Heamolymph Mineral Composition of two species of Land snail fed with *Moringa oleifera* leaf meal.

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ABSTRACT

This study evaluated the effects of *Moringa oleifera* Leaf meal on haemolymph mineral composition of Giant land snail (*Archachatina marginata) and the* Garden snail *(Achatina fulica).* The experiment was designed on a 4×3 Completely Randomized Design (CRD) with four dietary treatments of 0%, 10%, 15% and 20% levels of *M. oleifera* inclusion over a period of 16weeks. A total of one hundred and forty four (144) snails, 72 of each species were used for the investigation. Each treatment had three replicates with 6 snails per replicate and 18 snails per treatment for each species of snail. Results obtained showed that the haemolymph mineral composition (Magnesium, Calcium, Potassium, Iron, Phosphorus and Chlorine) of the two species (*A. marginata* and *A. fulica*) were highest in both species subjected to treatment with 20% *M. oleifera* while the least was recorded in the control. However, Copper and Sodium were recorded highest in the control while the least was recorded in treatment with 20% *M. oleifera* inclusion. This study shows that haemolymph mineral composition indices are the reflections of the effect of dietary treatment on the animals in terms of the type and amount of feed ingested.

KEYWORDS: Mineral composition, *Moringa oleifera,* Leaf meal, Haemolymph, *Achatina fulica, Archachatina marginata*.

INTRODUCTION

Haemolymph is a fluid in the circulatory system of the arthropods such as spiders, crabs, stoneflies and snails and is analogous to the fluids and cells making up both blood and interstitial fluid in vertebrates such as birds and mammals (Wyatt, 1998). Haemolymph fills the entire interior (the hemocoel) of the animal's body and surrounds all cells. It contains haemocyanin, a copper based protein that turns blue in colour when oxygenated, instead of the iron based hemoglobin in red blood cells found in vertebrates, thus giving haemolymph a blue–green colour rather than the red colour of vertebrate blood (Wyatt, 1998; Bateman and Fleming, 2009).

Haemolymph is composed of water, inorganic salts (mostly Na^+, Cl^-, K^+, Mg^{2+} and Ca^{2+}), and organic compounds (mostly carbohydrates, proteins and lipids) which provide a valuable medium for clinical investigation and nutritional status of human beings and animals (Church *et al*., 1994). Hence, World Health Organization recommended the use of blood and biochemical parameters in medical nutritional assessment (Church *et al*., 1994). The various blood functions are made possible by the individual and/ or collective actions of its constituents (Aletor and Egberongbe, 1992). Dietary components have measurable effect on blood components hence blood constituents are widely used in nutritional evaluation and survey of animals (Babalola and Akinsoyinu, 2011). In folk medicine, the bluish liquid (haemolymph) obtained from the shell when the meat has been removed is believed to be good for infant development (Ademosun and Omidiji, 1999). According to Osemeobo (1992), fluids from snail can be used to stop bleeding from cuts, healing of amputed fingers, and circumcision of male children and suppression of small pox.

MATERIALS AND METHODS

The snail pens were placed in roofed enclosure and protected from direct rain and sunlight. There were plantain trees and rich vegetation around the farm to minimize wind and temperature effects. One

hundred and forty four snails (144) of seventy two (72) *Archachatina marginata* and seventy two (72) *Achatina fulica* species were used for this study.

Fresh *M. oleifera* leaves were collected from Amansea in Awka Metropolis and were dried under shade until they became crispy. The drying lasted for two weeks before it was milled using local milling machine and then incorporated into the feed at 0%, 10%, 15% and 20% levels of inclusion. Other feed ingredients that includes maize, wheat offals, groundnut cake, blood meal, bone meal, palm kernel cake, limestone and vitamin premix were used to formulate the experimental diet at equicalorie and equiprotein levels. The gross composition for each of the four diets is shown in **Table1.**

