Maximizing alternative protein ingredient use in market turkey diets

Sally Noll

Department of Animal Science, University of Minnesota

Introduction

Distillers dried grains with solubles (DDGS) is a corn derived co-product of the ethanol industry. Recent renewable fuels legislation is encouraging more production of ethanol, thus using more corn but resulting in greater supplies of DDGS available for animal feeding. As corn prices increase some relief could be provided by feeding DDGS as it would replace some corn and soybean meal in poultry diets. If economics allow, producers would like to maximize the use of an ingredient in the diet. Many current industry recommendations limit the use of DDGS to 5-10% of the diet when diet formulations could easily use 20% or more DDGS in the diet. This study examined the utilization of high levels of DDGS in turkey starter and grower rations by assessing performance of commercial market turkeys.

The study examined increasing the inclusion level of DDGS at different ages. Often times alternative ingredients are introduced into the diet starting with a lower level of inclusion and increasing with age. However, for protein type ingredients, there is more opportunity for use at younger ages when the protein requirement is higher. The research question becomes then, at what early age can high levels of DDGs be introduced into the diet without negatively affecting performance. A second research question is: can levels of inclusion in excess of 20% be used as the bird gets older. Thus, a long term feeding study was proposed to examine the effect of high levels of DDGs inclusion starting at different age periods on heavy tom turkey performance to market age of 19 wks.

Materials and Methods

Diets were formulated using digestible amino acids as determined prior to the start of the trial. Corn, soybean meal, DDGs, and poultry byproduct meal were assayed using cecectomized roosters (in cooperation with Dr. Carl Parsons, University of Illinois). Chemical analyses (protein, fat, fiber, dry matter, minerals, amino acids) of the ingredients are conducted prior to the start of the trial. Each diet was fed to 9 replicate pens of tom turkeys (Large White, Nicholas strain).

Diet protein level was established by using intact protein set to meet the digestible NRC thr at 100% of the NRC recommendation (thr). All diets were supplemented with readily available supplements of lysine and methionine to meet the specific NRC recommendations for these amino acids. Inclusion levels of poultry byproduct meal (PBM) were limited to keep phosphorus from becoming excessive. During the starting period and finishing period, the level of PBM was 7 and 2%, respectively.

The treatments (DDGs inclusion levels, %) are described in the following table:

Treatment	Age Period					
	2-5 wks	5-8 Wks	8-11 wks	11-14 Wks	14-17 wks	17-19 Wks
1	0	0	0	0	0	0
2	10	10	10	10	10	10
3	20	20	20	20	20	20
4	30	30	30	30	30	30
5	0	10	10	10	10	10
6	0	20	20	20	20	20
7	0	30	30	30	30	30
8	5	10	20	20	20	20
9	5	10	20	30	30	30
10	5	20	30	40	40	40

Male Nicholas poults (1200) were brooded in 50 pens and then randomized by weight at 2 wks of age into 90 pens (10 turkeys/pen) to assure equivalent starting weights. All of the poults were fed the same pre-experimental diet to 2 weeks of age prior to the start of the trial. Experimental diets were started at 2 wks of age and fed to 19 wks of age.

Turkey body weight and feed consumption were determined at 2, 5, 8, 11, 14, and 17, and 19 wks of age. At each weighing, birds were observed for evidence of pendulous crops and incidence of such was calculated. At 15 wks of age, samples of litter were taken from each pen and oven dried for the determination of moisture content. The experimental design was a randomized block design. Analyses of variance was conducted to determine treatment effects on gain, feed intake, and feed conversion. Contrast testing was conducted to determine if performance differences existed for turkeys fed the control diet series with no DDGS and the diet series with varying levels of DDGS.

