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Haematology of weaner rabbits fed diets containing culture fermented cowpea husk

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Abstract
The present study was undertaken to demonstrate the potential usefulness of fermented cowpea husk as a source of fibre and to a lesser extent as a protein source in practical rabbits' feed. The authors are currently working on fortifying these fermented crop residues with, vitamins, minerals, amino acids and antioxidants to develop feedstock that rabbits will utilize to meet daily weight gain of 40-45g/day, which is the normal weight gain in developed countries.

Keywords: Fermented cowpea husk, haematology, rabbit feed

Introduction
In the utilization of fibre in rabbit nutrition has been of major concern to livestock nutritionists [1], largely due to abundant availability of fibrous agricultural and industrial by-products (AIBPs). Unfortunately these AIBPs are lignocellulosic in nature and therefore may require biochemical treatment such as fermentation to degrade the lignocellulose fibre for better utilization by rabbits. Hence, this study was aimed at testing culture fermented cowpea husk in rabbit ration using performance and haematology as response criteria.

Material and Methods
Feed preparation and formulation Cowpea husks were collected from designated centres and were sundried (DM ≥90%). The sample was then milled (1.0 mm sieve) and labelled as CH. CH were measured into six different double layered polythene bags. The cowpea husks, moistened with distilled water (2.5l kg^{-1}) and spore solutions of respective fungi species were added at the rate of 200ml kg-1 as follows: *Aspergillus niger* (ASP), *Rhizopus oligosporus* (RHZ), *Trichoderma reesei* (TRI), *A. niger* + *R. oligosporus* (ARH), *A. niger* + *T. reesei* (ATR) and *T. reesei* + *R. oligosporus* (TRH) and the content of each bag were mixed thoroughly. The moistened CH were afterwards allowed to ferment anaerobically for 96 hours and then oven dried (60 ^{o}C) for 48 h. Dried fermented and unfermented CH (DM ≥90%) were then incorporated into respective rabbit rations to supply 10% fibre. Animal protocol and dietary treatment Seventy experimental rabbits were allotted on weight equalization basis (average weight of 550g), in a completely randomized design into 7 treatments, with each treatment having 5 replicates and 2 rabbits per replicate and they were managed intensively for a period of 10 weeks in wooden cages of approximately 76x62x42cm dimension.
Feed and water were supplied *ad libitum* throughout the study period. In addition to the experimental diets, 100g of wilted *Tridax procumbens* were supplied to each rabbit. Fermented and unfermented crop residues were used as test ingredients. The test ingredients were incorporated to supply 10% crude fibre while the whole diet will supply 15% crude fibre. Table 1 shows the experimental diets.

Table 1: Experimental diets

	UCH	ASP	RHZ	TRI	ARH	ATR	TRH
Maize	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Soyabean Meal	16.00	16.00	16.00	16.00	16.00	16.00	16.00
Cowpea husk	29.50	31.41	32.62	33.00	33.68	33.38	33.83
Wheat Offal	24.90	22.99	21.78	21.40	20.72	21.02	20.57
Lysine	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Methionine	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Bone Meal	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Premix*	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Salt	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Calculated Analysis	UCH	ASP	RHZ	TRI	ARH	ATR	TRH
Energy (MJ/Kg)	10.78	10.79	10.72	10.69	10.72	10.74	10.77
Crude Protein (%)	16.85	16.86	16.87	16.86	16.90	16.82	16.93
Crude Fibre (%)	14.03	14.03	14.00	14.04	14.06	14.00	14.25
Determined Analysis (%)							
Crude Protein	16.92	16.91	16.98	16.96	16.98	16.95	16.99
Crude Fibre	15.15	15.05	15.10	15.07	15.02	15.09	15.00

