Hy-Line® VARIETY

W-36

Commercial Management Guide

2007-2008

Genetic Excellence®

Table of Contents

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-36

GROWING PERIOD (to 17 weeks):

Livability	97-98%
Feed Consumed	5.21 Kg (11.5 Lbs.)
Body Weight at 17 Weeks	1.24 Kg (2.7 Lbs.)

LAYING PERIOD (to 80 weeks):

Percent Peak	94-95%
Hen-Day Eggs to 60 Weeks	239-245
Hen-Day Eggs to 80 Weeks	346-354
Hen-Day Eggs to 110 Weeks	472-482
Hen-Housed Eggs to 60 Weeks	236-242
Hen-Housed Eggs to 80 Weeks	339-347
Hen-Housed Eggs to 110 Weeks	455-465
Livability to 60 Weeks	97%
Livability to 80 Weeks	95%
Days to 50% Production (from hatch)	151 Days
Egg Weight at 26 Weeks	55.2 g/Egg (43.8 Lbs./Case)
Egg Weight at 32 Weeks	58.8 g/Egg (46.7 Lbs./Case)
Egg Weight at 70 Weeks	63.4 g/Egg (50.3 Lbs./Case)
Total Egg Mass per Hen-Day (18-80 weeks)	21.1 Kg (46.4 Lbs.)
Body Weight at 32 Weeks	1.51 Kg (3.33 Lbs.)
Body Weight at 70 Weeks	1.55 Kg (3.42 Lbs.)
Shell Strength	Excellent
Haugh Units at 32 Weeks	93
Haugh Units at 70 Weeks	86
Average Daily Feed Consumption (18-80 weeks)	92 Grams/Bird/Day (20.3 Lbs./100 Birds/Day)
Lbs. Feed/Lbs. Eggs or Kg Feed/Kg Eggs (21-60 weeks)	1.81
Lbs. Feed/Lbs. Eggs or Kg Feed/Kg Eggs (21-80 weeks)	1.86
Feed per Doz. Eggs (21-60 weeks)	1.29 Kg (2.85 Lbs.)
Feed per Doz. Eggs (21-80 weeks)	1.36 Kg (3.00 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-36 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 32–33°C (90–92°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 cages. 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 17 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 17 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 twice daily, or more often. After six weeks, check feed consumption and body weights against the charts on page 12 & 13. (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 7). 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 17 weeks of age, before the onset of sexual maturity.

Growing Space Recommendations

CAGE		FLOOR	
Floor Space:	310 sq cm (48 sq. in.)	**Floor Space:**	835 sq cm (0.9 sq. ft.)
Feeder Space:	5 cm/bird (2"/bird)	**Feeder Space:**	5.0 cm/bird (2"/bird) 1 pan/50 birds
Water Space		**Water Space**	
Trough:	2.5 cm/bird (1"/bird)	**Trough:**	2.0 cm/bird (0.8"/bird)
Cups/Nipples:	1 per 8 birds	**Cups/Nipples:**	1 per 15 birds
Fountains:	—	**Fountains:**	1 per 150 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 32–33°C (90–92°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 on days 4-7 from 32-33°C (90-92°F.) to 30-32°C (86-90°F.). Starting day 8, reduce temperature 2°C (4°F.) per week 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 brooder 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.

Brooding Temperatures

Age	Cage Brooding		Floor Brooding	
	˚C	˚F	˚C	˚F
Day 1-3	32-33	90-92	33	92
Day 4-7	30-32	86-90	31	88
Day 8-14	28-30	82-86	29	84
Day 15-21	26-28	78-82	27	80
Day 22-28	23-26	74-78	24	76
Day 29-35	21-23	70-74	22	72
Day 36 →	21	70	21	70

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-36 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 (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.

Floor Systems Management

The Hy-Line variety W-36 is widely used in floor systems due to her good livability. It is important to provide the birds with the best possible floor environment to achieve the performance potential of the Hy-Line variety W-36.

Growing Period

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

It is essential that birds be on the same type of feeder and water system in the growing house that they will be on in the laying house. Birds will adapt better in the lay house if the growing house has perches. If birds are being grown at 12 birds/m^2 (0.9 sq. ft./bird) then each bird will need 6 cm (2.4 inches) of perch when using a A-frame construction. Use a spacing of 40 cm (16 inches) between perches and angle of 45°. Ideally the growing house should have elevated bird walkways with the feed and water stations up on them.

Birds grown on the floor will often be as much as 50 g (0.1 Lbs.) lower in body weight at 12 weeks of age than cage grown birds. To offset any decrease in egg size, it is common to delay light stimulation until the pullets reach 1.27 Kg (2.80 Lbs.).

Birds are very sensitive to extremes of relative humidity (RH). It is common to see young flocks in floor houses with RH dropping below 30%. This will cause increased agitation of the chicks and can cause aggressive behavior. Ideally RH should be in the 40 or 60% range. Excessive moisture will cause poor litter conditions. Wet litter will be associated with high ammonia levels and poor air quality. This must be avoided to prevent respiratory problems.

It is important to socialize the birds to humans by walking through the chicks daily.

The Hy-Line variety W-36 pullet is usually beak trimmed either in the hatchery or at 7-10 days of age.

Laying Period

Ensure that the feed and water systems in the growing and laying facilities are compatible. Check the lighting program and light intensity. Synchronize light times with the growing house. The birds will need bright light of at least 20 lux (2 foot candles). It is important not to have shadows in the lay house, as dark areas outside the nest will encourage floor eggs. Allow the pullets access to the nests during the day when they arrive. Place the pullets on the slats at housing. Walk the birds several times daily, particularly in the morning, to ensure the birds are finding feed and water.

Training the birds to use the nest will require frequent walks through the birds in the mornings for the first month after the birds are placed in the laying house. Use of an electric fence is helpful in training the birds not to lay eggs in corners or near the walls. The fence must be turned on as soon as the birds are housed. Place the fence 5 cm (2 inches) away from the wall of the house and about 10 cm (4 inches) above the floor.

It is common practice to lift the nest box curtain as the birds train to the nests. This will help prevent smothering. If nests near the walls are being used more heavily than nests towards the center of the house, use false walls of 1 m (3 feet) wide coming out and down from the nest down about every 12 m (39 feet) along the line of nest boxes.

The litter area in layer houses should not be more than 60 cm (24 inches) below the slat area. Position lights so they do not cause shadows on the litter below the slat area. Ensure that the litter area has the highest light intensity with a lower light intensity at the front of the nest boxes.

An all slat floor house provides an excellent environment, however, birds housed in this type of housing should also be grown on an all slat or wire floor.

Recommended Cage Free Densities for the Hy-Line W-36 Layer (Adult)

Floor Space	all litter	10 birds/m^2 (1.1 sq. ft./bird)
	all slat	12 birds/m^2 (0.9 sq. ft./bird)
	combination of litter/slat	11 birds/m^2 (1.0 sq. ft./bird)
Feeder Space	straight trough	8 cm (3 in.)
	round pans	40 birds
Water and/or Drinker Space	1 nipple/cup	per 10 birds
	2.5 cm (1 in.) water trough	per bird
	1-46 cm (18 in.) diameter circular automatic water fountain	per 125 birds
Nest Space	colony nest, single tier, 1.1-1.4 m (3.5-4.5 ft.) width	160 per nest (80/side)
	individual nest	8 birds/nest

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

Biosecurity is the best method of avoiding disease. A good biosecurity program identifies and controls the most likely ways a disease could enter the farm. Human and equipment movement onto the farm should be strictly controlled. Visitors to the farm should be limited to those who are essential for its operation. All visitors and workers should enter at a central location. Visitors should use a logbook to document their visits. Anyone having been on another poultry facility within 48 hours should not be permitted access. Clean boots, clothing and head cover should be provided for everyone working or visiting the farm. Clean footbaths containing disinfectant should be placed outside the entries to all poultry houses. If possible, avoid using outside crews or equipment for vaccination, moving, and beak trimming. Ideally, workers should be limited to a single house. The number of flocks visited in one day should be limited, and always progressing from younger to older flocks, and from healthy to sick flocks. After visiting a sick flock, no other flocks should be visited.

