

EFFECT OF GRADED LEVELS OF DIETARY PENICILLIN ON THE GROWTH RATE AND FEED CONVERSION OF BROILER CHICKS

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ABSTRACT

One hundred , 4 – week old Anak broiler chicks were used in an experiment to evaluate the effect of graded levels of dietary penicillin on the growth rate and feed conversion of broiler chicks. The birds were randomly assigned to five treatment diets in a Completely Randomized Design [CRD] and each treatment group was further sub – divided into four replicates . The chicks were fed ad-libitum with five formulated broiler finisher diets supplemented with dietary penicillin at levels of 0ppm,50ppm, 100ppm, 150ppm, and 200ppm representing treatments 1,2,3,4 and 5 respectively. Performance criteria were feed intake, daily weight gain and feed conversion ratio (FCR). Results showed that in all the measurements, broiler fed on 50ppm, 100ppm and 150ppm penicillin supplemental levels performed significantly. ($P < 0.05$) better than those fed on 0ppm, and 200ppm inclusion levels. There was no significant ($P > 0.05$) difference in the weight gain and feed conversion ratio among the birds fed T_1 and T_5 diets. The result of this experiment demonstrated that inclusion of penicillin in broiler diets enhanced growth rate and feed conversion of the birds and that penicillin could be supplemented in broiler diets at up to 150ppm levels.

Key words: broiler chicks, dietary penicillin, performance, feed conversion, growth rate.

INTRODUCTION

The inadequate supply and intake of animal protein in developing countries is due to high cost of feeding with the accompanying high cost of production. In Nigeria, corn serves as the major source of energy, while

soybean meal and groundnut cake serve as the major sources of plant protein in monogastric diets. However, there is a great deal of variation in the composition of these ingredients, which has a negative influence on the performance of birds (Eruvbetine *et al.*, 2002. Cheson 1996). Furthermore, the inadequate production and supply of these ingredients and the stiff competition between man and his livestock for the available grains are responsible for the high cost of commercial diets. The rising cost of proprietary feeds has greatly suppressed the expansion of the poultry industry with consequences of acute shortage of high quality animal protein supply and intake.

Efforts to abridge the deficiency of animal protein in the diet of people in developing countries and the realization of the enhanced rate of weight-gain and reduced feed intake following feed additive inclusion in poultry and livestock rations, has consequently led to a remarkable increase in the use of feed additives as growth promoters in animal production (Manie *et al.*, 1998, White, 1999).

Feed additives which include antibiotics, enzymes and probiotics have been efficiently used to enhanced certain characteristics of the feed and improve growth rate in monogastric animals (Ademola 2003, Licois 1996, Onu, 1995). It has been reported that that subtherapeutic antibiotic supplementation of animal feeds stimulates appetite, control harmful bacteria and stimulates vitamin synthesis in the alimentary canal resulting in improved weight gain and feed efficiency, without increasing feed intake (WHO report, 1997, Manie *et al.*, 1998).

This study was therefore designed to evaluate the performance of broilers chicks fed on graded levels of penicillin supplemented diets.

METHODOLOGY

One hundred (100), Anak broiler chicks procured from a reputable commercial hatchery at day old were used for the experiment. They were brooded up to the fourth week in a electrically heated deep litter house and fed on a proprietary antibiotic-free broiler starter diet. The birds were vaccinated against Newcastle and Gomboro diseases.

At the fifth week, the birds were randomly assigned to five treatment diets in a Completely Randomized Experimental Design (CRD). Each treatment group of 20 birds was further sub-divided into four replicates of five birds and kept in a compartment measuring 3 x 3m. Feed and water were provided *ad-libitum*.

Five experimental diets (Table 1) containing yellow maize and spent grain as the major sources of energy with soybean meal and fish meal serving as the protein sources were formulated. The composition of the diets were similar but for the level of penicillin supplementation in the diets. Treatment 1 was the control diet in which no supplement was added, while treatments 2, 3, 4, and 5 were supplemented with antibiotics penicillin at levels of 50ppm, 100ppm, 150ppm and 200ppm respectively. The response criteria were daily weight gain, feed intake, and feed conversion ratio.

Data on feed intake were obtained by difference between the quantity offered and the quantity left over each day, while body weight of broilers was on an individual basis weekly and in the morning hours when their crops were virtually empty. These were used to compute the feed conversion ratio as the gram feed intake per gram weight gain.

Data collected were subjected to statistical analysis appropriate for the Complete Randomized Design (CRD) (Snedecor and Cochran 1980). When analysis of variance indicated significant treatment effects, specific difference between the treatment means were detected using Duncan's New Multiple Range Test (DNMRT) as outlined by Obi (2002).