Note: ASP = *Aspergillus Niger*, RHZ = *Rhizopus oligosporus*, TRI = *Trichoderma reesei*, ARH = *A. Niger* + *R. oligosporus* ATR = *A.niger* + *T. reesei*, TRH = *T. reesi* + *R. oligosporus* UCH = Unfermented Cowpea husk. Premix: Premix used is broilers premix manufactured by animal care (NIG), contain the following (per kg): Vit A = 4000000IU, Vit D3 = 2500000IU, Vit E = 4000mg; Vit K = 800mg, Vit B3 = 300mg; Vit B2 = 6000mg; Vit B6 = 5000mg; Vit B12 = 25mg; Niacin = 6000mg, Pantothenic Acid = 20222mg; Folic Acid = 800mg; Biotin = 8mg, Manganese = 300000mg; Iron = 80000mg; Zinc = 20000mg; Copper = 25mg; Cobalt = 80mg; Iodine = 400mg; Selenium = 40mg; Chlorine = 800000mg.

Performance characteristics

The live weights of rabbits per replicate were measured on arrival and subsequently on weekly basis using weighing scale to monitor weight gain. Also the feed consumption was recorded weekly to determine the feed intake and feed conversion ratio. Haematological studies Blood samples for the determination of haematological and biochemical indices were collected during slaughtering from three representatives of each treatment. Blood samples were analyzed for haematological parameters such as PCV, Haemoglobin, RBC and WBC counts by methods expounded by Bush [2]; biochemical indices such as glucose, total protein, albumin and globulin; Erythrocytic indices such as MCH, MCV and MCHC were calculated using methods of Walker *et al.* [3] Statistical analysis All data collected from this experiment were subjected to general linear model of analysis of variance (ANOVA) using SAS (2003) statistical software package. Means for treatments showing significant differences in the ANOVA were compared using Duncan's multiple-range test [4].

Results and Discussion

In this the performance characteristics of the rabbits fed fermented and unfermented cowpea husk is shown in table 2. The results revealed that rabbits fed unfermented cowpea husk (UCH) had the highest final live weight, hence, highest weight gain which is significantly (P<0.05) higher than the fermented diets.

Table 2. Performance characteristics of experimental rabbits fed fermented and unfermented cowpea husk

	Initial weight (g)	Final weight (g)	Weight gain (g)	Average weekly weight gain (g)	Av. wkly FI (g)	FCR
ARH	570	1540e	970e	121.25cd	377.34d	3.11b
ATR	570	1614d	1044c	130.50c	375.72d	2.88a
ASP	575	1530f	955f	119.38d	379.89d	3.18c
TRI	580	1620c	1040c	130.00c	402.49c	3.10b
RHZ	575	1610cd	1035d	129.38c	401.00c	3.10b
TRH	575	1730b	1155b	144.38b	409.47b	2.84a
UCH	571	1780a	1209a	151.13a	537.32a	3.56d
SEM	5.53	5.53	5.53	5.53	5.53	5.53

Note: a-e, means on the same column with different superscript are significantly (p<0.05) different. Av. wkly FI = Average weekly feed intake, FCR = Feed conversion ratio. ASP = *Aspergillus Niger*, RHZ = *Rhizopus oligosporus*, TRI = *Trichoderma reesei*, ARH = *A. Niger* + *R. oligosporus*, ATR = *A. Niger* + *T. reesi*, TRH = *T. reesei* + *R. oligosporus*, UCH=Unfermented Cowpea husk. SEM = Standard error of mean.

This may be as a result of lower feed intake by the rabbits on fermented CH which is due to coarseness of CH after drying. However, the results of the feed conversion ratio indicated that cowpea husk fermented with *A. niger* + *T. reesei* (ATR) and *T. reesei* + *R. oligosporus* is better significantly (P<0.05) than other treatments. This shows that mixed cultures were able to degrade the lignin in the cowpea husk better than single culture; hence the experimental rabbits were able to convert to more flesh. Table 3 showed the effect of cowpea husk fermentation on the haematology and serum biochemistry of experimental rabbits.

