WATER CONSUMPTION AND FAECAL PHYSICAL CHARACTERISTICS IN COCKERELS FED DIETARY INCLUSION LEVELS OF FERMENTED CASSAVA TUBER WASTES (FCTW)

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ABSTRACT

Water consumption and faecal physical characteristics of cockerels fed fermented cassava tuber wastes (FCTWs) were investigated in a-sixteen-week study. The FCTWs were inoculated with two *Lactobacilli* (*L. delbrueckii and L.coryneformis*) and a fungus (*Aspergillus fumigatus*) for their protein enrichment and fibre degradation. Seven experimental diets (control diet and Six (FCTW-based diets) designated as: D1 (Control Diet), D2, D3 and D4 (diets with inclusion of 20%, 40% and 60% Microbially Fermented Cassava peel [MFCP]) and D5, D6 and D7 (diets with inclusion of 20%, 40% and 60% Microbially Fermented Cassava Starch Residue [MFCSR] respectively), were fed to the cockerel birds. Daily water consumption of the birds was recorded for both the starter and finisher phases. Faecal parameters like consistency, volume, output and density were also determined for the two growth phases. The results showed that the total water intake (TWI) and the average water intake of the starter phase were significantly ($P<0.05$) influenced by the experimental diets with T2 (3412.50±46.03ml) and T6 (3012.30±95.76ml) having the highest and least total water intake respectively. Water comsumption at the finisher phase was however highest (10264.00±1198.70ml) in T7 and lowest(7631.40±838.08ml) in T4. The water intake decreased as the inclusion rate of FCTWs increased i.e from T1 – T4 and also from T5 – T6. Faecal physical characteristics were only significantly ($P<0.05$) influenced in terms of fresh faecal weight, faecal dry matter and faecal volume which were relatively higher in the CTW diets than in the Control at both the starter and finisher phases. The weight of the faecal dry matter increased with increasing dietary levels of the CTW. The faecal volume and density did not follow a particular trend with dietary treatments applied. This experiment showed that cassava tuber wastes could be incorporated into the diets of cockerel birds without deleterious effects on the water consumption and faecal physical characteristics but a tendency towards decrease in water consumption with increasing dietary levels of fermented CTW and a corresponding increase in faecal dry matter was observed.

Keywords: Cassava, cockerels, faecal parameters, fermentation, water consumption.

INTRODUCTION

Water is essential for life. This statement is corroborated by the very high percentage composition of water to total body mass of living organisms (Guyton, 1991). Consumption of water is therefore one of the measured parameters in practical livestock husbandry. Water consumption in livestock is governed by so many factors like the age, the physiological state, the nature of the feed ingredients, environmental temperature and the salt content of the feed (Murphy, 1992; Ward and McKague, 2007). One of the major challenges facing the livestock industry in Nigeria is the high cost of the conventional feed ingredients that has continued to make profitable livestock production a mirage. A way out of this seemingly intractable challenge is the use of the unconventional feed ingredients derived from the by-products of agro-allied industries otherwise called agro-industrial wastes (Aro *et al.*, 2010). Many of these wastes abound in Nigeria in large quantities and have been exploited in many ways and with varying degrees of success to reduce the huge feed cost hitherto incurred in livestock production operations. Making use of these conventional feedstuffs to solve one management problem may however engender another if this is viewed under the purview of the water consumption or requirement of livestock fed with these unconventional feedstuffs. Another challenge that is related to the effect of water consumption of stock is the faecal output and the attendant disposal problem when farm animals are raised on diets in which these wastes constitute the bulk of the feed ingredients (Aro *et al.*, 2009). Faecal waste is the most abundant waste generated in livestock husbandry.The bulkiness, consistency and moisture content of the faecal matter are directly related to the physico-chemical properties of the feed ingredients that go into the formulation of the

feed. Since the cockerel birds spend a relatively longer duration under husbandry management than the broiler birds and hence have a higher capacity to accummulate more faecal wastes, then conscious efforts to prevent unnecessary accumulation of faeces should be taken. Such efforts could evolve from monitoring the capacity of the feed ingredients that are used to compound the diets to induce water consumption and engender faecal accummulation in the birds. The influence of cassava tuber waste-based ingredients on water consumption and faecal physical parameters in cockerels have not been reported in literature especially in this part of the world. This research work was therefore conducted to investigate the influence of microbially fermented CTWs on water intake and faecal output of cockerel birds.