The removal of old hens from the farm is a time when disease can be introduced. The trucks and crews used to transport old hens have often been on other farms. A plan should be developed to minimize the biosecurity risk during times outside crews or equipment are needed for vaccination, moving pullets, and beak trimming.

A single-aged growing farm using the all-in/all-out principle is best. This will prevent the transmission of disease from older flocks to younger, susceptible flocks. All houses should be designed to prevent exposure of the flock to wild birds. Quickly and properly dispose of dead chickens.

Rodents are known carriers of many poultry diseases and they are the most common reason for re-contamination of a cleaned and disinfected poultry facility. They are also responsible for house-to-house spread of disease on a farm. The farm should be free of debris and tall grass that might provide cover for rodents. The perimeter of house should have a 1 meter (3 foot) area of crushed rock or concrete to prevent rodents from burrowing into the houses. Feed and eggs should be stored in rodent-proof areas. Bait stations should be placed throughout the house and maintained with fresh rodenticide,

Cleaning and disinfection of the house between flocks serves to reduce the infection pressure for a new incoming flock. The house should be cleaned of organic matter by high pressure spraying with a warm water containing a detergent/disinfectant. Allow time for the detergent to soak. After drying, the house should be disinfected or fumigated and allowed to dry again before repopulating with birds. Heating the house during washing improves the removal of organic matter. Wash the upper portion of the house before the pit. Thoroughly clean the air inlets, fan housing, fan blades and fan louvers. Flush and sanitize the water lines. All feed and manure should be removed from the housing before cleaning. Allow a minimum of two weeks downtime between flocks.

Monitoring of poultry houses for the presence of pathogenic species of Salmonella, particularly *Salmonella enteritidis*, is recommended. This can be done by routine testing of the environment using drag swabs.

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 or HVT/Rispens
18-20 days	IBD intermediate strain in water
24-26 days	IBD intermediate strain in water, Newcastle B-1 and bronchitis, mild Mass. in water
30-32 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 immunosuppression 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, 24-26 days and at 30-32 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.

Internal Parasites

Worms

Worm infections cause damage to the bird's gut. This may result in a variety of problems including:

- Loss of shell strength, yolk color, and egg size.
- Poor body weight gain leading to unevenness or stunted birds. Affected birds may be dull and show pale combs.
- Increased cannibalism through vent pecking due to straining.
- Death, in very heavy infestations.

There are three main worms that may cause problems in free-range or cage birds:

1. **Roundworms (Ascaridia galli)**
   These are the biggest and most common. They are white, up to 5 cm (2 inches) long and may be visible in droppings in heavy infections.
2. **Hairworms (Capillaria)**
   These are much smaller (hair-like) and are barely visible with the naked eye but can cause significant damage even in only moderate infestations.
3. **Cecal Worms (Heterakis gallinarum)**
   As their name suggests, these worms, spend most of their time in the lower end of the gut, the ceca. Frequently they cause no obvious harm in themselves but can carry another parasite, Histomonas, into the birds. Histomonas is the cause of blackhead and hence control of one parasite can help to control another.

Birds become infected by picking up worm eggs from litter, soil, or feces. The worm eggs need warm moist conditions to develop outside the bird, which is why problems are frequently worse in the spring and summer, especially following a wet spring. Worm burdens can be identified by examination of feces, culled birds, or worm egg counts on bulk feces.

A product used for roundworm treatment in the United States is Piperazine at 50 mg/bird (0.1%) for 24 hours. A possible licensed dewormer in some countries for laying birds is Flubenvet, (Janssen Animal Health). This product has no withdrawal period, which means that it can be given in the feed during lay without the need to discard eggs, except in organic diets where eggs may need to be withheld.

Effective control is aimed at breaking the cycle of infection. Strategic use of deworming (in the rearing phase) will help to reduce challenge, but this needs to be combined with limiting stock density on land, the use of range rotation, good drainage, and the removal of heavily contaminated soil around the house before new pullets arrive.

Coccidiosis

This parasitic infection of the intestines can lead to gut damage and, in severe infestations, death of birds. More commonly, poor control of subclinical infection reduces feed conversion, or leaves pullets with chronic irreversible gut damage. Such flocks may be uneven or underweight at housing, and may not perform to their full potential in lay. Currently, effective control is achieved with drug treatments in feed that suppress oocyst output. These may involve the use of ionophores or chemicals on a step-down program to ensure a good build up of immunity in pullets. To avoid problems with drug resistance and continuous drug treatment, and help ensure even and target weight pullets, live vaccine is available that can be administered by spray in the hatchery or by feed or water application the first few days in the brooder house. All treatment/vaccination strategies should be supported with effective biosecurity. The use of a disinfectant with proven efficacy against coccidial oocysts will reduce challenge pressure. Maintenance of good dry litter will reduce oocyst build up.

External Parasites

Red Mite or Northern Fowl Mite

Mites are a cause of increasing problems in free-range and caged layers. It is particularly severe in the summer months when the weather is warm and mites are able to multiply quickly.

Even light infestations can irritate the birds, leading to poor performance and reduced feed intake. In more severe cases infestations can lead to some or all of the following.

- Mites irritate the birds and can make the flock unsettled and nervous.
- The incidence of peritonitis may increase and there may be increased vent pecking.
- Feed intake may be depressed.
- Heavy mite infestations can depress egg production by up to 5%.
- Heavy infestations of red mites will make birds anemic due to loss of blood. Birds will be evident in the flock with pale combs and, if severely affected, mortality may increase.
- There may be loss of yolk color and, with heavy infestations of red mites, there will be evidence of mites and mite feces on eggs and egg belts, which may lead to downgrading of speckled eggs.
- There may be an increase in floor eggs as birds will be reluctant to use heavily infested nests.
- Where there are heavy mite infestations, egg collectors may experience skin irritation.

Control strategies involve two broad areas:

1. Breaking the cycle of reinfection when the house is empty is the most effective approach. Treat the houses effectively at site depletion with an approved product, properly applied, to reach into all crevices on equipment, slats, and nest boxes. Use a fan nozzle to produce a flat spray. Do not mix pesticides with disinfectants.
2. Monitor the house and birds during the life of the flock to allow prompt treatment even if only light infestations are identified. Programs for treatment to break the Northern Fowl Mite life cycle (5-7 days) should be done three times on day 0, 5, and 10. Treatment to break the Red Mite life cycle (10 days) should be done three times on day 0, 10, and 20.

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 30 lux (3ftc.) intensity. Reduce day length weekly to reach 12 hours at 8-10 weeks of age or, if longer, the day length dictated by natural day length in open or brownout houses (see page 11). Reduce intensity to 5 lux ($\frac{1}{2}$ftc.) after the second week.
2. Provide light stimulation when body weight is at least 1.27 Kg (2.80 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 peak production. Light intensity should also be increased at housing to 20 lux (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 12 hours at 8-10 weeks of age and hold constant.

b. Increase day length one hour at 1.27 Kg (2.80 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 12 hours at 8-10 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 1.27 Kg (2.80 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 12 hours at 8-10 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 1.27 Kg (2.80 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 12 hours at 8-10 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 1.27 Kg (2.80 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 (18 weeks).
2. A minimum body weight (1270–1360 grams or 2.8–3.0 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 1270–1360 grams (2.8–3.0 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 18 weeks of age and hold that day length constant with artificial lights from 8 to 18 weeks.

Custom lighting programs are available on the Hy-Line website (www.hyline.com).

