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PERFORMANCE OF JUVENILE QUAILS FED RUMEN CONTENT MEAL WITH OR WITHOUT PROBIOTICS ENZYME SUPPLEMENTATION TO REPLACE GROUNDNUT CAKE (GNC)

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Abstract

A total of 180 Japanese juvenile quails were used for this experiment that lasted for a period of 8weeks. The study was designed to determine the performance of juvenile quails fed rumen content meal with or without Probiotics and enzymes supplementation to replace groundnut cake (GNC). There were twelve dietary treatments in which rumen content meal was fed at 3 graded levels 0, 30, and 60% and four supplementation levels (NSA, Probiotic A, probiotic B and Enzyme). data of different parameters were collected weekly, the data's collected were subjected to 3 X 4 Factorial experimental design. The weight gain of the quails decreased (P<0.05) with increase level of rumen content. The quails fed probiotic B supplement had the highest (P<0.05) weight gain which 't.nded" to he higher than quails fed NSA diet. The fed intake value decreased (P<0.05) with the increase in level of rumen content. The quails fed on NSA diet had a high feed intake. The feed to gain ratio increased as the level of rumen content increased in the diet. The quails fed on Probiotics B supplement had a lowest feed to gain ratio. The profitability increased as the level of rumen content increased. Base on the outcome of this study, it is here by recommended that quails could tolerate 30% rumen content meal in their diet, because of the weight gain and feed to gain ratio. Probiotic B is also recommended for quails because of its high weight gian, feed to gain ratio and feed cost (1kg) and also as a growth promoter.

Key word: Juvenile quail, rumen content, Probiotics, Enzyme, replacement, livestock feed.

Introduction

The rapid increase in the population of the world has resulted in a huge increase in the demand for animal protein. The average protein intake of about 19.8/Caput/day by Nigeria is low and far below FAQ requirement of 65g/caput/day for daily maintenance (FAQ, 1997). Animal protein contains essential amino acid which are more balance and readily available to meet human nutritional needs than plant protein.(McDonald et al., 1988). Fish meal, groundnut cake and soya bean meal have been used as convectional feedstuffs for livestock. But price of these conventional feedstuffs are usually so high and increases always. There is also problem of humans and livestock competition for food. There is the need therefore, to explore the use of non-conventional feed sources that have the capacity to yield similar output as conventional feedstuff and perhaps at a cheaper cost. The recommended policy is to identify locally available feed resources to formulate diets that are balanced as possible (Gueye and Branckaert, 2002). The success of wastes such as rumen content, oilseed meals and rendering plant by product as well as established feed ingredient may create the presswi that the use of any waste as feed is an easy, straight forward process. The production of animal feed could be the most profitable way of waste utilization in the country. The feed route represents the highest immediate cash return because demand for feed is huge and stable, and the technologies involved are not too sophisticated. Marketing is relatively easy; the introduction of unconventional feed is much easier than that of conventional feed, Unfortunately, there are also many factors that may limit the apparent profitability of the feed approach (Ore Abubakar, 2006). The US National Food Ingredient Association presented, probiotics (direct fed microbial) as a source of live naturally occurring microorganisms and this includes bacteria, fungi aicat Miles (1991). According to the currently adopted definition by FAQ/WHO, probiotics are: "live microorganisms which when administered in adequate amounts confer a health benefit on the host" FAO/WHO (2001). More precisely, probiotics are live microorganisms of nonpathogenic and nontoxic in nature, which when administered through the digestive route, are favorable to the host's health (Guilot 1998). Adding of enzymes into mixtures for broiler nutrition is applied with purpose to increase the efficiency of production of poultry meat. This is especially interesting if enzymes are used which enable use of feeds of lower nutritive value. This study was designed to investigate the performance of juvenile quails fed rumen content meal with or without Probiotics and enzyme supplementation to replace groundnut cake (GNC).

