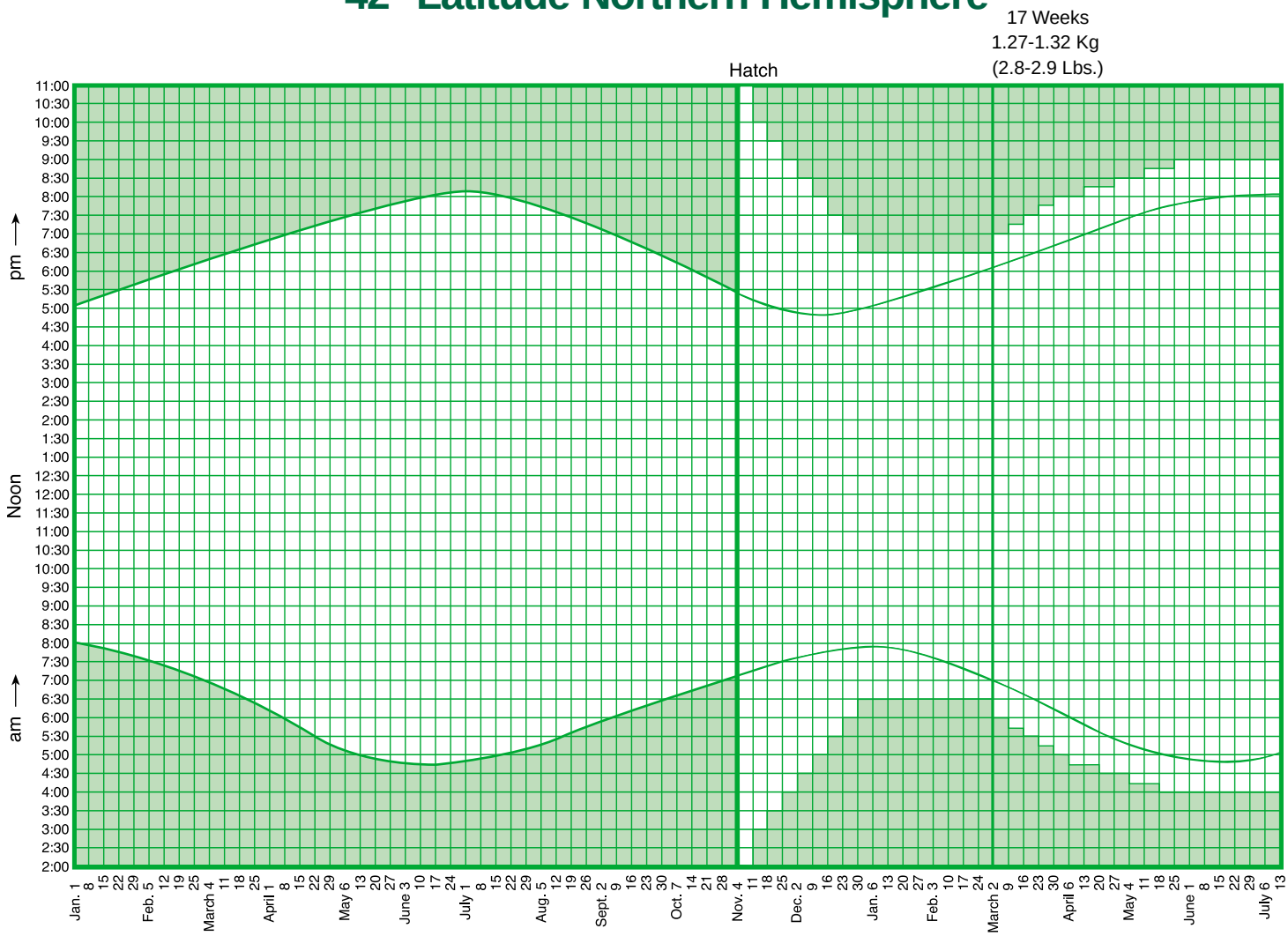
Egg size, to a large extent, is genetically determined, but can be managed, within certain limits, that is increased or decreased, to meet the needs of specific markets.

In managing 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 eggs will be throughout the lay cycle. For example, to maximize egg size light stimulation should be delayed until some minimum body weight is attained (i.e. 1320 grams—2.91 Lbs.). Conversely to minimize egg size the body weight at maturity (i.e. 18 weeks) should be smaller (i.e. 1256 grams—2.75 Lbs.)
2. **Rate of maturity** — In general the earlier the age at which a flock begins egg production the smaller egg size will be and likewise the later age of maturity the larger will be the egg size. In most circumstances lighting programs during the pullet growth period can be manipulated to delay or stimulate maturity and thus increase or decrease average egg size.
3. **Nutrition** — Egg size may be influenced by the intake of such nutrients as protein, methionine, dietary energy, linoleic acid and possibly isoleucine and threonine. Typically an increase in one or more of these nutrients above recommended intake will tend to enhance early egg size. For example, 435 mg of methionine per bird per day will typically result in an increase in early egg size, assuming that other nutrients which may influence egg size are adequate. Strategies for the limiting of egg size to some maximum need to be initiated 2 weeks prior to the time at which desired egg size is expected to be achieved. Added methionine may be reduced 1/2 Lb. per ton each 7-10 days (1Lb. for DL methionine liquid) until such time that egg size stabilizes. If the decrease in methionine is too rapid, egg production will decline.

# Sunrise and Sunset

## 42° Latitude Northern Hemisphere



# Growing Period Nutritional Recommendations

| W-98 Body Weight | Starter 0–6 Wks. to 450g (0.99 Lbs.) | Grower 6–8 Wks. to 650g (1.43 Lbs.) | Developer 8–16 Wks. to 1180g (2.60 Lbs.) | Pre-Layer[3] 16 Weeks until 5% Production | Pre-Peak 18 Weeks to 50% Production |
|---|---|---|---|---|---|
| **Nutrients:** | | | | | |
| Protein, % (Min.) | 20 | 18 | 16 | 15.5 | 17.5 |
| Met. Energy, Kcal./Lb. | 1325–1375 | 1325–1375 | 1300–1375 | 1285–1315 | 1300–1320 |
| Met. Energy, Kcal/Kg[1] | 2915–3025 | 2915–3025 | 2860–3025 | 2827–2893 | 2860–2904 |
| Linoleic Acid, % (Min.) | 1.0 | 1.0 | 1.0 | 1.0 | 1.5 |
| **Amino Acids [2] (Min.):** | | | | | |
| Arginine, % | 1.20 | 1.10 | 1.00 | 0.88 | 1.10 |
| Lysine, % | 1.10 | 0.90 | 0.75 | 0.75 | 0.88 |
| Methionine, % | 0.48 | 0.44 | 0.39 | 0.36 | 0.48 |
| Methionine + Cystine, % | 0.80 | 0.73 | 0.65 | 0.60 | 0.82 |
| Tryptophan, % | 0.20 | 0.18 | 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 | 3.0[3] | 4.0[4] |
| Phosphorus | | | | | |
| Total, % | 0.78± | 0.75± | 0.72± | 0.78± | 0.78± |
| Available, % | 0.50 | 0.48 | 0.46 | 0.50 | 0.50 |
| Sodium, % | 0.19 | 0.18 | 0.17 | 0.18 | 0.18 |
| Chloride, % | 0.15 | 0.15 | 0.15 | 0.16 | 0.17 |
| Potassium, % | 0.50 | 0.50 | 0.50 | 0.50 | 0.50 |

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

(2) When the level of energy in the ration is increased or decreased (±25-50 Kcal.) from stated levels, nutrient levels should be adjusted accordingly.

(3) Calcium level should be raised to a minimum of 3.0% for pre-layer feed beginning at 16 weeks, or when the flock shows signs of sexual maturity (blooming of the combs). Do not use past 5% production. At least 30% of the added limestone should have a minimum particle size of 2250 microns.

(4) A minimum of 40% of the added limestone should have a particle size of 2250 microns.

# Growing Period Feed Consumption

| Age in Weeks | Daily | | | Cumulative | | |
|---|---|---|---|---|---|---|
| | Grams/Bird/Day | Lbs./100/Day | Kcal./Bird/Day | Grams to Date | Lbs. to Date | Kcal. to Date |
| 1 | 14 | 3.09 | 41 | 98 | 0.22 | 287 |
| 2 | 17 | 3.75 | 50 | 217 | 0.48 | 637 |
| 3 | 21 | 4.63 | 60 | 364 | 0.80 | 1057 |
| 4 | 29 | 6.39 | 81 | 567 | 1.25 | 1624 |
| 5 | 39 | 8.60 | 116 | 840 | 1.85 | 2436 |
| 6 | 43 | 9.48 | 125 | 1141 | 2.52 | 3311 |
| 7 | 46 | 10.14 | 138 | 1463 | 3.23 | 4277 |
| 8 | 49 | 10.80 | 149 | 1806 | 3.98 | 5320 |
| 9 | 52 | 11.46 | 160 | 2170 | 4.78 | 6440 |
| 10 | 54 | 11.90 | 165 | 2548 | 5.62 | 7595 |
| 11 | 55 | 12.13 | 171 | 2933 | 6.47 | 8792 |
| 12 | 57 | 12.57 | 176 | 3332 | 7.35 | 10024 |
| 13 | 59 | 13.01 | 181 | 3745 | 8.26 | 11291 |
| 14 | 60 | 13.23 | 186 | 4165 | 9.18 | 12593 |
| 15 | 62 | 13.67 | 192 | 4599 | 10.14 | 13937 |
| 16 | 64 | 14.11 | 193 | 5047 | 11.13 | 15288 |

# Monitoring Body Weights

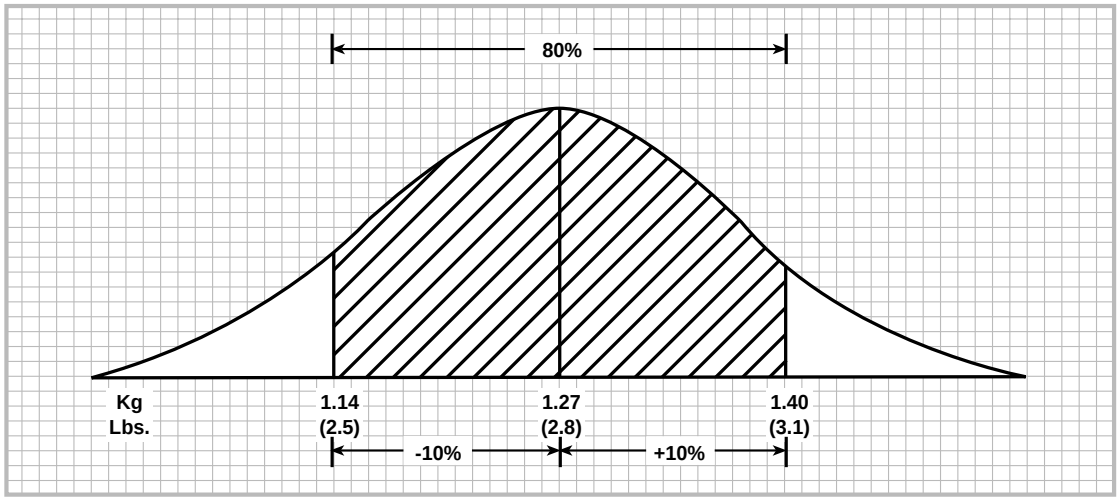
Body weights should be monitored periodically during the growing period and until after peak. At least 100 birds should be weighed individually with a scale having increments no larger than 50 grams or 1/10 Lb. Weighing should be started at five weeks of age and continued every two weeks during the growing 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 nutrient feed formulation until the target weight for age is reached.

It is best to produce a large-framed pullet, but one that is not over-weight or excessively fat. Encourage early feed consumption to stimulate growth and frame development, but avoid excessive weight gain in the period of 12-18 weeks of age.

Factors which can adversely affect body weight and uniformity are crowding, disease, poor beak trimming and inadequate nutrient intake. Weighing at frequent intervals will determine the age at which a flock deviates from normal and thereby help identify the 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 for 80% of birds to fall within 10% of the mean. That is, if the average flock weight at 17 weeks is 1.27 Kg (2.8 Lbs.), 80% of all birds should weigh between 1.14 Kg (2.5 Lbs.) and 1.40 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.