Egg Size Management

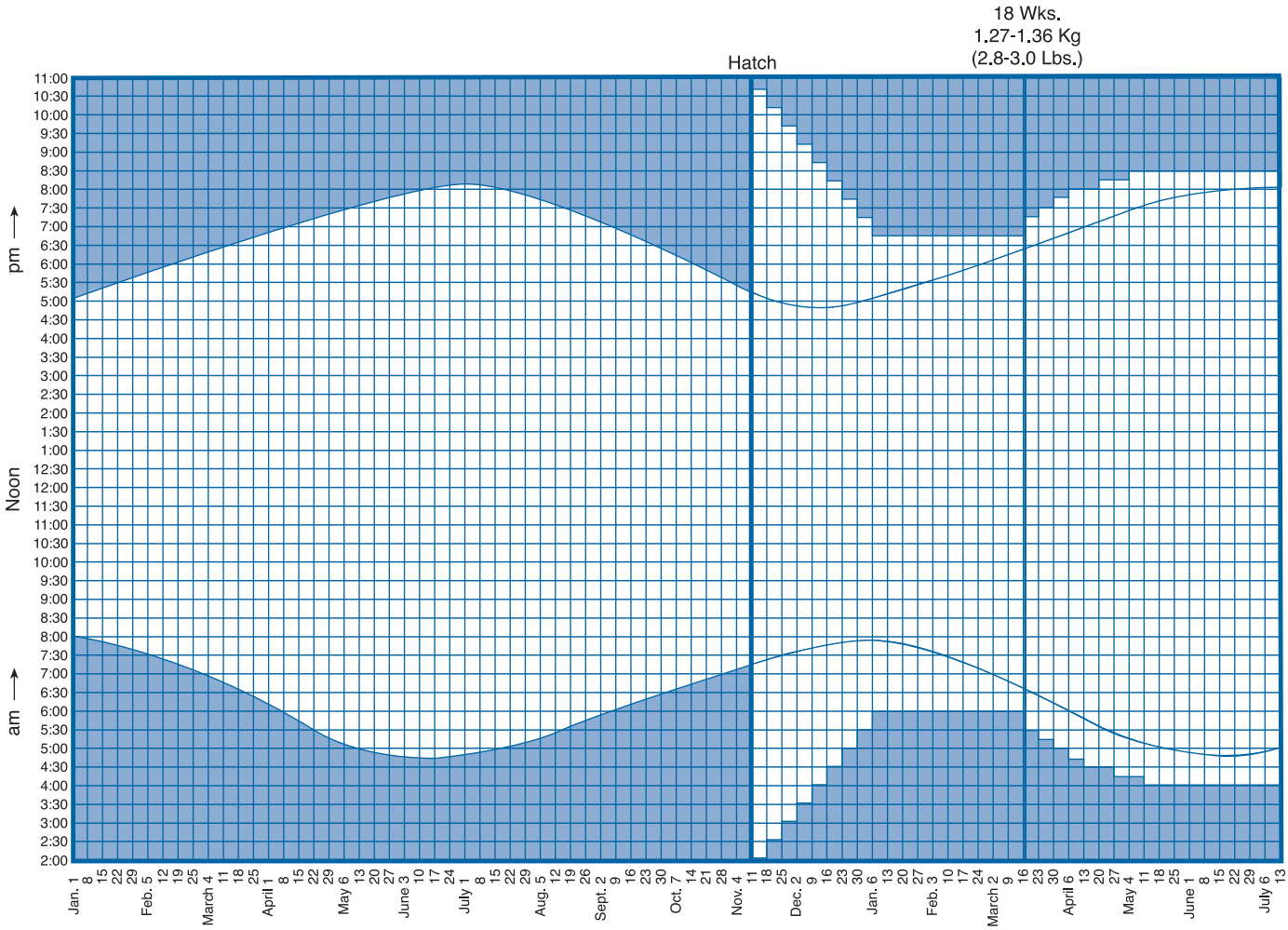
Egg size is to a large extent genetically determined, but within this given range, we can manage to either increase or decrease the egg size to suit the particular market needs.

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 a body weight of 1270–1360 grams (2.8–3.0 Lbs.) 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 after 8-10 weeks of age during growing will delay maturity and increase average egg size.
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 layer feeding program page 14.)

Sunrise and Sunset

42° Latitude Northern Hemisphere



Growing Period Nutritional Recommendations

Product Age in Weeks W-36 Body Weight	Starter 0-6 to 400g (0.88 Lbs.)	Grower 6-9 to 680g (1.50 Lbs.)	Developer 9-16 to 1200g (2.65 Lbs.)	Pre-Layer 16-5% Production	Pre-Peak 5% to 50% Production
Nutrients:					
Protein, % (Min.)	20	18	16	17	17.5
Met. Energy, MJ/Kg	12.2-12.6	12.4-12.9	12.4-13.0	12.3-12.9	12.2-12.4
Met. Energy, Kcal/Kg	2915–3025	2970–3080	2970–3124	2948–3080	2915–2970
Met. Energy, Kcal/Lb.	1325–1375	1350–1400	1350–1420	1340–1400	1325–1350
Linoleic Acid, % (Min.)	1.0	1.0	1.0	1.0	1.5
Amino Acids (1) (Min.):					
Arginine, %	1.20	1.05	0.93	0.90	1.10
Lysine, %	1.15	0.96	0.85	0.85	0.88
Methionine, %	0.48	0.43	0.39	0.42	0.48
Methionine + Cystine, %	0.80	0.70	0.66	0.72	0.82
Tryptophan, %	0.20	0.18	0.16	0.17	0.18
Threonine, %	0.73	0.67	0.61	0.65	0.68
Minerals (Min.):					
Calcium, %	1.0	1.0	1.0	2.75(2)	3.65(3)
Av. Phosphorus, %	0.50	0.47	0.45	0.48	0.50
Sodium, %	0.18	0.17	0.17	0.18	0.18
Chloride, %	0.16	0.16	0.16	0.17	0.17
Potassium, %	0.50	0.50	0.50	0.50	0.50

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

(2) Calcium level should be raised to a minimum of 2.75% for pre-layer feed beginning at 16 weeks, or when the flock shows signs of sexual maturity (blooming of combs). Do not use past 5% production. At least 30% of the added limestone should have a minimum particle size of 2250 microns.

(3) A minimum of 40% of the added limestone should have 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	13	2.80	38	89	0.20	266
2	16	3.50	48	200	0.44	602
3	19	4.20	57	333	0.74	1001
4	29	6.30	86	533	1.18	1603
5	38	8.40	115	800	1.76	2408
6	41	8.97	123	1085	2.39	3269
7	43	9.45	129	1385	3.05	4172
8	46	10.10	138	1706	3.76	5138
9	48	10.60	145	2042	4.50	6153
10	51	11.20	154	2398	5.29	7231
11	53	11.60	159	2766	6.10	8344
12	54	12.00	165	3147	6.94	9499
13	56	12.30	169	3538	7.80	10682
14	57	12.60	173	3938	8.68	11893
15	59	13.00	175	4351	9.59	13118
16	61	13.40	181	4776	10.53	14385
17	62	13.70	185	5211	11.49	15680

Monitoring Body Weights

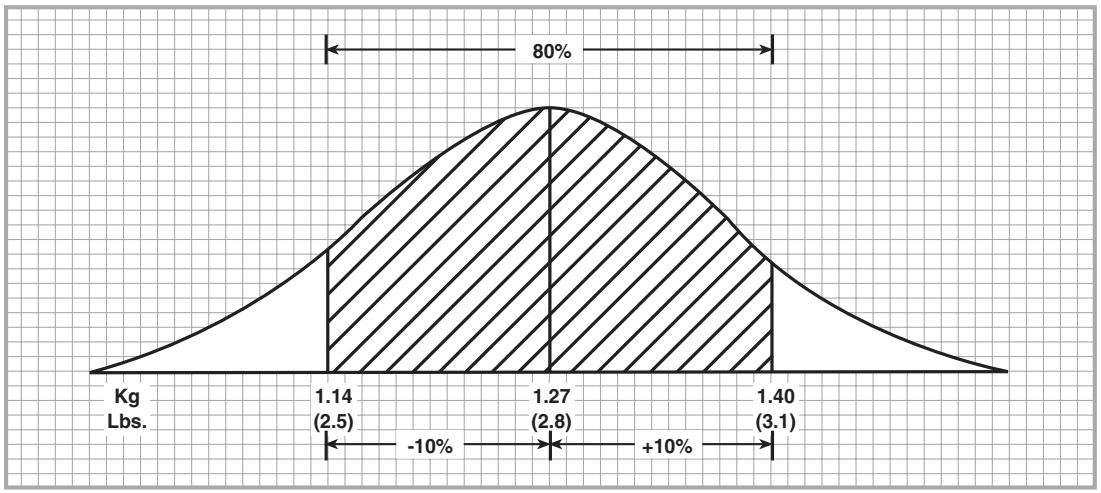
Body weights should be monitored periodically during the growing period and until after peak. At least 100 birds should be weighed individually with a scale having increments no larger than 50 grams or 1/10 Lb. Weighing should be started at five weeks of age and continued every two weeks during the growing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

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 80% uniformity.

