

**NSAP****47th Annual
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(JOS 2022)****CONFERENCE
PROCEEDINGS**THEME
**SECURING ANIMAL
AGRICULTURE AMIDST
GLOBAL CHALLENGES****HAEMATOLOGICAL INDICES OF WEANER RABBITS (*Oryctolagus cuniculus*) FED
VARYING LEVELS OF UREA-MOLASSES TREATED MAIZE COB AS A
REPLACEMENT FOR WHEAT OFFAL**Williams, G.A.¹, Mafimidiwo. A.N.², Adesanya, O.F.³, Sobayo, R.A.⁴¹Department of Animal Science, School of Agriculture, Lagos State University Epe Campus Lagos, Nigeria.²Yaba College of Technology, Department of Agricultural Technology, Lagos, Nigeria.³Federal College of Animal Health and Production Technology, Moor plantation, Ibadan, Nigeria.⁴Department of Animal nutrition, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

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ABSTRACT

A total of forty-five rabbits of about 5-6 weeks old were used to investigate haematological indices of weaner rabbits fed graded levels of urea-molasses treated maize cobs (UMTMC) as replacement for wheat offal in a 56-day trial. Rabbits were allotted into five dietary treatments of nine rabbits segregated into three replicate of three rabbits each. The diets contained UMTMC at five (0, 25, 50, 75 and 100 %) levels of replacement with wheat offal. Data obtained were subjected to analysis of variance in a Completely Randomized Design. Packed cell volume (PCV), Red blood cell (RBC) and haemoglobin (Hb) was increased ($P < 0.05$) with inclusion of 25, 75 and 100% UMTMC and were within normal range. Inclusion of UMTMC at 50, 75 and 100% reduced ($P < 0.05$) white blood cell (WBC) count and the values were slightly lower to normal values. It could be concluded that UMTMC can replace wheat offal up to 100% in rabbit diets without adverse effect on blood parameters.

Keywords: Rabbits, Maize cob, Urea-molasses, Haematology

INTRODUCTION

Rabbit is a pseudo-ruminant animal having short generation interval with high prolificacy and good mothering ability (Ajani *et al.*, 2020). It is easy to manage owing to the ability to utilize waste and other unconventional feed sources (Never, 2018). The increased production of rabbit can mitigate the shortage of animal protein intake in the country and also shorten the wide gap between supply and demand of animal protein (Sarikhani *et al.*, 2010). In the nutrition of rabbit, dietary fibre is essentially important because they help maintain a high rate of passage and control accumulation of digesta in the caecum which causes reduced feed intake and impaired growth (Gidenne and Lebas, 2002). Unlike poultry or swine, rabbits require a high fibre diet which helps in mucosa functionality and serve as substrate for microbiota (Lukefahr *et al.*, 2004). Wheat offal which is the conventional fibrous ingredients in rabbit feed is now expensive (Asar *et al.*, 2010), therefore, attempts have been made to search for alternatively low cost by-products to replace the conventional feedstuffs (Makinde *et al.*, 2014). Alternative fibrous feed ingredient that can be a substitute to wheat offal is maize cob. It contains 2104kcal ME, 3% Crude protein, (Gboshe *et al.*, 2014). Ruminant animals easily consume maize cobs either processed or not (Akinfemi and Adebayo, 2016). However, non-ruminant herbivores like rabbit can seldom use these cobs without processing because of their simple stomach nature. In order to improve its utilization, strategies that can solubilize the fibre fractions for non-ruminant absorption needed to be employed. One of the proven methods of processing maize cobs is the use of urea and molasses (Mafimidiwo, 2018). Urea treatment has been a conventional technique for improving the quality of fibrous feed material in terms of increasing the nitrogen content (Ubwa *et al.*, 2014). Rabbits can efficiently utilize urea as a nitrogen source due to high urease activity in the caecum (Marounek *et al.*, 1995). Molasses increases palatability of diet and acts as readily available energy source to microflora for better utilization (Sheikh *et al.*, 2007). Blood constituents are indicators of the composition of ingested nutrients (Animashahun *et al.*, 2006). In addition, the study of haematological characteristics can provide useful information for diagnostic and management purpose because blood serves as an important index of

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physiological, pathological and nutritional status of an animal (Oleforuh-Okoleh *et al.*, 2015). Therefore this research work investigated the haematological indices of rabbits fed diets containing urea-molasses treated maize cobs as replacement for wheat offal.

