

## Effect of phytase on the growth performance of laying hens

Experimental animal: 24 weeks old Hy-Line Brown hens

Experimental design:

1. Positive control group(PC): Corn miscellaneous meal based diets (TP 0.60%, AP 0.36%)
2. Negative control group(NC): Low phosphorus diet (TP 0.40%, AP 0.16%)
3. Test group 1(G1): Low phosphorus diet (TP 0.4%, AP 0.16%) +200U/Kg phytase
4. Test group 2(G2): Low phosphorus diet (TP 0.4%, AP 0.16%) +400U/Kg phytase
5. Test group 3(G3): Low phosphorus diet (TP 0.4%, AP 0.16%) +800U/Kg phytase

Each group had 5 replicates and 30 laying hens per replicate.

Experimental cycle: 24 weeks

Table 1: The formula composition of diets and nutritional content

Raw materials, %	Positive control group	Negative control group
Corn	61.35	61.50
Soybean meal	18.00	18.00
Cottonseed meal	5.00	5.00
Rapeseed dregs	5.00	5.00
Limestone	8.40	9.20

Dicalcium phosphate	1.25	0.00
Zeolite powder	0.00	0.30
Premix	1.00	1.00
Nutrition indexes		
Metabolic energy, MJ/kg	11.21	11.21
Crude protein, %	18.04	18.04
Calcium, %	3.41	3.41
Total phosphorus, %	0.60	0.40
Available phosphorus, %	0.36	0.16
Lysine, %	0.77	0.77
Methionine+ Cysteine, %	0.71	0.71

### Test Results:

#### 1) The effect of phytase on layer's performance

Table2. The effect of phytase on layer's performance

Phase	Indexes	PCG	NCG	G1	G2	G3
24-35 weeks	Laying rate, %	91.21±1.98	89.23±1.60	89.37±1.74	90.49±1.86	89.56±1.93
	Average daily intake, g	116.68±2.11	113.64±2.35	112.95±2.16	115.12±2.12	115.17±2.00
	Average egg weight, g	58.03±1.38	56.39±1.78	57.61±1.67	58.11±1.95	59.02±1.81

	Feed /Egg	2.20±0.002	2.26±0.003	2.19±0.001	2.19±0.002	2.18±0.001
36-47 weeks	Laying rate, %	90.00±1.76 <sup>a</sup>	83.44±1.69 <sup>b</sup>	85.23±1.58 <sup>b</sup>	90.81±1.63 <sup>a</sup>	91.11±1.75 <sup>a</sup>
	Average daily intake, g	123.56±1.83 <sup>a</sup>	117.16±1.85 <sup>c</sup>	119.74±1.87 <sup>bc</sup>	124.89±1.91 <sup>ab</sup>	125.43±1.90 <sup>ab</sup>
	Average egg weight, g	64.48±1.72 <sup>a</sup>	62.1±1.71 <sup>b</sup>	62.32±1.68 <sup>b</sup>	64.94±1.53 <sup>a</sup>	65.58±1.86 <sup>a</sup>
	Feed /Egg	2.13±0.001	2.26±0.002	2.25±0.003	2.12±0.002	2.10±0.001
24-47 weeks	Laying rate, %	90.61±2.01 <sup>a</sup>	86.34±1.64 <sup>b</sup>	87.30±1.62 <sup>b</sup>	90.65±1.57 <sup>a</sup>	90.34±1.86 <sup>a</sup>
	Average daily intake, g	120.12±1.99 <sup>a</sup>	115.40±2.05 <sup>c</sup>	116.35±1.99 <sup>bc</sup>	120.01±1.93 <sup>ab</sup>	120.30±2.04 <sup>ab</sup>
	Average egg weight, g	61.26±1.58 <sup>a</sup>	59.25±1.67 <sup>b</sup>	59.97±1.98 <sup>ab</sup>	61.53±1.68 <sup>a</sup>	62.30±1.48 <sup>a</sup>
	Feed /Egg	2.16±0.002	2.26±0.002	2.22±0.001	2.15±0.001	2.14±0.002

The results showed that the diet with lower phosphorus could affect the production performance of laying hens, which exhibited the longer feeding period, the worse the negative impact. The poor situation could be improved greatly by adding phytase, and the improvement degree became better when using higher dosage phytase. It indicates that in this experiment all the calcium hydrogen phosphate could be replaced completely by 400U/kg phytase, with no significant effect on production performance.

## 2) The effect of phytase on layer's calcium and phosphate metabolism

Table3. The effect of phytase on layer's calcium and phosphate metabolism (%)

Group	Blood calcium	Blood phosphorus	Tibia calcium	Tibia phosphorus	Ash	Calcium apparent digestibility	Phosphorus apparent digestibility
PC	3.57±0.08	2.78±0.10 <sup>a</sup>	31.88±1.38	9.20±0.38 <sup>a</sup>	56.57±1.64 <sup>ab</sup>	57.20±2.38 <sup>a</sup>	55.40±1.98 <sup>a</sup>
NC	3.51±0.06	2.17±0.09 <sup>b</sup>	34.10±1.34	8.28±0.32 <sup>b</sup>	54.57±2.34 <sup>c</sup>	52.97±3.21 <sup>b</sup>	46.68±2.02 <sup>b</sup>

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G1	3.36±0.07	2.20±0.06 <sup>b</sup>	33.95±1.38	8.75±0.21 <sup>b</sup>	55.61±2.12 <sup>bc</sup>	53.02±3.42 <sup>b</sup>	53.71±2.53 <sup>ab</sup>
G2	3.41±0.05	2.62±0.07 <sup>a</sup>	32.42±1.36	9.08±0.48 <sup>a</sup>	57.92±1.89 <sup>a</sup>	55.18±2.88 <sup>ab</sup>	54.62±2.38 <sup>a</sup>
G3	3.36±0.06	2.74±0.07 <sup>a</sup>	31.57±1.38	9.40±0.30 <sup>a</sup>	58.44±2.25 <sup>a</sup>	56.40±2.94 <sup>ab</sup>	56.23±2.00 <sup>a</sup>

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The results showed that the diet with lower phosphorus could decrease significantly serum phosphorus content, tibial phosphorus deposition and tibial ash content. And the situation had been improved obviously by adding phytase. When the dosage of phytase was 400U / kg, the indexes of physiology and digestibility could reach the positive control group level.