Table 3: Haematology of rabbits fed fermented and unfermented cowpea husk

	ARH	ATR	ASP	TRI	RHZ	TRH	UCC	SEM
Haemoglobin	11.70ab	8.70d	11.53abc	9.47d	9.87cd	10.17bcd	12.41a	0.32
Red blood cell	2.09a	1.55c	2.02ab	1.64c	1.73bc	1.46c	2.18a	0.07
White blood cell	13.00a	10.49c	12.47a	10.20c	11.89ab	12.27a	10.88bc	0.25
Packed cell volume	35.67a	25.33d	35.00ab	28.67cd	30.00bcd	30.67abc	35.00ab	0.96
Glucose	49.00d	68.67ab	77.67a	54.00c	57.33bc	47.33d	75.33a	2.91
Total protein	60.33b	49.67d	52.00cd	69.00a	51.67cd	54.67c	53.67cd	1.44
Albumin	38.00b	33.00bc	30.00c	47.33a	31.67c	33.67bc	34.00bc	1.33
Globulin	22.33a	16.67b	22.00a	21.67a	20.00ab	21.00a	19.67ab	0.58
MCV	56.20ab	56.32ab	56.61a	56.76a	55.00b	57.47a	56.61a	0.21
MCH	16.78	16.84	16.81	16.65	16.86	16.44	16.56	0.05
MCHC	33.42ab	33.44ab	33.56ab	33.61ab	33.20b	33.45ab	33.77a	0.06

Note: a-d, means on the same row with different superscript are significantly (p<0.05) different. ASP = *Aspergillus Niger*, RHZ = *Rhizopus oligosporus*, TRI = *Trichoderma reesei*, ARH = *A. Niger* + *R. oligosporus* ATR = *A. Niger* + *T reesi*, TRH = *T. reesei* + *R. oligosporus*, UCH = Unfermented Cowpea husk. SEM = Standard error of mean.

The results showed that values obtained for Haemoglobin falls within the normal range (8-17g/100ml) for a healthy rabbit [5]. This is an indication of a good nutritional status. The PCV also falls into the normal range (31-50%) except rabbits on ATR and TRI. This may be as a result of lower feed intake by the experimental rabbits on these treatments. Lower feed intake normally leads to reduced nutrient intake including iron needed for the formation of haemoglobin. WBC counts were much lower than what was expected. This may be attributed to stress such as temperature and lower feed intake by the experimental rabbits during data collection. The serum biochemistry showed that total protein was within the normal range except ATR, which was slightly lower than the normal. This result is not complementing the results obtained for albumin and globulin as these falls within the expected values for healthy rabbit. Nevertheless, the overall results for serum biochemistry indicate a normal nutritional status for rabbits fed fermented and unfermented cowpea husk [6].

Conclusions and Outlook

Rabbits fed cowpea husk fermented with TRH performed better (p<0.05) than rabbits on other treatments in terms feed conversion ratio. The haematology and serum biochemistry of the experimental rabbits indicated that the experimental feed were nutritionally adequate for the experimental rabbit.

References

1. Houndonougbo MF, Chrysostome CA, Attakpa SE, Sezan A, Dehou HB. Growth performance of rabbits fed palm-press fibre-based diets. ISRN Veterinary Science, 2012.
2. Bush BM. Interpretation of laboratory results for small animal clinicians. Blackwell Scientific Publications, UK, 1991, 32-67.
3. Clinical Methods, 3rd ed, The history, physical and laboratory examinations. Eds. Kenneth H, Walker, MD, W Dallas Hall, MD, and J Willis Hurst, MD. Emory University School of Medicine, Atlanta, Georgia. Boston: Butterworths, 1990.
4. Steel RGD, Torrie JH. Principle and Procedure of statistics. 2nd ed., McGraw Hill Book Company. New York, 1980.
5. Igwebuike JU, Anugwa FO, Raji AO, Ehiobu NG, Ikurior SA. Nutrient digestibility, haematological and serum biochemical indicies of rabbits fed graded levels of Acacia albida pods. ARPN Journal of Agricultural and Biological Science. SAS Institute Inc. 2003, 2008; 3(4):33-40
6. SAS/STAT User's guide, version 8 for windows. SAS institute Inc., SAS campus drive, Cary, North Caroline, USA.