### Target Weights of Hy-Line Variety W-98 Pullets — Rearing Period —

| Age in Weeks | Body Weight | |
|---|---|---|
| | Grams | Pounds |
| 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 | 1070 | 2.36 |
| 14 | 1130 | 2.49 |
| 15 | 1180 | 2.60 |
| Move to Lay House 16 | 1230 | 2.71 |
| 17 | 1270 | 2.80 |

# Laying Period Nutrition

## Minimum Daily Intake Recommendations per Bird - First Lay Cycle

| | Peaking[1] 50% Prod. – 32 Weeks | 32–44 Wks.[1] | 44–58 Wks.[1] | 58 Wks.[1] + |
|---|---|---|---|---|
| Protein, g/bird[1] | 16.50-17.00 | 16.00–16.50 | 15.50–15.75 | 15.00–15.25 |
| Methionine, mg/bird | 400 | 376 | 352 | 327 |
| Methionine + Cystine, mg/bird | 660 | 620 | 580 | 540 |
| Lysine, mg/bird | 900 | 860 | 820 | 780 |
| Tryptophan, mg/bird | 175 | 170 | 165 | 160 |
| Calcium, g/bird[2] | 4.10 | 4.25 | 4.40 | 4.55 |
| Phosphorus, (Total) g/bird | 0.78± | 0.70± | 0.63± | 0.55± |
| Phosphorus, (Available) g/bird | 0.50 | 0.45 | 0.40 | 0.35 |
| Sodium, mg/bird | 180 | 180 | 180 | 180 |
| Chloride, mg/bird | 160 | 160 | 160 | 160 |

## Formula Nutrient Profiles to Provide Recommendations for First Lay Cycle Nutrient Intake

### 50% to 32 Weeks Peaking

**Recommended Feed Energy 1275–1325 Kcal./Lb. or 2805–2915 Kcal/Kg[3]**

| Consumption Bird/Day Grams | Lbs. | % Protein | % Methionine | % Methionine + Cystine | % Lysine | % Tryptophan | % Calcium | % Total Phosphorus | % Avail. Phos. | % Sodium |
|---|---|---|---|---|---|---|---|---|---|---|
| ≤86 | ≤0.19 | 19.20 | 0.47 | 0.77 | 1.05 | 0.21 | 4.75 | 0.90± | 0.58 | 0.21 |
| 91 | 0.20 | 18.15 | 0.44 | 0.73 | 0.99 | 0.20 | 4.51 | 0.86± | 0.55 | 0.20 |
| 95 | 0.21 | 17.35 | 0.42 | 0.70 | 0.95 | 0.19 | 4.30 | 0.82± | 0.52 | 0.19 |
| 100 | 0.22 | 16.50 | 0.40 | 0.66 | 0.90 | 0.18 | 4.10 | 0.78± | 0.50 | 0.18 |
| 104 | 0.23 | 15.78 | 0.38 | 0.63 | 0.86 | 0.17 | 3.92 | 0.75± | 0.48 | 0.17 |

### 32–44 Weeks

**Recommended Feed Energy 1250–1300 Kcal./Lb. or 2750–2860 Kcal/Kg[3]**

| Consumption Bird/Day Grams | Lbs. | % Protein | % Methionine | % Methionine + Cystine | % Lysine | % Tryptophan | % Calcium | % Total Phosphorus | % Avail. Phos. | % Sodium |
|---|---|---|---|---|---|---|---|---|---|---|
| 91 | 0.20 | 17.60 | 0.41 | 0.68 | 0.95 | 0.19 | 4.68 | 0.77± | 0.50 | 0.20 |
| 95 | 0.21 | 16.76 | 0.40 | 0.65 | 0.90 | 0.18 | 4.45 | 0.73± | 0.47 | 0.19 |
| 100 | 0.22 | 16.00 | 0.38 | 0.62 | 0.86 | 0.17 | 4.25 | 0.70± | 0.45 | 0.18 |
| 104 | 0.23 | 15.30 | 0.36 | 0.60 | 0.82 | 0.16 | 4.07 | 0.67± | 0.43 | 0.17 |
| 109 | 0.24 | 14.67 | 0.34 | 0.57 | 0.79 | 0.16 | 3.90 | 0.64± | 0.41 | 0.17 |

### 44–58 Weeks

**Recommended Feed Energy 1225–1300 Kcal./Lb. or 2695–2860 Kcal/Kg[3]**

| Consumption Bird/Day Grams | Lbs. | % Protein | % Methionine | % Methionine + Cystine | % Lysine | % Tryptophan | % Calcium | % Total Phosphorus | % Avail. Phos. | % Sodium |
|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 0.21 | 16.30 | 0.37 | 0.61 | 0.86 | 0.17 | 4.61 | 0.66± | 0.42 | 0.19 |
| 100 | 0.22 | 15.50 | 0.35 | 0.58 | 0.82 | 0.16 | 4.40 | 0.63± | 0.40 | 0.18 |
| 104 | 0.23 | 14.90 | 0.34 | 0.56 | 0.79 | 0.15 | 4.21 | 0.60± | 0.38 | 0.17 |
| 109 | 0.24 | 14.20 | 0.32 | 0.53 | 0.75 | 0.15 | 4.03 | 0.58± | 0.37 | 0.17 |

### 58 Weeks and Older

**Recommended Feed Energy 1225–1300 Kcal./Lb. or 2695–2860 Kcal/Kg[3]**

| Consumption Bird/Day Grams | Lbs. | % Protein | % Methionine | % Methionine + Cystine | % Lysine | % Tryptophan | % Calcium | % Total Phosphorus | % Avail. Phos. | % Sodium |
|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 0.21 | 15.80 | 0.35 | 0.57 | 0.82 | 0.17 | 4.77 | 0.58± | 0.37 | 0.19 |
| 100 | 0.22 | 15.00 | 0.33 | 0.54 | 0.78 | 0.16 | 4.55 | 0.55± | 0.35 | 0.18 |
| 104 | 0.23 | 14.40 | 0.32 | 0.52 | 0.75 | 0.15 | 4.35 | 0.53± | 0.33 | 0.17 |
| 109 | 0.24 | 13.75 | 0.30 | 0.50 | 0.72 | 0.15 | 4.17 | 0.50± | 0.32 | 0.16 |

(1) Rations should provide suggested nutrient intake on a per bird per day basis independent of feed intake.
(2) Approximately 65% of the added limestone should be in particle sizes of 2250 microns.
(3) The lower dietary feed energy recommendations generally are for the higher feed intakes.

# Added Vitamins and Minerals

| | Growing Period | | Laying Period* | |
|---|---|---|---|---|
| **Added Minerals per Ton: (minimum)** | **1,000 Kg** | **2,000 Lbs.** | **1,000 Kg** | **2,000 Lbs.** |
| Manganese (g) as MnO or $MnSO_4,H_2O$ | 66 | 60 | 66 | 60 |
| Zinc (g) as ZnO or $ZnSO_4,H_2O$ | 66 | 60 | 66 | 60 |
| Iron (g) $FeSO_4,5H_2O$ | 33 | 30 | 33 | 30 |
| Copper (g) CuO or $CuSO_4,5H_2O$ | 4.4 | 4.0 | 8.8 | 8.0 |
| Iodine (g) Calcium Iodate or EDDI | 0.9 | 0.8 | 0.9 | 0.8 |
| Selenium (g) Sodium Selenite $NaSeO_3$ | 0.30 | 0.27 | 0.30 | 0.27 |
| **Added Vitamins per Ton:** | | | | |
| Vitamin A (IU) | 8,800,000 | 8,000,000 | 7,700,000 | 7,000,000 |
| Vitamin $D_3$ (IU) one half as spray dried | 3,300,000 | 3,000,000 | 3,300,000 | 3,000,000 |
| Vitamin E (IU) | 6,600 | 6,000 | 6,600 | 6,000 |
| Vitamin K (mg) (menadione) | 550 | 500 | 550 | 500 |
| Riboflavin (g) - spray dried | 4.4 | 4.0 | 4.4 | 4.0 |
| Vitamin $B_{12}$ (mg) | 8.8 | 8.0 | 8.8 | 8.0 |
| Pantothenic Acid (g) | 5.5 | 5.0 | 5.5 | 5.0 |
| Folic Acid (mg) | 220 | 200 | 110 | 100 |
| Biotin (mg) | 55 | 50 | † | † |
| Niacin (g) | 27.5 | 25 | 22 | 20 |
| Choline (g) | 275** | 250** | 275 | 250 |

*Based on daily feed intake of 100 g/bird/day (22 Lbs. per 100 birds/day).
**May be reduced by one half after 8 weeks.

† No Biotin in layer diets if corn based — otherwise supplement same as growing diets.

# Laying Period Feed Consumption and Energy Intake

The amount of feed a flock consumes is dependent on several factors, i.e., feed nutrient content (particularly caloric content), house temperature, rate of production, egg size and body weight. The W-98 responds well to control of house temperature to manage adult body weight and feed efficiency.

The following table suggests expected feed consumption for the W-98 layer under thermoneutral conditions using a modern-type layer diet. The daily energy values are based on the energy prediction equation on page 13 (with modification based on actual performance experience for the W-98 layer) and assumes standard body weight, production and egg size values from the performance table (pages 18–19) and an environmental temperature of approximately 26.7°C or 80°F. A good approximation of the influence of temperature on energy needs is that for each one degree Celsius higher or lower average temperature, subtract or add about two Kcal. per bird per day respectively. For each one degree of Fahrenheit change, subtract or add about 1½ calories.

| Age in Weeks | Grams/Bird/Day | Lbs./100/Day | Kcal./Bird/Day | Age in Weeks | Grams/Bird/Day | Lbs./100/Day | Kcal./Bird/Day |
|---|---|---|---|---|---|---|---|
| 17 | 67 | 14.8 | 208 | 50 | 100 | 22.1 | 281 |
| 18 | 72 | 15.9 | 212 | 51 | 101 | 22.2 | 281 |
| 19 | 78 | 17.2 | 230 | 52 | 101 | 22.2 | 281 |
| 20 | 83 | 18.3 | 237 | 53 | 101 | 22.2 | 281 |
| 21 | 88 | 19.4 | 252 | 54 | 101 | 22.2 | 281 |
| 22 | 91 | 20.1 | 261 | 55 | 101 | 22.2 | 281 |
| 23 | 93 | 20.6 | 267 | 56 | 101 | 22.2 | 281 |
| 24 | 95 | 21.0 | 273 | 57 | 101 | 22.2 | 281 |
| 25 | 97 | 21.3 | 276 | 58 | 101 | 22.3 | 281 |
| 26 | 97 | 21.4 | 278 | 59 | 101 | 22.3 | 281 |
| 27 | 98 | 21.5 | 279 | 60 | 101 | 22.3 | 281 |
| 28 | 98 | 21.6 | 279 | 61 | 101 | 22.3 | 281 |
| 29 | 98 | 21.7 | 279 | 62 | 101 | 22.3 | 281 |
| 30 | 99 | 21.8 | 279 | 63 | 101 | 22.3 | 281 |
| 31 | 99 | 21.8 | 279 | 64 | 101 | 22.4 | 282 |
| 32 | 99 | 21.9 | 279 | 65 | 102 | 22.4 | 282 |
| 33 | 99 | 21.9 | 279 | 66 | 102 | 22.4 | 282 |
| 34 | 99 | 21.9 | 279 | 67 | 102 | 22.4 | 282 |
| 35 | 99 | 21.9 | 280 | 68 | 102 | 22.4 | 282 |
| 36 | 99 | 21.9 | 280 | 69 | 102 | 22.4 | 283 |
| 37 | 100 | 21.9 | 280 | 70 | 102 | 22.5 | 283 |
| 38 | 100 | 21.9 | 280 | 71 | 102 | 22.5 | 283 |
| 39 | 100 | 22.0 | 280 | 72 | 102 | 22.5 | 283 |
| 40 | 100 | 22.0 | 280 | 73 | 102 | 22.5 | 284 |
| 41 | 100 | 22.0 | 280 | 74 | 102 | 22.5 | 284 |
| 42 | 100 | 22.0 | 280 | 75 | 102 | 22.5 | 284 |
| 43 | 100 | 22.0 | 280 | 76 | 102 | 22.5 | 284 |
| 44 | 100 | 22.0 | 280 | 77 | 102 | 22.6 | 284 |
| 45 | 100 | 22.1 | 280 | 78 | 102 | 22.6 | 284 |
| 46 | 100 | 22.1 | 280 | 79 | 103 | 22.6 | 285 |
| 47 | 100 | 22.1 | 280 | 80 | 103 | 22.6 | 285 |
| 48 | 100 | 22.1 | 281 | | | | |
| 49 | 100 | 22.1 | 281 | | | | |

# 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 marginally estimated with the following equation:

Kcal/bird/day = W (170–2.2T) + 2E + 5 △ W

where W = current body weight in kilograms

T = average ambient temperature in degrees celsius.