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 18 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-36 Pullets
— Rearing Period —

Age in Weeks	Body Weight Grams	Body Weight Pounds
1	65	0.14
2	110	0.24
3	180	0.40
4	250	0.55
5	320	0.71
6	400	0.88
7	500	1.10
8	590	1.30
9	680	1.50
10	770	1.70
11	870	1.92
12	950	2.09
13	1030	2.27
14	1100	2.43
15	1160	2.56
16	1200	2.65
Move to Lay House 17	1240	2.73
18	1270	2.80

Laying Period Nutrition

Minimum Daily Intake Recommendations per Bird – First Lay Cycle[1]

	Peaking 50% Prod. – 32 Weeks	32–44 Wks.	44–58 Wks.	58 Wks. +
Protein, g/bird[2]	16.0	15.5	15.25	15.0
Methionine, mg/bird	430	400	380	370
Methionine + Cystine, mg/bird	720	700	670	620
Lysine, mg/bird	880	820	780	760
Tryptophan, mg/bird	180	170	160	155
Calcium, g/bird[3]	3.90	4.10	4.25	4.40
Phosphorus, (Available) g/bird	0.48	0.46	0.42	0.38
Sodium, mg/bird	170	170	170	170
Chloride, mg/bird	170	170	160	160

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

50% to 32 Weeks Peaking[1]

Recommended Feed Energy 1290–1325 Kcal/Lb. or 2838–2915 Kcal/Kg or 11.8-12.2 MJ/Kg[4]

Consumption Bird/Day Grams	Lbs.	% Protein	% Methionine	% Methionine + Cystine	% Lysine	% Tryptophan	% Threonine	% Calcium	% Avail. Phos.	% Sodium
77	0.17	20.70	0.56	0.93	1.14	0.23	0.88	5.05	0.62	0.22
82	0.18	19.50	0.53	0.88	1.08	0.22	0.83	4.77	0.59	0.21
86	0.19	18.55	0.50	0.83	1.02	0.21	0.79	4.52	0.56	0.20
91	0.20	17.60	0.47	0.79	0.97	0.20	0.75	4.29	0.53	0.19
95	0.21	16.75	0.45	0.75	0.92	0.19	0.71	4.09	0.50	0.18
100	0.22	16.00	0.43	0.72	0.88	0.18	0.68	3.90	0.48	0.17

32–44 Weeks[1]

Recommended Feed Energy 1290–1335 Kcal/Lb. or 2838–2935 Kcal/Kg or 11.8-12.3 MJ/Kg[4]

Consumption Bird/Day Grams	Lbs.	% Protein	% Methionine	% Methionine + Cystine	% Lysine	% Tryptophan	% Threonine	% Calcium	% Avail. Phos.	% Sodium
82	0.18	18.95	0.49	0.86	1.00	0.21	0.81	5.01	0.56	0.21
86	0.19	17.95	0.46	0.81	0.95	0.20	0.76	4.75	0.53	0.20
91	0.20	17.05	0.44	0.77	0.90	0.19	0.73	4.51	0.51	0.19
95	0.21	16.25	0.42	0.73	0.86	0.18	0.69	4.30	0.48	0.18
100	0.22	15.50	0.40	0.70	0.82	0.17	0.66	4.10	0.46	0.17

44–58 Weeks[1]

Recommended Feed Energy 1280–1325 Kcal/Lb. or 2816–2915 Kcal/Kg or 11.8-12.2 MJ/Kg[4]

Consumption Bird/Day Grams	Lbs.	% Protein	% Methionine	% Methionine + Cystine	% Lysine	% Tryptophan	% Threonine	% Calcium	% Avail. Phos.	% Sodium
91	0.20	16.75	0.42	0.74	0.86	0.18	0.69	4.68	0.46	0.19
95	0.21	16.00	0.40	0.70	0.82	0.17	0.66	4.45	0.44	0.18
100	0.22	15.25	0.38	0.67	0.78	0.16	0.63	4.25	0.42	0.17
104	0.23	14.60	0.36	0.64	0.75	0.15	0.60	4.07	0.40	0.16

58 Weeks and Older[1]

Recommended Feed Energy 1270–1290 Kcal/Lb. or 2794–2840 Kcal/Kg or 11.7-11.9 MJ/Kg[4]

Consumption Bird/Day Grams	Lbs.	% Protein	% Methionine	% Methionine + Cystine	% Lysine	% Tryptophan	% Threonine	% Calcium	% Avail. Phos.	% Sodium
95	0.21	15.70	0.39	0.65	0.80	0.16	0.62	4.61	0.40	0.18
100	0.22	15.00	0.37	0.62	0.76	0.16	0.59	4.40	0.38	0.17
104	0.23	14.35	0.35	0.59	0.73	0.15	0.56	4.21	0.36	0.16
109	0.24	13.75	0.34	0.57	0.70	0.14	0.54	4.03	0.35	0.15

(1) Layer rations should be formulated to provide suggested nutrient intake on a per bird per day basis independent of feed intake.
(2) Protein (g/b/d) may be increased in conjunction with methionine + cystine and energy to increase egg size.
(3) Approximately 65% of the added limestone should be in particle sizes of 2250 microns.
(4) The lower dietary feed energy recommendations generally are for higher feed intake values.

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)	66	60	66	60
Zinc (g)	66	60	66	60
Iron (g)	33	30	33	30
Copper (g)	4.4	4.0	8.8	8.0
Iodine (g)	0.9	0.8	0.9	0.8
Selenium (g)	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 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)	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 following table suggests expected feed consumption for the W-36 layer under thermoneutral conditions using a modern-type layer diet. The daily energy values are based on the energy prediction equation on page 16 (with modification based on actual performance experience for the W-36 layer) assuming standard body weight, production and egg size values from the performance table (pages 21-22) 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
18	64	14.1	188	50	95	20.9	272
19	68	15.0	200	51	95	20.9	272
20	71	15.7	209	52	95	20.9	272
21	74	16.3	218	53	95	20.9	272
22	77	17.0	224	54	95	20.9	272
23	80	17.6	230	55	95	20.9	272
24	83	18.3	239	56	95	20.9	272
25	86	19.0	247	57	95	20.9	272
26	88	19.4	253	58	95	20.9	271
27	89	19.6	256	59	96	21.2	271
28	90	19.8	259	60	96	21.2	270
29	90	19.8	259	61	96	21.2	270
30	91	20.1	262	62	96	21.2	270
31	91	20.1	262	63	96	21.2	270
32	92	20.3	265	64	96	21.2	270
33	92	20.3	266	65	96	21.2	270
34	93	20.5	268	66	96	21.2	270
35	94	20.7	271	67	96	21.2	270
36	94	20.7	271	68	96	21.2	270
37	94	20.7	271	69	96	21.2	270
38	95	20.9	274	70	96	21.2	270
39	95	20.9	274	71	96	21.2	270
40	95	20.9	274	72	96	21.2	270
41	95	20.9	274	73	96	21.2	270
42	95	20.9	274	74	96	21.2	270
43	95	20.9	274	75	96	21.2	270
44	95	20.9	273	76	96	21.2	270
45	95	20.9	273	77	96	21.2	270
46	95	20.9	272	78	96	21.2	270
47	95	20.9	272	79	96	21.2	270
48	95	20.9	272	80	96	21.2	270
49	95	20.9	272				

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-36 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 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 useful for 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 high in linoleic acid which generally benefits egg size, although a blend of vegetable oil and animal fat may 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 12, 14 &15).

		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 elevate 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-36 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. Many variations of non-fast programs are being used, but in general, a low nutrient density ration (Molt 1 in the following table) may be fed at 55-65 g/bird/day (12-14 Lbs./100/Day) as an alternative to total feed removal. The same body weight reduction targets should be achieved as in a fasting molt.

Because the Hy-Line layer maintains good egg shell quality to 80 weeks of age, it may be best to keep her in production rather than inducing a molt. However, the Hy-Line bird will perform very well after a rest, particularly in the latter weeks of the molt cycle, due to her 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 their best pre-molt values. Egg size will remain essentially unaffected and will continue to increase after production resumes. Hens that have returned to their initial adult body weight of 1270g (2.8 Lbs.) will give better post-molt shell quality and egg numbers than lesser weight losses.