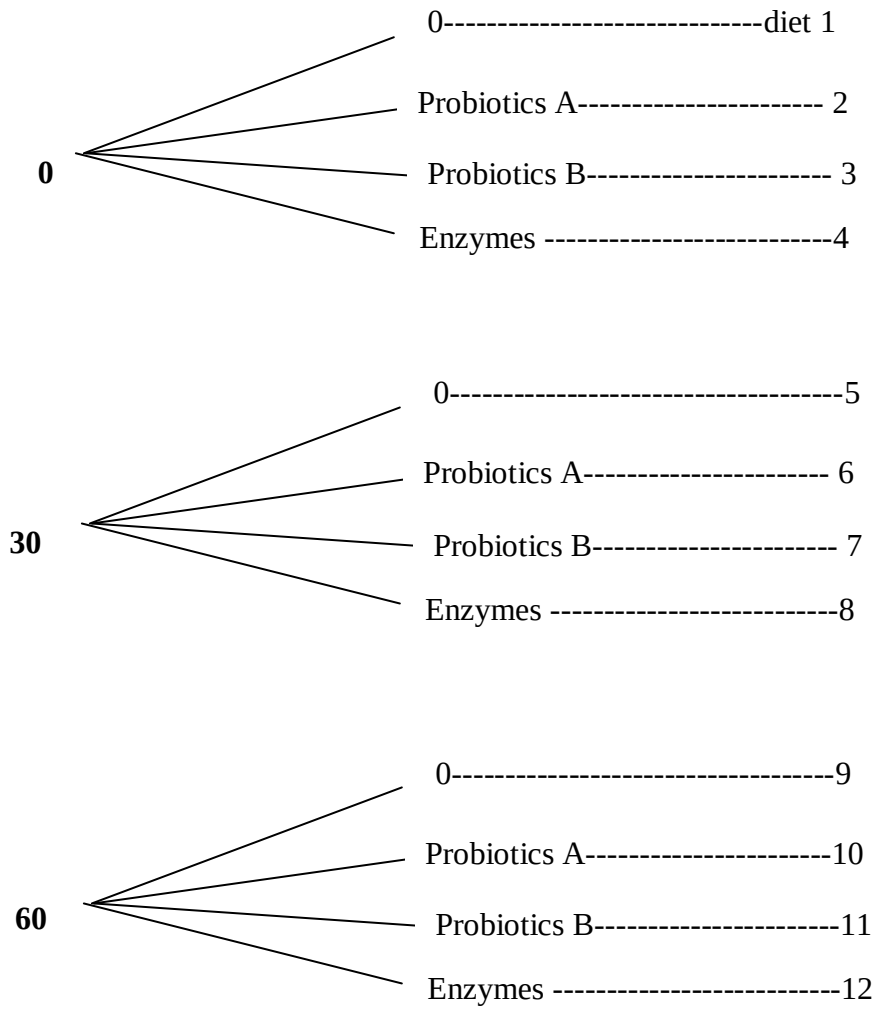
Materials and Methods

180 Japanese quails were reared in wooden cage that has 36 pens such that there were l2dietry treatment and each diet had 3 replicates of five quails each. The rumen content collected immediately when the rumen compartment was split open in the abattior and then subjected to hailing in a large aluminum locally made pot for about 3hours with constant stirring for equal heat distribution to eradicate the presence of microbes available in the rumen content. Three inclusion levels of rumen content meal (0, 30, 60%) were fed with four supplementation levels (No supplement added, Probiotic A, probiotic B and Enzyme) to replace GNC in the diet of quails. GNC in the control was 24%. 3x4 factorial experiment was adopted. Feed and water was supplied ad libitum throughout the experimental period. The cage was

cleaned every day and the water trough was also washed every day. The birds were given anti-stress and glucose for one week followed by coccidiostat on the 14th day for 3 consecutive days. The feeding of diets lasted for 8 weeks .The initial weight of the quails was recorded on arrival, weekly and daily feed intakes were also recorded, while the feed to gain ratio and cost implication were calculated. All proximate analysis was con: cted using the method of A.O.A.C (1990). Data were subjected to subjected to analysis of variance (ANOVA) to determine the significance of treatment effects following the methods described by SAS, (1997). Duncan multiple range test was used to separate the means at (P<0.05) to determine the difference between means.

