HAEMATOLOGICAL AND BIOCHEMICAL INDICES OF WEANER RABBITS FED DIETS CONTAINING SUNDRIED SOYBEAN MILK RESIDUE (SSMR) ORYCTOLAGUS CUNICULUS)

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ABSTRACT

A Fifty Six day feeding trial was conducted to evaluate the haematological and biochemical indices of weaner rabbits fed diets containing sundried soybean milk residue (SSMR) at five levels of inclusion. Forty weaner rabbit with an average initial weight of 520±1.04g arranged in a completely randomized design (CRD) were used. SSMR was used at 0, 25, 50, 75 and 100% levels to replace soya bean meal. The haematological indices examined were not significantly influenced (P>0.05) by dietary treatments. Hemoglobin concentration (Hb) of rabbits fed T1 diet was not significantly (P>0.05) different from those fed diets containing T3, T4 and T5 while T2 recorded the highest (16.18). The packed cell volume (PCV) of rabbits fed T4 diet recorded the lowest value (41.18%) followed by rabbits fed T5(41.33%) diet and rabbits fed T1 diet recorded the highest value (45.33%). Similar trend was also observed on red blood cell and white blood cells, where T4 diet recorded the lowest values ($6.96x10^6$/ul) and T3 ($7.54x10^3$/dl) respectively for red blood cells and white blood cells, while T2 diet recorded the highest value ($8.03x10^6$/ul) for red blood cell and T4 diet recorded the highest value ($7.98x10^3$/dl) for white blood cells. The mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) calculated were statistically significant (P>0.05) across all the dietary treatments.

Keywords: *haematological, biochemical, indices, soya bean residue*

INTRODUCTION

One of the most important inputs in rabbit production is feed and rabbits have been identified as a cheap source of high-quality protein that can substantially improve the level of animal protein production and consumption in developing countries. (Wafar*et al.,* 2018). Basse*yet al.* (2008) reported that rabbits are efficient converter of fibrous feed ingredients and agro- industrial by product to meat than other livestock species. However, feeding and nutrition of rabbits requires adequate supply of feed in quantity and quality for optimal growth (Abonyi*et al.,* 2012).

In most developing countries, rabbit production is based primarily on grasses and legumes which their availability and growth during dry season cannot sustain rabbit production all year round (Olomu*et al.,* 2019). The search for cheaper and available feed stuff that can sustain all year-round rabbit production has been the focus of animal nutritionist in recent years. The use of agro-by products in rabbit nutrition has been documented (Okorie, 2003 and Odeyinka *et al.*,2007). One of such agro-byproducts considered in this study is sundried soyabean milk residue. SSMR is a byproduct of milk and cheese produced from soyabean (Iyegh-Erakpotobor, *et al.,* 2006). It has been reported to be a good source of protein in feeding livestock (Odeyinka*et al.,* 2007. Study conducted by Ngele*et al*. (2011) reported that weaner rabbits can utilize up to 40% inclusion levels of SSMR. However, information on the use of SSMR beyond 40% in rabbit diet is limited. The study therefore was designed to investigate the effect of feeding varying levels of SSMR on the haematological and biochemical indices on weaner rabbits.

Materials and methods

The study was carried out at the Rabbit Unit of the Department of Animal Science and Range Management, Modibbo Adama University of Technology, Yola Nigeria. Yola is between latitude 7° 11' North and Longitude 11° 14' East and at an elevation of 364m above sea level in the north eastern part of Nigeria. The mean relative humidity ranges from 30 - 50% with a minimum in February to March when it drops to as low as 10% and a maximum of about 90% in August. The maximum temperature can reach 38^0C particularly in April, while minimum temperature can be as low as 18^0C (Adebayo, 1999).

Forty (40) five weeks old weaner rabbits of crossbreeds and mixed sexes were randomly assigned to five treatment groups in a completely randomly design. Each treatment group was replicated four times with two rabbit per replicate. The rabbits were housed in a three- tier metal framed and wire meshed cages raised 120cm above the ground. Each cage was provided with an aluminum feeder and drinker.

Fresh soya bean milk residue was obtained from local soya milk producers in Yola and environs, sun dried on a concrete floor until it was crispy to touch.

Five experimental diets were formulated using SSMR. Treatment1 (T1) served as control with 0% inclusion of SSMR, while 2, 3, 4 and 5 contained 25, 50, 75 and 100% SSMR respectively to replace soya bean meal. The experimental animals were fed 2% of their body weight on dry matter basis daily. The animals were subjected to one-week adaptation period, during this period. They were given control diets and prophylactic treatment against ecto and endo parasites using Ivomec® at 0.30/kg. The experiment lasted for 56 days (8 weeks).