Flocks with good shell quality at the end of the first cycle 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.

Molting Program

Day	Action
3-4 days before feed removal	Increase calcium to 5.00-5.25%.
1	Remove feed or begin feeding Molt 1. Set lights at 12 hours or equal to one hour more than longest natural day length in next three weeks, whichever is longer.
6 or more	Resume feeding at 1270g (2.8 Lbs.) with Molt 2 ration.
21	Increase light to 13 hours, or one hour more than during fasting, whichever is longest. Change feed to Molt 3 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. Continue with Phase A, B, and C formulas as directed.

Layer Molt Minimum Rations

Series	Grams/ Bird/Day	Lbs./100/ Day	Protein %	Ca%[1]	AvP%	Na%[2]	Cl%	Kcal/Kg	Met.%	TSAA%	Lys.%	Arg.%	Try.%
Molt 1	—	—	8-10	1.50	0.25	0.05	0.03	1650–2500	0.17	0.35	0.40	0.46	0.15
Molt 2	—	—	15.50	2.85	0.50	0.16	0.16	2750–2805	0.42	—	0.70	0.85	0.14
Molt 3	—	—	16.50	3.85	0.50	0.17	0.15	2895–2925	0.36	—	0.75	0.88	0.15
Peaking	85	19	17.95	4.55	0.48	0.21	0.20	2900–2940	0.41	0.68	0.92	1.04	0.19
	90	20	16.95	4.30	0.46	0.20	0.19	2980–2920	0.39	0.64	0.87	0.99	0.18
	95	21	16.05	4.10	0.44	0.19	0.18	2860–2900	0.37	0.61	0.82	0.94	0.17
	100	22	15.25	3.90	0.42	0.18	0.17	2840–2890	0.35	0.58	0.78	0.90	0.16
	105	23	14.50	3.75	0.40	0.17	0.16	2805–2855	0.33	0.55	0.74	0.86	0.15
Post–	85	19	17.65	4.80	0.44	0.21	0.20	2890–2930	0.39	0.63	0.89	1.02	0.18
Peak A	90	20	16.65	4.60	0.42	0.20	0.19	2870–2910	0.36	0.60	0.84	0.97	0.17
	95	21	15.80	4.40	0.40	0.19	0.18	2850–2890	0.34	0.57	0.80	0.92	0.16
	100	22	15.00	4.20	0.38	0.18	0.17	2825–2865	0.33	0.54	0.76	0.88	0.16
	105	23	14.30	4.00	0.36	0.17	0.16	2795–2835	0.31	0.51	0.72	0.84	0.15
Post–	90	20	16.65	4.80	0.39	0.20	0.19	2870–2910	0.35	0.58	0.83	0.95	0.16
Peak B	95	21	15.75	4.60	0.37	0.19	0.18	2850–2890	0.33	0.55	0.79	0.90	0.16
	100	22	15.00	4.35	0.35	0.18	0.17	2825–2865	0.32	0.52	0.75	0.86	0.15
	105	23	14.30	4.15	0.33	0.17	0.16	2795–2835	0.30	0.50	0.71	0.82	0.14
	110	24	13.65	4.00	0.31	0.16	0.15	2760–2800	0.29	0.47	0.68	0.79	0.14
Post–	95	21	15.50	4.70	0.35	0.19	0.18	2840–2880	0.32	0.53	0.77	0.88	0.15
Peak C	100	22	14.75	4.50	0.33	0.18	0.17	2815–2855	0.30	0.50	0.73	0.84	0.14
	105	23	14.05	4.30	0.31	0.17	0.16	2785–2925	0.29	0.48	0.70	0.80	0.14
	110	24	13.40	4.10	0.29	0.17	0.16	2725–2790	0.28	0.45	0.66	0.77	0.13
	115	25	12.85	3.95	0.26	0.16	0.15	2730–2770	0.26	0.43	0.63	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 Post-Molted Layers

Step 1 — The first feed offered after the period of weight reduction should be **Molt 2.** 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 weight reduction should be **Molt 3**. This should be fed after **Molt 2** 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 85 gm (19 Lbs.) peaking feed will be the choice in the warmer months whereas the 90 gm (20 Lbs.) peaking feed will be the choice in the cooler months. It is recommended that the peaking feed formula not be changed until a 10 gm (2 Lbs./100/D) change in feed intake has occurred and then change to the next higher intake formula. For example, if the first feed for the flock is peaking 85 gm (19 Lbs.) and intake increases to 95 gm (21 Lbs.), then change to a peaking 90 gm (20 Lbs.) formula. 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%.

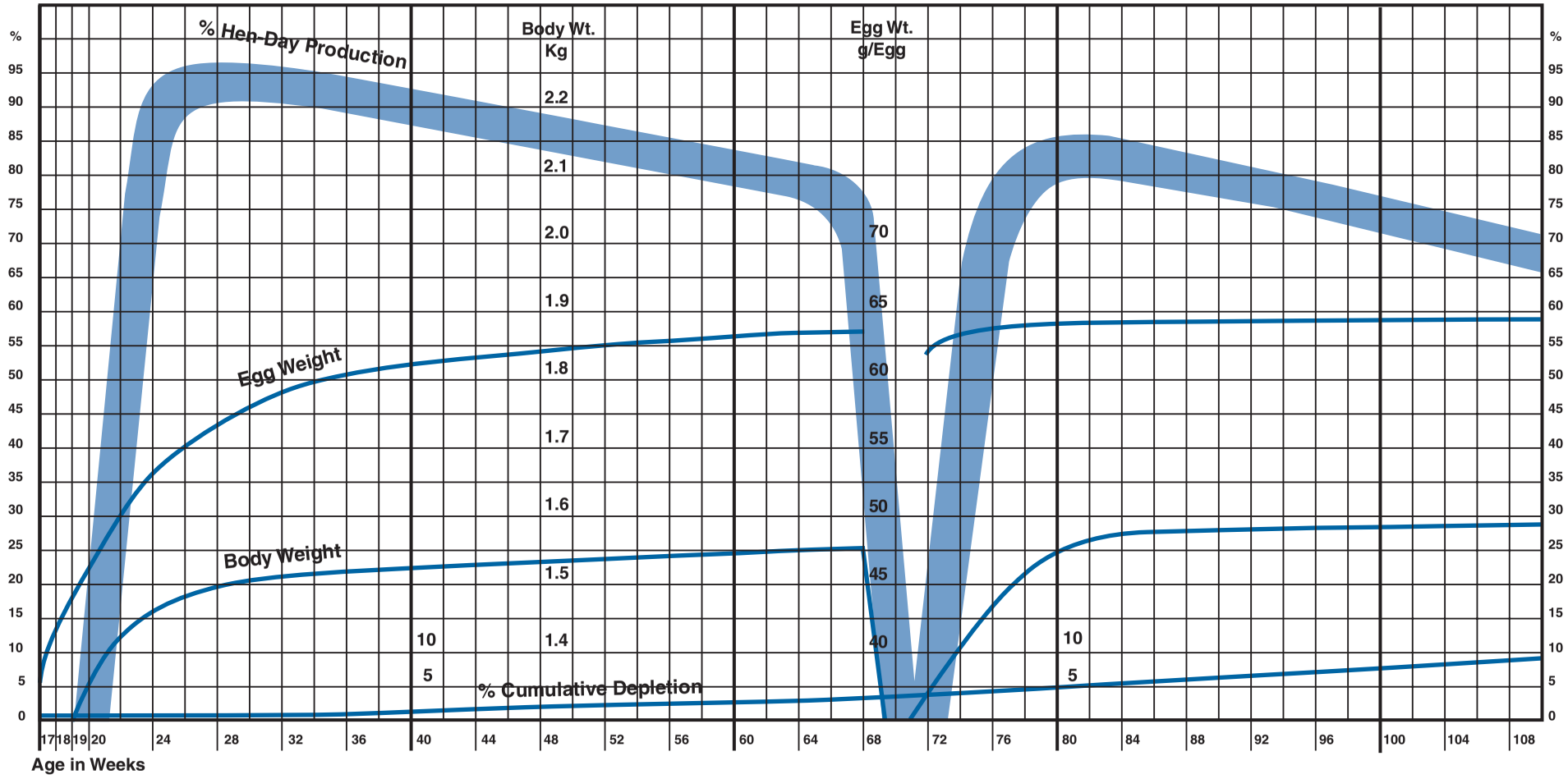
Hy-Line Variety W-36 Post-Molt Performance Table

