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Performance of Layer Growers Supplemented with Organic Phosphorus Compound in Drinking Water

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Abstract

The objective of this study was to evaluate the effect of SSG, a water-soluble organic phosphorus compound with synergistic factors on the performance of layer growers. A total of 240 Bovans layer growers were divided into two as control and treatment groups. Each group had 10 replicates with 12 birds per replicate. The control group was given basal diet as per the breed standards and in addition to basal diet the treatment group was supplemented with SSG @ 15 ml per 100 birds in morning 6 hours drinking water for a period of 7 days. At the end of the experiment, treatment group showed significantly higher ($P< 0.05$) body weight gain, better feed efficiency and economics over the control. It is concluded that supplementation of water-soluble organic phosphorus compound improved the growth performance in layer growers.

Key words: Growth Promoter Combination-SSG, growth performance, layer growers.

Achieving weekly body weight in layer growers has become a challenge amidst over-ornate vaccination schedule. Since body weight of growers in the standard range proportionate directly with laying performance, more focus is laid over to achieve the standard grower weight. Failure to maintain growth with good level of uniformity in the pre-production period may result in low peak egg production, inadequate egg size and/or post peak dips in production. In the present intensive system of poultry production, the birds are subjected to various stressors like high density, debeaking, ecto and endo parasites, impacts of environment, ammonia load in the manure, disturbance in gut health, frequent vaccinations in the growth phase, and disease outbreaks. It has been documented that metabolic accelerators, growth promoters and anti-stressors could improve weight gain and immunity in growing phase.

Phosphorus (P) is an indispensable mineral for poultry and plays a significant role in the metabolism and health of the bird. Phosphorus is used in several body processes including critical energy pathways (ATP), cell signaling, and synthesis of cell membranes, RNA, DNA, and bone (Hill *et al.,* 2008).

Vitamin B_{12} plays a key role in the normal functioning of the nervous system as well as synthesis and regulation of nucleic acids (DNA and RNA). This vitamin plays a vital role in homocysteine metabolism, energy metabolism, normal blood functions, RBC production, cell division, and in the immune system (Halle *et al*., 2011).

Taurine, an amino sulphonic acid is synthesized from methionine and is one of the end products of sulfur metabolism. Taurine exists in the small intestine at high concentrations where it plays a significant role in the intestinal functions such as in bile acid conjugation with cholic or chenodeoxycholic acid in the liver (Huang *et al.,* 2014a).

Digestion and absorption of dietary fat are sub-optimal in young birds due to limited bile secretion. Bile salts aid to improve the digestion and absorption of lipids and improve the bioavailability of fat soluble vitamins (A, D, E and K) (Stamp and Jenkins, 2008). Several studies have indicated that supplementation

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with bile acids or bile salts improved the utilization of dietary fat by chicks because of limited endogenous secretion (Ravindran *et al.*,2016).

Prebiotics have the ability to induce and accelerate the growth of beneficial microbes and inhibit the growth of harmful pathogens. Supplementation of poultry diets with MOS has resulted in improved growth, partly due to its nutrient sparing effect but primarily because of its influence on nutrient utilization in the gastrointestinal tract (Sonmez and Eren, 1999).

The current study was done in a commercial Poultry Farm, Namakkal-Tamil Nadu during October 2021 to evaluate the effect of SSG which is an organic phosphorus compound with synergistic factors manufactured by Neospark Drugs and Chemicals Pvt Ltd, Hyderabad, India on body weight gain, feed intake, feed efficiency and its economics on layer growers. The key

Table I. Ingredients and Nutrient composition of diet fed to layer growers

Ingredients (%)	**Grower Phase**
Maize	34.20
Jowar	5.00
Bajra	5.00
Broken Rice	10.00
Rice Polish	5.00
De-oiled rice bran	5.00
De-oiled Sunflower Pellet (36% Crude Protein)	9.00
De-oiled Sunflower Cake (28% Crude Protein)	6.00
De-oiled Groundnut cake (43% Crude Protein)	5.00
Layer Concentrate* (28% Crude Protein)	5.00
Dried Distillers Grain Soluble	2.00
Soya Bean Meal (45% Crude Protein)	5.00
Calcite	1.40
Di-calcium Phosphate	1.30
DL-Methionine	0.10
Lysine	0.20
Layer feed supplement premix**	0.50
Salt	0.30
Total	**100.00**
Feed cost (Rs/kg)	**24.00**
Nutrient	
Crude Protein %	18.00
ME (Mcal/Kg)	2.65
Calcium %	1.00
Available Phosphorus %	0.44
Digestible Lysine %	0.90
Digestible Methionine %	0.40

*Layer Concentrate is a mixture of multiple range of raw materials added as protein source (Crude Protein-28%, Crude Fiber-8.90%, Fat-2.80%, Metaboizable Energy-2200Kcal, Calcium-2.90%, Available Phosphorus-0.80%, Digestible Lysine-1.4%, Digestible Methionine-0.60%)

