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FALSE YAM *(Icacina Oliviformis)* LEAF MEAL AS AN INGREDIENT IN THE DIET OF WEANER RABBITS *(Oryctolagus Cuniculus)* TO IMPROVE BLOOD PROFILE

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ABSTRACT: *A 60 day feeding trial was conducted to determine the effect of Icacina oliviformis leaf (IOL) as a feed ingredient on the hematology of weaner rabbits. There were arranged in three treatments with four replicates in a completely randomized design. The control diet (T_0) contained 0% Icacina oliviformis leaf (IOL) while the treatment diets ($T_1$and T_2) contained 5% and 10% IOL, respectively. An amount of 200 g of the experimental diet was given to the animals each day while water was given ad-libitum. Initial blood samples were collected two days earlier before experimental diet was fed. Data were analyzed using Genstat Discovery Edition 3. There were no significant differences (P>0.05) in (Haemoglobin) Hb concentration, PCV, RBC however all the erythrocytes values increased from the initial low values to higher values. The margin of increase was higher for T_1. There were no significant differences (P>0.05) among the treatment means for WBC, Neutrophiles, Eosinophiles, Monocytes counts in the final readings. The hematology values recorded for all the treatments fell within the normal ranges for rabbits. Feeding 5% and 10% IOL to a weaner rabbits led to an increase in erythrocytes values and could be used in feeding without any detrimental effect.*

ORIGINAL ARTICLE

Keywords: *Haematology, Icacina Oliviformis, false yam, terpenes.*

INTRODUCTION

False yam plant is a perennial root crop belonging to the family *Icacinaeae*. In the year 1823 the plant was best known as *Icacina senegalinsis* by Adrein de Juss before later in 1875, the name changed scientifically to *Icacina oliviformis* and described by J. poiret but currently its English name is Icacina (Fay, 1987).

The aerial stems of the plant are highly green; leaves are simple, light green, measures about 5 -10 cm length. The fruit is bright and oval being covered with short hair, a thin layer of white pulp which is approximately 0.2 cm thick surrounding a single spherical seed (NRI, 1987). The Bright–red and plum–seeds are sweet and are usually consumed fresh (Fay, 1987). These seeds after roasting are pounded into flour and stored for use during time of food scarcity (NRI, 1987). Starch is produced from the tuber of Icacina and is used for commercial purpose that includes tapioca (Fay, 1987).

Several millions of people depend on its product as snack, staple and hunger food (Fay, 1987). In Ashanti region of Ghana, the tubers, leaves and stems are reported to be used as medicine (NRI, 1987). There is evidence that the tuber contains some anti-nutritional factors (ANFs) such as, terpenes (Vanhaelen et al., 1986). These anti–nutritional factors reduce its palatability as feed when given to animals (NRI, 1987). Due to the presence of these anti-nutritional factors, increase in the diets of animals, feed intake, growth rate and weight gain retrogresses in mono-gastric species (NRI, 1987).

The production of rabbits at the backyard and commercial level can help alleviate the problems of inadequate protein supply and intake as food. Their small body size and fast growth rate gives them a comparative advantage over ruminant and poultry. In 1994, world's production of rabbit meat was estimated to be 1.5 million tons per annum. This would mean per caput annual consumption of 280 g per person per year (Moreki, 2007).

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The study seeks to investigate the effects of *Icacina oliviformis* leaf meal as an alternative feed ingredient on the haematology of weaner rabbits.

MATERIALS AND METHODS

Study area

The study was carried out at the Livestock unit of the University for Development Studies–Nyankpala campus. Nyankpala is about 18 km west of Tamale in the Tolon–Kumbungu District. It is located in latitude 9° 25´41´´ N and longitude 0°58´42´´W at altitude 183 m above sea level (SARI, 2007). The area is in the Guinea Savanna Zone and characterized by unimodal rainfall pattern. Rains begin in April, rising to a peak in August–September and ending in October or November. Rainfall averages 1060 mm (NAES, 1994). Temperature ranges from as low as 15°C in January when the weather is under the influence of the North East (Harmattan) winds and as high as 42°C around the end of the dry season in March (SARI, 2007).

Experimental animals and design

Completely Randomized design was used in this experiment. There were three treatments with four replicates each. Twelve weaner rabbits which were about eight weeks old were selected randomly from different does (mothers) and were used for the experiment. The dimension of the hutch was 65 cm x 65 cm with wire mesh flooring. Initial blood samples were collected earlier before experimental diets were fed to the animals. Final blood samples were taken at the end of the experiment for analysis.

