

Comparing the Phytobiotic effects of feed-grade and liquid Oregostim® on Performance characteristics, Haematology and Serum biochemistry of Finisher broilers

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Abstract: The phytobiotic effects of feed-grade and liquid Oregostim were evaluated and compared on the performance characteristics, haematology and serum biochemistry of finisher broilers. 180 Marshal Broilers at 4wks were allotted into three treatments, T₀ (control), T₁ (3g/10kg feed-grade) and T₂ (3ml/10ltrs liquid), each was replicated thrice, with each replicate having 20 birds. Feed and water were given *ad libitum*, the feeding trial was for 4wks. The live BW for T₁ (1.73kg) is not significantly ($p>0.05$) different from T₂ (1.70kg), but T₁ and T₂ are greater than T₀ (1.52kg). The BWG, FCR and mortality % for broilers in T₁ and T₂ are significantly ($p<0.05$) superior to broilers in T₀ (control). The PCV for T₁ (24.33 ± 2.33) is not significantly ($p>0.05$) different from T₂ (23.30 ± 3.79), both are significantly ($p<0.05$) greater than T₀ (21.33 ± 3.28), the [Hb] and MCV are also the same for T₁ and T₂, but are significantly ($p<0.05$) greater than T₀. There are no significant ($p>0.05$) differences among all the other parameters of performance characteristics (FI), haematological (RBC, WBC, MCV) and all serum biochemical indices across the treatments. Either feed-grade Oregostim (3g/10kg feed) or liquid Oregostim (3ml/10 ltr water) is recommended for use in finisher Broilers.

Keywords: Feed-grade Oregostim, liquid Oregostim, Performance characteristics, Haematology, Serum biochemistry, Finisher Broiler

INTRODUCTION

Consumers today take a lot of interest in how their food is raised, whether their concerns have scientific merit or if they are simply responding to a story they read in a newspaper, we know they are worried about drugs in animal feed. Broiler producers therefore today need to be sensitive to consumer demands.

Despite the ban placed on the use of antibiotics growth promoters and other additives, statistics of late continues to show a drastic increase in the use of in-feed antimicrobials for therapeutic purpose, even though there is a significant reduction in the usage of antibiotic growth promoters [1]. Frequent outbreaks of poultry infections due to resistant bacterial strains in field settings occurred and claims regarding the hazards of multiple resistance to antibiotics used in humans and animal medicine increased due to indiscriminate use of commercial antimicrobial drugs or chemicals commonly used in the treatment of infectious diseases or as feed additives [2, 3], many studies have recently been undertaken investigating the use of Novel yet promising natural feed additives, such as organic acids, probiotics, prebiotics, plant extracts, enzymes and essential oils [4]. Herbs, spices and various plant

extracts have received increased attention as possible replacements for antibiotic growth promoters [5, 6].

Considerable effort has also been devoted to essential oils which are the products which are obtained from natural and aromatic plants by steam distillation. Some essential oils obtained from different sources were used in broiler diets to determine the effects on growth performance, digestibility and digestive systems [7-10]. Several researchers showed that the supplementation of some essential oils increased the live weight [11] and improved feed conversion ratio [12-15].

Oregostim is a phytobiotic, 100% natural feed or drinkin water additive containing *Oreganum aetheroleum* as an active substance, which is an oregano-etheric oil, which has widespread antibacterial activities [16], an anti-oxidizing, appetizing and growth enhancing properties [17, 18].

Oregostim stimulates the animal sense of appetite to increase feed intake, it also cleanses and replenishes the gut lining to improve the overall health of the animal, by rejuvenation of the absorbent gut surface [1].

The haematological parameters and serum biochemistry of chickens are essential for the diagnosis of various pathological and metabolic disorders, they also provide valuable information on the immune status of animals [19], They can be used as a diagnostic tool in order to assess the health status of an individual and/or a flock; Haematological changes are commonly used to determine the body status and to assess the impact of environmental, nutritional and/or pathological stresses [20].

