

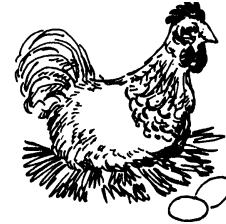


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**Cooperative Extension Service**

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NOVEMBER 2006



## **COMMERCIAL EGG TIP . . .**

### **BIOFUELS AND POULTRY PRODUCTION**

The generation of biofuels using current technology (ethanol from the fermentation of corn, biodiesel from fats and oils) is viewed as a means by which the United States can reduce its importation of petroleum. Estimates of the degree to which this will occur vary according to the assumptions made by the people making projections. Variables such as the amount of fossil fuel needed to grow, harvest, dry and transport grain, crop yield per acre, and fermentation efficiency all greatly affect estimates of net energy gain. As the production of biofuels has become established public policy, it is not surprising that the poultry (as well as swine) sector is questioning the impact of biofuel production on animal feeding and the overall efficiency of production. It is the purpose of this brief report to review the basis of some of those concerns.

During the past few years, this laboratory has conducted numerous studies to document the nutritive value of DDGS (distiller's dried grains plus solubles). In general, three lbs. of corn, when fermented, yield 1 lb. of DDGS, the remainder being ethanol and carbon dioxide. The results of this research have been very positive. DDGS is free of the toxic or anti-nutritional factors such as the gossypol in cottonseed meal or trypsin inhibitors in underheated soybean meal. Phosphorus availability is about twice as high in DDGS as in the original corn. By coincidence, both the protein and metabolizable energy of DDGS are almost exactly midway between those of corn and dehulled soybean meal, the two principal ingredients in poultry feed. Repeated studies at this and other institutions have confirmed that DDGS is a valuable ingredient for broilers, commercial layers, turkeys and swine.

Concerns being increasingly heard around the poultry industry do not question the feeding value of DDGS, but rather are based on the unknown extent to which corn will be diverted from the animal (and thus human) food chain. Whatever else may be said, these concerns have some validity. There are currently 101 ethanol plants in the United States with many more being planned. Remarkably, it is projected that within 2 years Iowa could become a net importer of

#### **PUTTING KNOWLEDGE TO WORK**

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corn. As corn constitutes about 60% of poultry feeds in the U.S., the conversion of the energy in corn into motor fuel instead of entering the human food chain is becoming a matter of legitimate concern, if not muted alarm.

When formulating feed for poultry, the two most critical nutritional components are protein and energy. It must be emphasized that nutritionists are not at all concerned about the effect of ethanol production on protein supplies. The protein in corn is not fermented, but rather is concentrated in DDGS by a factor of slightly more than 3. Thus, while corn contains about 7.5% protein, 27% is typical for DDGS. Instead, it is the reduced energy of DDGS that is of prime concern. Some in the feed industry may underestimate the degree to which ethanol production diverts energy away from the food chain. As seen in Table 1, the metabolizable energy of DDGS is about 1280 kilocalories / lb., versus 1540 for corn. Thus, only 260 kilocalories per lb., or 17%, is thought to be diverted to ethanol. This is a severe underestimation. As noted above, only one third of the original corn is recovered as DDGS. Thus, if the metabolizable energy of DDGS is multiplied by 0.33, to reflect the amount of energy from a unit of corn that is retained in the resulting quantity of DDGS (ie., 422 kilocalories), it is evident that 73% of energy in the corn has been removed from the food chain.

Table 1. Metabolizable Energy (ME) Distribution in Corn and DDGS

	<u>Corn</u>	<u>DDGS</u>	<u>Direct Energy Loss</u>
Kcal/lb.	1540	1280	17%
	<u>Corn</u>	<u>DDGS (X .33)</u>	<u>True Energy Loss</u>
Kcal/lb.	1540	422	73%

The key question that must be addressed is whether this is of practical importance. From a theoretical point of view, if there is an infinite amount of corn available to the market, the relative consumption of grain by the the biofuel and animal feeding industries would be immaterial. If this is not the case (which is the real scenario, especially in years of reduced harvest) whichever of the two industries is able to pay a higher price for corn will be served first. At present, the feeding industry is correct in its perception that the biofuel sector is in a better position to compete for grain. This is even more true when taking into account the \$0.51 per gallon federal subsidy for blending ethanol with gasoline combined with the \$0.51 tariff on imported ethanol. The view is starting to be heard, perhaps with some irony, that sound policy would dictate that the federal subsidy should also be made available to those industries dedicated to the bioconversion of plant protein into meat and eggs. This thinking is based on the reasonable assumption that it should be more central to public policy to feed the populace than to transport it.

An alternative view would be that neither federal subsidies nor tariff protection be given to anyone and let the chips fall where they may. In the future ethanol made from carbon sources such as switchgrass and crop residues might eventually become the dominant form of ethanol production.

Traditionally, when there is a reduced supply of one feed ingredient, nutritionists seek alternative sources of energy and nutrients. Should the availability of corn (ie., energy) for animal feeds become limited, alternative sources of calories will be sought. Some of these are listed in Table 2. However, none of those listed seem especially promising as meaningful alternatives to corn. The supply of bakery meal is unlikely to increase. Alternative grains such as milo, wheat and barley can also be employed to produce ethanol, and in any case their cost would parallel that of corn. Fats and oils, which are popular feed ingredients containing about 2.5 times more energy

than corn, are increasingly being converted to biodiesel. Rendered animal fats, vegetable oils and the by-products of their refining, and spent restaurant grease can all be used with varying degrees of efficiency by the biofuel industry. Nutritionists have compared the possible resulting scenario to a “perfect storm”, in which both traditional and alternative sources of feed energy become limiting at the same time.

Table 2: Alternative Sources of Energy for Poultry Feeds

<u>Ingredient</u>	<u>Metabolizable Energy</u>	<u>Relative to Corn</u> *(%)
Fats and Oils	3500 – 3900 kcal/lb.	227 - 253
Bakery meal	1550 - 1800 “	101 - 117
Milo	1500 “	97
Wheat	1450 “	94
Barley	1250 “	81

\* Corn ME = 1540 kcal/lb.

Summary: The concern over the future availability and price of energy for animal feeds increasingly being voiced by feed producers is based on the rapid expansion of the biofuel industry. Public policy has encouraged this expansion as a means of reducing dependence on imported petroleum. The degree to which biofuel production will affect petroleum imports will become increasingly clear when data from this and future years is fully analyzed. Increased ethanol and biodiesel production will almost certainly raise grain and feed fat (and thus ultimately food) prices, and this may be extreme in years of sub-optimal harvests. Debate over public policy will likely be framed around the issue of “food vs. fuel”. The impact of significantly increased grain prices on the economies of third world trading partners, and the ability of friendly governments to afford to feed their populations, are issues still on the horizon. The future use of other carbon sources to produce ethanol would end the “food vs. fuel” debate.



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\*\*Consult with your poultry company representative before making management changes.\*\*

“Your local County Extension Agent is a source of more information on this subject”