Results and Discussion

In general, level of DDGS fed had little effect on tom body weight performance (Table 1). Incorporating DDGS at high levels in turkey starter diets did not have a negative effect. Body weight was greater at 5 wks of age for poults fed diets containing DDGS ($P<.05$) (Figure 1). At 11 wks of age, turkeys fed diets containing 10, 20 or 30% DDGS performed similarly to the control with no DDGS. At 19 wks of age, only the 40% inclusion level of DDGS reduced body weight in comparison to the control (Treatment 1). Most of this effect occurred in the last feeding period where gain was reduced substantially (Figure 2). Feed conversion was increased by DDGS inclusion during 11-14 wks of age and the cumulative 2-19 wk feeding period. Inclusion of DDGS increased feed/gain values mostly due to an increased level of feed intake without proportional increases in body weight gain. The poorer feed conversion of the DDGS treatments was in contrast to previous results obtained when feeding 10 or 20% DDGS to heavy toms (Noll and Brannon, 2006, 2007). The level of moisture in the litter did not differ among dietary treatment groups. Likewise the incidence of pendulous crops ranged from 0 to 3% and was not affected by dietary treatment group (data not shown).

The results indicate that poult performance was not negatively affected by inclusion of high levels of DDGS in starter diets (2 to 5 wks of age). An inclusion level of 40% DDGS was found to decrease body weight and worsen feed conversion. However, the higher inclusion levels of DDGS may be economical if corn supplies become limiting or too expensive for poultry feeding.

References

Noll, S. L., and J. Brannon, 2007. Response of market turkey toms to dietary protein and threonine levels in diets containing corn distillers dried grains. Poult. Sci. 86 (Suppl. 1):68.

Noll, S. L., and J. Brannon, 2006. Inclusion levels of corn distillers grains with solubles and poultry byproduct meal in market turkey diets. Poultry Sci. 85 (Suppl 1): 106.

Acknowledgments

Support by a USDA-CSREES Special Research Grant to the Midwest Poultry Consortium, Minnesota Turkey Promotion and Research Council, ADM, and Commodity Specialist Company

Table 1. Influence of DDGS Inclusion Level on Market Tom Performance

Treatment No.	DDGS Level, %	19 wk BW (lbs)	F/G 2-19 wks
1	0	44.48^{ab}	2.42^{b}
2	10	44.62^{a}	2.48^{ab}
3	20	44.13^{ab}	2.49 ^{ab}
4	30	44.09^{ab}	2.48 ^{ab}
5	0, 10	44.31^{ab}	2.46 ^{ab}
6	0, 20	43.99^{abc}	2.51^{a}
7	0, 30	43.71^{bc}	2.49 ^{ab}
8	5, 10, 20	44.26^{ab}	2.51^{a}
9	5, 20, 30	43.67^{bc}	2.50^{a}
10	5, 30, 40	43.19^{c}	2.50^{a}

^{abcd} Means within the same column with different superscripts are significantly different (P<.05)

Figure 1. Tom poult body weight response to DDGS inclusion levels fed during 2-5 wks of age. Poults fed diets with DDGS had heavier body weights than the control (P<.05)

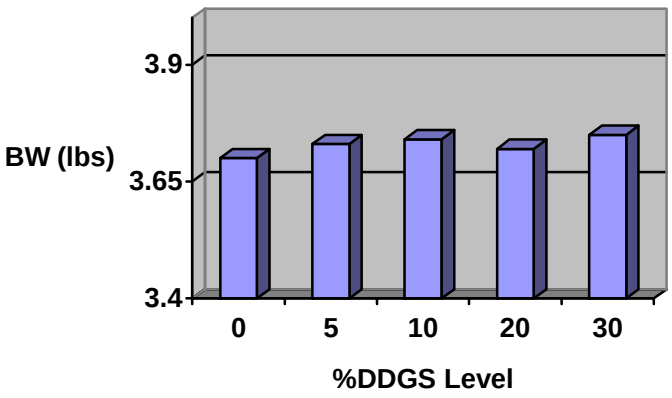

Figure 2. Gain response of market toms to DDGS level during 17-19 wks of age. Gain of turkeys in Trt 10 was less than those in Trt 1 (P<.05)