GENOTYPE EFFECT ON THE CHEMICAL COMPOSITION OF RABBIT MEAT

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Abstract

***The effect of genotype on the proximate composition of rabbit meat** was evaluated using eighteen male and female California white, New Zealand white and Havana black rabbit. The rabbits were raised under the same feeding and housing management system and slaughtered at 12 weeks. They were properly bled and dressed. Proximate analysis was carried out on the meat samples. Data obtained was subjected to analysis of variance (SAS, 2010). California white had the highest mean value for crude protein (24.41±1.26%), moisture content (70.18±0.77%), ash content (3.65±0.66%), nitrogen free extract (7.56±0.05%) while it had the least mean value for fat (8.26±4.88%). Havana black rabbit had the highest fat content (18.49±2.74%) but had the least mean for crude protein (15.05±2.85%) and ash content (0.91±0.10%) New Zealand breed had the least mean value for nitrogen free extract (2.59±0.51%). The male rabbit had higher values of moisture content, ash content and nitrogen free extract compared to female rabbits. However the crude protein was higher in female rabbit while the fat content were statistically similar in the meat of male and female rabbits. In conclusion, the genotype of rabbit had significant influence on the chemical composition of rabbit meat. California white had better nutritive value and should be preferred to New Zealand and Havana black rabbit.*

Key words: Proximate composition, meat, genotype , rabbit

Introduction

Rabbits provide an excellent source of protein for human consumption and may play a significant role in solving the problem of meat shortage in developing countries (Abdel- Azeem *et al.*, 2007). The meat of rabbit is characterized with a high protein and low fat. It has relatively high concentrations of polyunsaturated fatty acids (Dalle Zotte, 2002). According to Polak *et al.* (2006), rabbit meat contains monounsaturated fatty acids of 34.15%, polyunsaturated fatty acids of 25.10%, and saturated fatty acids of 40.9%. Another indicator of rabbit meat good quality is its exceptionally low cholesterol level that ranges between 45 and 85 mg/100 g of fresh meat (Dalle Zote, 2002; Polak *et al.*, 2006). Rabbit meat has about 1380 to 1820 calories per kilogram. It is rich in phosphorus, iron, calcium and iodine while potassium is the most abundant of its elements (Tarnauceanu, *et al.* 2010). Potassium content of rabbit meat is the highest compared with beef, pork, mutton and chicken meat . The meat also has a low sodium content and is also a good source of B vitamins (Hernandez and Gondret, 2006).

The chemical composition of rabbit meat is extremely variable, especially regarding fat content, depending on the part of the carcass studied (Pla *et al.*, 2004). Meat chemical composition of broiler rabbits are influenced by breed (Singh and Prasad, 2005). Hernandez *et al.* (2008) also reported the influence of genetic origin of rabbits on the lipid content, lipolytic activity and fatty acid composition of meat. However, Baiomy and Hassanien (2011) reported that there was no significant difference in moisture content, crude protein, fat and ash of meats in New Zealand white and California rabbits.This study was therefore carried out to investigate the chemical composition of the meat of Californian, New Zealand white and Havana black rabbits when raised in a humid tropical environment.

Materials and Methods

Experimental site: The experiment was carried out at the rabbitry unit of the Department of Animal and Environmental Biology, Adekunle Ajasin University Akungba-Akoko, Ondo state.

Experimental animals and management: Eighteen male and female California white, New Zealand white and Havana black rabbit were used for the study. Californian white rabbits are rounded in body and have short smooth coat. New Zealand white are multipurpose breed because they can be raised for meat, pets and laboratory purpose. The Havana black rabbit was first discovered in the Netherland. The experimental animals were kept in a wooden cage and were fed with commercial pelleted diet; the diet used contained 15% crude protein, 7% fat, 10% crude fibre, 1.0% calcium, together with available phosphorus of 0.35% and

2550Kcal/kg metabolisable energy. They were also supplied with forages. Clean water was also supplied to the rabbits *ad- libitum*. The rabbits were raised under same management system and slaughtered at 12 weeks. They were properly bled and dressed.

Data Collection: Meat samples were collected from the carcass of the rabbits and taken to the Central Research Laboratory , Faculty of Science of the University. Proximate analysis was carried out on the meat samples to determine the crude protein, fat content, moisture content ash content and the nitrogen free extract using AOAC (2005). Data obtained was subjected to analysis of variance (SAS, 2010).