MATERIALS AND METHODS

Experimental site: The experiment was carried out at the Teaching and Research Farm, Department of Agricultural Technology, Yaba College of Technology, Epe, Lagos State on longitude 3.98°E and latitude 6.57°N. It lies in the low land rain forest within the savannah agro-ecological zones with annual rainfall and temperature of 1694 mm and 27.1°C respectively (Google Earth 2021).

Preparation of UMTMC: Maize cobs were collected from corn starch processing factory along Sagamu-Ijebu ode express way, Ogun State. It was sun dried, milled and sieved using 2mm size sieve and stored in air tight bags until when needed. UMTMC was prepared by adding 5litres of water to 10kg weight of molasses and 2kg weight of synthetic urea and was thoroughly mixed together in a plastic bucket according to the method of Mafimidiwo (2018). 100kg weight of milled dried maize cob was added to the mixture and stirred thoroughly together with a stirring rod and left for 5 minutes. The brownish mix was spread to air-dry for 3days. Later it was oven-dried for 30 minutes at 65°C to achieve a constant weight.

Experimental animals and management: Forty-five weaner rabbits of 5-6weeks of age weighing between 400 – 500g were obtained from a reputable farm at Ibadan, Oyo State, Nigeria and were allotted randomly into five dietary treatments in a completely randomize design (CRD). There were nine rabbits per treatment, each treatment was replicated thrice containing three rabbits per replicate. The experimental animals were maintained in rabbit hutches placed on concrete floor. Experimental diets and water were offered *ad libitum*.

Experimental diets: Five experimental diets were formulated consisting of control (0% UMTMC) and four diets containing UMTMC which replaced wheat offal at levels of 25, 50, 75 and 100% (Table 1). Diets were formulated to meet the NRC (2012) requirements for rabbits.

Blood collection and analysis: At the end of the 8th week of the experiment, blood samples were randomly collected from six rabbits per treatment (2 per replicate). The blood samples were collected from the external ear vein of each rabbit using a 2ml sterilized disposable syringe and needle. The blood samples were collected into well-labelled and sterilized bottles containing ethylene diamine tetra acetic acid (EDTA), as anti-coagulant. The samples were investigated for packed cell volume (PCV), red blood cell count (RBC), white blood cell (WBC) and haemoglobin (Hb) (Lamb, 1991). The mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and mean corpuscular volume (MCV) were calculated according to Bush (1991).

Statistical analysis: The data collected were subjected to one-way analysis of variance (ANOVA) in a completely randomize design (CRD). The significant means were separated and compared using Duncan Multiple Range Test (Duncan, 1955) and SAS (2027) at 5% level of probability.

RESULTS AND DISCUSSION

Haematological indices of growing rabbits fed urea-molasses treated maize cob: Effect of urea-molasses treated maize cob on haematological indices of growing rabbits is presented in Table 2. Higher ($P<0.05$) PCV, RBC and Hb were recorded in rabbits fed diets containing 25, 75 and 100% UMTMC, however the values were within normal ranges (Nuhu, 2010). This is an indication that the nutrients in the diets supported normal haematological profile (Madubike and Ekenyem, 2006). Low haematological values such as PCV, Hb and RBC counts has been associated with presence of harmful dietary constituent (Bawala *et al.*, 2007). Increased ($P<0.05$) WBC was observed for rabbits fed diets incorporated with 25% UMTMC. However, WBC counts for rabbits on 50, 75 and 100% UMTMC were lower and consistent with the range reported by Ahamefule *et al.* (2008). Decreased count of WBC indicates suppressed production of leucocytes from bone marrow (Odesanmi *et al.*, 2010) which suggests good health status



and absence of foreign agents. MCHC was lower ($P < 0.05$) in rabbits fed diets containing 25% UMTMC. The values obtained for MCHC and MCH for rabbits fed 50-100% UMTMC were similar to those fed control diet. This suggest the absence of hypochromasia, because under this condition, MCHC is lower than normal (Olafadehan, 2011). MCV also followed a similar trend which indicates no presence of macrocytic and hypochronic anaemia because divergence from normal values has been implicated in defect in some haemopoietic factors responsible for production of red blood cells in bone marrow (Awodi *et al.*, 2005). The increased MCH (40.45 g/dl) and reduced MCV (56.90 fl) obtained in T2 and T4 respectively does not imply poor health status since PCV, RBC and Hb are within normal range.