**Layer feed supplement premix is a mixture of Vitamin A-1,25,00,000IU, Vitamin D3-25, 00,000IU, Vitamin B_2-5g, Vitamin B_6-1.6g, Vitamin B_{12}-0.02g, Vitamin B_1-0.8g, Vitamin E-8g, Vitamin K_3-1g, Niacin-12 g, Calcium d-Pantothenate-8g, Folic acid-0.8g, Biotin-0.006g, Choline Chloride-300g, Manganese-80g, Copper-15g, Iodine-1g, Iron-60g, Zinc-80g, Selenium-0.3g, Cellulase-60,00,000U, Hemicellulase-27,00,000U, Beta Glucanase-53,000U, Amylase-12,00,000U, Protease-12,00,000U, Phytase-5,00,000U, Inositol Methyl donors, Protein hydrolysate, Natural antioxidants, Phylo-silicates, Tecto-silicates, Cross linked insoluble poly-vinyl pyrrolidone homo-polymer, Mannon oligo-saccharides, activated charcoal, Xenobiotic metabolic bio-accelerators (Biotransformation compounds to deactivate mycotoxins), salts and free acids of propionic acid, Sorbic acid, Benzoic acid, Iso-Butyric acid and acetic acid, Hepatotropic agents.

components in SSG are phosphinic acid derivative (PAD), bile acids, cyanocobalamin, MOS (Mannan oligosaccharides) and taurine.

Materials and Methods

A total of 240 Bovans layer growers of 11 weeks age in a commercial layer farm Namakkal-Tamil Nadu were selected randomly for the study, wing banded, weighed, and divided into two as control and treatment groups. Each group had 10 replicates with 12 birds each per replicate. The control group was given basal diet as per the breed standards and to the treatment group, in addition to basal diet was supplemented with SSG 15 ml per 100 birds in the morning drinking water for 6 hours for a period of 7 days. Standard managemental practices were followed uniformly for all the replicates. Mortality (if any) was recorded periodically. Body weight of all the birds were recorded at 11th week, 12th week and 18th week. Feed consumption was measured daily during the study period. Composition of the feed fed to the birds is presented in Table I. The collected data on various parameters were statistically analyzed as per the methods described by Snedecor and Cochran (1989) and the means of experimental groups were tested for statistical significance by Duncan's multiple range test (Duncan 1995).

Results and Discussion

The data on body weight (kg), weight gain (g), feed intake (g), feed efficiency and feed cost per kilo gram weight gain of birds are presented in Table II. Body weight gain was significantly higher ($P< 0.05$) in the treatment group (68.88 g) than the control group (52.00 g). The feed intake was numerically higher in treatment group (297.60 g) over the control (251.60 g), but the feed efficiency was better in the treatment group (4.32) than the control group (4.84). SSG supplemented group showed reduced feed cost of Rs 3.66/kg weight gain (Rs.112.52 vs. 116.18 /-). The quantity of SSG consumed per bird during the experimental period and the cost were 1.05 ml and Rs 0.60/- respectively. Body weight of birds at 18th week showed the same trend and uniformity as at 12th week. The treatment group had significantly higher body weight at 18th week compared to that of the control group (1.15 kg vs. 1.11 kg).

The treatment group has shown better weight gain, efficiency and economics over the control group. This could be due to improved

Table II. Performance (Body weight gain, Feed efficiency & Economics) of Control and Treatment groups.

Attribute	Control	Treatment
Initial body weight at 11th week of age (kg)	0.750	0.752
Final body weight at 12th week of age (kg)	0.802	0.821
Weight gain (11-12 week) (g)	52.00^{a} ± 3.70	68.88^{b} ± 1.59
Feed intake (g)	251.60 ± 18	297.60 ± 14
Feed efficiency	4.84^{a} ± 0.01	4.32^{b} ± 0.02
Body weight at 18th week (kg)	1.11^{a}± 0.01	1.15^{b}± 0.01
Economics		
Cost of feed/kg (Rs.)	24.00	24.00
Feed intake (g)	251.60 ± 17.72	297.60 ± 6.41
Cost of feeding 0-7 days (inclusive of water supplement)	6.04^{a} ± 0.43	7.74^{b} ± 0.15
Average weight gain (g/bird)	52.00^{a} ± 3.70	68.88^{b} ± 1.59
Feed cost/kg body weight gain (Rs.)	116.18^{a} ± 0.34	112.52^{b} ± 0.49

Means with different superscript * in a row differ significantly ($p\leq0.05$)

digestion and metabolism in birds through supplementation of organic phosphorus with synergistic factors *viz.,* bile acids, cyanocobalamin, MOS and taurine present in SSG. The results agree with previous reports that Phosphinic acid derivative and cyanocobalamin favor the phosphorylation of molecules that intermediate metabolic pathways, such as gluconeogenesis, glycolysis, and Krebs cycle, improving the synthesis of the co-nutrients (ATP and ADP) and consequently increasing blood glucose (Rollin *et al.,* 2010). Syed Muhammad Lal *et al.* (2020) also reported that supplementation of MOS improved growth performance in broilers, which are in agreement with our results. Similarly, the results are in tandem with the work of Maisonnier *et al.* (2003) who observed significant increase in body weight gain in broilers fed with bile acids. The current study concurred with the previous findings of Lee *et al.,* (2004), who reported that the supplementation of taurine improved the growth performance of broiler chicken.

Summary

It could be concluded that the improvement in weight gain and better feed efficiency in the SSG supplemented group might be due to the combined effect of key nutrients and metabolic stimulators in SSG which positively influenced the performance of layer growers with better economics than the control group.

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