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Carcass Traits of New Zealand White, Californian, Palomino Brown and Havana Black Rabbit In the Humid Tropics

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Abstract: *In this study, carcass traits of ninety-six (96) rabbits which include New Zealand white, Californian, Palomino brown and Havana black rabbits raised in the humid tropics were appraised. The experiment was carried out at the rabbitry unit of the Department of Environmental Biology and Fisheries, AdekunleAjasin University Akungba-Akoko, Ondo state. At 12 weeks of age, all the rabbits were weighed and slaughtered. Hot carcass, giblets, inedible carcass were measured.New Zealand white had the highest value of the hot carcass (2033.61± 11.69g) followed by California (1965± 10.25g) while there was no significant difference in the hot carcass weight of Palomino and Havana black. The New Zealand white had the highest dressing yield percentage of 67.95±1.95 while Palomino brown had the least dressing yield (55.23±2.36%). California and Havana black had similar dressing yield percentage. New Zealand had the highest fore parts weight (186.98 ± 6.75 g) followed by California (145.78 ±1.88g) and Havana black (137.40 ± 4.74 g). Although the weight of thorax parts of California was similar to Havana black, the weight of the loin of California (369.30 ± 11.69 g) was significantly higher than Havana (328.48 ± 10.52g). The hind leg of New Zealand was not statistically different from that of California breed. There was no significant difference among the breeds in the relative percentage of any of the internal organs to their pre-slaughter weights. New Zealand white and Havana black had lower weight of inedible carcass compared toCalifornia and Palomino brown. New Zealand white had better carcass merits in the humid tropics.*

Keywords:*carcass traits, breed, rabbit, tropics.*

I. 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). Rabbit meat is characterized by a high protein, low fat and cholesterol contents and it is considered as a delicacy and a health food product (Dalle Zotte, 2000). Rabbits have a number of other characteristics that might be advantageous to subsistence farming system, such as their small body size, short generation interval with a relatively short gestation period average of 30-31 days. They have high growth rate, high feed efficiency, an early marketing age and require small land area(Ortiz- Hernandez and Rubio-Luzano, 2001). The diversity of rabbit breeds offers opportunity to increase the efficiency of commercial meat production through crossing (Piles et al., 2004).

Carcass traits are influenced by the adult weight and the maturity of rabbits at the age of slaughter (Piles et al., 2000). Szendro et al. (2004) reported that the selection for carcass traits is an effective tool for meat type rabbit.Ortiz-Hernandez and Rubio-Luzano 2001 found no significant difference in the carcass composition of Newzealand, California, Chinchilla and Rex rabbit.Nofal et al.(2004) reported that breed group (BG) had no effect on the majority of the carcass traits except on slaughter weight.However, Ghosh and Mandal (2008) reported significant differences in the dressing yield of carcass ofSovieth Chinchilla and Grey Giant under warm-humid condition.

Ozimba and Lukefahr 1991 reported that the New Zealand white were generally inferior to California pure bred, California X New Zealand cross bred and Flemish Giant crossbred. However Baiomy and Hassanien (2011) observed that though breed differences had no significant effect on most carcass traits, dressing yield of carcass was significantly higher in New Zealand white thanCalifornian breed. The aim of this experiment is to determine the carcass traits of New Zealand white, Californian, Palomino brown and Havana black rabbit in the humid tropics which is characterised with high ambient temperature and high relative humidity.

II. Materials And Method

Experimental site

The experiment was carried out at the rabbitry unit of the Department of Environmental Biology and Fisheries, AdekunleAjasin University Akungba-Akoko, Ondo state. Akungba–Akoko is located in Akoko South West Local Government Area of Ondo state, Nigeria. The area lies in the south western region of Nigeria (7º 28'and 5º43') and has the following environmental condition: ambient temperature of 27^0C and relative humidity of 46mm Hg.

Experimental animals and management

Ninety-six (96) rabbits which include California white, Palomino brown, New Zealand white and Havana black. Palomino brown rabbits are golden brown and lynx, they are large meaty rabbits. Californian white rabbits are rounded in body and have short smooth coat they are first bred in the 1920's with the intent of creating a better commercial meat rabbit, as a result of crosses between the Himalayan, and the standard Chinchilla. New Zealand white are multipurpose breed because they can be raised for meat, pets and laboratory purpose.The experimental animals were kept in a wooden cage with each compartment of dimension of lenght× width× height: 80× 50 ×30 cm^3. The cages were constructed of wood and a wire mesh. The hutch was constructed in a way that it allow there waste to drop on the floor easily and has a single roof which covers all cages from rain or sunlight. They 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.