RESULTS

The summary of the performance of broiler chicks fed on graded levels of penicillin supplemented diets are shown in Table 2. There was significant difference ($P < 0.05$) in the feed intake, body weight gain and feed conversion ratio of the birds feed on the experimental diets. Average daily feed intake ranged from 130.40g to 140.30g for chicks on 50 ppm and 200ppm penicillin supplemental levels. Treatment mean separation revealed that birds on Treatments 1 and 5 consumed significantly ($P <$

0.05) higher feed than birds on treatments 2 and 3. There was no significant ($P > 0.05$) difference in feed consumption among the former groups and those in treatment 4.

Birds on treatments 2, 3 and 4 gained significantly ($P < 0.05$) higher weight than those on treatments 1 and 5. There was no significant ($P > 0.05$) difference in body weight gain among birds on treatments 1 and 5. There was significant ($P < 0.05$) difference in the feed conversion ratio among the treatment groups. The feed conversion ratio of broiler chicks on treatments 2, 3 and 4 were superior to those on treatments 1 and 5.

DISCUSSION

Supplementation of diets with 50ppm, 100ppm and 150ppm enhanced weight gain and feed conversion ratio of the birds fed on the diets. The improved weight gain of the birds fed on these levels of penicillin supplemented diets, despite their lower feed intake could be partly due to the reduction or elimination of the bacteria which produce toxins that reduce the growth of host (broiler chicks) animals. The improved performance could also be due to the stimulation of the micro organisms that synthesize unidentifiable nutrients (McDonald *et al.*, 2002). The probable destruction of the harmful micro organisms in the alimentary canal of the birds and the stimulation of beneficial organisms may have improved the availability, absorption and utilization of the nutrient in the diets, resulting in enhanced weight gain (Serres, 1992, Eruvbetine *et al.*, 2002).

Body weight gain is not a reflection of feed intake as birds on treatments 1 and 5, which consumed significantly ($P < 0.05$) higher feed, gained significantly ($P < 0.05$) lower weights than those in treatments 1, 2 and 4. The increased consumption of feed when penicillin was fed at 200ppm level could be attributed to hyper stimulation of appetite achieved by the antibiotic, thus resulting in increased feed intake. Similar observations were made by Fetwell and Fox (1978); Ensminger *et al* (1990)

In spite of the fact that there was no significant ($P > 0.05$) difference in the weight gain and feed conversion ratio of birds on T_1 and T_5 diets, there were tendencies for better utilization of nutrients in T_5 diet. This is seen in the marginal increase of 3.12g and 0.23 for average weight gain and feed conversion ratio in favour of T_5 diet. This improvement over T_1 diet may not be unconnected to the reduction of the growth of micro organisms that compete with the host animal (broilers) for the available nutrients. It could also be due to increased absorptive capacity of the small intestine through a decrease in the thickness of the intestinal wall (McDonald *et al* 2002). The better feed conversion ratio exhibited by the birds on T_5 diets, though not significant ($P > 0.05$) agrees with the findings of Leonard *et al* (1979) that animals responding to antibiotic feeding consumed higher feed than the control with better feed efficiency.

The overall positive feed conversion ratio recorded by birds on penicillin supplemented diets could be ascribed to improved availability and absorption of nutrients by the birds.

CONCLUSION

It is apparent from the overall results that the inclusion of penicillin in broiler rations was effective in enhancing certain characteristics of the feed and feed efficiency resulting in improved weight gain. The study further showed that 50ppm 100ppm and 150ppm proved more superior in all the parameters measured.

REFERENCES

- Ademola, S. G. (2003). Effect of two antibiotics on the utilization of low protein diets by broiler chicks Proc. of the 28th Ann. Conf. Nig. Soc. for Anim. Prod. (NSAP) Ibadan. 158 – 161
- Chesson, A (1996). Feed enzymes, *Animal feed Science and Technology* 45:65-79.
- Ensminger, M.E. Oldfield, J.E., Heinemann, W. W. (1990). Feed and Nutrition – 2nd ed. 1009 – 1040.

Eruvbetine D.J., Dipeolu, M.A. and Oguntona E.B. (2002). Comparism of enzymes and antibiotic inclusion in diets for laying hen Proc. of the 27th Ann. Cof. of Nig. Soc. of Anim. Prod. (NSAP), Akure 101 – 104

Fetwell, R. and Fox, S (1978) *Practical Poultry Feeding*. Faber and Faber, London 97 – 98.

Leonard, A. M., Lossi, J.A; Hintz, H.F and Warmer, R. G. (1979). *Animal Nutrition* 7th ed. Tata McGrawhi Publishers 356 – 368.