At the end of the experiment (week 8) 5ml blood samples were collected from three rabbits per treatment for the determination of the haematological parameters and biochemical components as described by Uko *et al.* (2000). This was achieved by puncturing the jugular vein and allowing free flow of blood into labelled sterile universal bottle containing 1.0 mg/ml ethyl diamine tetracetic acid (EDTA) as anticoagulant. This was used to determine the haematological component according to the method described by Ajagbonna *et al.* (1999) and *Uko et al.* (2000). Another 5ml were collected into a labelled sterile sample bottles without anticoagulant and will be used to determine the biochemical components (Ajagbonna *et al*., 1999; Uko *et al*., 2000). Parameters to be determined include, packed cell volume (PVC), haemoglobin concentration (Hb), Red blood cell (RBC) and white blood cell (WBC). Means corpuscular volume (MCV), Mean corpuscular haemoglobin concentration (MCHC) and Mean corpuscular haemoglobin (MCH) was calculated according the procedure described by Sirior,(1995). The Biochemical indices such as the level of glucose total protein, globulin, albumin, urea ,creatine and cholesterol.

Proximate and anti-nutritional compositions of SSMR were determined using the methods described by AOAC, (2010). All data collected were subjected to one - way analysis of variance (ANOVA) using SAS,1998 and Duncan's Multiple Range Test (DMRT) option of same software.

Table 1: Ingredients Composition of the Experimental Diets fed to Weaner Rabbits

	Levels of soya bean meal replaced with SSMR (%)				
Ingredient	T1 (0%)	T2 (25%)	T3 (50%)	T4 (75%)	T5 (100%)
Maize	40.00	40.00	40.00	40.00	40.00
Soya bean	29.00	21.75	14.50	7.25	0.00
SSMR	0.00	7.25	14.50	21.75	29.00
Wheat offal	17.25	17.25	17.25	17.25	17.25
Ground haulms	9.75	9.75	9.75	9.75	9.75
Bone meal	3.00	3.00	3.00	3.00	3.00
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

Salt	0.25	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00	100.00
Calculated analysis					
ME (kcal/kg)	2881.77	2862.41	2843.89	2833.78	2831.56
Crude protein	18.00	17.88	17.64	.17.34	17.17
Crude fibre	8.56	7.56	7.45	7.46	7.40
Calcium	1.15	1.14	1.15	1.14	1.14
Phosphorous	0.82	0.79	0.79	0.78	0.76
Lysine	1.19	1.11	1.09	1.08	1.09
Methionine	0.56	0.55	0.54	0.53	0.54

Vitamin-mineral premix will provide per kg the following: Vit. A 1500 IU; Vit.D_3 3000 IU; Vit.E 30 IU; Vit.K 2.5 mg; Thiamine B_1 3 mg; Riboflavin B_2 6 mg; Pyrodoxine B_6 4 mg; Niacin 40 mg; Vit. B_{12} 0.02 mg; Pantothenic acid 10 mg; Folic acid 1mg; Biotin 0.08 mg; Chloride 0.125 mg; Mn 0.0956 g; Antioxidant 0.125 g; Fe 0.024 g; Cu 0.006 g; Se 0.24 g; Co 0.240 g

SSBMR=Sundried Soya bean milk residue

ME=Metabolizable Energy

RESULTS AND DISCUSSION

Proximate compositions and anti-nutritional factors in sundried soya bean milk residue

The proximate compositions and anti-nutritional factors of sundried soya bean milk residue (SSMR) are presented in Table 2. The result showed it content 92.75% dry matter (DM), 26.37% crude protein (CP), 19.13% crude fibre (CF), 8.31% ether extracts (EE), 7.16% ash, 32.04% nitrogen free extracts (NFE) and 3033.00 MEkcal/kg Metabolizable energy. The values for anti-nutritional factors include tannins (0.92mg/100g),saponins(0.16mg/100g),phytate (0.19mg/100g), alkaloid (0.12mg/100g), glycoside (0.13mg/100g), phenol (0.11mg/100g), and flavonoids (0.08mg/100g). The CP content and CF recorded is lower than 27.29% and 9.14% reported by Maidala and Doma (2016)and 29.11% and 23.77% reported by Saleh et al. (2018). The CP content however is in line with 26.88% reported by Muhammed *et al.,* (2015). This support an earlier report of Wafar*et al.* (2017) who stated that crude protein of 18% and above qualifies an ingredient as alternative protein source. The ether extracts recorded is slightly less than the value of 5.54% reported byMaidala and Doma (2016). The ash content obtained in the present study indicated the potential sources of dietary mineral elements. The energy value (3033.00 kcal/kg) in this present study is higherthan 2396.55 kcal/kg reported by Saleh*et al.* (2018), The values obtained showed that they can as well be used as energy feed stuff for livestock especially monogastric animals. The anti-nutritional factors are within the acceptance range reported by Wafar*et al.*, (2017) for rabbits in raised under tropical condition. The variation in nutrient composition may be attributed to climatic factors, edaphic factors processing methods and laboratory analysis (Ojewole*et al.*, 2015)

Table 2: Proximate Compositions and Anti-nutritional Factors of Sundried soya bean milk residues (SSMR).

