

## Determining Nutrient Intake of Broiler Breeders and Commercial Layers

### Match Diets to Needs

It makes good economic sense to match the diet of breeders and layers to their actual needs. If birds are underfed, production will suffer. If birds are overfed, the feed is wasted on oversize eggs and heavier-than-optimum hens. A hen, at optimum body weight, will have lower nutrient requirements for maintenance, be more likely to reach production potential, have better hatchability and maintain shell quality longer.

The first step to determine if layers and breeders are being fed to their actual needs is to calculate the intake of certain key nutrients. Once this is known, the appropriate ration adjustment can be made. This PS&T Guide explains the steps needed to obtain information on reliable nutrient intake.

### Determine Feed Consumption

Before determining any nutrient intake, a consistent and accurate feed consumption estimation program must be followed. Many different ways are available to measure the quantity of feed fed in our modern breeder and layer houses. Each poultry facility is somewhat unique; not all measuring systems will function well depending upon which equipment system is used. Dump scales, along with routine bin inventorying, is the most common method used in the field. PS&T Guide No. 24, "Feed Measurement," should be consulted for more information. Any errors greater than 2% will make the information on feed consumption unsuitable in determining nutrient intake; therefore, measuring feed consumption must be accurate.

#### Step 1 – Calculating Feed Consumption.

Feed consumption per bird is determined by the formula:

$$\frac{\text{Feed consumed per day by entire flock}}{\text{Number of birds}} = \text{feed consumption/bird/day}$$

**Example 1:** Calculate feed consumption for a broiler breeder flock of 7,820 hens and 790 cockerels that consumed 2,927 lbs of feed in a 24-hour period.

$$\frac{2,927 \text{ lbs}}{8,610 \text{ birds}} = 0.34 \text{ lbs/bird/day}$$

**Example 2:** Calculate feed consumption for a table egg flock of 50,650 hens that consumed 11,350 lbs of feed in a 24-hour period.

$$\frac{11,350 \text{ lbs}}{50,650 \text{ birds}} = 0.224 \text{ lbs/bird/day}$$

#### Step 2 – Calculating Energy Consumption.

Metabolizable energy (ME) intake is determined using the formula:

$$(\text{Feed/bird/day}) \times (\text{Kcal ME/lb of feed}) = \text{ME/bird/day.}$$

If the broiler breeder flock in **Step 1** were being fed a 1,300 Kcal/lb ration, their ME intake would be:

$$0.34 \text{ lbs/day} \times 1,300 \text{ Kcal/lb} = 442 \text{ Kcal ME/bird/day.}$$

If the table egg flock in **Step 1** were being fed a 1,285 Kcal/lb ration, their ME intake would be:

$$0.224 \text{ lbs/day} \times 1,285 \text{ Kcal/lb} = 288 \text{ Kcal ME/bird/day.}$$

#### Step 3 – Calculating Other Nutrients.

Intake of nutrients such as protein, amino acids and minerals are determined with the formula:

$$\text{Feed/bird/day} \times \text{decimal of \% nutrient in ration} \times 454 \text{ (grams/lb)} = \text{grams nutrient/bird/day}$$

**Examples:** Following are some nutrient intake determinations for the example of broiler breeder flock in **Step 1** that were fed a ration which contained 16% protein, 0.6% total sulfur amino acids (TSAA) and 3.0% calcium:

- *Protein* =  $0.34 \times .16 \times 454 = 24.7 \text{ g protein/bird/day}$
- *TSAA* =  $0.34 \times .006 \times 454 = 0.926 \text{ g or } 926^a \text{ mg TSAA/bird/day}$
- *Calcium* =  $0.34 \times .030 \times 454 = 4.63 \text{ g/bird/day.}$

As a comparison, calculation of TSAA intake for a leghorn flock consuming 0.224 lbs/bird/day of a ration containing 0.6% TSAA would be determined as follows:

$$\text{TSAA} = 0.224 \times 0.006 \times 454 = 0.61 \text{ g or } 610 \text{ mg}^a$$

#### Step 4 – Comparing Optimum Nutrient with Actual.

Once nutrient intake has been determined, the next step involves comparing the actual nutrient intake with a standard. If accurate records are kept, often an organization can develop their own standards to fit their unique situation. Table 1 shows a hypothetical standard

## Nutrient Intake and Other Management Tools

for broiler breeders compared with the calculations in the above examples with both 0.35 and 0.34 lbs/bird/day consumption rates. This comparison indicates the birds eating 0.34 lbs/bird/day have adequate nutrient intake for all nutrients. The 0.35 lbs/bird/day flock would be overconsuming nutrients. The person supervising the flock that is consuming 0.35 lbs/bird/day would have to choose to cut back on feed (restrict intake) or formulate a diet with lower nutrient levels to maintain optimum body weight and egg size. A hypothetical standard for commercial layers is compared in Table 2. Consumption rates of 0.21 and 0.22 lbs/bird/day are used in the example. This comparison demonstrates that the birds eating 0.21 lbs/bird/day have inadequate nutrient intake for all nutrients except lysine while the birds consuming 0.22 lbs/bird/day are consuming their nutrient needs. The supervisor of the flock consuming 0.21 lb/bird/day would have to raise the nutrient level in the ration being fed or change feed management to increase feed consumption. This situation commonly arises in hot weather with leghorn layers.

While determination of nutrient intake can be used as a management tool to assure adequate nutrition, its use, along with other management procedures, complements its effectiveness. For example, a program which includes routine determination of egg weight, body weight, and rate of production along with nutrient intake will give a better evaluation of a flock's nutritional status than just one factor.

Nutritional intake standards have been developed for most breeds of chickens. Most of these nutritional standards have used Nutrition Research Council requirements as a base with adjustment considering the breed's characteristics and other information about that particular breed. Note that nutrient standards should be used only as guides because every flock will be unique, due to health and environmental conditions, management, molting status, or other reasons.

<sup>a</sup>Multiply grams (g) by 1,000 to obtain milligrams (mg).

**Table 1. Broiler breeder nutrient consumption comparison to standard.**

Nutrient	Ration Specifications	Example 0.34 lb/bird/day	Example 0.35 lb/bird/day	Example Standard/ Bird/Day
Energy (M.E.)	1,300.00 Kcal	442.00 Kcal	455.00 Kcal	440.00 Kcal
Protein	16.00%	24.70 g	25.40 g	24.00 g
TSAA	0.60	926.00 mg	953.00 mg	850.00 mg
Ca	3.00	4.63 g	4.77 g	4.50 g

**Table 2. Commercial layers nutrient consumption comparison to standard.**

Nutrient	Ration Specifications	Example 0.21 lb/bird/day	Example 0.22 lb/bird/day	Example Standard/ Bird/Day
Energy (M.E.)	1,300.00 Kcal	273.0 Kcal	286.0 Kcal	290.0 Kcal
Protein	16.00%	15.3 g	16.0 g	16.0 g
TSAA	0.65	620.0 mg	649.0 mg	640.0 mg
Ca	3.80	3.6 g	3.8 g	3.8 g

### Prepared by

T.A. Carter, J.B. Carey, M.J. Wineland  
Extension Poultry Specialists

and

J.T. Brake  
Assistant Professor

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