Figure 1: Experimental Layout

Rumen content levels



3 **x** 4 factorial experiment = 12 diet
Probiotics A: Total Gut Integrity (TGI):250/tone of feed (250g/100kg of feed)
Probiotics B: Biotronic: bag/tone of feed (104g/100kg feed)
Enzyme: Maxi grain: 4kg/tone of feed (0.4g/100g of feed)

Results

Growth performance

The growth performance of Japanese quails fed Rumen Content (RC) and supplementation of Probiotics and enzyme are represented in Table 2. The dietary treatments had significant effect (Ps0.05) on the feed intake of the Japanese quail. The feed intake values obtained decreased (P<0.05) with the increase in the level of rumen content in the diets. Values recorded were 9.13, 8.33 and 7.04g at 0, 30, and 60% inclusion of Rumen content respectively. In terms of supplement, there were significant difference (P<0.05) on the feed intake by the Japanese. The feed intake values decreased in this sequence; Quail fed no supplement > Quails fed Probiotics A > Quails fed Probiotics B > Quail fed enzyme with corresponding values of 8.48, 8.22, 8.03 and 7.90g. The interaction between levels of Rumen content and supplementation had significant effect (P<0.05) on the feed intake values obtained.

The dietary treatment had significant effect (P<0.05) on the weight gain of the Japanese quail. The trend of weight gain was similar to that of feed intake, weight gain values decreased (P<0.05) with increased level of Rumen content. Values recorded were 6.81, 6.21 and 4.35 at 0, 30, and 60% inclusion of rumen content respectively. The supplements fed had significant effects (P<0.05) on the weight gain values recorded. The highest (P<0.05) weight gain value of 6.81g was recorded on quails fed Probiotics B which was comparable (P>0.05) to that obtained on quails fed Probiotics A

(655g) while the lowest (P<0.05) weight gain value of 5.63g was recorded on quails fed no supplement which was significantly lower than weight gain value of 6.49g recorded on quails fed enzyme supplementation. The interaction between levels of Rumen content and supplementation showed significant difference (P<0.05) on the weight gain values recorded. Table 3 shows the result of the financial implication of feeding Japanese quails fed rumen content meal with or without Probiotics and enzymes supplementation to replace groundnut cake. There was a significant difference (P<0.05) in the cost of feeding quails. A reduction in price of feed was observed with increase in the level of rumen content inclusion in the diet. The diet with 60% rumen content inclusion had the least cost of feed 71.72 N/kg while the diet with 30% of rumen content inclusion was also better than that of the control diet having 79.27 N/kg and the control diet having feed cost of 86.84 N/kg. There was no significant difference in the cost of feed per kg in diet with no supplement added (NSA) and the diet containing Probiotics A, Probiotics B and Enzyme (79.36, 79.35, 79.34 N/kg respectively).

Discussion

Adeniji (1996) reported that the blood rumen content, when well processed is not harmful to layers and the utilization of these waste would reduce the unhygienic environment of our abattoirs. Awotoye, (1991) also reported that a gradual decrease in weight gain of experimental broiler birds when dietary level of blood rumen content increased.

The feed consumption of quails fed rumen content had a slight difference 8.33 and 7.04 at 30 and 60% rumen content inclusion; compared to the quails fed the control diet that consumed (9.13g). This may be as a result of animal consumes more fed to meet their energy requirement (Atteh and Ologbenla, 1993; Odeniya, 2002). Feed consumption was significantly lower in the probiotic fed groups and comparable with enzyme group, might be due to better utilization of nutrients. Pakhira and samanta (2006) and Asrnita Kumari et al., (2001) reported lower intake on lactobacillus in diet of quails. In the weight gain, there was a gradual decrease in weight gain as the level of rumen content increases. The slight decrease in weight gain indicates the effect of the fibrous nature of the rumen content, fiber has show to decrease the rate of growth in monogastric animals. Sonaiya et al., (1989) reported that fiber causes depression in the proportion of energy digested and retained for metabolism.