Age in Weeks	% Hen-Day Lay Current	% Mortality Cum.	Hen-Day Cum.	Hen-Housed Cum.	Body Weight Kg	Body Weight Lbs.	Average Egg Weight* g/Egg	Average Egg Weight* Oz./Doz.	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	46	3.5	281.3	277.0	1.57	3.45	63.4	26.9	50.3	85	90	16.9	37.3
69	0	3.6	281.3	277.0	1.30	2.87	–	–	–	–	–	16.9	37.3
70	0	3.8	281.3	277.0	1.27	2.80	–	–	–	–	–	16.9	37.3
71	0	3.9	281.3	277.0	1.30	2.87	–	–	–	–	–	16.9	37.3
72	16	3.9	282.4	278.1	1.35	2.97	62.4	26.4	49.5	84	91	17.0	37.4
73	33	4.0	284.8	280.3	1.39	3.07	63.2	26.8	50.2	86	92	17.1	37.7
74	50	4.1	288.3	283.7	1.44	3.17	63.6	26.9	50.5	88	93	17.3	38.2
75	63	4.2	292.7	287.9	1.44	3.17	63.7	27.0	50.6	88	93	17.6	38.9
76	72	4.3	297.7	292.7	1.46	3.21	63.8	27.0	50.6	88	93	17.9	39.6
77	78	4.4	303.2	297.9	1.49	3.28	63.8	27.0	50.6	87	92	18.3	40.3
78	81	4.5	308.8	303.3	1.51	3.32	63.8	27.0	50.6	87	92	18.7	41.1
79	82	4.6	314.6	308.8	1.53	3.36	63.8	27.0	50.6	87	92	19.0	41.9
80	83	4.8	320.4	314.3	1.55	3.41	63.8	27.0	50.6	87	92	19.4	42.8
81	83	4.9	326.2	319.9	1.56	3.43	63.9	27.1	50.7	87	92	19.8	43.6
82	83	5.0	332.0	325.4	1.57	3.45	63.9	27.1	50.7	87	92	20.1	44.4
83	83	5.1	337.8	330.9	1.57	3.47	63.9	27.1	50.7	87	92	20.5	45.2
84	82	5.3	343.6	336.3	1.57	3.47	64.0	27.1	50.8	87	92	20.9	46.0
85	82	5.4	349.3	341.8	1.57	3.47	64.0	27.1	50.8	87	92	21.2	46.8
86	81	5.5	355.0	347.1	1.57	3.47	64.0	27.1	50.8	87	91	21.6	47.6
87	81	5.7	360.6	352.5	1.57	3.47	64.0	27.1	50.8	87	91	22.0	48.4
88	80	5.8	366.2	357.8	1.57	3.47	64.0	27.1	50.8	87	91	22.3	49.2
89	80	5.9	371.8	363.0	1.57	3.47	64.0	27.1	50.8	87	91	22.7	50.0
90	79	6.1	377.4	368.2	1.57	3.47	64.1	27.2	50.9	87	91	23.0	50.8
91	79	6.2	382.9	373.4	1.57	3.47	64.1	27.2	50.9	87	91	23.4	51.6
92	79	6.4	388.4	378.6	1.57	3.47	64.1	27.2	50.9	87	91	23.7	52.4
93	78	6.5	393.9	383.7	1.57	3.47	64.1	27.2	50.9	86	91	24.1	53.1
94	78	6.7	399.3	388.8	1.57	3.47	64.1	27.2	50.9	86	91	24.4	53.9
95	78	6.9	404.8	393.9	1.57	3.47	64.1	27.2	50.9	86	91	24.8	54.7
96	77	7.0	410.2	398.9	1.57	3.47	64.1	27.2	50.9	86	91	25.1	55.4
97	77	7.2	415.6	403.9	1.57	3.47	64.1	27.2	50.9	86	91	25.5	56.2
98	76	7.4	420.9	408.8	1.57	3.47	64.2	27.2	51.0	86	91	25.8	57.0
99	76	7.6	426.2	413.7	1.57	3.47	64.2	27.2	51.0	86	90	26.2	57.7
100	75	7.7	431.5	418.6	1.57	3.47	64.2	27.2	51.0	86	90	26.5	58.4
101	74	7.9	436.7	423.3	1.57	3.47	64.2	27.2	51.0	86	90	26.8	59.2
102	74	8.1	441.8	428.1	1.57	3.47	64.2	27.2	51.0	86	90	27.2	59.9
103	73	8.3	446.9	432.8	1.57	3.47	64.2	27.2	51.0	86	90	27.5	60.6
104	73	8.5	452.1	437.5	1.57	3.47	64.2	27.2	51.0	86	90	27.8	61.4
105	72	8.7	457.1	442.1	1.57	3.47	64.2	27.2	51.0	86	90	28.2	62.1
106	72	8.9	462.1	446.7	1.57	3.47	64.2	27.2	51.0	86	90	28.5	62.8
107	71	9.1	467.1	451.2	1.57	3.47	64.2	27.2	51.0	85	90	28.8	63.5
108	71	9.3	472.1	455.7	1.57	3.47	64.2	27.2	51.0	85	89	29.1	64.2
109	70	9.5	477.0	460.1	1.57	3.47	64.2	27.2	51.0	85	89	29.4	64.9
110	70	9.8	481.9	464.5	1.57	3.47	64.2	27.2	51.0	85	89	29.7	65.6

*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-36 Hen-Day Performance Graph
Molted Flocks