Experimental diets

Three experimental diets were formulated using the trial and error method and fed to the weaner rabbits twice a day. The control diet (T_0) contained 0% false yam leaf, while the treatment diets T_1 and T_2 contained 5% and 10% IOL respectively. Water was given *ad–libitum.* Table 1 shows the chemical composition and levels of the experimental diet fed to the animals. About 200g of the experimental diet was offered each day.

Table 1 - Composition of experimental diets (%)

Ingredient	Levels of *Icacina oliviformis* leaf (IOL) in diets (%)		
	T0 (0%)	T1 (5%)	T2 (10%)
IOL	-	5	10
Soyabean meal	16	16	16
Sheanut cake	15	15	10
Brewers spent grain	68	63	63
Premix	0.25	0.25	0.25
Dicalcium	0.25	0.25	0.25
Salt	0.5	0.5	0.5
Chemical Composition (%)			
Dry matter	93.2±1.9	93.4±0.8	93.2±2.7
Crude protein (DM)	17.3±13.5	16.1±4.5	16.9±1.4
Ether Extract (DM)	6.4±0.5	7.2±0.9	6.5±0.1
Ash (DM)	9.9±1.4	9.9±0.7	9.9±1.4
Organic matter	83.8±1.9	83.4±0.8	83.2±2.7

Collection and processing of *Icacina oliviformis*

Succulent false yam (*Icacina oliviformis)* leaves were harvested manually from the wild in Nyankpala and sun dried. The dried leaves were milled with hammer grounding mill to a coarse texture. A top pan scale was used to weigh the milled leaves .The processed false yam leaves were bagged and stored for use.

Blood sampling and analysis

The blood was collected in the morning between 7:00 am and 9:00 am using the ear–vine procedure (Radostits et al., 1994). The ear was pricked with a needle. A heparinised capillary tube was used to collect the blood to about 75% of its length. The capillary tube was then sealed with sealant and placed in a labeled container for analysis.

The parameters measured were; Haemoglobin (Hb), Packed Cell Volume (PCV), Red Blood Cells (RBC's), White Blood Cells (WBC's) total and White Blood cells differential (Baker and Silverton, 1990)

Statistical analysis

Data was analyzed using ANOVA from Genstat Discovery Edition 3. Means were compared using LSD and results presented in Tables.

RESULTS

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Results on the effects of IOL as a feed ingredient on the haematology of weaner rabbits are presented in table 2. Mean values of PCV increased from lower initial values to higher values after the feeding trial. There was no significant difference (P>0.05) among the three treatments in the final recordings. PCV for T_1 increased by (17.4%) representing the highest increase among the three treatments. Generally, mean values for RBC increased from initial lower values to higher values after the feeding trial for all treatments. Mean values among treatments showed no significant difference (P>0.05) in the final RBC counts. RBC in T_1 increased by 2.3 ^{x} 10^6/µl, the highest among the treatments means.

Treatment means showed no significant difference (P>0.05) in the final Hb concentration. T_0, T_1 and T_2 increased by 1.12 g/dl, 5.85 g/dl and 1.12 g/dl respectively. The final Hb concentration compared favorably with values reported by Njidda et al. (2006).

Mean total WBC values for T_0 decreased by 2.83 ^{x} 10^9L from the initial value of 11.76 ^{x} 10^9Lwhilst T_1 and T_2 had an increase of 2.37 ^{x} 10^9L and 5.37 ^{x} 10^9L, respectively. There was no significant difference (P>0.05) in the final total WBC. The values recorded for total WBC fell within the ranges reported by Archetti et al. (2008) for normal post weaned rabbits. Mean lymphocytes and eosinophiles all increased in T_1 and T_2 compared to T_0. Neutrophiles decreased by 2.6% in T_0 as compared to 6.1% and 9.7% in T_1 and T_2, respectively. However there was no significant difference (P>0.05) among the treatments. Basophiles and Monocytes all decreased from an initial higher value to lower values in T_1 and T_2.