Significantly, higher growth in probiotic group may be attributed to inhibition of growth of the enteropathtogens in their gut by decreasing the intestinal pH and efficient utilization of nutrient by the beneficial microbes. Asmita Kumari at a! (2001) and kumaraj et a! (1997) reported significant increase in body weight in quails. Staznicka (1992), Wantia (1993) and Edwin at a) (2004), reported improved live weight due to multienzmes in diet. It was also observed that quails that consumed the diet with probiotic and enzyme had better feed to gain ratio as compared to control. Two findings are in accordance with Asmita Kumari et a) (2001) and Elongvav et al (2004) who also reported better feed convection ratio on feeding of probiotic and enzymes in quails.

The price of 1kg of feed was found to be the cheapest at 60% Rumen content inclusion, while the most expensive was recorded in the control diet, the price of the diet decreased as level of rumen content increased. Therefore, the increasing cost of protein concentrate would be reduced with the inclusion of rumen content meal (Adeniji and Balogun, 2001).

The price of 1kg of feed was found to be the cheapest at probiotic B supplemented feed due to the difference in quantity of inclusion of Probiotic B in the feed, the inclusion of Probiotic B as(104/100kg feed) and that of probiotic A was (250g/l00kg of Feed).

The inclusion of Rumen content meal showed great increase in gross profitability and profitability. The economic sense of such a reduction on cost of feed wIl only depend on the utilization of the feed and weight gain would be the most economically advantageous diet. 0% rumen content inclusion had the best result in terms of weight gain (6.81g) and feed to gain ratio (3.15), which was slightly different from 30% rumen content inclusion which was having (6.21g) as weight gain and (4.0G) as feed to gain ratio. Guails fed with 30% rumen content inclusion had the best weight gain and feed to gain ratio when compared with quails fed with 60% rumen content inclusion. But for the supplemented feeds, probiotic A had the best result in terms of profitability (48.91%) between the two Probiotics used, which was comparable to the controi feed (49.07%),and probiotic B had the best price of 1kg of feed, also had the best weight gain. Probiotic B and enzyme had the best feed to gain ratio. The best result of the supplemented feed was gotten from probiotic B supplement.

Probiotics supplementation was better than enzyme supplementation in this experiment in terms of weight gain, price of 1kg of feed, cost of rearing, profitability and also Gross profit. Although enzyme also showed comparable difference with Probictics in terms of feed to gain and profitability in conclusion, throughout the experiment, 30% Rumen content meal is being recommended, though Adeniji and Balogun (2001) recommended 10% inclusion of rumen content meal in the dietary pullet chicks. It is also concluded that probiotics is a better supplement than enzyme because it gave better performance than enzyme at the end of the experiment. Although Probiotics and enzyme can be successfully incorporated in diet of Japanese quails as growth promoters.

References

Adeniji, A. A. (1996). The value of bovine rumen content meal as feed stuff or pullet. Ph.D Thesis; University of Ilorin.

Adeniji, A.A (2001). The potential of bovine blood rumen content meal as a feed stuff for livestock trop. Animal Production invest 4: 151-156.

Association of offal Analytical Chemists(A.O.A.C.)(1990). Official Methods of Analysis Ed. Washington D.C.

Awotoye, A.V. (1991). The effect of molasses on the ultilazation of Rumen content. B. Agric Project. Subrrnuted Lu the Department of Animal Production University of Ilorin.

Asmita Kumari, S. S. Singh, M. D. Neeruddin and K. C.P. Singh (2001): Effect of Probiotics on growth performance of meat type Japanese Quail. Indian J.Poult. Sci., 36 (2) : 233-234.