The experimental design was 4×3 CRD with four dietary treatments having 0%, 10%, 15% and 20% inclusion of moringa. Eighteen snails (18) were assigned to each of the dietary treatment and each replicated three times such that each replicate has six snails each. The diet with 0% *M. oleifera* served as the control. Each replicate were housed in a mini paddock pens with dimensions 120cm × 60cm × 30cm in accordance with the stocking density recommended by Cobbinah *et al*., (2008). The snails in all the treatments were subjected to the same management conditions: they were fed daily, they were provided with humus soil to a depth of 20cm and were fed 50g of ground egg shell to ensure adequate calcium supply and same amount of water (0.75 liter) was sprinkled daily to increase humidity and prevent hibernation (Ademola, 2008). Haemolymph for analysis from the snails in their groups were collected as described by Babalola and Akinsoyinu, (2011).

Analysis

The haemolymph collected was analyzed for minerals using Atomic Absorption Spectrophotometry (AAS). Calcium was by flame photometry using Jenway digital flame photometer. The data obtained were subjected to t- test.

RESULTS AND DISCUSSIONS

Results obtained showed that the haemolymph mineral composition (Magnesium, Calcium, Potassium, Iron, Phosphorus and Chlorine) of the two species (*A. marginata* and *A. fulica*) were highest in both species subjected to treatment with 20% *M. oleifera* while the least was recorded in the control. However, Copper and Sodium were recorded highest in the control while the least was recorded in treatment with 20% *M. oleifera* inclusion. This study shows that haemolymph mineral composition indices are the reflections of the effect of dietary treatment on the animals in terms of the type and amount of feed ingested.

The haemolymph of snails have been known to be fried and eaten like chicken eggs in some parts of Southwest Nigeria and also pregnant women drinks it as reported by Ademolu *et al*. (2004). This could be due to high contents of protein and minerals and also where snails are processed in a large scale; the haemolymph could be coagulated and used as animal feed. This study has showed that increased level of *M. oleifera* leaf meal inclusion in the diet of snails have appreciable effect on the haemolymph constituent of the snails.

Table1: Gross Composition of the Experimental diets

Ingredients	0%	10%	15%	20%
Yellow maize	40	40	40	40
Groundnut cake	15	10	12	10
Brewers grain	10	10	7.5	7
Palm kernel cake	12	10	7.5	5
Moringa	0	10	15	20
Blood meal	15	12	10	10
Oyster shell	1.5	1.5	1.5	1.5

Bone meal	1.5	1.5	1.5	1.5
Vitamin premix	5.0	5.0	5.0	5.0
Total	100	100	100	100

Table2: Proximate Composition of the Experimental diets (%)

Parameters	**0%**	**10%**	**15%**	**20%**
Dry matter	57.17	61.86	61.97	62.23
Crude protein	10.90	24.53	24.96	25.89
Ash	6.30	6.50	6.60	6.80
Crude fat	7.00	7.29	7.30	7.32

Table3: Summary of Haemolymph mineral composition (ppm) of the snails

		Feeding treatment								
		AM					**AF**			
Minerals	**Initial value b4 feeding**	**0%**	**10%**	**15%**	**20%**	**Initial value b4 feeding**	**0%**	**10%**	**15%**	**20%**
Mg	9.88	20.23	20.24	20.25	20.25	7.56	16.32	16.56	16.60	16.82
Ca	24.15	42.63	43.08	44.62	46.46	18.34	33.19	34.09	34.44	37.28
Cu	0.28	0.48	0.46	0,46	0.44	0.21	0.57	0.55	0.54	0.53
K	246.10	640.20	652.20	661.30	675.10	139.66	519.10	524.20	525.30	571.10
Fe	1.06	2.74	2.82	2.91	3.05	0.17	2.64	2.85	2.86	3.00
P	4.86	10.22	11.31	11.78	12.37	4.38	8.56	9.89	10.03	10.79
Cl	2.67	8.43	8.82	9.37	10.23	2.86	7.26	8.11	8.29	8.54
Na	2.24	11.48	10.97	10.65	9.44	63.12	9.21	88.81	88.79	88.77

* AF = *Achatina fulica;* AM = *Archachatina marginata*

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