E = daily egg mass in g/bird/day

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

△ W = body weight gain in g/bird/day

Based on field experience the Hy-Line W-98 layer may require slightly less energy than the equation predicts.

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

Kcal./Lb. feed × Lb./100/day ÷ 100 = Kcal./bird/day

Kcal/Kg feed × g/bird/day ÷ 1000 = 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 of the feed is useful at certain times, especially when energy consumption may be a limiting factor. This includes the critical period between housing and peak production. Flocks consuming less than 270-280 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 useful in increasing feed energy. It also has the benefit of a relatively low heat increment which is useful during periods of heat stress. Vegetable oils are typically high in linoleic acid which generally benefits egg size, although a blend of vegetable oil and animal fat may also be 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 (page 9 & 11).

| | Added Fat (%) | | |
|---|---|---|---|
| **Daily Highs** | **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 |

# 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 consumed.

## 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 evaluate consumption by 1.9 liters (.5 gallons) per 100.*

# 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 micro-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 kilogram of body weight per hour (one cubic foot per minute per pound of body weight).

The birds' optimum environmental temperature and humidity is in the range of 21–27°C (70–80°F.) and 40–60% relative humidity.

### SUGGESTED MINIMUM VENTILATION RATES

**CUBIC FEET PER MINUTE PER BIRD**

| Outside Temperature | AGE OF BIRDS 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 |
| 70°F. | 0.7 | 1.0 | 1.5 | 2.0 | 3.0 | 4–5 |
| 50°F. | 0.4 | 0.7 | 1.0 | 1.5 | 2.0 | 2.5–3 |
| 30°F. | 0.3 | 0.5 | 0.7 | 1.0 | 1.5 | 2–2.5 |
| 10°F. | 0.2 | 0.3 | 0.5 | 0.7 | 1.0 | 1.5–2 |
| –10°F. | 0.1 | 0.2 | 0.3 | 0.5 | 0.5 | 1–1.5 |

**CUBIC METERS PER HOUR PER BIRD**

| Outside Temperature | AGE OF BIRDS First Week | 3 Weeks | 6 Weeks | 12 Weeks | 18 Weeks | Beyond 18 Weeks |
|---|---|---|---|---|---|---|
| 35°C | 2.0 | 3.0 | 4.0 | 6.0 | 8.0 | 12–14 |
| 20°C | 1.4 | 2.0 | 3.0 | 4.0 | 6.0 | 8–10 |
| 10°C | 0.8 | 1.4 | 2.0 | 3.0 | 4.0 | 5–6 |
| 0°C | 0.6 | 1.0 | 1.5 | 2.0 | 3.0 | 4–5 |
| –10°C | 0.5 | 0.8 | 1.2 | 1.7 | 2.5 | 3–4 |
| –20°C | 0.3 | 0.6 | 0.9 | 1.2 | 1.5 | 2–3 |

## Recommended Cage Densities for the Hy-Line W-98 Layer

| | EU Guidelines | U.S. Recommended (UEP) |
|---|---|---|
| **Cage space** | 550 sq. cm (85 sq. in.) | 432-555 sq. cm (67-86 sq. in.) |
| **Feeder space** | 10 cm/bird (4"/bird) | 7.6 cm/bird (3"/bird) |
| **Water space** | access to 2 cups or nipples/cage | 2 cups or nipples/12 birds or 1" trough/bird |

# Induced Molting

Because of welfare concerns, many producers are now using programs to induce molting which do not involve fasting of the birds. The following traditional program is presented because it has produced good post-molt performance.

Because the Hy-Line layer will maintain good egg shell quality to 80 weeks of age, it may be best to continue egg production rather than inducing a molt. However, the Hy-Line W-98 bird will perform very well after a rest, particularly in the latter weeks of the molt cycle with excellent shell quality and persistency.

Induced molting will improve rate of lay, shell quality and albumen height. However, these levels will be somewhat lower than the best pre-molt values. Egg size will remain essentially unaffected and will continue to increase after production resumes.

A flock can be induced to cease laying by a variety of methods. The use of prolonged fast is the most common technique, although welfare-oriented non-feed-withdrawal methods are being developed that result in post-molt performance equivalent to that from fasting methods. Contact Hy-Line Technical Services for details.

Flocks with good shell quality at the end of the first cycle of lay may not require the complete regression of the oviduct. Such flocks may be subjected to a short rest. They will produce more eggs in the first few weeks after a molt than birds given a long rest, but can be expected to have poorer production and shell quality in the final weeks of the post-molt laying cycle.

### Recommended Molting Program

| Day | Action |
|---|---|
| 12-14 days before feed removal | Begin reducing lights by ½-1 hour per day. |
| 3-4 days before feed removal | Increase calcium to 5.00-5.25%. |
| 1 | Remove feed. Set lights at 8 hours or to natural daylength in open houses. Monitor body weights daily. |
| 6 or more | Resume feeding at 1270 g (2.8 Lbs.) with Molt 1 ration. |
| 21 | Increase light to 13 hours, or one hour more than during fasting, whichever is longest. Change feed to Molt 2 at 5% production. |
| 28 | Increase light one-half hour. |
| 35 | Resume normal lighting program with at least one-half hour more than at 28 days. |
| Approximately 42 days | At 50% production, change to peaking formula as recommended on following page.<br>Continue with Phase A, B, and C formulas as directed. |

# Layer Molt Minimum Ration Recommendations

| Series | Grams/ Bird/Day | Lbs./100/ Day | Protein % | Ca%[1] | AvP% | Na%[2] | Cl% | Kcal./Kg | Met.% | TSAA% | Lys.% | Arg.% | Try.% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Molt I | — | — | 15.50 | 2.85 | 0.50 | 0.16 | 0.16 | 2750–2805 | .42 | 0.69 | 0.70 | 0.85 | 0.14 |
| Molt II | — | — | 16.50 | 4.00 | 0.50 | 0.17 | 0.15 | 2825–2900 | .36 | 0.60 | 0.75 | 0.88 | 0.15 |
| Peaking | 85 | 19 | 18.25 | 4.98 | 0.58 | 0.21 | 0.20 | 2805–2950 | .41 | 0.67 | 0.96 | 1.04 | 0.19 |
| | 90 | 20 | 17.25 | 4.73 | 0.55 | 0.20 | 0.19 | 2805–2950 | .39 | 0.64 | 0.91 | 0.99 | 0.18 |
| | 95 | 21 | 16.30 | 4.50 | 0.52 | 0.19 | 0.18 | 2805–2950 | .37 | 0.61 | 0.86 | 0.94 | 0.17 |
| | 100 | 22 | 15.50 | 4.30 | 0.50 | 0.18 | 0.17 | 2805–2950 | .35 | 0.58 | 0.82 | 0.90 | 0.16 |
| | 105 | 23 | 14.75 | 4.11 | 0.48 | 0.17 | 0.16 | 2805–2950 | .33 | 0.55 | 0.78 | 0.86 | 0.15 |
| Post– | 85 | 19 | 17.95 | 5.15 | 0.52 | 0.21 | 0.20 | 2750–2860 | .39 | 0.63 | 0.94 | 1.02 | 0.18 |
| Peak A | 90 | 20 | 16.95 | 4.90 | 0.50 | 0.20 | 0.19 | 2750–2860 | .36 | 0.60 | 0.88 | 0.97 | 0.17 |
| | 95 | 21 | 16.05 | 4.66 | 0.47 | 0.19 | 0.18 | 2750–2860 | .34 | 0.57 | 0.84 | 0.92 | 0.16 |
| | 100 | 22 | 15.25 | 4.45 | 0.45 | 0.18 | 0.17 | 2750–2860 | .33 | 0.54 | 0.80 | 0.88 | 0.16 |
| | 105 | 23 | 14.50 | 4.26 | 0.43 | 0.17 | 0.16 | 2750–2860 | .31 | 0.51 | 0.76 | 0.84 | 0.15 |
| Post– | 90 | 20 | 16.65 | 5.06 | 0.44 | 0.20 | 0.19 | 2695–2860 | .35 | 0.58 | 0.86 | 0.95 | 0.16 |
| Peak B | 95 | 21 | 15.75 | 4.82 | 0.42 | 0.19 | 0.18 | 2695–2860 | .33 | 0.55 | 0.81 | 0.90 | 0.16 |
| | 100 | 22 | 15.00 | 4.60 | 0.40 | 0.18 | 0.17 | 2695–2860 | .32 | 0.52 | 0.78 | 0.86 | 0.15 |
| | 105 | 23 | 14.30 | 4.40 | 0.38 | 0.17 | 0.16 | 2695–2860 | .30 | 0.50 | 0.74 | 0.82 | 0.14 |
| | 110 | 24 | 13.65 | 4.22 | 0.37 | 0.16 | 0.15 | 2695–2860 | .29 | 0.47 | 0.71 | 0.79 | 0.14 |
| Post– | 95 | 21 | 15.50 | 5.03 | 0.37 | 0.19 | 0.18 | 2695–2860 | .32 | 0.53 | 0.79 | 0.88 | 0.15 |
| Peak C | 100 | 22 | 14.75 | 4.80 | 0.35 | 0.18 | 0.17 | 2695–2860 | .30 | 0.50 | 0.75 | 0.84 | 0.14 |
| | 105 | 23 | 14.05 | 4.59 | 0.33 | 0.17 | 0.16 | 2695–2860 | .29 | 0.48 | 0.71 | 0.80 | 0.14 |
| | 110 | 24 | 13.40 | 4.40 | 0.32 | 0.17 | 0.16 | 2695–2860 | .28 | 0.45 | 0.68 | 0.77 | 0.13 |
| | 115 | 25 | 12.85 | 4.22 | 0.31 | 0.16 | 0.15 | 2695–2860 | .26 | 0.43 | 0.65 | 0.74 | 0.13 |

1) A minimum of 50% of the added limestone should have average particle size of at least 2250 microns.
2) Maximum for Na should be 0.005% greater than minimum.

# Nutrition and Feeding of Molted Layers

**Step 1 —** The first feed offered after the period of fasting should be **Molt I.** This formula is designed to enhance body calcium retention, provide nutrients to prepare for egg production and maximize feather growth. This formula should be fed until egg production is about 5%. The second feed following the period of fasting should be **Molt II**. This should be fed after Molt I and until production is about 50%.

**Step 2 —** At about 50% production begin feeding a *peaking* formula. Select the peaking feed according to measured feed consumption. Typically the 95 grams (21 Lbs.) peaking feed will be the choice in the warmer months whereas the 105 grams (23 Lbs.) peaking feed will be the choice in the cooler months. At peak production the peaking formula should match the feed intake of the flock. Continue feeding a peaking formula until about 2 weeks post peak production or until egg production is less than 80%.

**Step 3 —** Select a *Series A* formula based on measured feed intake and begin feeding following the peaking formula. Feed the Series A formula for 12–13 weeks or until egg production is about 75%.

**Step 4 —** Select a *Series B* formula based on measured feed intake and begin feeding following the Series A formula. Feed the Series B formula for about 13–15 weeks or until egg production is about 70%.

**Step 5 —** Select a *Series C* formula based on measured feed intake and begin feeding only if the flock is greater than 105 weeks of age or egg production is less than 70%.