Elangovan, A. V., A. S. Mandal, P. K. Tyagi, P.K. Tyagi,S.Tappo and T. S. Johari (2004):Performance of growing and laying quails, J. Sci. Food and Agri.,84 (15) 2028-2034.

FAQ. (1997). Roughage utilization in warm climate, by M. Chenost & C. Kayouli. FAQ Animal Production and Health Paper No. 135.Rome.

FAO/WHO (2001) Health and nutritional properties of probiotics in food including powder milk with live lactic acid bacteria;Report of a Joint FAQ/WHO Expert Consultation on Evaluation of Health and Nutritional Properties of Probiotics in Food Including Powder Milk with Live Lactic Acid Bacteria; Amerian Córdoba Park Hotel, Córdoba,Argentina: FAQ/WHO;. pp. 1—34.

Gueye, E.F. (2002). Family poultry research and development in low- income food-deficit countries: approaches and prospects. Outlook on Agriculture 31(1): 13-21.

Guillot J.F. (1998). Les probiotiques en alimentation animale. Cah. Agric.;7:495 54.

Kumaraj, R., D. Narhari, G. Shrinivasan & R. A. Rajani(1997):Growth performance and carcass quality of Japanese quail, Indian J.Poult. Sd., 32: (1) : 106-107.

McDonald P., Edwards R.A., and Greenhalgh J.F.D., eds., (1988), Animal nutrition, 4th edition, John Wiley and sons inc., New York, USA,pp.398-418

Miles R. D, Bootwalla, S.M.(1991). Direct-Fed Microbials in Animal Production A Review, National Food Ingredient Association; West.

DesMonies, Iowa, USA:. Direct-fed microbials in animal production; pp. 117-5132.

Ore, A (2006). Effect of feeding pullet chicks decomposed rumen content maggot meal with or without enzyme supplementation. B. sc. Thesis, Dept of Animal Production Faculty of Agriculture University of Ilorin, Kwara Nig.

Pakhira, M.C. and G. Samuuha (2006); Response of meat type quails to dietary Probiotics, Indian J. Poult.Sci., 41 (1) :68-73.

SAS, (1997). Statistical Analysis System. SAS User's guide. Cary Ny SAS Institute.

Sonaiya, E. S. (1989). Animal by-product and their potential for commercial livestock feed production in G.M. Babatude, ed. Proc, Nat. workshop alternative formulation of livestock feed in Nigeria, ARMTI Ilorin, 21-25 Nov. 1988, Economic affairs office, the presidency, p. 289-31.

Staznicka, H. (1992); Zivocisna Vyroba,The effect of dietary fat or fiber addition on yield and composition of milk from sow,Feb67(2);482-95.

Annexure

TABLE 1: COMPOSITION OF EXPERIMENTAL DIET (Kg/l00kg)
RUM EN CONTENT REPLACEMENT LEVELS

	0%				**30%**				**60%**			
Ingredient	1	2	3	4	5	6	7	8	9	10	11	12
Probiotics	0	+	0	0	0	+	0	0	0	+	0	0
Probiotics	0	0	+	0	0	0	+	0	0	0	+	0
Enzyme	0	0	0	+	0	0	0	+	0	0	0	+
Rumen content	0	0	0	0	7.2	7.2	7.2	7.2	14.4	14.4	14.4	14.4
Groundnutcake	24	24	24	24	24	24	24	24	24	24	24	24
Maize	41	41	41	41	41	41	41	41	41	41	41	41
Corn bran	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7	12.7
Soy bean meal	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Wheat offal	8	8	8	8	8	8	8	8	8	8	8	8
Fish meal	2	2	2	2	2	2	2	2	2	2	2	2
Bone meal	3	3	3	3	3	3	3	3	3	3	3	3
Limestone	3	3	3	3	3	3	3	3	3	3	3	3
Salt	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
Premix	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Methionine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Lysine	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total	100	100	100	100	100	100	100	100	100	100	100	100
Proximate composition												
Crude protein	21.73	21.23	21.13	21.43	19.44	19.341	19.21	19.23	17.28	17.30	17.37	17.36
M.E cal/kg	2714.30	2715.32	2713.40	2718.30	2787.22	2711.66	2722.70	2713.10	2568.44	2571.165	2564.84	2554.67
Crude fiber %	4.71	4.60	4.62	4.65	6.40	6.22	6.34	6.51	7.95	7.85	7.64	7.88
Ether extract %	3.90	3.98	3.89	3.92	3.72	3.71	3.71	3.63	3.58	3.56	3.46	3.32
Moisture %	10.48	10.52	11.20	10.32	10.38	9.68	9.78	10.20	9.94	8.94	9.23	8.56
Total Ash	9.26	8.65	9.42	9.36	10.12	10.34	9.65	10.33	11.03	10.94	11.24	11.44

