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**FACTORS TO CONSIDER IN THE FORMULATION OF DIETS FOR OPTIMAL
LAYER PERFORMANCE**

H. John Kuhl, Jr., Ph.D.
Nest Egg Nutrition
1252 Sorensen Lane
Gardnerville, NV 89460

Ph: 775-265-7438; Fax: 775-265-6589
e-mail: johnkuhl@nest-egg-nutrition.com

Introduction

There are many references for use in establishing parameters for layer feed formulation. The National Research Council, Nutrient Requirements of Poultry, depict nutrient levels which result in the absence of deficiency symptoms. These should be considered as minimal requirements. The genetics companies publish nutrient requirements for individual strains of layers in management guides. These should be considered, for the most part, as optimum nutrient levels. Most layer feeds are actually formulated to nutrient levels somewhere in between.

The reason the title of this paper uses the word “optimal” and not “optimum” is that the definition of optimum is “best” while optimal is “most favorable or desirable.” Our diet specifications should be optimal. The specifications should be influenced by factors found in each operation and for a specific market.

Nutritionists routinely evaluate ingredients and adjust nutrient levels in ingredients. We also must be able to evaluate the affect of environment, management, flock health, egg market, market type, strain differences and government regulation upon the feed program and nutrient requirements.

ENVIRONMENT

Even in the newest of layer houses, our feeding programs are affected by the environment around the chicken. Houses are heated with feed energy. Reduced cage density amplifies this affect. Poor ventilation or the desire to keep house temperatures up during winter months will reduce the oxygen content of air in the house. This combined with increased levels of ammonia will result in decreased feeding activity. Adjustments to house temperature can be an effective means to increase feed intake in young layers or decrease feed intake in older hens.

Lighting programs can influence feeding activity. During summer months the addition of increased day length during the cool hours of the day will result in increased feed intake.

MANAGEMENT

The decision as to house design, cage density, feeder system, lighting program, temperature, ventilation, length of the laying period, feeding times and feed depth all rest with management. Each of these factors needs to be considered in determining the density of the diet. Not enough feedings or shallow feed depth will result in low flock body weight uniformity and lower than expected egg production.

FLOCK HEALTH

Flock health problems may be persistent or temporary. Kidney damage from bronchitis or caused from the feeding of high levels of calcium to chicks would be examples of persistent nutrition related health problems. Soft bones or “caged layer fatigue” is an example of a temporary nutrition related health problem. Either case should signal a reevaluation of diets and factors found under our topics of environment and management.

EGG MARKET

The layer industry has a history of low markets for long periods of time. During those periods or during times of high ingredient cost, feeding for maximum egg production and/or the lowest feed conversion may not be the ideal program. Cost analysis may indicate the use of lower density diets at a higher feed intake level. Maximizing profit or minimizing loss should be the goal of the nutritionist.

MARKET TYPE

There is a difference in feeding programs for table egg or breaker operations. Egg size is critical to both types of operations but for different reasons. The table egg operation needs to reach 48 to 48.5 average case weight as quickly as possible and hold any further size increase to the minimum. The breaker operation needs to reach maximum egg mass and try to maintain it. In general, energy intakes are higher for hens in breaker operations.

STRAIN DIFFERENCES

The genetic improvement in today's layers is phenomenal. Peak egg production in the 93 to 97 percent range is normal. Is 100 percent peak egg production in the near future? Egg production persistence has improved and some flocks maintain over 90 percent production past 55 weeks of age. Diet specifications need to be examined in light of the performance potential of today's layers. Nutritional needs differ among the strains of layers. Body size, egg size and activity are three factors that influence diet differences among strains.

GOVERNMENT REGULATION

Ammonia (nitrogen), phosphorus, sodium and trace mineral levels in manure or air either are now regulated or face the possibility of regulation. This factor may force diet specifications even farther away from the optimum nutrient intake level.

Compliance with regulatory measures must take precedent over cost of production if the individual company is to survive.

SUMMARY

The affect of environment, management, flock health, egg market, market type, strain difference and government regulation upon diet specifications for layers was discussed in general. The presentation has specific examples for each factor. The layer nutritionist must evaluate each factor singularly and in combination with all other factors in order to establish optimal nutrient specifications for individual operations. The future holds a lot of challenge for the layer nutritionist and his or her most valuable trait will be adaptability.