

AN ASSESSMENT OF THE EFFECT OF PROCESSING ON THE PROXIMATE CONSTITUENTS OF BLOOD MEAL SOURCED FROM CATTLE AND GOAT IN ZARIA, NIGERIA

By

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INTRODUCTION

- Blood meal is a dry inert powdered matter used as protein supplement for cattle, sheep, fish, swine and poultry due to its high lysine content.
- Blood is a highly perishable product, it is processed and being dried to about 10 - 12% moisture content through solar or oven drying (Gea-Hernandez *et al.*, 2009).

- Common methods of processing blood meal is boiling fresh blood at a temperature of 100°C for 45 minutes, oven drying at 55°C for 6 days before grinding into fine particles (Hansen and Olgaard, 1984).
- Blood meal is very rich in lysine and is a good source of arginine, methionine, cystine, and leucine but is very poor in isoleucine and contains less glycine than either fish meal or bone meal (NRC, 1994).

STATEMENT OF RESEARCH PROBLEM

- Blood meal can be used to compensate the lysine and methionine deficiencies in vegetable protein based diets.
- Attention on blood meal sourcing is centered on cattle, and less on other ruminants that could possibly serve as better alternative sources.

OBJECTIVES OF THE RESEARCH

- To assess the effect of processing on the proximate and mineral contents of blood meal sourced from goat and cattle in order to obtain the processing condition of optimum nutritional value for blood meals from these ruminants.
- To determine which of the animal's blood meal is more nutritional.

METHODS

Sample Collection and Treatment

- Ten composite samples of blood were collected from cattle and goat separately at Zango and Yan Awaki abattoirs in Zaria - Nigeria in November 2012.
- A 1.0 L portion of each of the sample was left for 6 h, after which the liquid portion was decanted, the solid was then sun-dried and ground to powder.
- Also, a 1.0 L portion of each of the blood was processed by steam coagulation at 100°C for 45 minutes (n = 10).

- The coagulated solid of each group was then sun dried for 72 h before grinding into meals.

Proximate Determination

- The moisture content, crude fat, crude fibre and total ash were carried out on the blood meal before and after processing, using the methods of Association of Official Analytical Chemists, 1990.
- Crude protein by Kjeldahl method, adopted by Aletor, (2002) for n =5 determinations.

RESULTS

Table 1: Proximate composition of non-steam processed blood meal from cattle and goat

S/N	Sample	% Moisture	% Crude lipid	% Ash	% Crude Protein	% Crude fibre
1	C1	24.33	1.59	2.32	80.75	0.51
2	C2	24.91	1.06	2.52	84.07	0.49
3	C3	24.90	1.12	2.91	84.21	0.56
4	C4	29.28	1.79	2.59	82.97	0.49
5	C5	27.86	1.05	2.21	85.17	0.50
6	G1	31.05	1.03	2.00	86.12	0.51
7	G2	31.90	0.72	2.01	86.74	0.56
8	G3	32.61	1.02	2.03	86.44	0.51
9	G4	36.29	1.41	2.22	85.70	1.15
10	G5	32.39	1.70	2.01	85.60	0.51

Table 2: Proximate composition of steam processed blood meal from cattle and goat

S/N	Sample	% Moisture	% Crude lipid	% Ash	% Crude Protein	% Crude fibre
1	C _p 1	10.1	2.97	9.99	75.98	0.07
2	C _p 2	9.67	2.24	7.15	80	0.07
3	C _p 3	9.85	2.84	9.23	77.21	0.05
4	C _p 4	8.99	2.35	9.67	78.01	0.06
5	C _p 5	8.99	2.36	7.83	80.01	0.05
6	G _p 1	9.79	2.89	9.91	76.79	0.04
7	G _p 2	8.59	2.69	7.58	80.2	0.03
8	G _p 3	8.98	2.90	7.33	79.98	0.02
9	G _p 4	9.99	2.84	11.25	74.94	0.01
10	G _p 5	8.51	2.83	8.49	79.22	0.03

Table 3: Calcium and phosphorus composition of blood meal non-steam processed and steam-processed

Meal type		Unprocessed			Processed		
S/N	Sample	Ca(mg/kg)	P(mg/kg)	Ca/P	Ca(mg/kg)*	P (mg/kg)*	Ca/P*
1	C1	344.9	473.61	0.72	8256	1191.188	6.93
2	C2	350	430.55	0.81	8446	961.5617	8.78
3	C3	578.1	559.72	1.03	6482	1593.035	4.06
4	C4	512.6	430.55	1.19	7810	918.5067	8.5
5	C5	550.5	516.66	1.06	8835	1234.243	7.15
6	G1	498.2	774.99	0.64	11090	1837.013	6.03
7	G2	371.4	688.88	0.53	8406	1306.002	6.43
8	G3	728.5	688.88	1.05	9262	1435.167	6.44
9	G4	293.7	688.88	0.42	7536	1607.387	4.68
10	G5	666.6	818.05	0.81	9571	1707.848	5.6

DISCUSSION

- There was an average yield of 70% blood meal from serum blood weight, for both animals.
- The ash content (%) ranged from 2.21-2.91% for cattle and 2.00-2.22% for goat in the non-steam coagulated sample; and 7.15-9.99% for cattle and 7.33-9.91% for goat in the processed counterpart.
- Processing increased the total amount of minerals in blood meal by about three-fold; conforming to the report of Adubiaro *et al.* (2011).

DISCUSSION CONTD.

- From Tables 1 & 2, the crude lipid ranged 2.24-2.97% and 2.69-2.90% after processing blood meal was about double the values in the unprocessed.
- The crude fibre content range were 0.49-1.56 % and 0.51-1.15 % in the non-steam processed blood meal of cattle and goat respectively; steam coagulation led to a statistically significant decrease in the crude fibre content of the blood meal obtained from cattle and goat (Duncan grouping, $P < 0.05$) .

- Crude protein content was 80.75-85.17% and 85.60-86.74% for the non-steam processed blood meal of cattle and goat: 75.98-80.01% and 74.94-80.20% after steam processing for cattle and goat blood meals respectively.
- There was no significant difference in the crude protein level as a result of processing effect.
- Nevertheless, the high protein content of these meals shows that goat and cattle can equally serve as useful alternative source of protein in livestock feed manufacture.

- The Ca and P contents before processing have the range 344.9-550.5 mg/kg and 430-559 mg/kg for blood meal sourced from cattle, and 293.0-728.0 mg/kg and 688.0-818.0 mg/kg for that of goat source (Table3).
- However, steam processing led to the range of Calcium and P contents being 6482.0 -8835.0 mg/kg and 918-1234 mg/kg for cattle, 7536-11090 mg/kg and 1306-1837 mg/kg for goat.
- The steam processed meal indicates presence of higher calcium in the product based on the calcium: phosphorus ratio following from Duarte *et al.* (1999).

- Both the density and pH were generally higher for the non-steam processed product, the processed had the pH range 4.95 ± 0.08 - 5.93 ± 0.02 , indicating mild acidity.

CONCLUSION

- The Ca/P ratio, density, pH, ash content and crude lipid were significantly elevated in the blood meals sourced from cattle and goat as a result of steam processing ($P < 0.05$).
- Blood meal from cattle and goat are equally enriched with the determined nutritional and mineral contents.

THANK YOU FOR LISTENING