Hy-Line Variety W-36 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)	% Solids**
19								1.30	2.87										
20	16	16	.1	1.1	1.1	1.1	1.1	1.35	2.98	46.7	19.8	37.1	1	4	0.1	0.1	97.6	0.345	22.9
21	32	31	.1	3.4	3.3	3.4	3.3	1.40	3.08	48.1	20.4	38.2	2	8	0.2	0.3	97.2	0.345	23.1
22	58	55	.2	7.4	7.1	7.4	7.1	1.42	3.13	49.5	21.0	39.3	5	13	0.3	0.8	96.8	0.345	23.2
23	78	75	.3	12.9	12.4	12.9	12.4	1.44	3.18	51.1	21.6	40.6	10	23	0.6	1.4	96.4	0.345	23.4
24	89	86	.3	19.1	18.4	19.1	18.4	1.46	3.22	52.6	22.3	41.7	18	34	0.9	2.1	96.0	0.344	23.5
25	93	91	.4	25.6	24.8	25.6	24.7	1.47	3.24	53.9	22.8	42.8	26	45	1.3	2.8	95.6	0.344	23.6
26	94	92	.4	32.2	31.2	32.1	31.1	1.48	3.26	55.2	23.4	43.8	36	55	1.6	3.6	95.3	0.344	23.7
27	95	93	.5	38.9	37.7	38.7	37.6	1.49	3.29	56.2	23.8	44.6	44	63	2.0	4.4	95.0	0.344	23.8
28	95	94	.5	45.5	44.3	45.3	44.2	1.49	3.29	56.9	24.1	45.2	50	69	2.4	5.2	94.6	0.344	23.9
29	95	93	.6	52.2	50.8	51.9	50.6	1.50	3.31	57.5	24.4	45.6	55	73	2.7	6.1	94.2	0.343	24.0
30	95	93	.6	58.8	57.3	58.6	57.1	1.50	3.31	58.0	24.6	46.0	59	76	3.1	6.9	93.9	0.343	24.1
31	94	92	.7	65.4	63.8	65.1	63.5	1.51	3.32	58.4	24.7	46.3	62	79	3.5	7.7	93.6	0.343	24.2
32	94	92	.7	72.0	70.2	71.6	69.9	1.51	3.33	58.8	24.9	46.7	66	82	3.9	8.6	93.2	0.343	24.3
33	93	92	.8	78.5	76.7	78.1	76.3	1.51	3.33	59.2	25.1	47.0	69	84	4.3	9.4	92.9	0.343	24.4
34	93	92	.8	85.0	83.1	84.5	82.7	1.51	3.33	59.6	25.2	47.3	72	86	4.6	10.2	92.6	0.342	24.4
35	93	91	.9	91.5	89.5	91.0	89.0	1.51	3.33	59.9	25.4	47.5	75	88	5.0	11.1	92.3	0.342	24.5
36	92	91	.9	97.9	95.8	97.4	95.3	1.51	3.33	60.2	25.5	47.8	77	89	5.4	11.9	92.0	0.342	24.5
37	92	90	1.0	104.4	102.1	103.8	101.5	1.51	3.33	60.5	25.6	48.0	79	91	5.8	12.8	91.7	0.342	24.6
38	92	90	1.1	110.8	108.4	110.1	107.8	1.51	3.34	60.8	25.8	48.3	82	92	6.2	13.6	91.4	0.342	24.6
39	92	90	1.1	117.3	114.7	116.5	114.0	1.52	3.34	61.0	25.8	48.4	83	92	6.6	14.5	91.1	0.341	24.6
40	91	89	1.2	123.6	121.0	122.8	120.1	1.52	3.35	61.1	25.9	48.5	83	92	6.9	15.3	90.8	0.341	24.6
41	91	89	1.2	130.0	127.2	129.1	126.3	1.52	3.35	61.2	25.9	48.6	83	93	7.3	16.1	90.5	0.341	24.6
42	91	88	1.3	136.4	133.4	135.4	132.4	1.52	3.35	61.3	26.0	48.7	84	93	7.7	17.0	90.3	0.341	24.7
43	90	88	1.4	142.7	139.5	141.6	138.5	1.52	3.35	61.4	26.0	48.7	84	93	8.1	17.8	90.0	0.341	24.7
44	90	87	1.4	149.0	145.6	147.8	144.5	1.52	3.36	61.4	26.0	48.7	84	93	8.4	18.6	89.7	0.340	24.7
45	89	87	1.5	155.2	151.7	153.9	150.5	1.53	3.36	61.5	26.1	48.8	84	93	8.8	19.5	89.5	0.340	24.7
46	89	86	1.6	161.4	157.7	160.1	156.4	1.53	3.36	61.6	26.1	48.9	84	93	9.2	20.3	89.2	0.340	24.7
47	88	86	1.6	167.6	163.7	166.1	162.3	1.53	3.36	61.7	26.1	49.0	84	92	9.6	21.1	89.1	0.340	24.7
48	88	85	1.7	173.7	169.7	172.2	168.2	1.53	3.37	61.8	26.2	49.0	85	92	9.9	21.9	88.9	0.340	24.7
49	88	85	1.8	179.9	175.6	178.2	174.0	1.53	3.37	61.9	26.2	49.1	85	92	10.3	22.7	88.6	0.340	24.7
50	87	85	1.8	186.0	181.6	184.2	179.8	1.53	3.37	62.0	26.3	49.2	85	92	10.7	23.5	88.5	0.339	24.7

