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CHEMICAL COMPOSITION OF FRESH GREEN OFFAL SOURCED FROM DIFFERENT PARTS

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ABSTRACT
The study evaluated the chemical composition of fresh green offal sourced from different parts of ruminant species to assess its nutritional potential and possible utilization in food systems. Samples of green offal (stomach and intestine) were collected from cattle, sheep, goat, and camel. Each sample was cleaned and analyzed for proximate composition. Results showed significant ($P<0.05$) differences in dry matter, crude protein, lipid, and nitrogen-free extract (NFE) among the offal parts, while ash content remained consistent ($P>0.05$). The stomach recorded higher dry matter (49.56%), crude protein (23.46%), and lipid (16.07%) compared to the intestine (41.05%, 20.87%, and 9.38%, respectively). However, the intestine had higher NFE (4.17%) than the stomach (3.02%). These findings indicate that the stomach portion of green offal possesses superior nutritive value in terms of protein and lipid content. Green offal, particularly from the stomach, can serve as a cost-effective and nutrient-rich source of animal protein.

Keywords: Green offal, proximate composition, ruminant by-products, protein content, nutrient utilization.

Description of Problem

Green offal, which includes the stomach and intestinal contents of slaughtered ruminants, constitutes a major by-product of meat processing operations. It is often underutilized or improperly disposed of, leading to environmental pollution and loss of valuable nutrients [1]. However, fresh green offal can serve as a potential source of cheaper and alternative animal protein sources due to its rich nutrient profile. The chemical composition of green offal varies considerably depending on the animal species, diet, physiological status, and the region or part from which it is sourced. In many developing countries, including Nigeria, data on the nutrient composition of fresh green offal from different locations remain limited. Hence, the need for this study.

Methodology

The study was conducted at the Animal Products and Processing Laboratory of the Department of Animal Science, Ahmadu Bello University, Zaria, Kaduna State. Zaria is located in the Northern Guinea Savannah Zone on longitude 11° 09' 01.78''N and 7°39'14.79''E at an altitude of 671m above sea level. The climate is characterized by well-defined dry and wet seasons [2]. Samples of 1kg each of green offal (intestine and rumen) from cattle, sheep, goat and camel were obtained from Central Abattoir, Kano. The collected samples were trimmed off connective tissues, fat, debris and dirt; then thoroughly washed. Each separate organ was washed with 150 - 200ml of clean and sterile water, ¼ teaspoonful of salt and 2-lemon (lime) were also added and used to wash each organ. The samples were subjected to proximate analysis at the Products Laboratory of the Institute for Agricultural Research, Ahmadu Bello University, Zaria using AOAC [3] procedures.

Results and Discussion

Chemical composition of fresh green offal sourced from different parts

The chemical composition of fresh green offal from different parts is shown in Table 1. The results showed that dry matter, crude protein,

lipid and NFE differed significantly ($P<0.05$) among the offal parts while ash remained consistent ($P>0.05$). The stomach had significantly higher dry matter (49.56%) than the intestine (41.05%). The stomach had a significantly higher crude protein content (23.46%) than the intestine (20.87%). The stomach had significantly higher lipid content (16.07%) than the intestine (9.38%). No significant difference was observed between the intestine (6.61%) and stomach (7.01%). The intestine had significantly higher NFE (4.17%) than the stomach (3.02%). There were no significant ($P>0.05$) difference among the interaction between red meat animal species and green offal parts.

The high protein content reported in these green offal aligns with previous reports by Hoffman *et al*. [4], which highlighted that ruminant offal, particularly the stomach, is a valuable protein source due to its connective tissue and muscle fibre content. Higher NFE values in sheep indicate that their digestive tracts may retain more undigested plant material. Higher dry matter in the stomach suggests that it contains denser tissue and lower moisture content. The higher dry matter content in stomach offal may contribute to a longer shelf life, as moisture content is a key factor in microbial spoilage [5]. Higher crude protein content in the intestine is consistent with Rodríguez-Romero et al. [6], who found that the stomach has more muscle fibres and protein-rich connective tissues than the intestine. The high protein content across offal types could makes green offal a valuable protein source, particularly for populations with limited access to muscle meat [7]. Higher lipid content in the stomach aligns with findings from Hoffman *et al*. [4], which indicate that the stomach, particularly the rumen, retains more fat deposits. This higher NFE composition in the intestine indicates a greater presence of residual carbohydrates from digested feed.

Table 1: Chemical composition of unprocessed green offal sourced from different sources of red meat animals

Offal parts	**Dry matter (%)**	**Crude protein (%)**	**Lipid (%)**	**Ash (%)**	**NFE (%)**
Intestine	41.05^{b}	20.87^{b}	9.38^{b}	6.61	4.17^{a}
Stomach	49.56^{a}	23.46^{a}	16.07^{a}	7.01	3.02^{b}
SEM	2.04	1.03	1.89	0.41	0.33
LOS	*	*	*	NS	*

^{abc}Means with different superscripts along the same column are significantly ($P<0.05$) different, SEM: standard error of means, NS: Not significant, NFE: Nitrogen-free extract.

Conclusion and Application

The study revealed that fresh green offal from different parts of ruminants exhibits varying chemical compositions, with the stomach containing higher dry matter, crude protein, and lipid contents than the intestine. The intestine, however, showed slightly higher nitrogen-free extract due to residual feed content. And they can be used as alternative animal protein sources.

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