The Effect of Yeast Culture on the Performance of Two Poultry Types Fed under Various Regimes

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Story in Brief

Two studies were conducted utilizing 270 chickens to evaluate the efficacy of yeast culture (YC) for both broiler and layer avian types. In the first experiment, three dietary levels (0, 1.25, 2.50 percent) of YC were included in a nutritionally complete ration and fed to 14-day-old broiler chicks for 8 days. Body weight gain, feed consumption (g) and feed efficiency were not influenced by yeast culture supplementation.

In the second experiment, YC was fed at two dietary levels (0, 2.5 percent) to 14-week-old Shaver pullets receiving two ration types varying in nutrient density. Rations evaluated with and without YC included: 1) a low fiber ration; 2) a high fiber ration and 3) a low phosphorus ration. Body weight gain, feed consumption, and dry matter and phosphorus digestibility were not influenced by YC addition.

Introduction

Many Oklahoma producers utilize yeast culture, which is a feed product formed by fermenting mixtures of grains, sugar and live yeast. The product has been reported to stimulate gut microflora to increase microbial enzyme levels and thereby digestion efficiency and to also provide unidentified poultry growth factors (Tonkinson et al., 1964). Thornton (1960) fed YC levels of 0, 1.5 and 2.5 percent to broilers receiving a 7.5 percent crude fiber ration and found fiber digestibility to increase by 163 and 225 percent respectively for the 1.5 and 2.5 percent YC additions. It has also been suggested that the increased enzyme levels attributed to YC enhance phosphorus digestibility (Thayer et al., 1978). The studies reported herein were conducted to evaluate YC effects on growth of broilers and digestion efficiency of pullets fed high and low quality diets.

Materials and Methods

Yeast culture was added to the basal ration (Table 1) used in the first experiment by substituting YC levels (0, 1.25, 2.50 percent) for cornstarch and soybean meal such that diets remained isonitrogenous and isocaloric. Two hundred and ten 14-day-old New Hampshire X Columbian crossbred chicks were randomly assigned to three treatment groups creating 7 replicates per treatment with ten chicks per replicate. The chicks were raised for 8 days in starter batteries housed in an environmentally controlled room with experimental ra-

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Table 1. Ration Composition (%)

Ingredient	YC Level (%)		
	0	1.25	2.50
Ground corn grain	53.4	53.4	53.4
Soybean meal (44%)	33.8	33.4	33.0
Corn starch	1.7	0.85	—
Yeast culture	—	1.25	2.50
Meat and bone meal	5.2		
Alfalfa meal	3.1		
Dicalcium phosphate	1.0		
Calcium Carbonate	0.9		
Vitamin mix	0.4		
Salt	0.3		
dl methionine	0.1		
Trace mineral	0.1		

tions and water provided *ad libitum*. Body weight gain, feed consumption, and feed/gain ratios were used as a criteria to evaluate performance.

The basal ration (Table 2) used in the second experiment was modified via the addition of 20 percent ground alfalfa hay or by deleting phosphorus to create diets varying in fiber level and phosphorus content. Two Yeast Culture levels (0, 2.5 percent) were added to the nutritionally complete, high fiber and the phosphorus deficient diets creating six treatment groups. Yeast Culture additions were made as described in the first experiment so that YC levels within a ration classification were isocaloric and isonitrogenous. Sixty 21-week-old Shaver pullets were randomly divided into 6 groups of 10 pullets each and fed the respective experimental rations. All pullets were individually caged and raised in an environmentally controlled house with a mean temperature of 86 F. The test period lasted 35 days with feces being collected on days 9-13 so that dry matter digestibility on all treatment and phosphorus digestibility on the phosphorus deficient rations could be estimated.

Results and Discussion

In the first experiment (Table 3), broiler chicks fed a chick starter ration with 0, 2.5 or 5.0 percent supplemental YC had similar ($P > .1$) feed consumption, rate of gain and efficiency of gain. Yeast culture addition apparently did

Table 2. Ration Composition (%)

Ingredient	Control	High Fiber	Phosphorus Deficient
Ground Corn grain	71.6		
Soybean meal	21.9		
Alfalfa meal (17%)	4.0	+20.0	
Dicalcium phosphate	0.5		−0.5
Calcium Carbonate	1.3		
Vitamin mix	0.5		
Salt	0.4		
Trace mineral	0.1		
dl methionine	0.2		

Table 3. Results, Experiment 1

	YC Level (%)		
	0	1.25	2.50
Gain per chick (g)	334.8[a]	325.1[a]	331.2[a]
Feed per chick (g)	512.9[a]	516.8[a]	520.7[a]
Feed/Gain	1.53[a]	1.59[a]	1.57[a]

[a]Means in a row with same superscript do not differ (P>.10).

not supply unidentified growth factors that were supplied by the starter ration. Feed efficiency was not improved by YC additions and in fact was reduced 3.3 percent. The lack of YC effect upon feed efficiency questions the hypothesis of YC enhancing gastrointestinal tract digestive processes. However, YC could provide unidentified growth factors and/or increase digestive efficiency of birds fed lower quality rations. The second experiment was conducted to evaluate these possibilities.

In experiment 2 (Table 4), the addition of YC to the standard diet had no significant effect upon body weight gain, feed consumption, feed efficiency, dry matter digestibility or phosphorus digestibility of pullets fed the three ration types. Addition of 20 percent alfalfa meal increased feed consumption 3 percent and reduced feed efficiency by a mean of 24 percent reflecting the low energy availability from alfalfa. This data does not support the hypothesis that YC improves gut microflora ability to digest fiber and phosphorus. In previous work Tonkinson (1965) and Thornton (1960) reported that YC additions significantly increased fiber digestibility. However, these studies were conducted using relatively low fiber rations that varied in fiber source and the effect may have been due to fiber source and not YC. Thayers study (1960) incorporated dicalcium phosphate in the basal ration used across all treatments. Positive effects of YC upon phosphorus availability could be due to YC interactions with dicalcium phosphate and not phytin bound phosphorus. Corn grain, the principle source of phosphorus in the phosphorus deficient ration evaluated in experiment 2, contains much of its phosphorus in the phytate form but no improvements in phosphorus digestibility were observed with YC addition. These contradictions warrant further investigations of YC efficacy.

Table 4. Results, Experiment 2

	Control		High Fiber		Phosphorus Deficient	
	-YC	+YC	-YC	+YC	-YC	+YC
Gain/pullet (g)	277.4[a]	305.0[a]	237.8[a]	262.0[a]	235.3[a]	232.9[a]
Feed/pullet (g)	2212[a]	2403[a]	2336[a]	2395[a]	2021[a]	1858[a]
Feed/gain	8.2[a]	8.3[a]	10.4[b]	10.1[b]	8.2[a]	8.1[a]
Dry matter digestibility (%)	68.3[a]	68.8[a]	60.7[b]	59.3[b]	70.3[a]	69.9[a]
Phosphorus digestibility (%)	—	—	—	—	31.4[a]	30.9[a]

[a]Means in a row with same superscript do not differ (P>.10).

Literature Cited

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Tonkinson, et al. 1965. Poultry Science 44:159.
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