Licois. D (1996) Risques associes a L'nutilization des antibiotiques chez la lapnin: Une mini revue. *World Rabbit Research* 4: 63 – 68.

McDonald, P., Edward R.A., Greenhalph J.F.D. and Morgan C.A. (2002). *Animal nutrition* (6th ed.) Person Education Limited, United Kingdom.

Manie T., Khan S., Bronzell V.S., Veith W.J and Gouws P. A.(1998).Antimicrobial resistance of bacteria isolated from slaughtered and retain Chicken in South Africa *Latts. Apple. Microbial.* 26 253-258

Obi I.U (2002). *Statistical methods of detecting differences between treatment Means and research methodology issues in laboratory and field experiments*. AP Express Publishing Company Ltd. Nsukka.

Onu P. N. (1995). Effect of graded levels of procaine penicillin on the growth performance of broilers. PGD project. Rivers State University of Science and Technology, Port Harcourt.

Serres, H (1992). Manual of pig production in this tropic. CTA – CABI publishing.110 –111.

Snedecor G. G. W. and Cochran W. G. (1980). Statistical methods. The IOWA State University Press. Ames IOWA 6th ed.

White N. (1998). Medical consequences of antibiotic use in Agriculture. *Science* 279; 996 – 997.

WHO Report (1997). The Medical Impact of the use of antimicrobials in food animals. WHO/EMC/200/97.

Table 1:Composition of the Experimental Diets
Dietary levels of penicillin (ppm)

Ingredients	T ₁	T ₂	T ₃	T ₄	T ₅
Maize	55.0	55.0	55.0	55.0	55.0
Soya bean meal	19.0	19.0	19.0	19.0	19.0
Wheat offal	12.0	12.0	12.0	12.0	12.0
Fish meal	5.0	5.0	5.0	5.0	5.0
Palm kernel cake	5.0	5.0	5.0	5.0	5.0
Bone meal	3.0	3.0	3.0	3.0	3.0
Salt	0.25	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00

	Penicillin 0	50	100	150	200
Calculated analysis					
Crude protein	19.83	19.83	19.83	19.83	19.83
Ether extract	4.22	4.22	4.22	4.22	4.22
Crude fibre	4.55	4.55	4.55	4.55	4.55
Ash	3.72	3.72	3.72	3.72	3.72
Methionine	0.39	0.39	0.39	0.39	0.39
Lysine	1.31	1.31	1.31	1.31	1.31
Calcium	0.34	0.39	0.39	0.39	0.34
Phosphorus	1.05	1.05	1.05	1.05	1.05
ME (kcal/g)	2777.2	2777.2	2777.2	2777.2	2777.2

The commercial premix contributed the following per kg of the product: Vit. A, 12,000 I.U.; Vit E, 3,611.U; Vit k., 1.8mg; Vit B₂ 3.6mg; Nicotinate, 1.8gm; Calcium-d-panthothanate, 9.6mg; Biotin, 3.6mg.; b₁₂; 0.012mg; Chorine chloride, 120mg.; Chlortetracycline, 48mg.; Mn, 24mg., Iron, 48mg.; Zn, 96mg.; Iodine, 1.8mg.; Cobalt, 0.48mg.

Table 2: Performance of broiler fed on graded levels of penicillin supplemented diets

Parameter	<u>Dietary levels of Penicillin (PPM)</u>					SEM
	T ₁ (0)	T ₂ (50)	T ₃ (100)	T ₄ (150)	T ₅ (200)	
Av. Initial body weight	400.00	320.00	300.00	300.00	400.00	
Av. Final body weight (g)	1710.00 ^b	1890.00 ^a	1830.00 ^a	1826.00 ^a	1820.00 ^a	7.03
Av. body weight gain (g)	1310.00 ^b	1570.00 ^a	1530.00 ^a	1526.00 ^a	1420.00 ^b	
Av. Daily body weight (g)	37.43 ^b	44.86 ^a	43.71 ^a	43.60 ^a	40.57 ^b	1.20
Av. Total feed intake (g)	4833.50 ^b	4564.00 ^a	4627.00 ^a	4658.50 ^{ab}	4910.50 ^b	9.90
Av. Daily feed intake (g)	138.10 ^b	130.40 ^a	132.20 ^a	133.10 ^{ab}	140.30 ^b	1.68
Feed conversion ratio	3.69 ^b	2.91 ^a	3.02 ^a	3.05 ^a	3.46 ^b	0.13

^a and ^b: Means with unidentical superscripts differ significantly ($P < 0.05$)