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Effect of Fungal Treated Maize Cob on the Performance of West African Dwarf Rams
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Introduction

Maize cobs (MC) are generated in large quantities in Nigeria. After removal of the grains from the cobs; the cobs constitute a nuisance to the environment. There is limitation to their consumption by ruminants due to their high fibre, low protein, vitamins and mineral contents. Appropriate methods of processing these wastes into value added ruminant feed is of particular interest to the developing countries especially Nigeria, where the rate of livestock production and consumption is low due to high cost of conventional feed (Abu et al., 2005). Reports (Belewu and Okhawere, 1998) showed that fungal treatment of crop residue improved the crude protein while the fibre fractions significantly reduced. In view of the paucity of information on this subject, this study was conducted to examine the impact of fungal treated maize cob in the diet of West African dwarf rams

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Material and Methods

On farm degradation of maize cobs using *Pleurotus tuber-regium* for a period of 40days was conducted for the feeding of twenty rams allotted to five groups of four rams per treatment in a completely randomized design. Each group was fed any of the diets in which the maize cobs treated with *Pleurotus tuber-reguim* replaced in (g/100g) Wheat Offal at 0 (A), 25 (B), 50 (C), 75 (D) and 100 (E) as supplement to basal diet of *Panicum maximu* in an experiment lasting for 114days. The parameter measured were Voluntary Dry Matter Intake (VDMI), Average Daily Weight Gain (ADWG), Feed Conversion Ratio (FCR), Nitrogen Balance, ruminal pH (pH), Total Volatile Fatty Acids (TVFA's) and Ammonia Nitrogen (NH₃-N).

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Results and Discussion

The results obtained showed that treatment effects on DMI, MWG and AVDG were significant and higher for WAD rams on T₅ followed by T₄, T₃ and T₂ with the least obtained for animals on the control diet (T₅). The DMI increased with increasing levels of supplementation and with corresponding increased MWG and AVDG. This increase may be due to the beneficial effects of the fermentation. The animals on the fungal treated diets showed more pronounced effects on

improving N-balance. Such improvement was highly significant when compared with the control treatments and when related to percent of N-intake. The improved positive nitrogen obtained in the present study is consistent with that reported elsewhere (Bakshi and Jander, 1991). The pH ranged from 6.76 to 9.08. The TVFA were generally higher in all the fungal supplemented treatments compared with the control. Similarly, $\text{NH}_3 - \text{N}$ also increased with increase in supplementation.

The lower pH obtained in T_3 and T_5 may be related to fermentation process of both non-structural and structural carbohydrate, and production of VFA, which affected the pH to some limit until they are proportionally and relatively absorbed from the rumen wall (Salmen *et al.*, 2008). Reddy (1995) observed an inverse relationship between pH and TVFA's concentration in the rumen. The TVFA's concentration may also be affected by other factor such as DM digestibility, rate of absorption, rumen pH, transportation of the digest from the rumen to other parts of the digestive tract and the activities of the microbial population (Salman *et al.*, 2008). Reports (Smith *et al.*, 2008) attributed increase in $\text{NH}_3 - \text{N}$ concentration in the rumen to reduction of $\text{NH}_3 - \text{N}$ absorption by rumen epithelium or to a decrease in the efficiency of microbial protein synthesis. Yadav and Yadav (1980) observed that increased ruminal ammonia nitrogen concentration might be due to higher intake of nitrogen and higher crude protein digestibility. Their findings are consistent with the present result.

