

ANR-P1 2021

Poultry Production

Broiler and Layer Nutrition

The bird needs 6 major nutrient classes:

Carbohydrates • Protein • Fat • Vitamins • Minerals • Water

However, many factors which may be considered basic needs can interfere with optimal utilization of these nutrients. These include: (1) Fresh Feed, (2) Fresh Water, (3) Fresh Air, (4) Light, (5) Darkness, (6) Thermal Environment, and (7) Protection Space.



Feeding Schemes

Broilers are typically fed in three phases and the nutrient requirements are specific for each phase of growth. These phases include (1) starter, (2) grower and (3) finisher. The starter and grower feeds have relatively high levels of Metabolizable energy and protein to facilitate muscle growth, and moderately high mineral content such as calcium and phosphorus for skeletal development. As the demand for the high concentration of nutrients, other than Metabolizable energy, decrease with age of the birds, the nutrients' concentrations in the feed are also decreased proportionately (Table 1). The increase in Metabolizable energy with age of the broilers meet the increasing demand for maintenance. Layers are also fed in phases, but because their maintenance needs are not as high as those of broilers, a constant energy level is maintained throughout the production cycle to minimize weight gain which can adversely affect egg production. Crude protein in the diet is decreased with a decline in egg production as the birds age to reduce the cost of feeding. For free range, birds will pick up other feedstuffs, but these are not sufficient to meet their nutritional needs.

Table 1. Nutrient specifications for broilers

Nutrient	Starter (0-10 days)	Grower (11-22 days)	Finisher (23-42 days)
Metabolizable Energy (Kcal ME/lb.)	1,360	1,397-1,406	1,429-1,451
Crude Protein (%)	21-22	19-20	18-19
Digestible Lysine (%)	1.22-1.32	1.12-1.19	1.02-1.05
Digestible Methionine (%)	0.46-5.0	0.45-0.48	0.42-0.43
Digestible Methionine + Cysteine (%)	0.91-0.98	0.85-0.89	0.80-0.82
Digestible Arginine (%)	1.25-1.28	1.18-1.25	1.07-1.13
Calcium (%)	0.90	0.84-0.90	0.76-0.78
Available Phosphorus (%)	0.45	0.42-0.45	0.38-0.40
Feed Texture	Crumble	Pellet	Pellet

National Research Council, 1994; Cobb500 Nutrition Supplement.

Table 2. Nutrient specifications for Layers

Nutrient	Starter (0-6 Wks)	Grower (6-14 wks)	Developer (14-16 wks)	Prelay (16-18 wks)	Layer Phase I (20-40 wks)	Phase II (40-60 weeks)	Phase III (60-72 wks)	2nd Year
Metabolizable Energy (Kcal ME/lb.)	1,320	1,320	1,320	1,320	1,320	1,300	1,280	1,272
Crude Protein (%)	18	16	12	16-18	17-18	16	14.5	14
Digestible Lysine (%)	0.85	0.60	0.45	0.9	0.7	0.6	0.55	0.55
Digestible Methionine (%)	0.30	0.25	0.20	0.30-0.32	0.32	0.28	0.27	0.27
Methionine + Cysteine (%)	0.60	0.50	0.40	0.55-0.60	0.55-0.58	0.53	0.50	0.50
Digestible Arginine (%)	1.20	1.10	1.00	0.90	1.15	1.20	1.25	1.25
Calcium (%)	0.80	0.70	0.60	2.00	3.50	3.60	3.75	4.00
Available Phosphorus (%)	0.40	0.35	0.30	0.45	0.45	0.40	0.35	0.40
Linoleic Acid, %	-	-	-	-	1.20	1.00	1.00	1.00
Feed Texture	Mash	Mash	Mash	Mash	Mash	Mash	Mash	Mash

National Research Council, 1994; Commercial Poultry Production Manual, Bell and Weaver, 2002; wks=weeks.

Feed Texture

Broilers: The starter feeds are fed as crumbles. Crumbles are used to accommodate the oral cavity of the birds as newly hatched chicks are unable to consume whole pellets. The transition from Starter feed to Grower feed will involve a change of texture from crumbs to pellets. Pelletizing improves feed efficiency, minimizes waste, and reduces the dustiness of the feed. Good quality feed maximizes broiler performance (Bell and Weaver, 2002).

Layers: The layers are fed mash feed.

Things to look for when purchasing feed:

1. Read the labels to ensure the nutrient content as provided in Tables 1 and 2
2. Determine the date when the feed was mixed. Older feeds tend to lose nutrient content or nutrients such as vitamin potency decline over time and thus need fortification. Try buying smaller lots, enough to feed your birds so that you don't store feed for longer periods;
3. Determine if the feed mills test and guarantee the nutrient content of the mixed feeds to ascertain content. Alternatively, submitting samples of the feed to analytical labs is advisable. If it is costly, several producers can team up to pay for the cost of the nutrient analysis. Feed nutrient analysis should be done in cases where there are signs of nutrient deficiencies. If you are seeing signs of nutrient deficiencies, it is advisable to have your feed analyzed for nutrient content in analytical labs. Example labs include Barrow-Agee Laboratories, LLC in Memphis, TN and the Donald Danforth Plant Science Center Proteomics & Mass Spectrometry Facility in St. Louis, MO.
4. Understand the feed ingredients used to formulate the feed and their source. For the most part the primary feed ingredients will be corn and soybean; and
5. Understand the energy content of the feed. Energy is important because it governs feed intake. High energy lowers feed intake while low energy increases feed intake. Therefore, this change in feed consumption can also affect the intake of other nutrients and ultimately affect bird performance.



Feed Storage:

1. Store feed in containers (plastic) to prevent mice, rats and other insects from accessing the feed;
2. Store feed away from direct sunlight, possibly in the garage in a cool area. Exposure of feed to heat or sunlight diminishes the value of vitamins, essential fatty acids and antioxidants;
3. Rotate feed every 2-4 weeks, especially during the summer months;
4. Keep feed away from moist environments for this will cause mold spoilage; molds in feed can produce mycotoxins which can be very toxic to birds and lethal;
5. Ensure that there is ventilation in the feed storage area;
6. If stored in a well ventilated and dry, cool area, poultry feed can last up to 2-3 months, but this is entirely dependent on the storage conditions. The higher the turnover rate for the feed from when it was purchased the better to avoid longer storage periods;
7. Keep the feed off the ground to avoid condensation and moisture penetration into the feed; and
8. Store poultry feed away from chemicals and drugs to avoid contamination.

References:

Bell, D.D., and W.D. Weaver Jr. 2002. *Commercial Chicken Meat and Egg Production*. 5th ed. Kluwer Academic Publisher, Cambridge, Massachusetts.

Cobb 500 Broiler Performance and Nutrition Supplement manual (https://www.academia.edu/38382168/Cobb_500_Broiler_Performance_and_Nutrition_Supplement. Last accessed June 14, 2021)

Hy-Line International. *White Leghorn layers production manual*, 2020.

National Research Council. 1994. *Nutrient Requirements of Poultry*. 9th rev. ed. Natl. Acad. Press, Washington, DC.