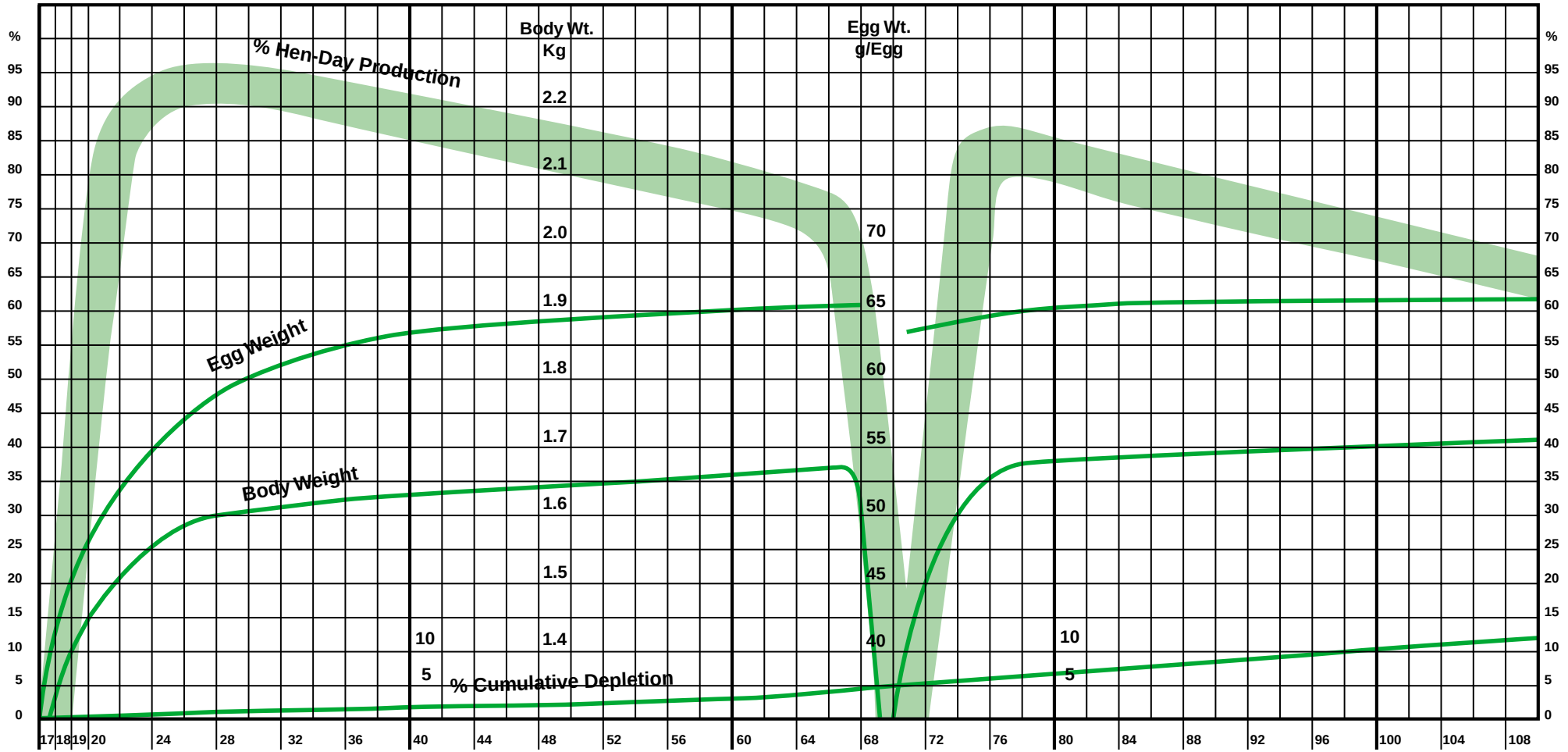
# Hy-Line Variety W-98 Post Molt Performance Table

| Age in Weeks | % Hen-Day Lay Cur. | % Mortality Cum. | Hen-Day Cum. | Hen-Housed Cum. | Body Weight Kg | Body Weight Lbs. | Average Egg Weight* g/Egg | Average Egg Weight* Oz./Doz. | Average Egg Weight* Net Lbs./ 30 Doz. Case | % Grade A Large and Above 24 Oz./ Doz. | % Grade A Large and Above 23 Oz./ Doz. | Egg Mass Cum. Kg | Egg Mass Cum. Lbs. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 68 | 44 | 4.6 | 288.9 | 283.4 | 1.67 | 3.68 | 65.5 | 27.7 | 52.0 | 89 | 92 | 17.8 | 39.3 |
| 69 | 0 | 4.9 | 288.9 | 283.4 | 1.33 | 2.93 | — | — | — | — | — | 17.8 | 39.3 |
| 70 | 0 | 5.1 | 288.9 | 283.4 | 1.27 | 2.80 | — | — | — | — | — | 17.8 | 39.3 |
| 71 | 3 | 5.3 | 289.1 | 283.6 | 1.44 | 3.18 | 63.3 | 26.8 | 50.2 | 87 | 93 | 17.8 | 39.3 |
| 72 | 21 | 5.4 | 290.6 | 285.0 | 1.51 | 3.32 | 63.7 | 27.0 | 50.5 | 88 | 93 | 17.9 | 39.5 |
| 73 | 50 | 5.5 | 294.1 | 288.3 | 1.56 | 3.44 | 64.1 | 27.1 | 50.8 | 89 | 93 | 18.1 | 40.0 |
| 74 | 76 | 5.6 | 299.4 | 293.4 | 1.61 | 3.55 | 64.3 | 27.2 | 51.0 | 89 | 93 | 18.5 | 40.7 |
| 75 | 80 | 5.7 | 305.0 | 298.6 | 1.64 | 3.62 | 64.4 | 27.3 | 51.1 | 90 | 93 | 18.8 | 41.5 |
| 76 | 83 | 5.8 | 310.8 | 304.1 | 1.66 | 3.66 | 64.7 | 27.4 | 51.3 | 90 | 94 | 19.2 | 42.3 |
| 77 | 84 | 6.0 | 316.7 | 309.6 | 1.67 | 3.68 | 64.8 | 27.5 | 51.5 | 90 | 93 | 19.6 | 43.2 |
| 78 | 83 | 6.1 | 322.5 | 315.1 | 1.67 | 3.69 | 65.0 | 27.5 | 51.5 | 90 | 93 | 20.0 | 44.0 |
| 79 | 83 | 6.2 | 328.3 | 320.5 | 1.67 | 3.69 | 65.0 | 27.5 | 51.5 | 90 | 93 | 20.3 | 44.8 |
| 80 | 81 | 6.3 | 334.0 | 325.9 | 1.68 | 3.70 | 65.1 | 27.6 | 51.6 | 90 | 93 | 20.7 | 45.7 |
| 81 | 80 | 6.5 | 339.6 | 331.1 | 1.68 | 3.70 | 65.1 | 27.6 | 51.6 | 90 | 93 | 21.1 | 46.5 |
| 82 | 80 | 6.6 | 345.1 | 336.3 | 1.68 | 3.70 | 65.1 | 27.6 | 51.6 | 90 | 93 | 21.4 | 47.3 |
| 83 | 79 | 6.8 | 350.7 | 341.4 | 1.68 | 3.70 | 65.1 | 27.6 | 51.6 | 90 | 93 | 21.8 | 48.0 |
| 84 | 79 | 6.9 | 356.2 | 346.6 | 1.68 | 3.71 | 65.2 | 27.6 | 51.7 | 90 | 93 | 22.1 | 48.8 |
| 85 | 78 | 7.1 | 361.6 | 351.6 | 1.68 | 3.71 | 65.2 | 27.6 | 51.7 | 89 | 93 | 22.5 | 49.6 |
| 86 | 77 | 7.2 | 367.0 | 356.6 | 1.68 | 3.71 | 65.2 | 27.6 | 51.7 | 89 | 93 | 22.9 | 50.4 |
| 87 | 77 | 7.4 | 372.4 | 361.6 | 1.68 | 3.71 | 65.2 | 27.6 | 51.7 | 89 | 92 | 23.2 | 51.2 |
| 88 | 77 | 7.5 | 377.7 | 366.5 | 1.68 | 3.71 | 65.2 | 27.6 | 51.7 | 89 | 92 | 23.6 | 51.9 |
| 89 | 77 | 7.7 | 383.1 | 371.5 | 1.69 | 3.72 | 65.3 | 27.7 | 51.8 | 89 | 92 | 23.9 | 52.7 |
| 90 | 76 | 7.9 | 388.4 | 376.4 | 1.69 | 3.72 | 65.3 | 27.7 | 51.8 | 89 | 92 | 24.3 | 53.5 |
| 91 | 76 | 8.0 | 393.7 | 381.3 | 1.69 | 3.72 | 65.3 | 27.7 | 51.8 | 89 | 92 | 24.6 | 54.2 |
| 92 | 76 | 8.2 | 399.0 | 386.1 | 1.69 | 3.72 | 65.4 | 27.7 | 51.9 | 89 | 92 | 24.9 | 55.0 |
| 93 | 75 | 8.4 | 404.2 | 390.9 | 1.69 | 3.72 | 65.4 | 27.7 | 51.9 | 88 | 92 | 25.3 | 55.8 |
| 94 | 75 | 8.6 | 409.5 | 395.7 | 1.69 | 3.72 | 65.4 | 27.7 | 51.9 | 88 | 92 | 25.6 | 56.5 |
| 95 | 74 | 8.8 | 414.6 | 400.4 | 1.69 | 3.73 | 65.4 | 27.7 | 51.9 | 88 | 92 | 26.0 | 57.3 |
| 96 | 74 | 9.0 | 419.8 | 405.1 | 1.69 | 3.73 | 65.5 | 27.7 | 51.9 | 88 | 91 | 26.3 | 58.0 |
| 97 | 73 | 9.2 | 424.9 | 409.8 | 1.69 | 3.73 | 65.5 | 27.7 | 51.9 | 88 | 91 | 26.6 | 58.7 |
| 98 | 72 | 9.4 | 429.9 | 414.3 | 1.69 | 3.73 | 65.5 | 27.7 | 51.9 | 88 | 91 | 27.0 | 59.5 |
| 99 | 71 | 9.6 | 434.9 | 418.8 | 1.69 | 3.73 | 65.6 | 27.8 | 52.0 | 88 | 91 | 27.3 | 60.2 |
| 100 | 71 | 9.8 | 439.9 | 423.3 | 1.69 | 3.73 | 65.6 | 27.8 | 52.0 | 88 | 91 | 27.6 | 60.9 |
| 101 | 70 | 10.0 | 444.8 | 427.7 | 1.69 | 3.73 | 65.6 | 27.8 | 52.0 | 87 | 91 | 27.9 | 61.6 |
| 102 | 70 | 10.3 | 449.7 | 432.1 | 1.70 | 3.74 | 65.6 | 27.8 | 52.0 | 87 | 91 | 28.3 | 62.3 |
| 103 | 70 | 10.5 | 454.6 | 436.5 | 1.70 | 3.74 | 65.7 | 27.8 | 52.1 | 87 | 91 | 28.6 | 63.0 |
| 104 | 70 | 10.7 | 459.5 | 440.9 | 1.70 | 3.74 | 65.7 | 27.8 | 52.1 | 87 | 90 | 28.9 | 63.7 |
| 105 | 69 | 11.0 | 464.3 | 445.2 | 1.70 | 3.74 | 65.7 | 27.8 | 52.1 | 87 | 90 | 29.2 | 64.4 |
| 106 | 69 | 11.2 | 469.1 | 449.4 | 1.70 | 3.74 | 65.7 | 27.8 | 52.1 | 87 | 90 | 29.5 | 65.1 |
| 107 | 68 | 11.5 | 473.8 | 453.6 | 1.70 | 3.74 | 65.7 | 27.8 | 52.1 | 87 | 90 | 29.9 | 65.8 |
| 108 | 68 | 11.7 | 478.6 | 457.8 | 1.70 | 3.74 | 65.8 | 27.9 | 52.2 | 87 | 90 | 30.2 | 66.5 |
| 109 | 67 | 12.0 | 483.3 | 461.9 | 1.70 | 3.74 | 65.8 | 27.9 | 52.2 | 86 | 89 | 30.5 | 67.2 |
| 110 | 67 | 12.3 | 487.9 | 466.0 | 1.70 | 3.75 | 65.8 | 27.9 | 52.2 | 86 | 89 | 30.8 | 67.9 |

*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.