Results and Discussion

California rabbit had the highest crude protein (24.41 ± 1.26%) followed by New Zealand white (21.12 ± 2.50%) while Havana black had the least crude protein (15.05 ± 2.58%) as presented on Table 1. Havana black had the highest fat content (18.49 ± 2.74%) followed by New Zealand (14.53 ± 5.30%) while the least was found in California white meat (8.26 ±4.88%). Polak *et al.* (2006) reported a higher intramuscular fat content influenced by the genotype of rabbits. The proximate analysis also showed that the California white had the highest moisture content (70.18 ±0.77%) followed by New Zealand (60.65 ± 2.67%) while Havana black had the least moisture content (59.27 ± 5.64%). Meat samples obtained from California rabbit also had the highest nitrogen free extract (7.56 ± 5.00%) followed by Havana black (6.28±0.10%) while the least was found in New Zealand rabbit (2.59±0.51%). Havana black had the least ash content (0.91±0.10%) followed by New Zealand while the highest ash content was found in California rabbit. Maj *et al.* (2008) observed no significant difference in protein content and ash content of New Zealand White, California and their backcrosses. However slight difference was observed with regards to fat and moisture content between the two breeds .

The proximate composition of rabbit meat as affected by sex is presented on Table 2. Meat samples from female rabbits had higher crude protein (21.62±1.69%) than male rabbits (18.27±4.36%). However, male rabbit meat contains more nitrogen free extract compared to female. The fat content in the meat of male and female rabbit were stastically similar. The effect of sex was also significant ($P<0.05$) on the moisture content. Higher moisture content was found in male rabbits compared to female rabbits. This is similar with the report of Kuzelov *et al.* (2011) who reported that male rabbit contained more moisture and mineral substances. According to Polak *et al.* (2006) males had higher contents of water, proteins and mineral substances in comparison with female rabbits while female rabbits had a higher fat content than male rabbits. However, Baiomy and Hassanien (2011) found that the meat from female rabbit had more moisture than males but less protein and fat. In this study, male rabbit also contains higher ash content than the female rabbit. According to Murshed *et al.* (2014), ash content was higher in meat of male than female rabbit but no significant difference was found in crude protein of male and female rabbit meat.

Conclusion

The meat of California rabbit contains more crude protein, moisture, nitrogen free extract and ash than New Zealand. The Havana black had the highest fat content when compared with California w and New Zealand white. The New Zealand rabbit had lesser nitrogen free extract than the Havana black rabbit. Male rabbit meat contains more nitrogen free extract, moisture and ash compared to female. The fat content in the meat of male and female rabbit were similar.

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Table 1: Proximate composition of rabbit meat as affected by genotype (Mean ± SEM)

Composition %	Californian	New Zealand	Havana black
Crude Protein	24.41 ± 1.26^{a}	21.12 ± 2.50^{b}	15.05 ± 2.85^{c}
Fat Content	8.26 ± 4.88^{c}	14.53 ± 5.30^{b}	18.49 ± 2.74^{a}
Moisture	70.18 ± 0.77^{a}	60.65 ± 2.67^{b}	59.27 ± 5.64^{b}
Ash	3.65 ± 0.66^{a}	1.11 ± 0.34^{b}	0.91 ± 0.01^{c}
Nitrogen free extract	7.56 ± 5.00^{a}	2.59 ± 0.51^{c}	6.28 ± 0.10^{b}

Means on the same row with the different superscript are significantly different ($p<0.05$).

Table 2: Proximate composition of rabbit meat as affected by sex (Mean ± SEM)

Composition %	Female	Male
Crude Protein	21.62 ± 1.69^{a}	18.27 ± 4.36^{b}
Fat Content	13.31 ± 3.41	12.99 ± 5.75
Moisture	61.21 ± 2.69^{b}	70.67 ± 0.65^{a}
Ash content	1.98 ± 0.63^{b}	2.27 ± 1.00^{a}
Nitrogen free extract	4.05 ± 1.01^{b}	9.51 ± 5.63

Means on the same row with the different superscript are significantly different ($p<0.05$).