Table 2 - Initial and final haematological values of weaner rabbits fed varying levels of IOL

Parameters	T_0 (means ±SD)	T_1 (means ±SD)	T_2 (means ±SD)	SED
Initial Packed Cell Volume (%)	31.40 ±3.71^{a}	17.32 ±4.34^{b}	29.62 ±2.17^{a}	2.31
Final Packed Cell Volume (%)	38.40 ±3.21	34.80 ±4.34	32.8 ±2.17	3.06
Initial Haemoglobin (g/dl)	11.68 ±3.20^{a}	5.77 ±2.48^{b}	9.80 ±0.72^{a}	1.33
Final Haemoglobin (g/dl)	12.80 ±1.04	11.62 ±2.48	10.92 ±0.72	1.02
Initial Red Blood Cell (x 10^6/µl)	4.10 ±0.48^{a}	2.23 ±0.99^{b}	4.00 ±0.29^{a}	0.28
Final Red Blood Cell (x 10^6/µl)	4.99 ±0.42	4.56 ±0.99	4.28 ±0.29	0.41
Initial Total White Blood Cell (x 10^9l)	11.76 ±2.26^{a}	5.07 ±3.66^{b}	4.47 ±1.07^{b}	0.88
Final Total White Blood Cell (x 10^9l)	8.93 ±2.79	7.44 ±3.66	9.84 ±1.07	1.73
Initial Neutrophiles (%)	36.40 ±5.03^{a}	39.30 ±6.34^{ab}	43.70 ±5.34^{b}	2.45
Final Neutrophiles (%)	33.80 ±3.77	33.20 ±6.34	34.00 ±5.34	3.32
Initial Lymphocytes (%)	58.40 ±5.03^{a}	56.70 ±5.81^{ab}	52.30 ±5.45^{b}	2.62
Final Lymphocytes (%)	48.60 ±5.77^{a}	59.40 ±5.81^{b}	61.80 ±5.45^{b}	3.59
Initial Eosinophiles (%)	5.20 ±1.79^{a}	2.33 ±0.45^{b}	2.33 ±1.64^{b}	1.00
Final Eosinophiles (%)	17.80 ±4.80^{a}	3.20 ±0.45^{b}	4.20 ±1.64^{b}	1.86
Initial Monocytes (%)	0.00 ±0.00^{a}	1.33 ±0.45^{b}	1.00 ±0.00^{a}	0.47
Final Monocytes (%)	0.40 ±0.54	0.20 ±0.45	0.00 ±0.00	0.26
Initial Basophiles (%)	0.00 ±0.00^{a}	0.53 ±0.00^{b}	0.27 ±0.00^{ab}	0.24
Final Basophiles (%)	0.20 ±0.45	0.00 ±0.00	0.00 ±0.00	0.16

DISCUSSION

The inclusion of IOL in the diet led to an increase in the PCV values however the rate of increase decreased with increase in IOL levels in the diet. The decrease with increase in IOL could be attributed to anti-nutritional factors (ATF) that may be present in the IOL. Fay (1987) reported of the presence of terpenes in the tuber and seeds of *Icacina oliviformis*. The final PCV values recorded all fell within the normal range of 33-50% reported by Hillyer (1994).

The lower margin of increase in T_2 is an indication that IOL above 5% inclusion could reduce the RBC counts in rabbits. The RBC values recorded in this study fell within the ranges of 3.5 x10^{12}/l-6.6x10^{12}/l reported by Archetti et al. (2008) for normal post weaned rabbits. Increased RBC's have been associated with high quality dietary protein Hackbath et al. (1983).

High values may conversely mean an increase in the circulation of red blood cells or an increase in plasma volume (Frandson and Spurgeon, 1992). Njidda and Hambagda (2006) indicated that PCV, MCHC and Hb are the most dependable blood indices for assessing the health status of animals. The higher increase in PCV, RBC and Hb values could be attributed to the inclusion of IOL in the diets. Adding IOL to the diet may have improved digestibility making

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the nutrients available to the animals for absorption resulting in the higher increases observed. Rabbits are monogastric herbivores and therefore addition of shrubs to their diet will enhance digestibility.

Icacina oliviformis has been reported to contain some anti-nutritional factors (ATF) (Fay, 1987). This ATF's may have caused some stress and immune response on the animals on the experimental diets leading to a rise in the lymphocyte and eosinophile values.

Conclusion

Feeding 5% and 10% IOL to a weaner rabbits led to an increase in erythrocytes values and there were no negative effects on the animal since all parameters fell within the normal ranges reported for rabbits.

Recommendation

In further research, treatments such as boiling, steaming, soaking is recommended to reduce the ATF's present in the IOL.

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