Hy-Line® BRAND LAYERS

# W-98 Hen-Day Performance Graph
# Molted Flocks



# Hy-Line Variety W-98 Performance Table

| Age in Wks. | % Hen-Day | | Mortality | Hen-Day Eggs | | Hen-Housed Eggs | | Body Weight | | Average Egg Weight* | | | % Grade A Large & Above | | Egg Mass Cum. | | Egg Quality | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Curr. Under Opt. Cond's | Curr. Under Avg. Cond's | % Cum. | Cum. Under Opt. Cond's | Cum. Under Avg. Cond's | Cum. Under Opt. Cond's | Cum. Under Avg. Cond's | Kg | Lbs. | g/Egg | Oz./Doz. | Net Lbs./ 30 Doz. Case | 24 Oz./ Doz. | 23 Oz./ Doz. | Kg | Lbs. | Haugh Units | Shell Thickness (mm) | Specific Gravity |
| 18 | 14 | 12 | 0.1 | 1.0 | 0.8 | 1.0 | 0.8 | 1.32 | 2.91 | 41.6 | 17.6 | 33.0 | | | 0.0 | 0.1 | 99.6 | 0.360 | 1.090 |
| 19 | 34 | 32 | 0.1 | 3.4 | 3.1 | 3.4 | 3.1 | 1.39 | 3.07 | 45.5 | 19.3 | 36.1 | 2 | 5 | 0.1 | 0.3 | 98.9 | 0.359 | 1.090 |
| 20 | 58 | 55 | 0.2 | 7.4 | 6.9 | 7.4 | 6.9 | 1.45 | 3.20 | 47.8 | 20.2 | 37.9 | 5 | 11 | 0.3 | 0.7 | 98.5 | 0.358 | 1.090 |
| 21 | 80 | 77 | 0.2 | 13.0 | 12.3 | 13.0 | 12.3 | 1.49 | 3.29 | 49.8 | 21.1 | 39.5 | 11 | 20 | 0.6 | 1.3 | 98.0 | 0.357 | 1.090 |
| 22 | 89 | 87 | 0.3 | 19.3 | 18.4 | 19.2 | 18.4 | 1.52 | 3.35 | 51.7 | 21.9 | 41.0 | 19 | 31 | 0.9 | 2.0 | 97.6 | 0.356 | 1.090 |
| 23 | 92 | 89 | 0.4 | 25.7 | 24.6 | 25.6 | 24.6 | 1.54 | 3.40 | 53.6 | 22.7 | 42.5 | 29 | 43 | 1.2 | 2.7 | 97.0 | 0.356 | 1.090 |
| 24 | 93 | 90 | 0.4 | 32.2 | 30.9 | 32.1 | 30.8 | 1.56 | 3.44 | 54.8 | 23.2 | 43.5 | 36 | 51 | 1.6 | 3.5 | 96.6 | 0.355 | 1.089 |
| 25 | 93 | 91 | 0.5 | 38.7 | 37.3 | 38.6 | 37.2 | 1.57 | 3.47 | 56.1 | 23.8 | 44.5 | 44 | 60 | 1.9 | 4.3 | 96.1 | 0.354 | 1.089 |
| 26 | 93 | 92 | 0.5 | 45.2 | 43.8 | 45.1 | 43.6 | 1.58 | 3.49 | 57.2 | 24.2 | 45.4 | 51 | 66 | 2.3 | 5.1 | 95.7 | 0.354 | 1.089 |
| 27 | 94 | 92 | 0.6 | 51.8 | 50.2 | 51.6 | 50.0 | 1.59 | 3.51 | 57.8 | 24.5 | 45.9 | 55 | 70 | 2.7 | 5.9 | 95.2 | 0.353 | 1.088 |
| 28 | 94 | 93 | 0.7 | 58.4 | 56.7 | 58.1 | 56.5 | 1.60 | 3.52 | 58.5 | 24.8 | 46.4 | 60 | 74 | 3.1 | 6.8 | 94.7 | 0.352 | 1.088 |
| 29 | 94 | 93 | 0.7 | 65.0 | 63.2 | 64.7 | 62.9 | 1.60 | 3.53 | 59.0 | 25.0 | 46.8 | 64 | 77 | 3.4 | 7.6 | 94.2 | 0.352 | 1.088 |
| 30 | 94 | 93 | 0.8 | 71.5 | 69.7 | 71.2 | 69.4 | 1.61 | 3.54 | 59.6 | 25.2 | 47.3 | 68 | 80 | 3.8 | 8.5 | 93.8 | 0.351 | 1.088 |
| 31 | 93 | 92 | 0.8 | 78.0 | 76.2 | 77.6 | 75.8 | 1.61 | 3.55 | 60.1 | 25.5 | 47.7 | 71 | 83 | 4.2 | 9.3 | 93.3 | 0.350 | 1.087 |
| 32 | 93 | 92 | 0.9 | 84.5 | 82.6 | 84.1 | 82.1 | 1.61 | 3.55 | 60.6 | 25.7 | 48.1 | 75 | 86 | 4.6 | 10.2 | 92.9 | 0.350 | 1.087 |
| 33 | 92 | 91 | 1.0 | 90.9 | 88.9 | 90.4 | 88.4 | 1.61 | 3.56 | 60.9 | 25.8 | 48.3 | 77 | 87 | 5.0 | 11.0 | 92.4 | 0.349 | 1.087 |
| 34 | 92 | 91 | 1.0 | 97.3 | 95.3 | 96.7 | 94.7 | 1.61 | 3.56 | 61.1 | 25.9 | 48.5 | 79 | 89 | 5.4 | 11.9 | 92.0 | 0.348 | 1.087 |
| 35 | 91 | 90 | 1.1 | 103.7 | 101.6 | 103.0 | 100.9 | 1.62 | 3.57 | 61.4 | 26.0 | 48.7 | 81 | 90 | 5.8 | 12.7 | 91.5 | 0.348 | 1.086 |
| 36 | 91 | 90 | 1.1 | 110.0 | 107.9 | 109.3 | 107.1 | 1.62 | 3.57 | 61.6 | 26.1 | 48.9 | 83 | 92 | 6.2 | 13.6 | 91.1 | 0.347 | 1.086 |
| 37 | 90 | 89 | 1.2 | 116.3 | 114.1 | 115.5 | 113.3 | 1.62 | 3.58 | 61.9 | 26.2 | 49.1 | 85 | 93 | 6.5 | 14.4 | 90.7 | 0.346 | 1.086 |
| 38 | 90 | 89 | 1.3 | 122.6 | 120.3 | 121.7 | 119.4 | 1.62 | 3.58 | 62.1 | 26.3 | 49.3 | 87 | 94 | 6.9 | 15.3 | 90.4 | 0.346 | 1.086 |
| 39 | 90 | 88 | 1.3 | 128.9 | 126.5 | 127.9 | 125.5 | 1.63 | 3.59 | 62.4 | 26.4 | 49.5 | 88 | 95 | 7.3 | 16.1 | 90.1 | 0.345 | 1.085 |
| 40 | 90 | 88 | 1.4 | 135.2 | 132.6 | 134.1 | 131.5 | 1.63 | 3.59 | 62.6 | 26.5 | 49.7 | 89 | 95 | 7.7 | 17.0 | 89.7 | 0.344 | 1.085 |
| 41 | 89 | 87 | 1.5 | 141.4 | 138.7 | 140.2 | 137.5 | 1.63 | 3.60 | 62.9 | 26.6 | 49.9 | 90 | 95 | 8.1 | 17.8 | 89.3 | 0.344 | 1.085 |
| 42 | 89 | 87 | 1.6 | 147.6 | 144.8 | 146.4 | 143.5 | 1.63 | 3.60 | 63.1 | 26.7 | 50.1 | 90 | 95 | 8.5 | 18.7 | 88.8 | 0.343 | 1.085 |
| 43 | 88 | 87 | 1.6 | 153.8 | 150.8 | 152.4 | 149.5 | 1.64 | 3.61 | 63.3 | 26.8 | 50.2 | 90 | 95 | 8.8 | 19.5 | 88.5 | 0.342 | 1.084 |
| 44 | 88 | 86 | 1.7 | 159.9 | 156.8 | 158.4 | 155.4 | 1.64 | 3.61 | 63.5 | 26.9 | 50.4 | 91 | 95 | 9.2 | 20.4 | 88.1 | 0.342 | 1.084 |
| 45 | 87 | 86 | 1.8 | 166.0 | 162.8 | 164.4 | 161.3 | 1.64 | 3.62 | 63.6 | 26.9 | 50.5 | 91 | 95 | 9.6 | 21.2 | 87.8 | 0.341 | 1.084 |
| 46 | 87 | 85 | 1.9 | 172.1 | 168.8 | 170.4 | 167.1 | 1.64 | 3.62 | 63.8 | 27.0 | 50.6 | 91 | 95 | 10.0 | 22.0 | 87.4 | 0.340 | 1.084 |
| 47 | 86 | 85 | 2.0 | 178.1 | 174.7 | 176.3 | 172.9 | 1.64 | 3.62 | 63.8 | 27.0 | 50.6 | 91 | 95 | 10.4 | 22.9 | 87.2 | 0.339 | 1.083 |
| 48 | 86 | 85 | 2.1 | 184.1 | 180.6 | 182.1 | 178.7 | 1.65 | 3.63 | 63.9 | 27.1 | 50.7 | 91 | 95 | 10.7 | 23.7 | 86.8 | 0.339 | 1.083 |
| 49 | 86 | 84 | 2.1 | 190.1 | 186.5 | 188.0 | 184.5 | 1.65 | 3.63 | 64.0 | 27.1 | 50.8 | 91 | 95 | 11.1 | 24.5 | 86.5 | 0.338 | 1.083 |
| 50 | 85 | 83 | 2.2 | 196.0 | 192.3 | 193.8 | 190.2 | 1.65 | 3.63 | 64.1 | 27.2 | 50.9 | 91 | 95 | 11.5 | 25.3 | 86.2 | 0.337 | 1.083 |

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

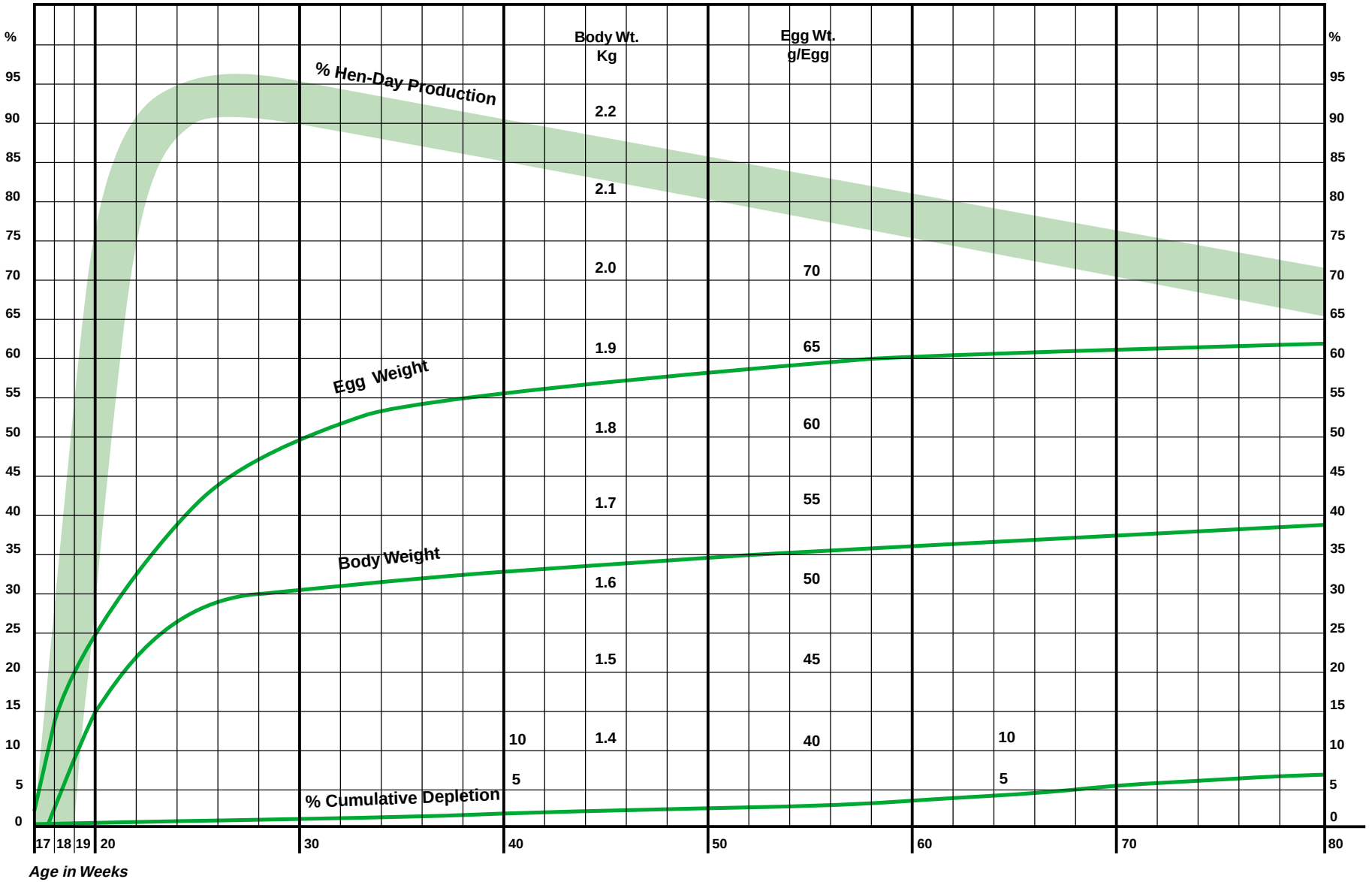
# Hy-Line Variety W-98 Performance Table

