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THE EFFECT OF IRISH POTATO (*SOLANUM TUBEROSUM* L.) PEELS MEAL BASED DIET ON THE HAEMETOLOGY AND BLOOD BIOCHEMICAL PROFILE OF WEANER RABBITS

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ABSTRACT

The effect of Irish potato peel meal (IPPM) on the haematology and blood bio-chemical profile of weaner rabbits was investigated. Twenty (20) rabbits of mixed sexes with an initial weight of 766.67-783.33g were randomly allotted to four (4) dietary treatments of five (5) rabbits per treatment in a completely randomized design (CRD). The diets contain O, 10, 20 and 30% IPPM. Representing T_1.T_2, T_3 and T_4, respectively. T_1 was the control which is devoid of IPPM. Feed and water were provided ad libitum for a period of 56 days. At the end of the study period, blood samples were collected from each rabbits and assayed for haematology, triglycerides, total protein, total cholesterol, LDL and HDL cholesterol. Results show significant ($p<0.05$) differences in blood bio-chemical profile across the treatments. Total cholesterol and LDL cholesterol were significantly higher in rabbits in T_2 compared to other treatments. Triglyceride level was significantly ($p < 0.05$) higher in rabbits on T_3 but was similar to T_1. Total serum protein was significantly ($p < 0.05$) higher in T2 but similar to T3 and T4, only T1 differs. HDL cholesterol was similar across treatment as well as PCV, WBC, Neutrophils, lymphocytes and moncytes across the treatments. Based on the results,T_3 compared favourably with the control, IPPM can be added up to 30% inclusion level in rabbit diets without adverse effect on their health.

Keywords: Haematology, Irish potato peel meal, Rabbits, Performance and Blood Bio-chemistry

INTRODUCTION

The rapid increase in human population has been accompanied by a shortfall in animal protein intake which may be due to shortage of livestock feeds. Feeds account for between 70 – 80% of monogastric animal production (Ogunfowora, 1984). This is because conventional feed resources are being competed for by man and livestock as well as industries (Musali *et al*, 2005). Shortage of conventional feedstuffs has resulted in the search for alternative feeds for livestock feeding (Dafwang, 2006).

Tewe (1988) states that under the prevailing circumstances, it is unlikely that there will be surplus conventional feeds which livestock production can develop, therefore, the waste to wealth concept of directing effects towards increasing and utilizing wastes and by-products is the most logical thing. One of such wastes is Irish potato peels.

Potato peels is a waste product from domestic and potato processing industry. It is available in large amounts and contain a wide variety of compounds that can be used as food and non-food (Schieber, *et al*, 2009) the utilization of potato peels need to be developed to reduce waste and

the associated pollution problems since the wet peels are prone to rapid microbial spoilage (Schieber*et al*, 2009).To recommend the use of Irish potato peel meal (IPPM) in livestock nutrition and subsequent human consumption of the animals, its effect on haematological and blood biochemical profile need to be ascertained.

There is a strong influence of diets on haematological traits with packed cell volume (PCV) haemoglobin count being strong indicators of the nutritional status of the animal. Information on the influence of potato peels on the blood bio-chemical profile and haematology of rabbits is not documented.

This study is therefore designed to evaluate the effect of Irish potato peel meal on the haematology and blood bio-chemical parameters of rabbits.

MATERIALS AND METHOD

Rabbits used for this study were purchased from Samaru market in Zaria and the feeding trial was done at livestock unit of research and teaching, department of animal science, Ahmadu Bello University, Zaria. IPPM were also sourced from Zaria environs and dried, milled before being incorporated into the animal diet at graded levels of 0, 10, 20 and 30%.Twenty rabbits were used, they were housed in cages individually and there were five rabbits per treatment. The feeding trial lasted 56 days.

