

BLOOD INDICES OF RABBIT FED DIETS CONTAINING DIFFERENT QUALITY PROTEIN MAIZE.

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Abstract

The study was conducted to assess the effects of inclusion of quality protein maize as substitute for normal maize on haematological and serum biochemical indices in the diet of weaned rabbits. A total of forty eight weaned rabbits of relatively the same size were randomly allotted to 3 dietary treatments and each treatment was replicated 4 times with four rabbits per replicate. The experimental design was completely randomized design, with 3 experimental dietary groups. Three diets were formulated to contain 3 different types of maize in equal proportion. Diet 1 contained the normal maize (TZBP), Diet 2 contained QPM (ART/98/SW5/OB) while diet 3 contained QPM (ART/98/SW6/OB). The ingredients in all the diets were the same except the maize. Rabbits fed diet containing QPM had better weight than those fed normal maize. The result of haematological indices showed that the packed cell volume of the rabbit fed experimental diets were relatively the same in the diet 2 and 3 contained QPM but slightly higher than diet 1 fed normal maize. The WBC of the rabbits fed quality protein maize was relatively the same but higher than that of diet 1 fed normal maize. The mean corpuscular haemoglobin concentration (MCHC) was significantly higher in diet 2 and 3 containing QPM and the value fell within the recommended values of 29 – 40 % for normal rabbit. The neutrophil and monocyte % were low in diet containing normal maize. The total protein was high in diet 2 and 3 containing QPM than diet 1 containing normal maize. The blood globulin for rabbit in diet 2 and 3 was 2.45 and 2.47g/dl which was significantly higher than 1.34 reported in diet 1. The blood phosphorus was significantly better in the diet containing QPM. Significant differences were not observed in Albumin and creatine levels in rabbit fed experimental diet. The results of haematological and biochemical indices supported the fact that QPM is superior to normal maize.

Introduction:

The importance of animal protein in the diet of man cannot be over-emphasized. The main source of animal protein is from eggs, muttons, beef, pork and chicken meat etc. Livestock industries are closing down in Nigeria because of lack of availability of quality feed at affordable price (Babatunde et al., 2001). Maize is one of the major ingredients of economic importance. It contributes substantially to the total cereal grain production in the world and also occupies an important place in the world economy and trade as a food, feed and an industrial grain crop (CIMMYT 2005; Akande and Lamidi, 2006). Maize is deficient in lysine and tryptophane and this has led to development of quality protein maize. QPM produces 70-100% more of lysine and tryptophan than the most modern varieties of tropical maize (Bjarnson and Vasal 1992; CIMMYT 2005; Guang-Hai et al., 2006). These two amino acids allow the body to manufacture complete proteins, thereby eliminating wet-malnutrition. In addition tryptophan can be converted in the body to Niacin, which theoretically reduces the incidence of Pellagra (CIMMYT 2005). Bai, (2002) concluded that QPM is superior to normal maize in its amino acids balance and nutrient composition, and

could improve the performance of various animals. He suggested that it is more economical to use diets incorporating QPM as it can lead to progressive reductions in the use of fishmeal and synthetic lysine additives. This study was conducted to assess the effects of inclusion of quality protein maize as substitute for normal maize on haematological and serum biochemical indices in the diet of weaned rabbits.

Methodology

The experiment was carried out at the Rabbitary Unit of the Institute of Agricultural Research and Training (I.A.R. & T.), Moor Plantation, Ibadan which is located on Longitude 0351E, Latitude 0723N and Altitude 650' lies in the humid zone of the rainforest belt 0703.25 of Southwestern Nigeria with mean annual rainfall of 1220 mm and mean temperature of 26C. The rabbits were acclimatized for one week before the commencement of the feeding trial. A total of forty eight crosses of Chinchilla and white California weaned rabbits of mixed sexes of mean weight 543.45±3.6g were randomly allotted to 3 dietary treatments with each treatment replicated 4 times with four rabbits per replicate. The experimental design was completely randomized design, with 3

experimental dietary groups. Three diets were formulated to contain 3 different types of maize in equal proportion. Diet 1 contained the normal maize (TZBP), Diet 2 contained QPM (ART/98/SW5/OB) while diet 3 contained QPM (ART/98/SW6/OB). The ingredients in all the diets were the same except the maize. The management practices were all the same in all the treatments. The diets were formulated to contain 16% crude protein and energy of 2600kcalME/kg. Feed intake was measured on daily basis with the use of weighing balance. The blood samples for haematology and serum biochemical were collected from the rabbits by inserting the needle through the 2nd and 3rd intercostal space of the ribs on the left side of the rabbit into the heart of the rabbit i.e intra cardia route, the blood was gently aspirated from the heart into the syringe and the blood was slowly infused into the anticoagulant (heparin bottle). Proximate composition of the feed and faeces were carried out according to the method of A.O.A.C, 1990. All data were subjected to analysis of variance using SAS, 1999.