| Age in Wks. | % Hen-Day | | Mortality | Hen-Day Eggs | | Hen-Housed Eggs | | Body Weight | | Average Egg Weight* | | | % Grade A Large & Above | | Egg Mass Cum. | | Egg Quality | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Curr. Under Opt. Cond's | Curr. Under Avg. Cond's | % Cum. | Cum. Under Opt. Cond's | Cum. Under Avg. Cond's | Cum. Under Opt. Cond's | Cum. Under Avg. Cond's | Kg | Lbs. | g/Egg | Oz./Doz. | Net Lbs./ 30 Doz. Case | 24 Oz./ Doz. | 23 Oz./ Doz. | Kg | Lbs. | Haugh Units | Shell Thickness (mm) | Specific Gravity |
| 51 | 84 | 83 | 2.3 | 201.9 | 198.1 | 199.6 | 195.8 | 1.65 | 3.64 | 64.3 | 27.2 | 51.0 | 91 | 95 | 11.9 | 26.2 | 86.0 | 0.337 | 1.082 |
| 52 | 84 | 83 | 2.4 | 207.8 | 203.9 | 205.3 | 201.5 | 1.65 | 3.64 | 64.3 | 27.2 | 51.0 | 90 | 94 | 12.2 | 27.0 | 85.6 | 0.336 | 1.082 |
| 53 | 84 | 82 | 2.5 | 213.6 | 209.7 | 211.0 | 207.1 | 1.65 | 3.64 | 64.4 | 27.3 | 51.1 | 90 | 94 | 12.6 | 27.8 | 85.4 | 0.335 | 1.082 |
| 54 | 83 | 82 | 2.7 | 219.5 | 215.4 | 216.7 | 212.6 | 1.65 | 3.64 | 64.5 | 27.3 | 51.2 | 90 | 94 | 13.0 | 28.6 | 85.1 | 0.335 | 1.082 |
| 55 | 83 | 81 | 2.8 | 225.3 | 221.0 | 222.3 | 218.1 | 1.66 | 3.65 | 64.6 | 27.4 | 51.3 | 90 | 94 | 13.3 | 29.4 | 84.9 | 0.334 | 1.081 |
| 56 | 83 | 81 | 2.9 | 231.1 | 226.7 | 227.9 | 223.6 | 1.66 | 3.65 | 64.8 | 27.4 | 51.4 | 90 | 94 | 13.7 | 30.2 | 84.6 | 0.333 | 1.081 |
| 57 | 82 | 80 | 3.0 | 236.8 | 232.3 | 233.5 | 229.0 | 1.66 | 3.65 | 64.9 | 27.5 | 51.5 | 90 | 93 | 14.1 | 31.0 | 84.3 | 0.333 | 1.081 |
| 58 | 82 | 80 | 3.1 | 242.6 | 237.8 | 239.1 | 234.4 | 1.66 | 3.65 | 65.0 | 27.5 | 51.6 | 90 | 93 | 14.4 | 31.8 | 84.0 | 0.332 | 1.081 |
| 59 | 81 | 79 | 3.3 | 248.2 | 243.3 | 244.6 | 239.7 | 1.66 | 3.66 | 65.1 | 27.6 | 51.7 | 90 | 93 | 14.8 | 32.6 | 83.8 | 0.331 | 1.080 |
| 60 | 81 | 78 | 3.4 | 253.9 | 248.8 | 250.0 | 245.0 | 1.66 | 3.66 | 65.3 | 27.7 | 51.8 | 90 | 93 | 15.1 | 33.4 | 83.6 | 0.331 | 1.080 |
| 61 | 80 | 77 | 3.5 | 259.5 | 254.2 | 255.4 | 250.2 | 1.66 | 3.66 | 65.3 | 27.7 | 51.8 | 90 | 93 | 15.5 | 34.2 | 83.3 | 0.330 | 1.080 |
| 62 | 80 | 77 | 3.7 | 265.1 | 259.5 | 260.8 | 255.4 | 1.66 | 3.66 | 65.3 | 27.7 | 51.8 | 90 | 93 | 15.9 | 35.0 | 83.1 | 0.329 | 1.080 |
| 63 | 79 | 76 | 3.8 | 270.6 | 264.8 | 266.1 | 260.5 | 1.66 | 3.67 | 65.4 | 27.7 | 51.9 | 89 | 92 | 16.2 | 35.7 | 82.8 | 0.329 | 1.079 |
| 64 | 79 | 76 | 4.0 | 276.2 | 270.1 | 271.5 | 265.5 | 1.66 | 3.67 | 65.4 | 27.7 | 51.9 | 89 | 92 | 16.5 | 36.5 | 82.7 | 0.328 | 1.079 |
| 65 | 78 | 75 | 4.1 | 281.6 | 275.4 | 276.7 | 270.6 | 1.66 | 3.67 | 65.5 | 27.7 | 52.0 | 89 | 92 | 16.9 | 37.2 | 82.4 | 0.327 | 1.079 |
| 66 | 78 | 75 | 4.3 | 287.1 | 280.6 | 281.9 | 275.6 | 1.66 | 3.67 | 65.5 | 27.7 | 52.0 | 89 | 92 | 17.2 | 38.0 | 82.2 | 0.327 | 1.079 |
| 67 | 77 | 74 | 4.4 | 292.5 | 285.8 | 287.1 | 280.5 | 1.66 | 3.67 | 65.5 | 27.7 | 52.0 | 89 | 92 | 17.6 | 38.7 | 82.0 | 0.326 | 1.078 |
| 68 | 77 | 74 | 4.6 | 297.9 | 291.0 | 292.2 | 285.5 | 1.67 | 3.68 | 65.5 | 27.7 | 52.0 | 89 | 92 | 17.9 | 39.5 | 81.9 | 0.325 | 1.078 |
| 69 | 76 | 74 | 4.8 | 303.2 | 296.1 | 297.3 | 290.4 | 1.67 | 3.68 | 65.5 | 27.7 | 52.0 | 89 | 92 | 18.2 | 40.2 | 81.7 | 0.325 | 1.078 |
| 70 | 76 | 73 | 4.9 | 308.5 | 301.2 | 302.3 | 295.2 | 1.67 | 3.68 | 65.6 | 27.8 | 52.1 | 89 | 92 | 18.6 | 41.0 | 81.6 | 0.324 | 1.078 |
| 71 | 75 | 73 | 5.1 | 313.7 | 306.3 | 307.3 | 300.1 | 1.67 | 3.68 | 65.6 | 27.8 | 52.1 | 88 | 92 | 18.9 | 41.7 | 81.4 | 0.323 | 1.077 |
| 72 | 74 | 72 | 5.3 | 318.9 | 311.4 | 312.2 | 304.8 | 1.67 | 3.68 | 65.6 | 27.8 | 52.1 | 88 | 91 | 19.2 | 42.4 | 81.3 | 0.322 | 1.077 |
| 73 | 74 | 72 | 5.4 | 324.1 | 316.4 | 317.1 | 309.6 | 1.67 | 3.69 | 65.6 | 27.8 | 52.1 | 88 | 91 | 19.6 | 43.2 | 81.1 | 0.322 | 1.077 |
| 74 | 73 | 71 | 5.6 | 329.2 | 321.4 | 321.9 | 314.3 | 1.67 | 3.69 | 65.6 | 27.8 | 52.1 | 88 | 91 | 19.9 | 43.9 | 81.0 | 0.321 | 1.077 |
| 75 | 73 | 71 | 5.8 | 334.3 | 326.3 | 326.8 | 319.0 | 1.67 | 3.69 | 65.7 | 27.8 | 52.1 | 88 | 91 | 20.2 | 44.6 | 80.8 | 0.320 | 1.076 |
| 76 | 72 | 69 | 6.0 | 339.4 | 331.2 | 331.5 | 323.5 | 1.67 | 3.69 | 65.7 | 27.8 | 52.1 | 88 | 91 | 20.5 | 45.3 | 80.7 | 0.320 | 1.076 |
| 77 | 71 | 69 | 6.2 | 344.3 | 336.0 | 336.2 | 328.1 | 1.67 | 3.69 | 65.8 | 27.9 | 52.2 | 88 | 91 | 20.9 | 46.0 | 80.5 | 0.319 | 1.076 |
| 78 | 70 | 69 | 6.3 | 349.2 | 340.8 | 340.7 | 332.6 | 1.68 | 3.70 | 65.8 | 27.9 | 52.2 | 88 | 91 | 21.2 | 46.7 | 80.4 | 0.318 | 1.076 |
| 79 | 69 | 68 | 6.5 | 354.1 | 345.6 | 345.3 | 337.0 | 1.68 | 3.70 | 65.8 | 27.9 | 52.2 | 87 | 91 | 21.5 | 47.4 | 80.2 | 0.318 | 1.075 |
| 80 | 69 | 68 | 6.7 | 358.9 | 350.4 | 349.8 | 341.5 | 1.68 | 3.70 | 65.8 | 27.9 | 52.2 | 87 | 90 | 21.8 | 48.1 | 80.1 | 0.317 | 1.075 |

