

## **Effect of thermostable phytase on the growth performance and tibia bone mineralization in broilers**

### **I. Investigators:**

Research institution: Center for southern economic crops, Chinese academy of agriculture science.

### **II. Experimental details:**

- A.Genetics: AA
- B. Experimental animal: 1 day old broiler
- C. Replicates: Completely randomized, 30 × 5 birds/pen (total 750 birds)
- D.Initial weight: 42.1 ± 0.1 g live weight
- E.Duration: 42 days (Apr 19 to May 30, 2017)
- F. Final report: Jun 13, 2017

### **III. Experimental treatments:**

- A. Positive control group(PC): Based diets
- B. Negative control group(NC): Low phosphorus diet ( Reduce the available phosphorus 0.10%)
- C. Test group 1(T1): Low phosphorus diet+500U/Kg thermostable phytase
- D.Test group 2(T2): Low phosphorus diet+1000U/Kg thermostable phytase
- E.Test group 3(T3): Low phosphorus diet+2000U/Kg thermostable phytase

### **IV. Experimental diet formulation:**

- A. Diets were fed by phase: starter, d 1-21, and finisher, d 22-42.
- B. Diets were formulated based on corn and soybean meal to contain nutrients at or above those required for maximum growth of chickens (Table 1).
- C. Thermostable phytase as experimental test material were from Jinan Bestzyme.

### **V. Experimental measurements:**

- A. Individual bird weights - at d 1
- B. Total pen weights - at d 1, 21 & 42
- C. Feed disappearance - at d 1, 21& 42

#### D. Feed/gain ratio

E. Mineral determination-The left tibia bones were removed, removed adherent soft tissues, further analysis tibia ash, calcium, and phosphorous.

### VI. Results

A. The results showed that lower 0.12% available phosphorus in diets could have negative effects on the growth performance, which exhibited the average daily gain reduced and F/G increased. However, after added 500U/kg thermostable phytase, the production performance of lower phosphorus diet could reach comparative levels to the normal group, and the improvements were more obvious when the dosage was 1000U/kg and 2000U/kg (Table 2).

B. The results showed that NC diet had no effect on tibia ash and Ca percentage compared with the PC, but it did have lower tibia bone P content. Supplementation of NC diets with thermostable phytase improved tibia ash and P contents at 2000U/kg (Table 3).

### VII. Conclusions

On the basis of these results, it is concluded that supplementation of thermostable phytase into a low P diet (-0.12%AP) at suitable dosage could compensate for growth and tibia mineralization deficiencies. Although the dosage of 500U/kg could achieve the similar effects with the PC diets, the dosage of 2000U/kg were better effective to improve growth performance and nutrients retention.

### VIII. Table

Table 1. The formula composition of diets and nutritional content

Raw materials, %	1-21days	22-42 days
Corn	57.08	59.47
Soybean meal	37.01	34.84
Soybean Oil	0.82	2.07
Met	0.29	0.14
Limestone	1.01	1.13

Dicalcium phosphate	1.98	1.43
NaCl	0.3	0.3
Premix	0.5	0.5
Nutrition indexes		
Metabolic energy, MJ/kg	12.14	12.26
Crude protein, %	21.50	20.00
Calcium, %	1.00	0.90
Total phosphorus, %	0.69	0.57
Available phosphorus, %	0.45	0.33

Table2. The effect of thermostable phytase on broiler' performance

Phases	Indicators	PC	NC	T1	T2	T3
1-21	ADFI,g	58.98±4.62	56.57±7.23	59.62±4.62	61.61±5.32	62.55±4.32
	ADG,g	45.03±3.34 <sup>a</sup>	42.22±2.71 <sup>b</sup>	45.17±2.68 <sup>ab</sup>	47.03±3.56 <sup>a</sup>	48.12±4.36 <sup>a</sup>
	F/G	1.31±0.02	1.34±0.02	1.32±0.02	1.31±0.03	1.30±0.02
22-42	ADFI,g	165.14±7.37	166.43±5.73	165.59±6.28	161.95±8.34	161.83±5.36
	ADG,g	94.99±7.02	93.70±6.35	94.71±8.12	93.55±5.83	94.76±6.32
	F/G	1.74±0.01 <sup>a</sup>	1.78±0.03 <sup>b</sup>	1.75±0.05 <sup>ab</sup>	1.73±0.01 <sup>a</sup>	1.71±0.04 <sup>a</sup>
1-42	ADFI,g	112.02±10.86	111.45±11.38	112.60±12.56	111.76±12.03	112.16±10.42
	ADG,g	70.01±7.72 <sup>a</sup>	67.96±8.52 <sup>b</sup>	69.94±4.78 <sup>ab</sup>	70.29±5.26 <sup>a</sup>	71.44±7.12 <sup>a</sup>
	F/G	1.60±0.02 <sup>a</sup>	1.64±0.04 <sup>b</sup>	1.61±0.02 <sup>ab</sup>	1.59±0.02 <sup>abc</sup>	1.57±0.03 <sup>bc</sup>

Note:<sup>a-c</sup> means within columns similar superscripts differ significantly at P<0.05.

The results showed that lower 0.12% available phosphorus in diets could have negative effects on the production performance, which exhibited the average daily gain reduced and F/G increased. However, after added 500U/kg thermostable phytase, the production performance of lower phosphorus diet could reach comparative levels to the normal group, and the improvements were more obvious when the dosage was 1000U/kg and 2000U/kg.

Table3. The effect of thermostable phytase on broiler's tibia bone mineralization (%)

Indicators	PC	NC	T1	T2	T3
Tibia ash	42.01±2.85 <sup>ac</sup>	38.98±4.04 <sup>a</sup>	41.87±3.02 <sup>ab</sup>	41.92±2.03 <sup>ab</sup>	42.42±2.88 <sup>bc</sup>
Phosphorus	10.80±1.08 <sup>a</sup>	9.67±1.09 <sup>b</sup>	10.71±1.26 <sup>ac</sup>	10.87±1.42 <sup>ac</sup>	11.04±1.12 <sup>ac</sup>
Calcium	26.09±2.15	23.83±3.03	25.59±3.47	25.73±2.86	26.06±3.06

Note:<sup>a-c</sup> means within columns similar superscripts differ significantly at P<0.05.