Bio Mix Grower (Bio-ONICS) Primix used contained the following per kg: Vit
vitB6=2,000mg,VitBl2=l0mg, folic scd = 500mg, Biotin Hg =
250mg,choline chloride 175,000mg, cobalt = 200mg, coer = 3,000mg, iodine = 1,000mg, iron = 21,0000mg, manganese = 40,000mgselenium=200mg,zinc=31,OO0mg,Artd mt=1,250mg
*Recommended inclusion level of each of the probiotics and enzyme of feed)

TABLE 2: growth performance characteristics of Japanese quails fed rumen content meal with or without Probiotics and enzyme supplementation

Dietary **Treatment**	Initial body Weight (g/b/day)	Final body Weight (g/b/day)	Feed intake **Ratio**	Weight gain (g/b/day)	Feed to gain (g/b/day)
0	9.80[a]	248[a]	9.13[a]	6.81[a]	3.15[c]
30	9.70b	227b	833b	621b	406b
60	9.84.[a]	162[c]	7.04[c]	**4.35[C]**	440[a]
SEM	0.47	7.42	1.79	0.45	0.45
SUPPLEMENT					
NSA	9.80[a]	207[c]	8.48[a]	5.63[c]	4.288
Probiotics A	9.70[b]	239[b]	822[b]	655[b]	368[b]
(Total gut Integrity)					
Probiotics B (Biotronic)	970b	248a	8.03c	6.81a	3.30c
Enzyme (Maxi grain)	9.80[a]	237[b]	7.90[c]	649[b]	**3.40[c]**
SEM	0.32	1.63	0.269	1.72	0.074
Significance	*	*	*	*	*
Interaction Effect	*	*	*	*	*

Treatment means in the same column (within a particular criterion) having different superscripts are significantly different (P<0.05).
NS=Non significant (P>0.05)
SEM= standard error of mean

TABLE 3: Financial implication of feeding Japanese quails fed rumen content mea with or without Probiotics and enzyme supplementation to replace GNC.

Level R/C	Feed cost (1kg)	Cost of rearing the bird (N)	Selling price of birds (N)	Gross profit	Profitability(%)	Feed cost efficiency
0	86.84a	254.17a	450	195.83c	43.515c	2.26c
30	7927b	22343b	450	22657b	5035b	285b
60	71.72c	218.28c	450	231.72a	5149a	3.23a
SEM	2.09	5.12	0.27	5.19	1.16	0.14
Significance	*	*	*	*	*	*
SUPPLEMENTS						
NSA	79.36	229.16c	450	220.84a	49.07a	2.83
Probiotics A	79.36	229.92c	450	2208b	48.91a	2.79
Total gut Integrity)						
Probiotics B (Biotronic)	79.25	234.28b	450	215.75c	4794b	2.76
Enzyme (Maxi grain)	79.34	234.48	450	215.52c	4789b	2.75
SEM	1.151	2.54	0.85	2.54	0.693	0.091
Significance	*	*	NS	*	*	NS

Treatment means in the same column (within a particular criterion) having different superscripts are significantly different (P<0.05); NS=Non significant (P>0.05); SEM= standard error of mean