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

Hy-Line® BRAND LAYERS

# W-98 Hen-Day Performance Graph



# Egg Size Distribution – U.S. Standards

| Age in Weeks | Average Egg Weight (Lbs./Case) | Jumbo Over 30 Oz./Doz. | Extra Large 27–30 Oz./Doz. | Large 24–27 Oz./Doz. | Medium 21–24 Oz./Doz. | Small 18–21 Oz./Doz. | Peewee Under 18 Oz./Doz. |
|---|---|---|---|---|---|---|---|
| 22 | 41.0 | 0.1 | 1.8 | 17.6 | 44.7 | 30.2 | 5.7 |
| 24 | 43.5 | 0.3 | 6.1 | 31.0 | 43.7 | 17.0 | 1.9 |
| 26 | 45.4 | 1.0 | 12.2 | 40.2 | 36.7 | 9.2 | 0.6 |
| 28 | 46.4 | 1.5 | 16.2 | 44.7 | 31.7 | 5.7 | 0.3 |
| 30 | 47.3 | 2.0 | 20.3 | 47.8 | 26.5 | 3.4 | 0.1 |
| 32 | 48.1 | 2.5 | 24.8 | 49.6 | 21.2 | 1.9 | 0.0 |
| 34 | 48.5 | 2.8 | 26.7 | 51.5 | 17.9 | 1.1 | 0.0 |
| 36 | 48.9 | 3.3 | 29.4 | 52.4 | 14.3 | 0.5 | 0.0 |
| 38 | 49.3 | 4.1 | 31.8 | 53.4 | 10.5 | 0.2 | 0.0 |
| 40 | 49.7 | 4.5 | 35.6 | 50.4 | 9.3 | 0.2 | 0.0 |
| 42 | 50.1 | 5.1 | 39.0 | 48.2 | 7.6 | 0.2 | 0.0 |
| 44 | 50.4 | 5.4 | 42.1 | 45.6 | 6.8 | 0.1 | 0.0 |
| 46 | 50.6 | 6.6 | 43.5 | 43.4 | 6.4 | 0.1 | 0.0 |
| 48 | 50.7 | 6.9 | 44.1 | 42.8 | 6.1 | 0.1 | 0.0 |
| 50 | 50.9 | 7.9 | 44.7 | 41.3 | 6.0 | 0.1 | 0.0 |
| 52 | 51.0 | 8.9 | 45.6 | 39.6 | 5.8 | 0.1 | 0.0 |
| 54 | 51.2 | 10.1 | 45.7 | 38.4 | 5.7 | 0.1 | 0.0 |
| 56 | 51.4 | 11.2 | 46.8 | 36.7 | 5.1 | 0.1 | 0.0 |
| 58 | 51.6 | 12.5 | 46.9 | 35.4 | 5.1 | 0.1 | 0.0 |
| 60 | 51.8 | 14.2 | 47.3 | 33.7 | 4.8 | 0.1 | 0.0 |
| 62 | 51.8 | 14.2 | 47.3 | 33.7 | 4.8 | 0.1 | 0.0 |
| 64 | 51.9 | 15.0 | 47.2 | 33.0 | 4.7 | 0.1 | 0.0 |
| 66 | 52.0 | 15.5 | 47.2 | 32.5 | 4.7 | 0.1 | 0.0 |
| 68 | 52.0 | 16.3 | 46.5 | 32.4 | 4.7 | 0.1 | 0.0 |
| 70 | 52.1 | 17.3 | 46.0 | 31.8 | 4.7 | 0.1 | 0.0 |
| 72 | 52.1 | 17.3 | 46.0 | 31.8 | 4.7 | 0.1 | 0.0 |
| 74 | 52.1 | 17.9 | 45.9 | 31.4 | 4.7 | 0.1 | 0.0 |
| 76 | 52.1 | 18.8 | 45.7 | 30.8 | 4.7 | 0.1 | 0.0 |
| 78 | 52.2 | 19.3 | 45.1 | 30.7 | 4.7 | 0.1 | 0.0 |
| 80 | 52.2 | 19.3 | 45.1 | 30.7 | 4.7 | 0.1 | 0.0 |

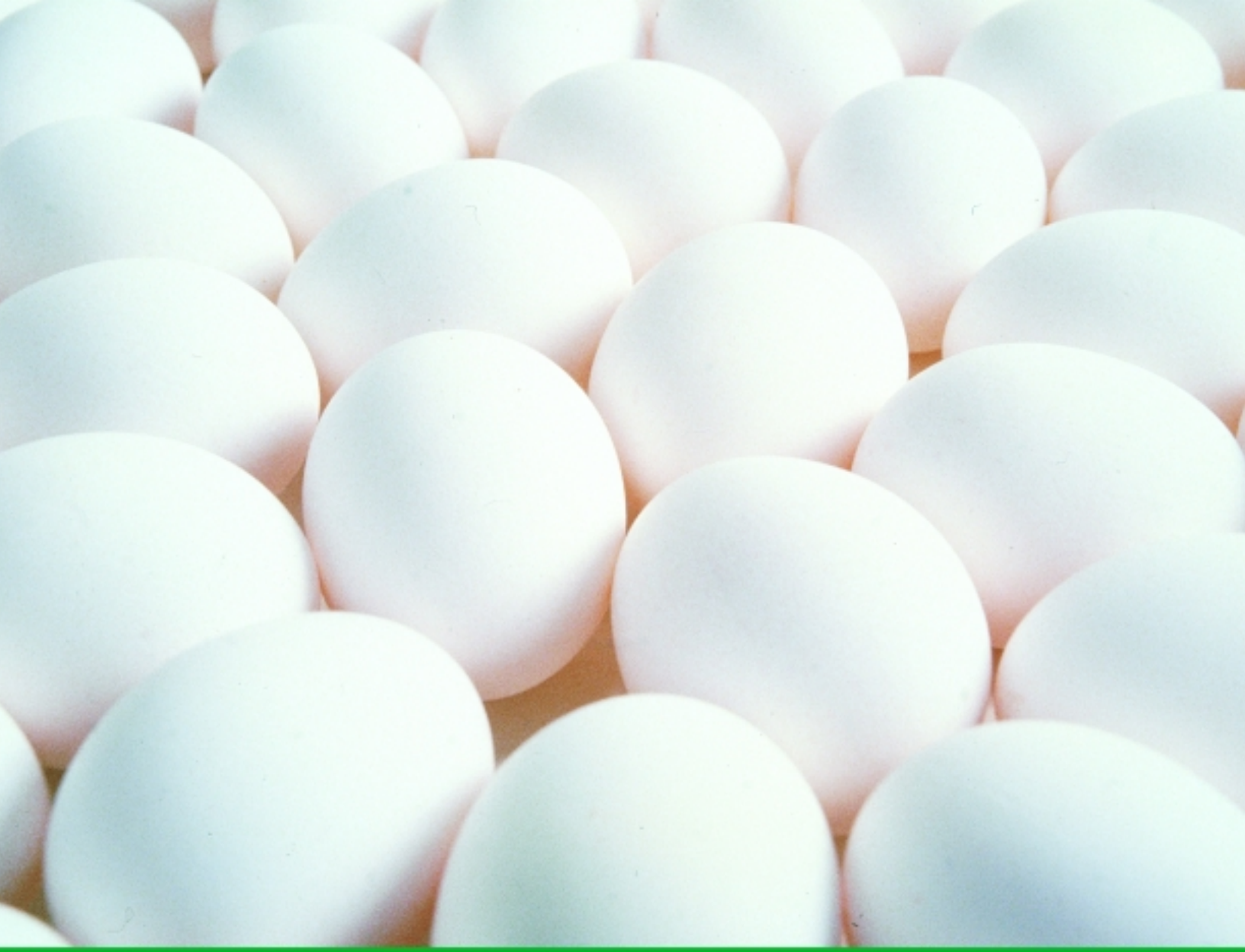
# Egg Size Distribution – European Standards

| Age in Weeks | Average Egg Weight (g) | Very Large Over 73g | Large 63–73g | Medium 53-63g | Small 43-53g |
|---|---|---|---|---|---|
| 22 | 51.7 | 0.0 | 2.6 | 38.6 | 58.9 |
| 24 | 54.8 | 0.1 | 8.1 | 53.8 | 38.0 |
| 26 | 57.2 | 0.4 | 15.9 | 59.9 | 23.8 |
| 28 | 58.5 | 0.6 | 20.9 | 61.8 | 16.7 |
| 30 | 59.6 | 0.7 | 26.1 | 61.7 | 11.5 |
| 32 | 60.6 | 0.8 | 31.7 | 59.9 | 7.6 |
| 34 | 61.1 | 0.9 | 34.6 | 59.3 | 5.3 |
| 36 | 61.6 | 0.9 | 37.4 | 58.4 | 3.4 |
| 38 | 62.1 | 1.0 | 40.9 | 56.2 | 1.9 |
| 40 | 62.6 | 1.0 | 45.4 | 51.9 | 1.6 |
| 42 | 63.1 | 1.4 | 49.5 | 47.9 | 1.3 |
| 44 | 63.5 | 2.0 | 52.4 | 44.6 | 1.1 |
| 46 | 63.8 | 2.5 | 54.2 | 42.2 | 1.1 |
| 48 | 63.9 | 2.6 | 55.0 | 41.4 | 1.0 |
| 50 | 64.1 | 3.2 | 55.9 | 40.0 | 1.0 |
| 52 | 64.3 | 3.8 | 57.1 | 38.2 | 1.0 |
| 54 | 64.5 | 4.5 | 57.3 | 37.3 | 0.9 |
| 56 | 64.8 | 5.1 | 58.6 | 35.4 | 0.9 |
| 58 | 65.0 | 5.8 | 59.4 | 33.8 | 0.9 |
| 60 | 65.3 | 6.9 | 60.2 | 32.0 | 0.9 |
| 62 | 65.3 | 6.9 | 60.2 | 32.0 | 0.9 |
| 64 | 65.4 | 7.4 | 60.2 | 31.5 | 0.9 |
| 66 | 65.5 | 7.9 | 59.8 | 31.3 | 0.9 |
| 68 | 65.5 | 8.4 | 59.6 | 31.1 | 0.9 |
| 70 | 65.6 | 9.1 | 59.3 | 30.7 | 0.9 |
| 72 | 65.6 | 9.1 | 59.3 | 30.7 | 0.9 |
| 74 | 65.6 | 9.1 | 59.3 | 30.7 | 0.9 |
| 76 | 65.7 | 10.1 | 58.9 | 30.1 | 0.9 |
| 78 | 65.8 | 10.7 | 58.5 | 29.9 | 0.9 |
| 80 | 65.8 | 10.7 | 58.5 | 29.9 | 0.9 |