MATERIALS AND METHODS

The experiment was conducted in the poultry house of the Livestock Unit of the Teaching and Research Farm of the Federal University of Technology, Akure, Nigeria.Cassava peels (CAP) were obtained fresh from a cassava processing community located along Igbatoro road, Akure, Ondo state while the cassava starch residues (CSR) were obtained fresh from Matna Foods Limited - a cassava starch processing factory located at Ogbese, along Owo-Benin express road in Ondo state, Nigeria. These wastes were sun-dried, crushed and subsequently subjected to solid state fermentation using a combination of candidate micro-oganims according to the method described by Aro (2010). Seven experimental diets were formulated such that the first diet with no inclusion of cassava tuber wastes served as the control diet (D1). The remaining six diets were labelled diet two (D2) with 20% microbially fermented cassava peels (MFCP), diet three (D3) 40% MFCP, diet four (D4) 60% MFCP, diet five (D5) 20% microbially fermented cassava starch residue (MFCSR), diet six (D6) 40% MFCSR and diet seven (D7) 60% MFCSR respectively. Two-hundred and ten day old cockerels were purchased from a reliable source and were randomly assigned to seven different dietary treatments for sixteen weeks of two phases: the starter and finisher phases of eight weeks each. Each treatment was replicated thrice with ten birds per replicate. The birds were provided fresh, clean water and were appropriately fed *ad libitum* daily throughout the feeding period. They were placed under good hygienic conditions throughout the 16-week feeding period and necessary vaccines and prophylactic treatments were scheduled and administered when due. Water intake was recorded daily while at the end of every week, the total water intake was calculated to know the total and average water intake per bird and per treatment. Faecal consistency was visually observed for the degree of firmness; as normal, soft, watery and very watery faeces with scores ranging from 0-3 according to Marquardt (1999). At the 6th and 14th week of the experiment for the starter and the finisher phase respectively, three birds per treatment were selected and transfered to metabolism cages to facilitate faecal collection. Total faecal output per bird was collected for ten days, weighed, wrapped with aluminum foil, labeled, recorded and oven dried on a daily basis to determine the moisture content, percentage moisture content and the dry matter of the faeces while on the last day of faecal collection, the volume and density were calculated from a fixed weight of faecal matter using the Archemedes' principle.

Experimental Design/Statistical Analysis

The Completely Randomized Design (CRD) was used for the experiment and it involved seven treatment diets and three replicates per treatment resulting in twenty-one observations. A one-way analysis of variance (ANOVA) and Duncan Multiple Range Test (DMRT) were carried out on the data using SPSS 17 (2008) package. The statistical model used was: $Y_{ij} = \mu + T_i + \varepsilon_{ij}$

Where, Y_{ij} = observation, μ = overall mean, T_i = level of inclusion of MFCP (i = 1–7), and ε_{ij} = residual error (j = 1–3). Significance was accepted at $P<0.05$.

RESULTS AND DISCUSSION

Table 1 showed that the total and average water intake for both the starter and finisher phases were influenced significantly ($P < 0.05$) by the dietary treatments. The total water intake in the starter;s phase decreased as the inclusion rate of FCTWs increased i.e from D2 – D4 and D5 – D6 except for D7 . The total water intake also decreased as the inclusion of CTWs increased i.e from D1 – D4 and from D5 – D6 in the finisher's phase. Diet 7 (D7)and D4 had the highest and least TWI and AWI respectively. The decrease in water intake with increase in the dietary levels of the CTWs corroborates the earlier report of Kompiang *et al.*(1995) Table 1 also showed that

water intake increased with the age of animals (ANZECC, 2000) and the physico-chemical properties of the feed (Patterson *et al.* 2002). The faecal parameters of cockerels fed dietary There were significant differences in the weight of fresh faeces in the starter and finisher phases.It was highest in T3 (109±9.13g) for the finisher phase and the least in T2 (63.53±4.32g). Faecal dry matter also varied significantly in both phases. It was highest in T7 (17.97±1.79g) in starter phase and in T3 (29.57±0.95g)in the finisher phase respectively. The percentage moisture also varied significantly in both phases. The diet with 40% MFCSR (T5)had the highest value (71.17±4.20%) in the starter phase whileT4 recorded the highest value in the finisher phase. These values were however lower than 75% faecal moisture content reported in http://hencam.com (2014) as normal for chickens. The faecal volume in both the starter and finisher phases was highest in T4 (30.67±2.91cm^3) and T7 (36.00±3.46cm^3) respectively. The density of the faecal matter had no significant difference in both phases of the experiment. The consistency of the faecal matter was normal with no predisposition to diarrhoagenic tendencies (Marquardt, 1999) in both starter and finisher phases of the experiment.

CONCLUSION

Birds on the CTW diets consumed relatively less water to meet their physiological needs in comparison with the control. The utilization of these wastes would hence ensure a better water economy especially with the utilization of cassava peels in the diets.The increase in faecal dry matter in the CTW diets relative to the control with a corresponding decrease in percentage faecal faecal moisture showed that the utilization of these wastes would not impact negatively on the environment. Rather, they could help mitigate the emission of greenhouse gases generated as a result rapid decomposition of faecal matter accentuated by a high percentage of faecal moisture content.

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