The aim of this experiment was to evaluate and compare the phytobiotic effects of Oregostim (feed-grade and liquid) on finisher broiler performance, haematology and serum biochemistry.

MATERIALS AND METHODS:

Experimental Site and Materials

The research work was carried out at the Student Teaching and Research Farm, Poultry Section of Federal College of Animal Health and Production Technology, Moor Plantation, Ibadan, Nigeria. 200 day old Marshall Broiler chicks were purchased from a reputable hatchery in Ibadan, South Western Nigeria, and were brooded and raised until they were 4wks old. Thereafter birds were allotted into three treatments viz., To (control), T1 (feed-grade Oregostim), T2 (liquid Oregostim), each treatment was replicated twice, and each replicate having twenty birds, a total of one hundred and eighty (180) birds were used for this phase of the work. The birds were fed *ad libitum* with the experimental diet for 4wks, during which necessary vaccinations and medications were done. Oregostim® is a product of Meriden-Animal Health Co., UK, but was purchased from the sole marketer in Nigeria, Animal Care Konsult, Ogere, Nigeria.

Blood Collection and Analysis

At the termination of the feeding trial after 4wks, blood samples were collected from four (4) birds per replicate, making twelve (12) birds per treatment. Bleeding was done from the punctured wing vein with a sterile gauge 19 needle; about 5ml of blood was collected from each bird into two sets of sterilized labeled sample bottles, one containing Ethylene Diamine Tetraacetic Acid (EDTA) and other bottles without anti-coagulant. Blood was collected, kept on ice in a cooler and transferred to the laboratory; the samples were immediately used for determination of haematological parameter values: Haemoglobin concentration was determined spectrophotometrically by cyanomethaemoglobin method [21], RBC and WBC counts using Neubauer haemocytometer as described by [22], Packed Cell Volume (PCV) was determined by the microhaematocrit method, while the MCV, MCH and MCHC were calculated from RBC count, Hb concentration and PCV using the appropriate formulae as described by [23].

Sera were collected from the second set of bottles without anti-coagulants through centrifugation with a macro centrifuge and used for analysis of the biochemical indices viz., Total protein was determined using the Kjeldahl method as described by [24], albumin was measured using dye binding technique as described by [25], while serum cholesterol was determined by the Roschlan methods, serum enzymes (ALT and ALP) were measured spectrophotometrically as described by [26] and Holder and [27] respectively. Qualitative estimation of uric acid by method of [28]. The proximate composition of the Broiler's mash was determined according to the official method of analysis [29].

All data collected were subjected to Analysis of Variance (ANOVA), and errors were calculated as Standard Errors of Means (SEM). Significant treatment means were compared using Duncan's New Multiple Range Test as outlined by Obi [30], significance was accepted at the 0.5 level of probability

RESULTS

Table 1: Ingredients and Proximate Composition of Broiler Starter

Ingredients (kg/1000kg)	Quantity
Maize	550
Soya meal	200
Ground nut cake	100
Wheat offal	71
Bone meal	20
Limestone	10
Mycotoxin binder	1
Lysine	1
Methionine	1
Salt	3
Vitamin + Mineral Premix	3
Total	1000
Composition (proximate analysis)	%
Dry Matter	93.20
Crude Protein	20.90
Ether Extract	5.20
Crude Fibre	4.30
Ash	6.50
Nitrogen Free Extract	56.30
Composition (calculated)	
Metabolisable Energy (Kcal/kg)	2900.00
Crude Protein	22.00
Fat	4.00
Fibre	3.30
Calcium	1.02
Available Phosphorus	0.45
Methionine	0.46
Lysine	1.25

Table 2: Ingredients and Proximate Composition of Expt. Diet (4-8wks)