Table 1: Growth Performance of WAD rams fed the experimental diets

Parameters	T₁	T₂	T₃	T₄	T₅	SEM
DMI g/d W ^{0.75}	132.68 ^e	134.48 ^d	136.46 ^c	139.41 ^b	141.45 ^a	0.003
Initial body weight, kg	13	12.75	13	13	12.75	-
Final body weight, kg	21.13 ^e	22.33 ^d	23.57 ^c	26.01 ^b	27.33 ^a	0.003
Mean weight gain, kg	8.13 ^e	9.58 ^d	9.67 ^c	10.33 ^b	11.58 ^a	0.003
Total DMI/BW%	3.03 ^c	3.08 ^a	3.04 ^{bc}	3.05 ^b	3.08 ^a	0.020
Feed conversation ratio	9.99 ^a	8.83 ^b	8.34 ^b	8.28 ^b	7.79 ^b	0.210

abcd means along the same row with different superscripts are significant ($P < 0.005$), $T_1 = 0\%$ Fungal treated maize cobs, $T_2 = 10\%$ fungal treated maize cobs, $T_3 = 20\%$ fungal treated maize cobs, $T_4 = 40\%$ fungal treated maize cobs, SEM = Standard error of mean.

Table 2: Nitrogen utilization and rumen fluid parameters of WAD rams fed experimental diet

Parameters	T ₁	T ₂	T ₃	T ₄	T ₅	SEM
N – intake $\text{gd}^{-1}/\text{kgW}^{0.75}$	8.71 ^d	8.76 ^b	8.76 ^b	8.55 ^c	9.08 ^a	0.003
Faecal-N (g/d^1) $\text{kgW}^{0.75}$	1.99 ^a	1.65 ^{ab}	0.94 ^b	1.55 ^{ab}	0.99 ^c	0.15
Urinary-N (g/d^{-1}) $\text{KgW}^{0.75}$	4.25 ^a	3.99 ^{ab}	4.20 ^{ab}	3.00 ^b	4.45 ^a	0.21
N-balance (g/d^{-1}) $\text{KgW}^{0.75}$	2.49 ^b	3.46 ^a	3.62 ^a	4.00 ^a	4.18 ^a	0.21
Rumen fluid parameters at 6hrs post feeding						
pH (g/d^{-1})	6.76 ^a	7.74 ^b	8.76 ^b	8.55 ^c	9.08 ^a	0.003
TVFA meq mL^{-1}	10.10 ^e	10.30 ^d	11.92 ^c	12.37 ^b	12.84 ^a	0.02
NH ₃ -N mg/ mL^{-1}	18.20 ^e	19.60 ^d	23.75 ^c	24.20 ^b	26.40 ^a	0.03

abcd means along the same row with different superscripts are significant ($P < 0.005$), T₁ = 0% Fungal treated maize cobs, T₂ = 10% fungal treated maize cobs, T₃ = 20% fungal treated maize cobs, T₄ = 40% fungal treated maize cobs, TVFA = Total volatile fatty acid, N = nitrogen, SEM = Standard error of mean.

Table 3: Gross composition (%) of experimental diets

Ingredient	T ₁	T ₂	T ₃	T ₄	T ₅
Maize bran	30	30	30	30	30
Palm kernel cake	10	10	10	10	10
Groundnut cake	10	10	10	10	10
Wheat offal	40	30	20	10	-
FTMC	-	10	20	30	40
Common salt	1.0	1.0	1.0	1.0	1.0
Dicalciumphosphate	3.75	3.75	3.75	3.75	3.75
Soybean meal	3.75	3.75	3.75	3.75	3.75
Vit. Premix	1.50	1.50	1.50	1.50	1.50
Total	100	100	100	100	100

T₁ = 0% Fungal treated maize cob, T₂ = 10% fungal treated maize cob, T₃ = 20% fungal treated maize cob, T₄ = 30% fungal treated maize cob, T₅ = 40% fungal treated maize cob, FTMC = Fungal treated maize cob.

Conclusions and Outlook

Fungal treatment has proved to be a useful method of recycling maize cob into useful ruminant feed. It could be used to enrich crop residue and animal performance of West African dwarf rams given rations supplemented with *Pleurotus tuber-regium* treated maize cobs. Furthermore, fungal

treatment serves as better alternative to chemical treatment because it is cheap and environmentally friendly recycling biotechnology with fewer side effects.

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