

*Director's
Digest*



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FAT IN LAYING HEN RATIONS

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Ambient temperatures exert a profound effect on laying hen performance as a result of the inverse relationship between feed intake and temperature. Temperature affects both the energy required for maintenance and energy intake, and, as a result, influences both the rate of egg production and efficiency of production. Economic considerations limit the degree to which housing and ventilation can be used to control the environment.

Since feed represents the major cost in the commercial production of eggs, it seems reasonable to explore any possibilities for improvement in feed utilization in order to reduce feed costs and produce eggs more efficiently. We all learned in our elementary nutrition courses that fat is a highly concentrated source of energy, and, as a result of experiments over the last 30 years, that feed consumption in poultry is directly related to the energy content or energy density of the diet, provided other nutrients are balanced to meet the laying hen's requirement. An obvious way of

reducing feed costs is the inclusion of fat into the diet to reduce the total amount of feed required for maintenance and egg production.

Fat is a more energetically efficient source of energy for egg production than carbohydrate. Glucose from dietary carbohydrate is stored as glycogen, with about 5% of the metabolizable energy being lost in this process. However, when glucose must be converted to fat for deposition in eggs, considerable loss occurs, amounting to 18 to 22%. Fat is much more efficiently utilized; only somewhat less than 5% of the energy in the fat molecule is lost when it is taken up and deposited into eggs or stored as adipose tissue. The energy losses from the conversion of carbohydrate to fat produce an added heat load on animals during periods of high temperature stress and also increase the amounts of energy required in the dissipation of this excess heat.

In the last 10 years other advantages have been identified for the addition of fat to the diet of the laying hen. The first of these is an increase in energy intake as a result of added fat. Even though total feed intake is reduced with the increased energy density of fat supplemented diets, energy intake is usually higher. This is especially important during periods of hot or cold temperature stress. During cold periods more energy is needed to maintain body temperature and less is available for egg formation. High temperatures cause a reduction in feed intake as a result of the need to reduce the heat load on the hen and the requirement to dissipate heat generated in the body. This results in the use of body energy stores for egg production initially and a subsequent decrease in egg production when body energy reserves are depleted. The laying hen will not maintain a high rate of production for an extended period of time when confronted with an energy deficit. Adding fat during periods of high temperature causes the animals to consume higher levels of energy, and, therefore, more nearly meet the requirements for high levels of egg production.

A second advantage results from the fact that fat is a much better source of energy for fat deposition in eggs than is carbohydrate. Fat supplemented diets are more energetically efficient.

A third advantage associated with fat use in the diet of laying hens is an improved utilization of the other nutrients in the diet. Dietary fat in all animals results in a slower rate of feed passage through the intestinal tract, and one benefit associated with this is that lower quality feeding ingredients are

digested to a greater extent. These facts serve as an explanation for a number of the papers which appeared in the early 1980's indicating that the metabolizable energy of dietary fat was higher than its gross energy. This is an "artifact" associated with improved digestibility of the ingredients present in the basal diets used in these metabolizable energy measurements.

The amounts of supplemental fat needed to obtain the benefits discussed above are in the range of 4 to 5%. It is especially important to consider adding fat to all poultry diets during periods of extreme temperature, either hot or cold. Fat additions are more beneficial to laying birds during the early phases of production. Older birds, near the end of the laying cycle, tend to deposit more abdominal fat, and less of the increased energy consumed is deposited in eggs. The problems associated with excessive fat deposition in poultry, more particularly in broilers, have led nutritionists to consider the elimination of fat from poultry diets. In actuality, the reverse would probably be more advantageous. Biochemical studies show that dietary fat reduces the activity of the fat synthesizing enzymes within the body, and most of the studies with poultry have failed to show an increase in body fat deposition as a result of fat feeding, provided dietary amino acid balance is maintained.