Ingredients (kg/1000kg)	T ₀	T ₁	T ₂
Maize	580	580	580
Soya meal	200	200	200
Ground nut cake	100	100	100
Oregostim [®]	-	0.30	-
Wheat offal	60	59.70	60
Bone meal	20	20	20
Limestone	11	11	11
Mycotoxin binder	1	1	1
Lysine	1	1	1
Methionine	1	1	1
Salt	3	3	3
Vitamin + Mineral Premix	3	3	3
Total	1000	1000	1000
Composition (proximate analysis)	%		
Dry Matter	93.00		
Crude Protein	19.20		
Ether Extract	5.20		
Crude Fibre	4.50		
Ash	6.40		
Nitrogen Free Extract	57.70		
Composition (calculated)			
Metabolisable Energy (K.cal/kg)	2950.00		
Crude Protein	20.43		
Fat	3.95		
Fibre	3.11		
Calcium	1.04		
Available Phosphorus	0.43		
Methionine	0.42		
Lysine	1.13		

Table 3: Effects of Oregostim on Performance Characteristics of Finisher Broilers

Parameters	T ₀ (control)	T ₁ (3g/10kg feed-grade)	T ₂ (3ml/10ltr liquid)	±SEM
Initial weight (Kg)	0.76	0.75	0.76	0.01
Body Weight (Kg)	1.52 ^b	1.73 ^a	1.70 ^a	0.23
Body Weight gain (Kg)	0.76 ^b	0.98 ^a	0.94 ^a	0.12
Feed Intake (Kg)	1.95	2.02	2.00	0.05
Feed Conversion Ratio	2.57 ^a	2.06 ^b	2.13 ^b	0.42
Mortality (%)	10.00 ^a	0.00 ^b	3.33 ^b	6.50

^{ab} means with different superscripts on same horizontal row differ significantly (p<0.05)

Table 4: Haematology of Finisher Broilers Treated with Feed-Grade and Liquid Oregostim

Parameters	T ₀ (control)	T ₁ (3g/10kg feedgrade)	T ₂ (3ml/10ltr liquid)
PCV (%)	21.33 ± 3.28 ^b	24.33 ± 2.33 ^a	23.30 ± 3.79 ^a
[Hb] (g/dl)	7.00 ± 1.22 ^b	8.10 ± 0.96 ^a	8.02 ± 0.98 ^a
RBC (x 10 ⁶ mm ³)	2.02 ± 0.31	2.34 ± 0.29	2.42 ± 0.26
WBC (x 10 ³ mm ³)	144.23 ± 17.45	120.67 ± 3.32	130.50 ± 12.85
MCV (fl)	103.60 ± 3.88	104.67 ± 1.32	103.45 ± 2.08
MCH (pg)	32.80 ± 0.99 ^b	34.40 ± 1.49 ^a	33.13 ± 1.21 ^{ab}

^{ab} means with different superscripts on same horizontal row differ significantly (p<0.05)

Table 5: Serum Biochemistry of Finisher Broilers Treated With Feed-Grade and Liquid Oregostim

Parameters	T ₀ (control)	T ₁ (3g/10kg feed-grade)	T ₂ (3ml/10ltr liquid)	±SEM
Total Protein (g/dl)	5.50	5.80	6.00	0.35
Albumin (g/dl)	3.20	3.53	3.50	0.25
Globulin (g/dl)	2.30	2.27	2.50	0.17
Cholesterol (g/dl)	39.88	40.28	40.25	0.51
Uric Acid (mg/dl)	8.30	7.80	8.20	0.40
ALT (u/l)	13.05	13.48	12.99	0.36
ALP (u/l)	22.33	22.83	21.75	1.05
GGT (u/l)	10.55	10.88	10.96	0.40

^{ab} means with different superscripts on same horizontal row differ significantly (p<0.05)

DISCUSSION

Table 3, shows the performance characteristics of finisher broilers treated with feed-grade (3g/10kg feed) and liquid (3ml/10ltr water) Oregostim, the live body weights of feed-grade (1.73kg) and liquid Oregostim (1.70kg) four weeks after the administration show a significant (p<0.05) increment more than the control (1.52kg) which does not have any type of Oregostim. The body weight gain also followed the same trend, all these are in agreement with the findings of [8, 31, 32].