Parameter	% Composition
Dry Mater	72.75
Crude Protein	26.37
Crude fibre	19.13
Ether Extracts	8.31
Ash	4.56
Nitrogen free extracts	32.04
Metabolizable energy (Kcal/kg)	3033.00
Anti-nutrients mg/100g	
Tannins	0.92
Saponins	0.16
Phytate	0.19
Alkaloid	0.12
Glycoside	0.13
Phenol	0.11
Flavonoids	0.08

Calculated according to the formula Pauzenga, (1985)

Haematological and Biochemical Indices of Weaner Rabbits Fed Graded Levels of Sundried Soya Bean Milk Residue

The results of hematological and biochemical parameters of weaner rabbit fed graded levels of **S**undried soya bean milk residue are shown in Table 6. The haematological indices examined were not significantly influenced (P>0.05) by dietary treatments. Hemoglobin concentration (Hb) of rabbits fed T1 diet was not significantly (P>0.05) different from those fed diets containing T3, T4 and T5 while T2 recorded the highest (16.18). The packed cell volume (PCV) of rabbits fed T4 diet recorded the lowest value (41.18%) followed by rabbits fed T5(41.33%) diet and rabbits fed T1 diet recorded the highest value (45.33%). Similar trend was also observed on red blood cell and white blood cells, where T4 diet recorded the lowest values ($6.96x10^6$/ul) and T3 ($7.54x10^3$/dl) respectively for red blood cells and white blood cells, while T2 diet recorded the highest value ($8.03x10^6$/ul) for red blood cell and T4 diet recorded the highest value ($7.98x10^3$/dl) for white blood cells. The mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular haemoglobin concentration (MCHC) calculated were statistically significant (P>0.05) across all the dietary treatments.

The results of total protein, cholesterol, albumin, glucose, urea and creatinine were not significantly (P>0.05) differences among the dietary treatments. Total protein were similar for rabbits fed T1, T2, and T4. Rabbits fed T4 diets recorded the highest cholesterol level of (37.38mg/dl) than the other dietary treatments. Albumin of rabbit fed T4 (3.13g/dl) diet was higher than those fed T1 (3.0g/dl), T2 (2.53g/dl), T3(2.13g/dl) and T5(2.86g/dl). Glucose rabbits fed T4 diet recorded the highest value (76.24mg/dl) followed by rabbit fed T5 diet value (76.14mg/dl) and rabbit fed T1 diet recorded the lowest value (75.65mg/dl).

Table 3: Hematological Indices of Weaner Rabbit and Feed Graded Levelsof Sundried Soya Bean Milk Residue

	Dietary Treatments					
Parameter	T_1 (0%)	T_2 (25%)	T_3 (50%)	T_4 (75%)	T_5 (100%)	SEM
Hemoglobin (g/dl)	14.96	16.18	13.89	15.26	15.20	0.70^{ns}
Pack cell volume (%)	45.33	44.57	43.21	41.18	41.33	1.39^{ns}
RBC ($X10^6$/dl)	7.33	8.033	7.867	6.967	7.357	0.22^{ns}
WBC ($X10^6$/dl)	7.96	7.92	7.54	7.98	7 .92	0.33^{ns}
MCV	61.77	55.58	55.28	59.08	56.16	2.53^{ns}
MCH	20.41	20.19	17.73	21.90	20.64	1.01^{ns}
MCHC	33.35	36.38	32.17	37.10	36.78	1.97^{ns}

Means in the same row bearing different superscript differ significantly (P<0.05)
*= Significantly Different (P>0.05)
NS = Not Significantly Different
SEM = Standard Error Mean

Table 4: Biological Indices of Weaner Rabbit and Feed Graded Levels of Sundried Soya Bean Milk Residue

	Dietary Treatments					
Parameter	T_1 (0%)	T_2 (25%)	T_3 (50%)	T_4 (75%)	T_5 (100%)	SEM
Lympocites	33.90	28.30	30.19	33.36	34.06	2.12^{ns}
Eosinophil	2.23	1.65	2.21	1.81	2.10	0.37^{ns}
Cholesterol	37.13	36.66	36.82	37.38	36.36	0.65^{ns}
Total protein	5.46	5.23	4.32	5.16	4.90	0.4^{ns}
Albumin	3.0	2.53	2.13	3.13	2.86	0.3^{ns}
Globulin	2.46	70	2.18	2.03	2.03	0.37^{ns}
Glucose	75.65	76.10	75.74	76.24	76.14	0.33^{ns}

Means in the same row bearing different superscript differ significantly (P<0.05)
*= Significantly Different (P>0.05)
NS = Not Significantly Different
SEM = Standard Error Mean

CONCLUSION AND RECOMMENDATION

The results obtain in this study indicated that SSMR could serve as a substitute for full fat soya bean without detrimental effect on the haematology and biochemical indices of weaner rabbits. . . The study thus recommends that100% SSMR could be incorporated in the diets of weaner rabbits without adverse effect on all parameters and further studies should be conducted to evaluate the utilization of soya bean residue on other classes rabbits.

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