Table 1: Gross composition of experimental diet (g/100g DM)

Ingredients (%)	Urea-molasses treated maize cob (%)				
	0	25	50	75	100
Maize	40.00	40.00	40.00	40.00	40.00
SBM	18.00	18.00	18.00	18.00	18.00
Fish meal	0.50	0.50	0.50	0.50	0.50
Wheat offal	37.00	27.75	18.50	9.25	-
UMTMC	-	9.25	18.50	27.75	37.0
Bone meal	2.50	2.50	2.50	2.50	2.50
Oyster shell	1.50	1.50	1.50	1.50	1.50
Vitamin and mineral premix ¹	0.25	0.25	0.25	0.25	0.25
Salt	0.25	0.25	0.25	0.25	0.25
Total	100	100	100	100	100

Calculated nutrients (%)

Crude protein	18.39	18.00	17.61	17.22	16.84
Crude Fibre	8.72	8.58	8.63	8.30	8.16
Metabolisable energy (Kcal/kg)	2479.00	2502.00	2526.00	2549.00	2573.00

¹Each 3 kg vitamin and mineral premix provides: Vit. A 12000000 IU, Vit. D3 750000 IU, Vit. E 10000 mg, Vit. K 2000 mg, Vit B1 1000 mg, vit B2 4000 mg, Vit. B6 1500 mg, Vit B12 10 mg, Pantothenic acid 10000 mg, Niacin 20000 mg, Biotine 50 mg, Folic acid 1000 mg, Choline chloride 500mg, selenium 100mg, Manganese 55 gm, Zinc 50 gm, Fe 60 gm, CU 2.5 gm, CO 6 mg and Iodine 1 gm.

Table 2: Effects of urea-molasses treated maize cob on haematological indices of weaner rabbits

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	Normal range*	SEM
PCV (%)	29.00 ^b	32.50 ^a	29.50 ^b	31.50 ^a	33.00 ^a	30.00-50.00	0.40
RBC (x10 ¹² /L)	4.90 ^b	5.25 ^a	4.90 ^b	5.30 ^a	5.40 ^a	4.00-8.00	0.05
Hb (g/dl)	9.85 ^b	10.75 ^a	10.10 ^b	10.70 ^a	10.70 ^a	8.00-17.50	0.13
WBC (x10 ⁹ /l)	5.45 ^b	5.90 ^a	4.30 ^c	3.10 ^d	3.05 ^d	4.68-5.90	0.06
MCHC (g/dl)	33.90 ^a	20.91 ^b	33.45 ^a	32.75 ^a	32.32 ^a	33.10-33.30	0.88
MCH (g/dl)	19.25 ^b	20.05 ^a	19.80 ^b	20.06 ^b	19.65 ^b	19.67-20.04	2.55
MCV (fl)	60.00 ^a	59.50 ^a	60.21 ^a	56.90 ^b	60.10 ^a	58.73-60.14	0.29

^{abc}: Means in the same row with different superscripts differ significantly ($P < 0.05$)

SEM= Standard Error of Means. PCV: Packed Cell Volume, RBC: Red Blood Cell, Hb: Haemoglobin, WBC: White Blood Cell, MCH: Mean corpuscular hemoglobin, MCHC: Mean corpuscular hemoglobin concentration, MCV: Mean corpuscular volume

* Mitruka and Rawnsley (1977)

CONCLUSION

From the results obtained, urea-molasses treated maize cob can replace wheat offal up to 100% in the diets of rabbits without any negative effect on haematology parameters.