On the last day of the feeding trial, three rabbits per treatment were selected and 1.5ml of blood was obtained from their jugular vein into bottles containing EDTA as anti-coagulant. The blood samples were taken to the haematology and biochemical laboratories of the 44 Nigeria Army Hospitals, Kaduna (44 NARHK) for biochemical analysis (Triglyceride, total cholesterol, LDL cholesterol, HDL cholesterol and total proteins) and haematological parametres (packed cell volume, white blood cell and differential blood count).

Date generated from the study was analyzed by analysis of variance (ANOVA) using SAS package version 9 (SAS, 2006). Significant differences among treatment means were separated using the Duncan multiple Rang Test in the SAS package.

RESULTS AND DISCUSSION

Effect of sundried IPPM on the Serum lipid profile of weaner rabbits is presented on Table 2. There were significant ($p<0.05$) differences in total cholesterol, triglycerides, LDL cholesterol and total serum proteins across the treatments. Rabbits fed 10% IPPM had significantly higher total cholesterol and LDL compared to the others and total cholesterol levels are similar in control and groups with 20 and 30% inclusion levels. This indicates a decrease with increase inclusion of IPPM in the diets. Cholesterol is a steroid alcohol of animal tissues and performs some essential functions in the body, (Champe *et al*, 2006). IPPMcontains soladinine which makes it an interesting adduct for conversion to an intermediate for the synthesis of steroid hormones, (Schieber *et al*, 2009).This is further reflected in the significantly ($p < 0.05$) higher levels of LDL cholesterol (4.50.Mmol/L) in T_2 compared to T_1, T_3 and $T_4$with values of 1.27, 0.77 and 0.77Mmol/L, respectively.

Triglyceride level was significantly ($p < 0.05$) higher in rabbits fed 20% IPPM compared to T_2 and T_4 but similar to T_1 (control). Triglyceride is a major energy source when metabolized. This

indicates that rabbits in T_1 and $T_3$are of higher energy plane than those on T_2 and T_4. In a similar study reported by Chori, 2012, it shows that mortality of these groups is lower than T_2 and T_4.. Total serum protein was significantly ($p < 0.05$) higher in rabbits on T_2 compared to those on T_1 but similar toT_3 and T_4. It follows the same trend with LDL cholesterol and there was no significant ($p < 0.05$) difference in HDL- cholesterol in all treatments. The results shows that total cholesterol, triglycerides, LDL – cholesterol and total protein on rabbits on T_2 compared favourably with those on T_1,

Effects of graded levels of IPPM on Haematological parameters of weaner rabbits is presented on table 3. There were no significant differences in PCV, WBC, Neutrophils and lymphocytes across treatments. T_4 had numerically lowest PCV value (30.50) while T_1 and T_3 had similar value of 34.50%. Rabbits on T_2 had numerically lowest value for neutrophils (25.50) while those on T_1 and T_3 had similar value of 29.50% each. It has been established that PCV, Hb count and total proteins are strongly influenced by diet and are strong indicators of the nutritional status of animals (Hacbath et al, 1983) and is used to assess the heath status of animals. Abnormal values may indicate anaemia (Bush, 1991; Omifade and Tewe, 1993;Abu et al, 1999). All these valuesfor blood parameters obtained in this study were within normal range of 39 +5.5% reported for PCV by Swansonand Recce, 1993 and Ani and Adiegwu, 2005 and 0.45 $\pm$ 8.43g/l for total protein reported by Oladede and Ayo, 1990 and Mitruka and Rawnsley, 1977.The results agree with the values reported by Anoh 2012 when sundried, ensiled and fermented ruminant rumen digesta were fed to weaner rabbits. The normal differential count value portrays the nutritional and health status of rabbits which indicates accurate nourishment. (Church et al, 1984). It also indicates that IPPM did not have any adverse effect on blood parametres hence, the heath status of the rabbits.