Slaughtering and dissection procedure

At 12 weeks of age,allthe rabbits were weighed and slaughtered. Rabbits were weighed and stunned before slaughter. Eachrabbit was bled and weighed to determine the blood weight. The fur was removed and weighed after slaughter.The head was separated and the internal organs were also removed and weighed. The carcass was split between the 7th and 8th thoracic vertebrae and between the 6th and 7th lumbar vertebrae. Carcass parts (fore-, mid- and hind part) were weighed; the hind legs (HL) were removed and weighed. The pelts, tail and other inedible parts were also measured with a sensitive scale.

Data collection:

Pre-slaughter weight(g): This was the live weight of each rabbit before slaughter in grammes

Hot carcass/ slaughter weight(g): This was the weight after slaughter and bleeding of rabbit.

Giblets(g): Total weight of kidney, liver, lung and heart

Inedible carcass(g): Total weight of pelt ,blood, offal, tail and feet.

Edible carcass(g): This included the carcass parts (fore-, mid- and hind part), dressed head and giblet

Dressing yield (%): This was taken as the percentage of edible carcass to the pre-slaughter weight .

Statistical analysis

Data obtained from the measurements was analysed using SAS 2007. The linear model is as specified below:

$Y_{ijk} = \mu + A_i + B_i + (AB)_{ij} + e_{ijk}$

Y_{ijk} = the parameter or interval

μ = overall mean for the parameter of interest

A_i = Fixed effect of ith breed (I=1-3)

e_{ijk} = random error associated with each record (Normally= Independently and identically distributed with zero mean and variance ($\delta^2 e$)

III. ResultsAnd Discussion

The least square means of the carcass composition presented on Table 1 shows that there was no significant difference in the pre-slaughter weight of New Zealand, California, Palomino and Havana black breed. Ghosh et al. (2004) found no significant differences among breeds in body weight at maturity. Baiomy and Hassanien 2011 reported that the breed mean values of live weight at slaughter for New Zealand White and Californian rabbits were found to be 2218 and 2200 g respectively.

However the hot carcass weight and the relative percentage of the carcass to pre-slaughter weight were significantly affected by the breed type. New Zealand white had the highest value of the hot carcass (2033.61± 11.69g) followed by California (1965± 10.25g) while there was no significant difference in the hot carcass weight of Palomino and Havana black breed. Nevertheless the relative percentage of the hot carcass to the pre-slaughter weight of Havana breed was higher (91.28±0.54%) than Palomino breed (82.71±2.36%). Ouyed and Brun (2008) reported that there were no significant effects of breed type on commercial carcass weight, commercial carcass yield of New Zealand White and Californian breed and their crosses.

The New Zealand white and Palomino brown had higher giblets weight than other breeds studied. New Zealand white and Havana black had similar weight of inedible carcass. The highest edible carcass weight was found in New Zealand white 1512.29±10.25g followed by Califonia (1399.34±14.32g) and Havana black (1309.83±12.25g) white. The least edible carcass weight was recorded for Palomino brown (1231.51±11.56g). Ortiz-Hernandez and Rubio-Luzano 2001 found no significant difference in the carcass composition of New Zealand, California, Chinchilla and Rex rabbit.

The New Zealand white had the highest dressing yield percentage of 67.95±1.95 while Palomino brown had the least dressing yield (55.23±2.36%). California and Havana black breed had similar dressing yield percentage (Table 1).Ozimba and Lukefahr 1991 reported that the dressing yield of New Zealand white were generally inferior to California pure bred, California X New Zealand cross bred and Flemish Giant crossbred. However Baiomy and Hassanien (2011) observed that though breed differences had no significant effect on most carcass traits, dressing yield of carcass was significantly higher in New Zealand white than Californian breed(58.5, 57.3%), respectively.