Results and Discussion

The result of hematological indices showed that the packed cell volume of the rabbit fed experimental diets were relatively the same in the diet 2 and 3 contained QPM but slightly higher than diet 1 fed normal maize. The PCV recommended value for rabbit as recommended by (Coles, 1986; Scalm, et.al., 1975). The red blood cell count, haemoglobin and WBC followed the same trend with PCV. The RBC level ranged between 11.23 and 13.58 which fell within the recommended values of 4.5 and 9.0 $\times 10^6$ /ul for normal rabbits (, Mitruka, and Rawnsley, 1977; Etim, and Ogunke, 2011). The WBC of the rabbits fed quality protein maize was relatively the same but higher than that of diet 1 fed normal maize. The higher WBC reported in the diet 2 and 3 could be due to lysine and tryptophane present in QPM which was absent in normal maize and it has been observed that QPM improved health status of livestock due to high biological values of protein present (Burgoon, et. al., 1992; Guang et.al., 2006).The mean corpuscular haemoglobin concentration (MCHC) which measured the concentration of haemoglobin in a given volume of packed red was significantly higher in diet 2 and 3 containing QPM and the value fell within the recommended values of 29 – 40 % for normal rabbit (Coles,1986), Etim, and Ogunke, 2011). The neutrophil and monocyte % were low in diet

containing normal maize but still fell within the recommended values (Scalm, et.al., 1975). The result of haematological indices supported the fact that QPM is superior to normal maize. These results were in agreement with the reports of different authors who used QPM in the diet of livestock such as broilers, layers and pigs and concluded that QPM improved health status of livestock and superior to normal maize (Burgoon, et. al., 1992; Guang et.al., 2006). The total protein was high in diet 2 and 3 containing QPM than diet 1 containing normal maize although it fell within the recommended value as reported by (Scalm, et.al., 1975, Mitruka, and Etim, and Ogunke, 201). The blood globulin and glucose also followed the same trend. The blood globulin for rabbit in diet 2 and 3 was 2.45 and 2.47g/dl which were significantly higher than 1.34 reported in diet 1. The blood globulin in all the treatment fell within the recommended value of 1 – 5g/dl recommended for normal rabbits (Mitruka, and Rawnsley, 1977; Etim, and Ogunke, 2011). The blood phosphorus was significantly better in the diet containing QPM. Significant differences were not observed in Albumin and creatine levels in rabbit fed experimental diet but fell within the recommended value (Mitruka, and Rawnsley, 1977). The better performance of rabbit in rabbit fed QPM in terms of serum biochemical indices reported above those fed normal maize could be due to good management practice observed during the course of the experiment. Several reports on QPM indicated that QPM is superior to normal maize. The results of experiments in which QPM was used to replaced normal maize in the diet of broiler, layers and pigs revealed that animal fed QPM had good dressing percentage and better feed utilization (Burgoon, et. al., 1992; Guang et.al., 2006).

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Table 1: Gross Composition of the Experimental Diet.

Ingredient (%)	Diet 1	Diet 2	Diet 3
Maize	32.0	32.0	32.0
*Others	68.0	68.0	68.0
Total	100.0	100.0	100.0
Calculated analysis			
Crude protein (%)	16.10	16.15	16.17
Metabolizable energy (kcal/KgME)	2621.33	2621.33	2621.33

*Other fixed ingredients : Wheat offal-24, BDG, 25, Fish meal-0.5, Soya bean meal-5.55, Ground nut cake-7.0, Bone meal-1.50, Oyster shell-4.2, Premix-0.25.

Diet1- Diet containing normal maize (TZBP), Diet 2-Diet containing QPM (ART/98/SW5/OB) Diet 3 - Diet containing QPM (ART/98/SW6/OB).

Table 2 : Determined Proximate Composition of the Maize, and Experimental diets

Parameters	QPM (ART/98/SW5/OB)	QPM (ART/98/SW6/OB)	normal maize (TZBP),	Diet 1	Diet 2	Diet 3
Dry Matter	97.66	98.77	97.45	95.92	94.38	94.89
Crude Protein	10.34	10.30	9.65	16.02	16.14	16.34
Crude Fibre	5.77	5.69	6.77	11.36	11.03	11.03
Ether Extract	7.18	7.36	6.58	5.82	5.91	5.98
Ash	10.82	10.98	7.98	12.11	12.32	12.59
Nitrogen Free Extract	65.89	65.67	69.02	54.69	54.9	54.51

Diet1- Diet containing normal maize (TZBP), Diet 2 -Diet containing QPM (ART/98/SW5/OB) Diet 3 - Diet containing QPM (ART/98/SW6/OB).

Table 3 Haematology parameters of weaned rabbits fed experimental diets.

Parameters (Means)	Diet 1	Diet 2	Diet 3	SEM	Normal range
PCV (%)	36.5b	37.63a	37.91a	1.44	35 - 41.5
R.BC(x 10 ⁶ /μl)	5.68 ^b	6.82 ^a	6.89 ^a	0.48	4.5 - 9.0
Haemoglobin (g/dl)	11.23 ^b	13.45 ^a	13.58 ^a	0.51	10 - 16
WBC (x 10 ³ /μl)	6.57b	7.88a	7.92a	0.34	6 - 10
MCHC%	31.56 ^b	33.63 ^a	33.69 ^a	1.11	29 - 40
Neutrophil %	34.89b	36.58a	36.76a	1.22	33 - 45
Monocyte%	0.78b	1.21	1.23	0.15	0.4 - 1.5

Means along rows with different superscript are significantly different from each other (P<0.05)

Table 4 Serum biochemical parameters of weaned rabbits fed experimental diets.

Parameters (Means)	Diet 1	Diet 2	Diet 3	± SEM	Normal range
Total protein (g/dl)	5.12 ^b	6.98 ^a	6.99 ^a	0.86	4 - 10
Globulin (g/dl)	1.34 ^b	2.45 ^a	2.47 ^a	0.25	1 - 5
Glucose Mg/dl)	128.6 ^b	140.12 ^a	142.21 ^a	8.94	130 - 155
Albumin g/dl	3.56	4.34	4.45	0.38	2.5 - 6.0
Creatine Mg/dl	1.75	1.84	1.88	0.42	1 - 3.5