Table 1: Composition of Experimental Diets

Ingredients	**Graded level of Irish potato peels (%)**			
Maize	49.31	39.93	30.55	21.15
Soyabeans	7.00	7.00	7.00	7.00
Irish potato peels	0.00	10.00	20.00	30.00
Wheat offals	8.00	8.00	8.00	8.00
Groundnut cake	31.79	31.17	30.55	29.95
Bone meal	2.50	2.50	2.50	2.50
Limestone	0.50	0.50	0.50	0.50
Methionine	0.20	o.20	0.20	0.20
Lysine	1.15	1.15	1.15	1.15
Salt	0.30	0.30	0.30	0.03
Premix	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated analysis				
ME(kcalkg)	2914	2917	2962	3007
C/P (%)	23.00	23.00	23.00	23.00
Ether extract (%)	6.56	6.89	7.85	8.81
Crude fibre (%)	3.63	4.95	4.92	4.90

Calcium (%)	1.20	1.20	1.30	1.40
Phosphorus (%)	0.89	0.82	0.82	0.82
Lysine (%)	0.91	0.84	0.95	0.84
Methionine-cystein	0.70	0.60	0.60	0.60
Cost/kg feed (N)	61.13	56.61	52.00	47.57

Vit-Mineral premix supplied the following per kg diet Vit A. 10.00 lv, Vit D 2000 1u, Vit E S/1v k 2. 34mg, Riboflavin 5.5mg calcium pantothenate 10mg, Niacin 25mg

Table 2; Effect of graded levels of IPPM on the blood lipid profile of weaner rabbits

	Treatments				
Parameters	**T_1 (0%)**	**T_2 (10%)**	**T_3 (20%)**	**T_4 (30%)**	**SEM**
Cholesterol (mmol/L)	2.77^{b}	5.60^{a}	1.80^{b}	1.27^{b}	0.063
Triglycerides (mmol/L)	0.53^{ab}	0.30^{b}	0.67^{a}	033^{b}	0.81
HDL-cholesterol (mmol/L)	1.40	1.07	150	1.50	0.21
LDL-cholesterol (mmol/L)	1.27^{b}	4.50^{a}	0.77^{b}	0.77^{b}	0.64
Total Serum protein (mg/dl)	46.00^{b}	57.67^{a}	53.00^{ab}	49.00^{ab}	3.07

Abc = mean in the same row with different superscripts are significantly different ($p < 0.05$)
SEM = Standard error of mean
HDL-cholesterol = High Density lipoprotein cholesterol
LDL-Cholesterol = low Density lipoprotein cholesterol

Table 3: Effect of graded levels of IPPM on haematological parameters of weaner rabbits

	Treatment				
Parameters	**T_1 (0%)**	**T_2 (10%)**	**T_3 (20%)**	**T_4 (30%)**	**SEM**
PCV %	34.50	34.00	34.50	30.50	2.85
WBC ($x10^3$g/ml)	4.20	4.70	4.65	5.50	0.34
Neutrophils (%)	29.50	25.50	29.50	27.00	1.85
Lymphocytes (%)	70.50	74.50	65.50	68.00	6.48
Monocytes (%)	0.00	0.00	0.00	0.00	
Eosinophils (%)	0.00	0.00	0.00	0.00	
Basophils (%)	0.00	0.00	0.00	0.00	

SEM = Standard error of mean

CONLUSION AND RECOMMENDATIONS

From result obtained from this study on haematology and blood biochemical profile, it shows that;

- 20% inclusion level of sundried IPPM compared favourably with control in both haematology and blood biochemical profile.
- 10% inclusion level compares less favourably with the control, 20% and 30% in cholesterol and LDL.
- Sundried IPPM can replace maize up to 30% in rabbit's diet.

It is therefore recommended that adequate processing methods like heating or cooking at high temperature (over 17^{o}C) should be used to reduce glyco-alkaloid levels and other anti-nutrients in potato peels. T_3 compares more favourably with T_1. Since the result indicates that Irish potato peels can replace maize up to 30% level in rabbits diets, it will minimize environmental pollution since the wet peels are prone to rapid microbial spoilage and it will also reduce the cost of production of rabbit feeds and the rabbits themselves.

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