Another parameter of importance in performance characteristics is the Feed Conversion Ratio (FCR), T₁ (3g/10kg feed) and T₂ (3ml/10ltr water) presented statistically the same FCR, which is significantly (p>0.05) lower than the T₀ (control) without Oregostim. This shows that finisher broilers in T₁ and T₂ consumed same feed as the control, but produced a better body weight (1.73kg and 1.70kg) and weight gain (0.98 and 0.94kg) than the control (1.52kg) and (0.76kg) respectively, this is attributable to increased digestion due to supplementation with with Oregostim [8].

These positive responses of the finisher broilers in performance characteristics to the inclusion

of Oregostim, irrespective of the type is attributed to the essential oils [33] in the active ingredients, which stimulates the digestive system [34], to increase the production of digestive enzymes and also improves the utilisation of digestive products through enhanced liver functions [7]. Thus improves feed intake, FCR [8, 14, 15], promoting a better sedimentation of muscle protein [35], and so improves the live body weight [11].

Oregostim also has antibacterial and antimicrobial properties [16], most of the harmful bacteria viz., enterococcus, campylobacter, klebsiella, salmonella and staphylococcus [36] in the gastrointestinal tract of the finisher broilers were suppressed by the action of Oregostim and prevented from reaching an infective level, hence nil or very low mortality in the treatments (T₁ and T₂) with feed-grade and liquid Oregostim respectively, when compared with the control (T₀) with a mortality record of 10% (see Table3).

Table 4, shows the haematological parameters of finisher broilers treated with different types of Oregostim. The Packed Cell Volume (PCV) of T₁ (24.33±2.33) and T₂ (23.30±3.79) with feed-grade and liquid Oregostim respectively are significantly (p<0.05) greater than T₀, the control (21.33 ± 3.28) this is as a

result of the inclusion of Oregostim in either the broiler finisher diet or water, which increases the digestion of protein, by so doing provide improvement in all the systems and digestion in the ileum [7].

Haemoglobin concentration ([Hb]) also followed the same trend as PCV for all the treatments, T₁ (8.10±0.96) and T₂ (8.02±0.98) are significantly (p<0.05) greater than T₀, the control (7.00±1.22), also as a result of the aforementioned reasons. Mean corpuscular Haemoglobin (MCH) which is directly related to [Hb] shows T₁ (34.40±1.49) is significantly (p<0.05) greater than the control (32.80±0.99), but not different from T₂ (33.13±1.21) treated with liquid Oregostim at 3ml/10ltr water, though statistically equal to the control (T₀).

All other haematological parameters (RBC, WBC and MCV) measured did not show any significant (p>0.05) difference across the table irrespective of the treatment. All the values of haematological parameters measured fall within the normal range [37]. This implies that Oregostim does not have adverse effects on haematological parameters.

Table 5 shows the serum biochemistry of finisher broilers treated with Oregostim. All the values for the parameters measured (TP, albumin, globulin, ALP, AST, GGT, Uric acid and cholesterol) did not differ (p>0.05) across the treatments irrespective of the types of Oregostim used, and all values fall within the normal range (38). The serum biochemical analysis of the finisher broilers treated with Oregostim was carried out to know if Oregostim has adverse or side effects on some organs despite its overwhelming usefulness. Since there is no significant (p>0.05) difference in Total Protein, albumin and globulin, and liver enzymes activities (ALT and ALP), when compared with the control and range of values, it shows that the liver functions are not affected, this is in agreement with the findings of [39]. Also since values of uric acid for T₁ and T₂ is statistically the same as that of the control and within the normal range of values, it shows that the kidney functions are not affected, this is also in agreement with [39]. Furthermore, the cholesterol level after treatment with Oregostim did not differ significantly (p>0.05) from the control and fall within the normal range, this corroborates the findings of [40].

CONCLUSION

The supplementation of the finisher broiler diet with Oregostim, irrespective of the type (feed-grade or liquid) increases the live body weight, weight gain and reduces the FCR and mortality rate, while it does not have detrimental effects on the haematological and serum biological parameters of broilers at the finisher phase. It is therefore recommended that either feed-grade or liquid Oregostim can be used at 3g/10kg feed or 3ml/10ltr water respectively for finisher broilers.

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