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

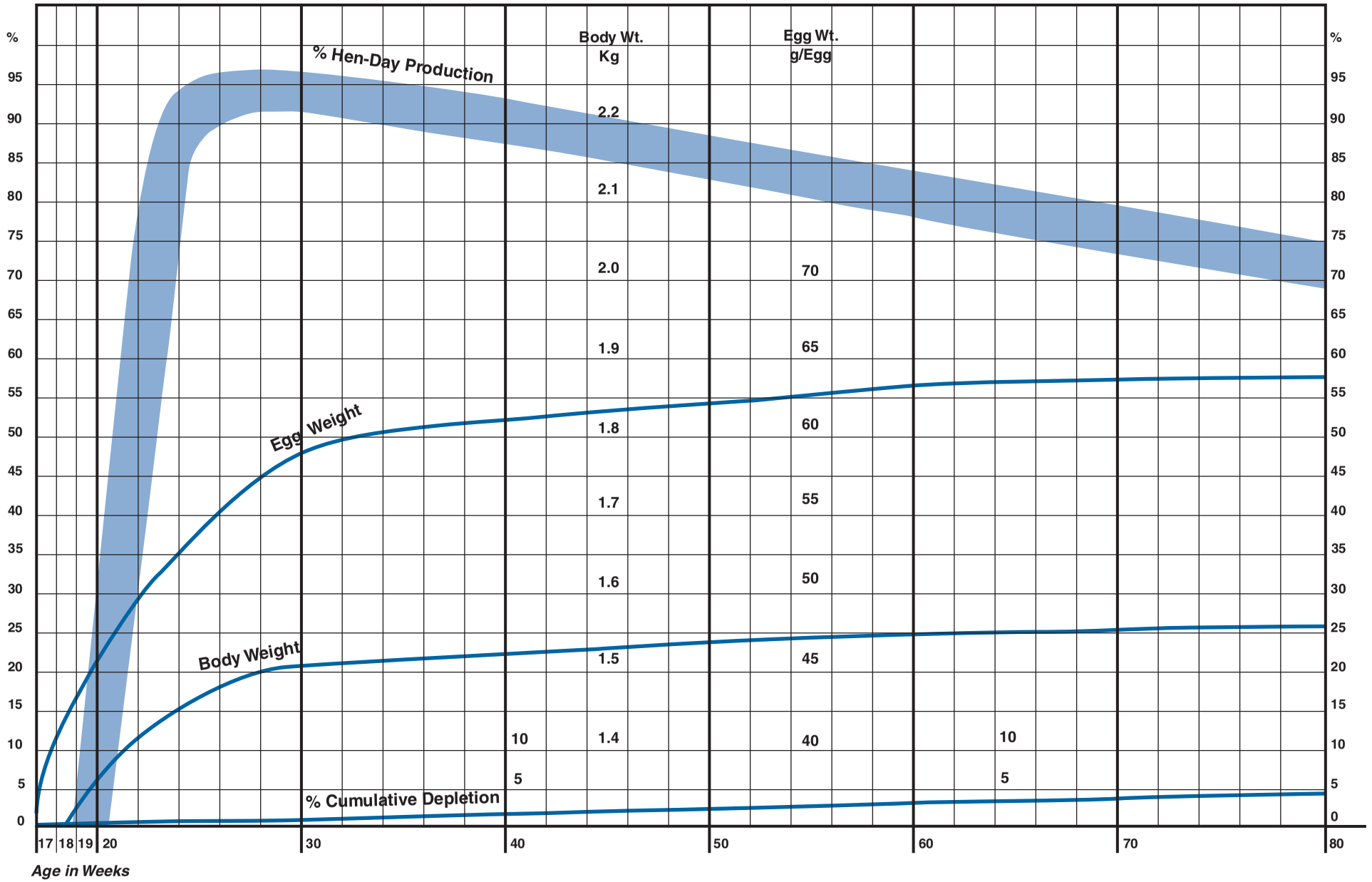
Hy-Line Variety W-36 Performance Table

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)	% Solids**
51	87	84	1.9	192.1	187.5	190.2	185.6	1.53	3.37	62.1	26.3	49.3	85	92	11.0	24.3	88.3	0.339	24.7
52	86	84	2.0	198.1	193.3	196.1	191.4	1.53	3.37	62.2	26.3	49.4	85	92	11.4	25.1	88.1	0.339	24.7
53	86	84	2.1	204.1	199.2	202.0	197.1	1.53	3.37	62.3	26.4	49.4	85	92	11.8	25.9	87.9	0.339	24.7
54	85	83	2.2	210.1	205.0	207.8	202.8	1.53	3.37	62.4	26.4	49.5	85	92	12.1	26.7	87.7	0.339	24.7
55	85	83	2.2	216.0	210.8	213.6	208.5	1.53	3.37	62.5	26.5	49.6	85	92	12.5	27.5	87.6	0.338	24.7
56	84	82	2.3	221.9	216.6	219.4	214.1	1.53	3.38	62.6	26.5	49.7	85	92	12.9	28.3	87.5	0.338	24.7
57	84	82	2.4	227.8	222.3	225.1	219.7	1.54	3.38	62.7	26.6	49.8	85	92	13.2	29.1	87.3	0.338	24.7
58	83	82	2.5	233.6	228.1	230.8	225.3	1.54	3.38	62.9	26.6	49.9	86	91	13.6	29.9	87.2	0.338	24.7
59	83	81	2.6	239.4	233.7	236.4	230.8	1.54	3.38	63.0	26.7	50.0	86	91	13.9	30.7	87.1	0.338	24.7
60	82	81	2.6	245.1	239.4	242.0	236.3	1.54	3.38	63.1	26.7	50.1	86	91	14.3	31.5	87.0	0.337	24.7
61	82	80	2.7	250.9	245.0	247.6	241.8	1.54	3.40	63.2	26.8	50.2	86	91	14.6	32.3	86.9	0.337	24.7
62	81	80	2.8	256.6	250.6	253.1	247.2	1.54	3.40	63.2	26.8	50.2	86	91	15.0	33.1	86.8	0.337	24.7
63	81	79	2.9	262.2	256.1	258.6	252.6	1.54	3.40	63.3	26.8	50.2	86	91	15.3	33.8	86.7	0.337	24.7
64	80	79	3.0	267.8	261.7	264.0	258.0	1.55	3.41	63.3	26.8	50.2	86	91	15.7	34.6	86.6	0.337	24.7
65	80	79	3.1	273.4	267.2	269.5	263.3	1.55	3.41	63.3	26.8	50.2	86	91	16.0	35.4	86.5	0.336	24.7
66	79	78	3.2	279.0	272.7	274.8	268.6	1.55	3.41	63.4	26.9	50.3	86	91	16.4	36.1	86.4	0.336	24.7
67	79	78	3.3	284.5	278.1	280.2	273.9	1.55	3.42	63.4	26.9	50.3	86	91	16.7	36.9	86.3	0.336	24.7
68	79	77	3.4	290.0	283.5	285.5	279.1	1.55	3.42	63.4	26.9	50.3	86	91	17.1	37.7	86.2	0.336	24.7
69	78	77	3.5	295.5	288.9	290.8	284.3	1.55	3.42	63.4	26.9	50.3	86	91	17.4	38.4	86.1	0.336	24.7
70	78	77	3.6	300.9	294.3	296.0	289.5	1.55	3.42	63.4	26.9	50.3	85	91	17.8	39.2	86.0	0.335	24.7
71	78	76	3.7	306.4	299.6	301.3	294.6	1.56	3.43	63.4	26.9	50.3	85	90	18.1	39.9	85.9	0.335	24.7
72	78	76	3.8	311.9	304.9	306.6	299.7	1.56	3.43	63.4	26.9	50.3	85	90	18.4	40.7	85.8	0.335	24.7
73	77	75	3.9	317.2	310.2	311.7	304.8	1.56	3.43	63.5	26.9	50.4	85	90	18.8	41.4	85.7	0.335	24.7
74	77	75	4.0	322.6	315.4	316.9	309.8	1.56	3.43	63.5	26.9	50.4	85	90	19.1	42.1	85.6	0.335	24.7
75	76	74	4.1	328.0	320.6	322.0	314.8	1.56	3.44	63.5	26.9	50.4	85	90	19.4	42.9	85.5	0.334	24.7
76	76	74	4.2	333.3	325.8	327.1	319.8	1.56	3.44	63.5	26.9	50.4	85	90	19.8	43.6	85.4	0.334	24.7
77	75	73	4.3	338.5	330.9	332.1	324.6	1.56	3.44	63.5	26.9	50.4	85	90	20.1	44.3	85.3	0.334	24.7
78	74	73	4.4	343.7	336.0	337.1	329.5	1.56	3.44	63.5	26.9	50.4	85	90	20.4	45.0	85.2	0.334	24.7
79	73	72	4.5	348.8	341.0	342.0	334.3	1.56	3.44	63.5	26.9	50.4	85	90	20.7	45.7	85.1	0.334	24.7
80	73	72	4.6	353.9	346.1	346.8	339.1	1.56	3.44	63.5	26.9	50.4	85	90	21.1	46.4	85.0	0.333	24.7

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

Hy-Line® BRAND LAYERS

W-36 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	39.3	0.0	0.1	5.0	44.0	45.3	5.7
24	41.7	0.0	0.8	17.9	55.7	24.3	1.4
26	43.8	0.0	3.3	34.1	50.9	11.3	0.4
28	45.2	0.2	7.0	44.6	42.3	5.9	0.1
30	46.0	0.3	10.2	50.7	35.5	3.4	0.0
32	46.7	0.4	13.0	54.6	30.0	2.0	0.0
34	47.3	0.5	16.5	57.5	24.3	1.1	0.0
36	47.8	0.7	19.5	58.3	20.8	0.7	0.0
38	48.3	0.8	23.0	59.7	16.1	0.4	0.0
40	48.5	1.2	25.4	58.1	14.9	0.4	0.0
42	48.7	1.3	26.8	57.6	13.9	0.3	0.0
44	48.7	1.6	27.8	56.4	13.9	0.3	0.0
46	48.9	1.8	29.2	55.8	13.0	0.3	0.0
48	49.0	2.2	30.7	54.2	12.5	0.3	0.0
50	49.2	2.7	32.2	52.7	12.2	0.3	0.0
52	49.4	3.0	33.5	51.9	11.3	0.3	0.0
54	49.5	3.6	34.8	50.5	10.9	0.3	0.0
56	49.7	3.9	36.1	49.5	10.3	0.3	0.0
58	49.9	4.8	37.8	47.5	9.6	0.3	0.0
60	50.1	5.6	38.8	46.1	9.2	0.3	0.0
62	50.2	5.9	39.4	45.6	9.0	0.3	0.0
64	50.2	6.1	39.9	45.1	8.6	0.3	0.0
66	50.3	6.3	40.5	44.6	8.3	0.2	0.0
68	50.3	6.3	40.5	44.6	8.3	0.2	0.0
70	50.3	6.3	40.5	44.6	8.3	0.2	0.0
72	50.3	6.3	40.5	44.6	8.3	0.2	0.0
74	50.4	6.6	41.0	44.1	8.0	0.2	0.0
76	50.4	6.6	41.0	44.1	8.0	0.2	0.0
78	50.4	6.6	41.0	41.1	8.0	0.2	0.0
80	50.4	6.6	41.0	41.1	8.0	0.2	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	49.5	0.0	0.1	21.2	78.7
24	52.6	0.0	1.2	45.4	53.5
26	55.2	0.0	4.8	63.2	32.0
28	56.9	0.0	9.7	70.0	20.3
30	58.0	0.1	13.8	72.3	13.9
32	58.8	0.1	17.5	72.0	10.5
34	59.6	0.1	21.9	71.3	6.7
36	60.2	0.2	25.6	69.6	4.7
38	60.8	0.2	29.8	66.8	3.2
40	61.1	0.3	32.7	64.2	2.8
42	61.3	0.3	34.3	62.5	2.8
44	61.4	0.4	35.4	61.4	2.8
46	61.6	0.5	37.0	59.8	2.7
48	61.8	0.6	38.9	57.9	2.7
50	62.0	0.8	40.6	56.1	2.5
52	62.2	0.9	42.2	54.6	2.3
54	62.4	1.2	43.7	52.9	2.2
56	62.6	1.4	45.3	51.3	2.1
58	62.9	1.8	47.4	48.9	2.0
60	63.1	2.2	48.7	47.2	2.0
62	63.2	2.3	49.4	46.5	1.9
64	63.3	2.4	50.1	45.8	1.8
66	63.4	2.5	50.8	45.1	1.7
68	63.4	2.5	50.8	45.1	1.7
70	63.4	2.5	50.8	45.1	1.7
72	63.4	2.5	50.8	45.1	1.7
74	63.5	2.6	51.4	44.3	1.6
76	63.5	2.6	51.4	44.3	1.6
78	63.5	2.6	51.4	44.3	1.6
80	63.5	2.6	51.4	44.3	1.6

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 14) are based on calculations utilizing these ingredient nutrient values.

Hy-Line®
BRAND
LAYERS

A PUBLICATION OF
HY-LINE INTERNATIONAL
1755 West Lakes Parkway
West Des Moines, Iowa 50266 U.S.A.
Telephone: 515-225-6030
Fax: 515-225-6425
www.hyline.com

(01/07) Printed in U.S.A.