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REFERENCES

- Ahamefule, F.O., Ejiofor, C.A. and Ibeawuchi, J.A. (2008). A comparative study of the constituents of cattle, sheep and goat milk in a hot humid environment. *Discovery and Innovation*, 15: 64-68.
- Ajani, J.O., Oyekan, O.O., Udagbe, O M., Ogundimu, O.A. and Oyewole, O.O. (2020). Prolificacy and fecundity studies among selected breeds of rabbits (*Oryctolagus cuniculus*) Linnaeus. *International Journal of Animal health and livestock production research*, 4(1):55-70.
- Akinfemi, A. and Adebayo, B. J. (2016). Effect of Urea on chemical composition and in-vitro digestibility of maize cobs. Proceedings of 41st Annual Conference. NSAP, FUNAAB, Nig. 20th-24th March 2016. Pp 496-498.
- Animashahun, R.A., Omoikhoje, S.O. and Bamgbose, A.M. (2006). Haematological and biochemical indices of weaner rabbits fed concentrates and *Syndrella nodiflora* forage supplement. Proceedings of 11th annual Conference of Animal Science Association of Nigeria. Institute of Agricultural Research and Training, Ibadan, Nigeria, pp: 29-32.
- Asar, M.A., Mona, O., Takout, H.M. and Safoat, A. (2010). Utilization of corn- cob meal and Faba bean straw in growing rabbit diet and their effects on performance, digestibility and economic efficiency. *Egypt Poultry Science*, 30:415-442.
- Awodi, S., Ayo, J.O., Atodo, A.D. and Dzende, T. (2005). Some haematological parameters and the erythrocyte osmotic fragility in the laughing Dove (*Streptopella Senegalensis*) and the village weaver bird (*Ploceus Cucullatus*). Proceedings of 10th Annual conference of Animal Science Association of Nigeria held on 12–15th September at University of Ado-Ekiti, Nigeria, pp: 384–388.
- Bawala, T.O., Akpan, U., Ogunnowo, A. O., Fasae, O. A. and Sogunle, O. M. (2007). Influence of Mg supplementation on the haematological indices of young West African Dwarf (WAD) goats. Proceedings of the 32nd Annual Conference of Nigerian Society for Animal Production, 76-78.
- Bush, B.M. (1991). Interpretation of Laboratory Results for Small Animal Clinicians. Blackwell Scientific Publications. London, UK, pp: 32–67.
- De Blas, J. C., Gutierrez, I. and Carabano, R. (1999). Destete precoz en gazapos. Situacion actual y perspectivas. In: Rebollar, G., de Blas, J.C. and Mateos, G.M. (eds) *Advances en Nutrición Animal*. XV Curso de Especializacion FEDNA, Ediciones Peninsular, Madrid, Spain, pp. 67–81.
- Duncan, D.B. (1955). Multiple range and multiple F test. *Biometrics*. 11: 1-42.
- Gboshe, P.N., Enaku, O.O. and Shaahu, D.T. (2019). Effect of graded levels of maize cob as replacement for dietary maize on the carcass characteristics of growing rabbits. *Nigerian Journal of Animal science*, 21(1): 204-213.
- Gidenne, T. and Lebas, F. (2002). 2d Rabbits Congress of the Americas, Banana city, Cuba, June 19-22,
- Lamb, G. N. (1991). Manual of veterinary laboratory technique (pp. 98-99). CIBA-GEIGY, Kenya.
- Lukefahr, S.D., Cheeke, P.R., McNitt, J.I. and Patton, N. M. (2004). Limitations of intensive meat rabbit production in North America: A review. *Canadian Journal of Animal Science*, 84: 349-360.
- Madubike, F. N. and Ekenyem, B. U. (2006). Haematology and serum biochemistry characteristics of broiler chicks fed varying dietary levels of *Ipomoea asarifolia* leaf meal. *International Journal of Poultry Science*, 5: 9-12.
- Mafimidiwo, A.N. (2018). Response of weaner rabbits to graded levels of urea-molasses treated maize cob as a replacement for wheat offal. M.Agric dissertation submitted 3rd Aug. to Department of Animal nutrition, Federal University of Agriculture Abeokuta, Ogun state, Nigeria.
- Makinde, O.J., Enyigwe, P.C., Babajide, S.E., Atsumbe, J.A., Ibe, E.A. and Samuel, I. (2014). Growth performance and carcass characteristics of finisher broilers fed rice offal based diets supplemented with exogenous enzyme. *Greener Journal of Agricultural Sciences*, 4 (4): 144-149.
- Marounek, M., Vook, S. J. and Skrivanova, V. (1995). Distribution of activity of hydrolytic enzymes in the digestive tract of rabbits. *British Journal of Nutrition*, 73: 463–469.
- Mitruka, B.M. and Rawnsley, H.M. (1977). Clinical, biochemical and haematological reference values in normal and experimental animals. Masson Publishing, USA, Inc., 83:134-135.



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- Never, A. (2018). Use of non- classical feed resources and their influence on some performance indicators in rabbits. *Science Journal of review*, 7(1): 563-571. <https://doi.org/10.14196/sjr.v7i1.2492>
- Odesanmi, S. O., Lawal, R. A. and Ojokuku, S. A. (2010). Haematological effects of Ethanolic fruit extract of *Tetrapleura tetraptera* in Male Dutch White rabbits. *Research Journal of Medical Plant*, 1-5.
- Olafadehan, O.A. (2011). Haematological parameters, serum constituents and organ development of growing rabbits as affected by feeding processed cassava peels. *Animal Nutrition and Feed Technology*, 11: 41-51.
- Oleforuh-Okoleh, V.U., Ndofor-Foleng, H.M., Olorunleke, S.O. and Uguru, J.O. (2015). Evaluation of Growth Performance, Haematological and Serum Biochemical Response of Broiler Chickens to Aqueous Extract of Ginger and Garlic. *Journal of Agricultural Science*, 7:167-173. <https://doi.org/10.5539/jas.v7n4p167>