The least square means of the primal cut-out parts on Table 2 showed that the New Zealand breed had the highest fore parts weight (186.98 ± 6.75 g) followed by California breed (145.78 ±1.88g) and Havana black (137.40 ± 4.74 g). Although the weight of thorax parts of California was similar to Havana black, the weight of the loin of California breed (369.30 ± 11.69 g) was significantly higher than Havana black (328.48 ± 10.52g). The hind leg of New Zealand breed was not statistically different from that of California breed. However California breed had heaviest dressed head followed by New Zealand and Havana black while Palomino brown had the least dressed head as shown on Table 2.Ouyed and Brun (2008) reported significant differences between breed types for fore part, intermediate part and hind part yields. New Zealand White hadbetter hind part yield than California breed. However California breed had better fore part and intermediate part yield than New Zealand White. According to Metzger et al (2006), genetic origin influenced the dressing out percentage, which was 0.5% higher in pure Pannon white rabbits compared to their crossbred. The offspring of Pannon White males had heavier hind parts. However, no differences were found in the hind part ratio to reference carcass weight. Similar results were found both in the weight and ratio of hind leg. The weight and the ratio of the mid part were also higher pure Pannon white rabbits.

In the least square means of the internal organs presented on Table 3, Havana black had highest value of lung weight but there was no significant difference among the breeds in the relative percentage of the lungs to their pre-slaughter weights. The New Zealand white had the biggest liver while the least value was recorded for Havana black (Table 3). The effect of breed was not significant on the kidney weight and their relative percentage to their pre-slaughter weights. Although,Havana black had highest value of heart weight, the relative percentage of the heart to the pre-slaughter weight of each breed was statistically similar. The least square means of the internal organs presented on Table 3 also showed that there was no significant difference in the weights of gastro intestinal tract as well as their relative percentage to the pre-slaughter weights of the breeds.Baiomy and Hassanien 2011 reported significant differences in the internal organs weight such as liver, kidneys, heart, spleen lungs with trachea and G.I. tract full of New Zealand White and California rabbits. Larger sized genotypes had heavier kidneys in all cases; however these differences were not significant (Metzger et al 2006).

Table 4 showed the least square means of the inedible parts of the rabbits as influenced by the breed. Palominobrown hadthe highest value for blood in weight as well as in relative percentage to the pre-slaughter weight followed by Havana black. Although, Havana black had the least pelt weight, the relative percentages of pelt to the pre-slaughter weight was similar among New Zealand, California breed and Havana black. The offal of the rabbits were similar among the breeds both in weight and the relative percentages to the pre-slaughter weight. This similarity was also found with the tail of the rabbits (Table 4). The effect of the breed was significant on the weight of the feet; however there was no significant difference in the relative percentage of the feet to the pre-slaughter weight of the different breed studied. New Zealand white and Havana black had lower weight of inedible carcass compared toCalifornia breed andPalomino brown. Villalobos et al. (2008) reported that the non-edible part of carcass averaged 816 g in New Zealand white rabbits slaughtered at 12 weeks of age.

IV. Conclusion

New Zealand white had the highest value of the hot carcass followed by California while Palomino and Havana black breed had similar hot carcass weight. The New Zealand white had the highest dressing yield percentage of 67.95±1.95 while Palomino brown had the least dressing yield (55.23±2.36%). California and Havana black breed had similar dressing yield percentage. The relative percentage of the internal organs to their pre-slaughter weights were similar among the breeds. New Zealand white and Havana black had lower weight of inedible carcass compared to California breed Palomino brown.

Table 1: Least square means of the carcass composition

Parameters	New Zealand	California	Palomino	Havana black
Pre-slaughter wt (g)	2225.48 ± 33.29	2160.67 ± 17.42	2230.15 ± 43.27	2010.34 ± 13.56
Hot carcass (g)	2033.61 ± 11.69[a]	1965.67 ± 10.25[b]	1844.58 ±12.13[c]	1835.20 ± 11.36[c]
Hot carcass(%)	91.38 ± 0.78[a]	90.97± 0.25[b]	82.71 ± 2.36[c]	91.28 ± 0.54[a]
Giblets(g)	87.63±1.52[a]	76.27 ± 0.68[b]	86.97 ± 0.23[a]	74.98 ±0.56[c]
Giblets (%)	3.94± 0.02[a]	3.53 ± 0.01[c]	3.90 ± 0.03[a]	3.73 ± 0.01[b]
Inedible carcass(g)	713.19 ± 7.23[c]	761.33 ± 4.65[b]	998.64 ± 5.23[a]	700.51±7.68[c]
Edible carcass (g)	1512.29 ±10.25[a]	1399.34±14.32[b]	1231.51±11.56[d]	1309.83 ±12.25[c]
Dressing yield (%)	67.95 ± 1.95[a]	64.76 ±1.23[b]	55.23 ± 2.36[c]	65.15±1.68[b]