# Feed Ingredient Analysis Table[1]

| Ingredient | Dry Matter % | Crude Protein % | Fat % (Ether Extract) | Fiber % | M.E. Kcal./Lb. Poultry | Calcium % | Phosphorus % | Avail. Phosphorus % | Potassium % | Sodium % | Chlorine % | Ash % | Choline mg/Lb. | Arginine % | Lysine % | Methionine % | Cystine % | Tryptophan % | Threonine % | Bulk Density (Lb./Cu. Ft.) | Linoleic Acid % | Xanthophyll (mg/Lb.) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alfalfa Meal, dehydrated | 93.0 | 17.5 | 3.0 | 25.0 | 750 | 1.30 | 0.27 | 0.27 | 2.49 | 0.09 | 0.46 | 9.0 | 680 | 0.75 | 0.73 | 0.28 | 0.18 | 0.45 | 0.75 | 20 | — | 100.0 |
| Bakery Product, dried | 91.5 | 10.0 | 11.5 | 0.7 | 1700 | 0.06 | 0.40 | 0.10 | 0.80 | 1.14 | 1.48 | 5.4 | 560 | 0.40 | 0.30 | 0.50 | 0.16 | 0.09 | 0.60 | 40 | 1.5 | — |
| Barley | 89.0 | 11.6 | 1.8 | 5.0 | 1250 | 0.07 | 0.36 | 0.11 | 0.49 | 0.05 | 0.03 | 3.0 | 450 | 0.50 | 0.50 | 0.16 | 0.25 | 0.13 | 0.36 | 25 | — | — |
| Barley, West Coast | 88.0 | 9.7 | 2.0 | 6.5 | 1255 | 0.05 | 0.33 | 0.10 | 0.44 | 0.02 | 0.10 | 2.4 | 425 | 0.43 | 0.36 | 0.16 | 0.20 | 0.13 | 0.30 | 22 | — | — |
| Beet Pulp | 92.0 | 8.0 | 0.6 | 20.0 | 300 | 0.56 | 0.10 | 0.03 | 0.20 | 0.18 | 0.04 | 4.0 | 370 | 0.30 | 0.60 | 0.01 | 0.01 | 0.09 | 0.35 | 13 | — | — |
| Blood Meal, flash dried | 91.0 | 85.0 | 1.6 | 1.0 | 1400 | 0.30 | 0.22 | 0.20 | 0.09 | 0.32 | 0.27 | 4.4 | 440 | 3.00 | 7.60 | 1.00 | 1.40 | 1.10 | 3.90 | 38 | — | — |
| Brewers Dried Grains | 93.0 | 27.0 | 7.5 | 12.0 | 1000 | 0.27 | 0.66 | 0.18 | 0.08 | 0.25 | 0.12 | 4.6 | 960 | 1.30 | 0.90 | 0.57 | 0.39 | 0.40 | 1.00 | 20 | — | — |
| Canola Meal | 92.5 | 38.0 | 3.8 | 11.0 | 960 | 0.70 | 1.17 | 0.30 | 1.30 | 0.05 | 0.06 | 7.2 | 3042 | 2.30 | 2.30 | 0.68 | 0.47 | 0.44 | 1.70 | 25 | — | — |
| Coconut Meal, Mech | 93.0 | 21.5 | 5.8 | 12.0 | 680 | 0.15 | 0.60 | 0.20 | 1.85 | 0.04 | 0.03 | 6.9 | 510 | 2.30 | 0.55 | 0.33 | 0.20 | 0.20 | 0.60 | 27 | — | — |
| Corn Germ Meal (wet milled) | 93.0 | 20.0 | 1.0 | 12.0 | 770 | 0.30 | 0.50 | 0.16 | 0.34 | 0.04 | 0.10 | 3.8 | 800 | 1.30 | 0.90 | 0.57 | 0.40 | 0.18 | 1.10 | 26 | — | — |
| Corn, yellow | 86.0 | 7.9 | 3.8 | 1.9 | 1560 | 0.02 | 0.25 | 0.08 | 0.31 | 0.03 | 0.04 | 1.1 | 250 | 0.36 | 0.26 | 0.20 | 0.18 | 0.07 | 0.26 | 39 | 1.9 | 10.0 |
| Corn, yellow (hi-oil) | 86.0 | 8.2 | 6.0 | 1.9 | 1625 | 0.02 | 0.26 | 0.09 | 0.31 | 0.03 | 0.04 | 1.2 | 250 | 0.40 | 0.28 | 0.20 | 0.19 | 0.07 | 0.30 | 40 | 3.0 | 10.0 |
| Corn Glutten Feed | 90.0 | 22.0 | 2.1 | 10.0 | 800 | 0.20 | 0.80 | 0.21 | 0.60 | 0.14 | 0.20 | 7.8 | 1100 | 1.30 | 0.45 | 0.20 | 0.50 | 0.10 | 0.80 | 30 | 1.0 | 10.0 |
| Corn Glutten Meal, 60% | 90.0 | 62.0 | 2.0 | 2.0 | 1690 | 0.02 | 0.50 | 0.18 | 0.45 | 0.03 | 0.06 | 1.5 | 1000 | 1.90 | 1.00 | 1.90 | 1.10 | 0.26 | 2.00 | 34 | 1.0 | 140.0 |
| Cottonseed Meal, expeller | 91.0 | 41.0 | 3.9 | 12.5 | 1000 | 0.15 | 0.93 | 0.28 | 1.25 | 0.04 | 0.04 | 6.2 | 1270 | 4.30 | 1.60 | 0.50 | 0.59 | 0.50 | 1.35 | 37 | 1.2 | — |
| Cottonseed Meal, solvent | 90.5 | 41.0 | 0.8 | 12.4 | 900 | 0.15 | 0.98 | 0.28 | 1.26 | 0.04 | 0.04 | 6.4 | 1300 | 4.60 | 1.70 | 0.46 | 0.62 | 0.45 | 1.35 | 40 | 0.4 | — |
| Crab Meal | 93.0 | 31.0 | 1.8 | 14.0 | 750 | 16.00 | 1.50 | 1.50 | 0.80 | 0.88 | 1.51 | 30.8 | 920 | 1.70 | 1.40 | 0.50 | 0.20 | 0.30 | 1.00 | 26 | — | — |
| Distillers Dried Grains w/solubles | 91.0 | 28.0 | 8.0 | 8.0 | 1090 | 0.27 | 0.77 | 0.34 | 0.86 | 0.55 | 0.17 | 4.5 | 1780 | 1.00 | 0.80 | 0.45 | 0.50 | 0.20 | 1.00 | 25 | 4.0 | 1.0 |
| Fat, animal (stabilized) | 98.0 | — | 95.0 | — | 3700 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 54 | — | — |
| Fat, feed (vegetable/animal blend) | 98.0 | — | 95.0 | — | 3800 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 55 | 20.0 | — |
| Fat, poultry | 98.0 | — | 96.0 | — | 3850 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 55 | 20.5 | — |
| Fat or Oil, vegetable | 98.0 | — | 96.0 | — | 4000 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | 52 | 38.0 | — |
| Feather Meal | 92.0 | 85.0 | 2.5 | 1.5 | 1050 | 0.20 | 0.70 | 0.70 | 0.30 | 0.70 | 0.28 | 3.7 | 400 | 3.90 | 1.05 | 0.55 | 4.00 | 0.37 | 3.00 | 34 | — | — |
| Fish Meal (Anchovy) 65% | 92.0 | 65.0 | 10.0 | 1.0 | 1290 | 4.00 | 2.80 | 2.80 | 0.74 | 0.87 | 1.00 | 15.0 | 2200 | 3.60 | 4.80 | 1.90 | 0.60 | 0.70 | 2.80 | 35 | — | — |
| Fish Meal (Menhaden) 60% | 92.0 | 62.0 | 9.5 | 1.0 | 1340 | 5.00 | 2.90 | 2.90 | 0.73 | 0.59 | 0.60 | 19.6 | 1400 | 3.60 | 4.80 | 1.70 | 0.50 | 0.55 | 2.86 | 35 | — | — |
| Fish Solubles (50% solids) | 51.0 | 31.0 | 4.5 | 0.5 | 870 | 0.10 | 0.49 | 0.49 | 1.48 | 1.00 | 1.70 | 9.4 | 1800 | 1.30 | 1.47 | 0.44 | 0.20 | 0.11 | 0.60 | — | — | — |
| Hominy Feed, yellow | 90.0 | 11.5 | 6.0 | 5.6 | 1360 | 0.04 | 0.50 | 0.17 | 0.63 | 0.08 | 0.05 | 2.7 | 630 | 0.55 | 0.44 | 0.22 | 0.13 | 0.12 | 0.40 | 26 | — | 1.5 |
| Meat & Bone Meal 50% | 94.0 | 50.0 | 9.5 | 2.8 | 1075 | 9.70 | 4.40 | 4.40 | 0.46 | 0.72 | 0.84 | 32.0 | 870 | 3.40 | 2.50 | 0.65 | 0.35 | 0.29 | 1.70 | 37 | — | — |
| Molasses, cane | 75.0 | 3.0 | 0.0 | 0.0 | 890 | 0.90 | 0.05 | 0.02 | 2.38 | 0.16 | 2.00 | 8.0 | 400 | — | — | — | — | — | — | 88 | — | — |
| Oats | 89.0 | 11.5 | 4.0 | 11.0 | 1150 | 0.10 | 0.35 | 0.10 | 0.42 | 0.08 | 0.10 | 3.2 | 425 | 0.80 | 0.38 | 0.18 | 0.20 | 0.14 | 0.30 | 20 | — | — |
| Peanut Meal, hydraulic or expeller | 92.0 | 45.0 | 5.2 | 12.0 | 1050 | 0.15 | 0.55 | 0.20 | 1.12 | 0.08 | 0.03 | 5.7 | 700 | 4.80 | 1.60 | 0.41 | 0.70 | 0.46 | 1.40 | 29 | — | — |
| Poultry By-Product Meal | 93.0 | 60.0 | 13.0 | 2.0 | 1325 | 3.60 | 1.90 | 1.90 | 0.55 | 0.28 | 0.54 | 1.77 | 2720 | 3.80 | 2.55 | 1.00 | 1.00 | 0.50 | 2.00 | 35 | — | — |
| Rice (broken) | 89.0 | 7.3 | 1.4 | 8.0 | 1340 | 0.04 | 0.24 | 0.10 | 0.13 | 0.04 | 0.06 | 4.5 | 400 | 0.56 | 0.16 | 0.14 | 0.10 | 0.12 | 0.25 | 34 | — | — |
| Rice Bran, unextracted | 89.0 | 12.5 | 15.5 | 11.0 | 1175 | 0.06 | 1.60 | 0.16 | 1.50 | 0.05 | 0.06 | 5.0 | 515 | 0.95 | 0.55 | 0.21 | 0.21 | 0.13 | 0.43 | 30 | 3.0 | — |
| Rice Bran, solvent | 90.0 | 14.0 | 1.0 | 13.5 | 660 | 0.10 | 1.40 | 0.15 | 1.34 | 0.04 | 0.06 | 11.1 | 520 | 1.00 | 0.60 | 0.30 | 0.30 | 0.14 | 0.40 | 21 | — | — |
| Rice Polishings | 90.0 | 12.0 | 12.0 | 5.0 | 1400 | 0.05 | 1.20 | 0.20 | 0.02 | 0.17 | 0.15 | 9.0 | 600 | 0.90 | 0.60 | 0.25 | 0.26 | 0.10 | 0.36 | 26 | 3.0 | — |
| Sorghum | 89.0 | 9.8 | 2.8 | 2.0 | 1500 | 0.04 | 0.30 | 0.10 | 0.35 | 0.03 | 0.06 | 1.8 | 300 | 0.36 | 0.27 | 0.12 | 0.18 | 0.10 | 0.30 | 34 | — | — |
| Soybean Hulls | 90.0 | 11.0 | 1.9 | 36.5 | 668 | 0.40 | 0.19 | 0.04 | 1.16 | 0.01 | 0.01 | 4.5 | 223 | 0.89 | 0.66 | 0.14 | 0.17 | 0.17 | 0.50 | 20 | — | — |
| Soybean Meal, solvent | 90.0 | 45.0 | 0.8 | 6.5 | 1020 | 0.25 | 0.60 | 0.20 | 1.92 | 0.04 | 0.03 | 5.8 | 1245 | 3.20 | 2.85 | 0.65 | 0.67 | 0.60 | 1.70 | 37 | — | — |
| Soybean Meal, dehulled | 90.0 | 48.5 | 1.0 | 3.0 | 1100 | 0.20 | 0.65 | 0.20 | 2.05 | 0.04 | 0.05 | 5.8 | 1295 | 3.60 | 3.05 | 0.70 | 0.71 | 0.66 | 2.00 | 40 | — | — |
| Sunflower Meal Solvent | 90.0 | 34.0 | 1.0 | 13.0 | 1000 | 0.30 | 1.25 | 0.26 | 1.60 | 0.20 | 0.21 | 7.0 | 850 | 2.80 | 1.40 | 0.60 | 0.55 | 0.35 | 1.45 | 31 | — | — |
| Wheat, hard | 89.0 | 12.5 | 1.7 | 2.9 | 1450 | 0.05 | 0.38 | 0.15 | 0.45 | 0.06 | 0.07 | 2.1 | 390 | 0.62 | 0.39 | 0.24 | 0.26 | 0.16 | 0.36 | 39 | — | — |
| Wheat, soft, western | 89.0 | 10.5 | 1.8 | 2.6 | 1455 | 0.05 | 0.30 | 0.12 | 0.39 | 0.06 | 0.07 | 1.8 | 395 | 0.45 | 0.30 | 0.15 | 0.21 | 0.12 | 0.28 | 38 | — | — |
| Wheat Bran | 89.0 | 15.0 | 3.5 | 11.0 | 590 | 0.12 | 1.15 | 0.40 | 1.23 | 0.06 | 0.07 | 6.1 | 445 | 1.05 | 0.57 | 0.18 | 0.30 | 0.27 | 0.50 | 18 | — | — |
| Wheat Middlings, flour | 89.0 | 16.0 | 4.0 | 6.0 | 1150 | 0.10 | 0.66 | 0.18 | 0.89 | 0.06 | 0.05 | 7.8 | 430 | 1.00 | 0.80 | 0.20 | 0.26 | 0.22 | 0.49 | 20 | — | — |
| Wheat Middlings, standard | 89.0 | 15.5 | 3.6 | 8.5 | 940 | 0.14 | 0.88 | 0.23 | 0.59 | 0.06 | 0.07 | 5.4 | 480 | 1.10 | 0.70 | 0.16 | 0.20 | 0.20 | 0.50 | 21 | — | — |

1. Formula nutrient profile recommendations (page 11) are based on calculations utilizing these ingredient nutrient values.



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