[a b c d]Mean on the same row with different superscripts are significantly (P<0.05) different.
The percentages of the parameters were taken relative to the pre- slaughter weightof each breed

Table 2: Least square means of the primal cut-out parts

Parameters	New Zealand	California	Palomino	Havana black
Fore parts	186.98 ± 6.75[a]	145.78 ± 1.88[b]	125.36 ± 2.83[d]	137.40 ± 4.74[c]
Thorax	300.68 ±10.22[a]	277.52 ±11.92 [b]	227.23 ± 0.91[c]	267.50 ± 10.45[b]
Loin	398.23 ±13.26[a]	369.30 ± 11.69[a]	354.50± 10.81 [a]	328 .48 ± 10.52[b]
Hind leg	407.66 ±12.91[a]	398.97 ± 13.05[a]	321.25± 4.01[c]	375.97 ± 6.05[b]
Dressed head	121.09 ± 4.36[b]	131.50 ± 1.74[a]	116.20 ± 1.2 1[d]	125 .50 ± 1.43[b]

[a b c d]Mean on the same row with different superscripts are significantly (P<0.05) different.
The percentages of the parameters were taken relative to the pre- slaughter weight of each breed

Table 3: Least square means of the internal organs

Parameters (g)	New Zealand	California White	Palomino	Havana black
Lung(g)	9.06 ± 0.75[b]	8.11 ± 0.28[c]	7.98± 0.89[c]	9.70 ± 0.90[a]
(%)	0.41 ±0.03	0.38±0.02	0.36±0.04	0.48±0.01
Liver(g)	63.16±2.02[a]	52.12± 3.44[c]	62.45±1.23[b]	48.59 ± 4.29[d]
(%)	2.84±0.01	2.41±0.42	2.80±0.05	2.42±0.03
Kidney(g)	11.08 ± 1.42	11.32 ± 1.91	11.56 ±0.86	11.48 ±0.45
(%)	0.50±0.01	0.52±0.02	0.52±0.01	0.57±0.03
Heart(g)	4.33± 0.11[d]	4.72 ± 0.18[c]	4.98 ± 0.23[b]	5.21 ± 0.12[a]
(%)	0.19±0.08	0.22±0.03	0.22±0.01	0.26±0.04
GIT (g)	489.57 ± 13.84	457.80 ± 17.36	490.53±9.64	444.89 ±18.21
(%)	22. 0±0.71	21.19±1.01	21.99±0.91	22.13±0.81

[a b c d]Mean on the same row with different superscripts are significantly (P<0.05) different.
The percentages of the parameters were taken relative to the pre- slaughter weight of each breed
GIT - Gastro intestinal tract

Table 4: Least square means of the inedible parts

Parameters (g)	New Zealand	California White	Palomino	Havana black
Blood (g)	53.12 ± 2.25[c]	52.50 ±3.29[c]	97.12 ±3.69[a]	62.56 ±1.88[b]
(%)	2.39 ± 0.16[c]	2.43± 0.09[c]	4.35± 0.11[a]	3.11± 0.14[b]
Pelt weight (g)	138.75 ± 12.01[b]	142.50 ± 7.50[a]	288.45±4.72[c]	112.58 ±2.13[d]
(%)	6.23± 2.05[b]	6.56± 1.01[b]	12.93 ± 0.10[a]	5. 60 ± 0.89[b]
Offal (g)	549.57 ± 12.44	547.80 ± 18.32	581.55 ±9.85	504.89 ±16.27
(%)	24. 69± 5.01	25.35± 6.04	26.07± 4.01	25.11± 5.21
Tail(g)	2.74±0.12	2.38±0.14	2.56±0.46	2.67±0.54
(%)	0.12± 0.01	0.11± 0.02	0.11± 0.01	0.13± 0.04
Feet(g)	19.01 ± 1.69[a]	16.15 ± 0.79[c]	18.96 ±0.37[a]	17.89±0.85[b]
(%)	0.85± 0.03	0.75± 0.09	0.85± 0.01	0.88 ± 0.05

[a b c d]Mean on the same row with different superscripts are significantly (P<0.05) different.
The percentages of the parameters were taken relative to the pre- slaughter weight of each breed

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