CANONICAL CORRELATION ANALYSIS OF BODY MEASUREMENTS AND CARCASS TRAITS OF CROSS BRED RABBIT POPULATION

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ABSTRACT

In this study, canonical correlation analysis was applied to estimate the relationship between body measurements and carcass traits of 28 male cross bred rabbits of about 12 weeks of age, reared under semi intensive system. Four body measurements, preslaughter weight (PSW) , body length (BL), chest circumference (CC), and ear length (EL) as predictor variable while dressing percentage (DP) , hot carcass weight (HCW) and cold carcass weight (CCW) as criterion variables. Preslaughter weight and body length had significant (P<0.001) simple correlation coefficients with the carcass traits except for dressing percentage . The three canonical variate pairs ranged between .99 to .42 and only the first pair was significant (P<0.001). From the analysis preslaughter weight and body length can be regarded as the main factors as live measurement traits, while dressing percentage did not have pronounced effect on the emerged criterion variables.

Keywords : Mixed bred rabbit, carcass, body measurements, canonical correlation.

INTRODUCTION

Associations among live body measurements were established through the examination of correlation among them (Chineke, 2005). Studies of interrelationship among body measurements also finds its application in selection and breeding. The magnitude of the correlation between live body mesurements and raw meat yield was reported to be a valuable indicator for selecting high meat yielding strain of turkey MacNeil (1969) and in pig (Ogah *et al.*, 2011). As in large animals, it will be desirable if farmers could determine from pre-slaughter measurements carcass traits when animals are suitable for slaughtering. Researches on predicting optimum finishing criteria for other livestock have been reported by Dolezel (1993) and Minchi *et al*. (2009) for cattle. This study was undertaken to quantify rabbit linear traits and determine the most useful measurements that could predict carcass traits.

MATERIALS AND METHODS

Animal and their management

The experiment was carried out on 28 male cross bred rabbits (crosses of NewZealand white , Chinchilla and California white). The rabbits were reared at the Teaching and Research Farm of College of Agriculture, Lafia, Nasarawa State, Nigeria.. They were placed in a rearing cages in pairs and fed *ad libitum* on commercial diet contaning 17% crude protein, 2300kcal/kg digestible energy

and 14% crude fibre and supplemented with legumes and water supplied regularly. All animals were treated and medicated for the period under considration. At 12 weeks of age the rabbits were prepared for slaughter after data on body measurements and weight were taken following the standard procedure by Newton and Penman (1990).

Measurement of traits

Prior to slaughtering, and after 12 hours fasting, the preslaughter weight (PSW), body length (BL) , chest circumference (CC) and ear length(EL) of each rabbit was taken as described by Chineke (2005). The carcass traits, dressing percentage (DP), hot carcass weight (HCW) and cold carcass weight (CCW) were obtained using the procedure as described by Blasco *et al*.(1993) and reported by (Pinna *et al*., 2004).

Canonical correlation analysis was used to examine the relationship between two sets of the traits using PROC CANCORR procedure of SAS (1999). It outlines the linear combination of two sets (Johnson and Wichern, 1986 and Haier *et al*., 1998) as described by Akbas and Takma (2005) and Ogah *et al*. (2009).

RESULTS AND DISCUSSION

Descriptive statistics of the body measurements and carcass traits are presented in Table 1. The findings were similar to what Yakubu *et al*. (2009) and Pinna *et al*. (2004) reported, but lower than those of Villalobos *et al*.(2008), and Baiomy and Hassainien (2011), due to variation in breed and environment. The simple correlations for body measurements and carcass traits in Table 2, were moderate to high between all traits, except for dressing percentage, similar to the observation of Lukefahr and Ozimba (1991), implying that body measurements and carcass traits are good predictors of one another. The canonical correlation between the first pair of canonical variables was found to be significant ($P<0.001$) Table 3 . From the likelihood ratio test which was also equal to the significant Wilk A. Cankaya *et al*.(2007) and Ogah *et al*. (2009) reported similar result.Based on this, the paper interpreted the relationship between the first pair of canonical variate as suggested by Thompson (1984). The contribution of each pair to the correlated variate is explained by the standardized canonical coefficient of first pair. The coefficient indicates that EL, DP and CCW have negative effect on the two sets, only HCW will tend to increase with increase in body measurements.The cross-loading of the variables further attests to the relationship of preslaughter weight and carcass prediction, suggesting that carcass weight is a product of the rabbit live weight.

Table 1. Descriptive statistics of body measurements and carcass traits of mixed breed rabbit population.

Traits	Mean±se g	Min g	Max g	CV
Preslaughter weight	1316.9±46.1	1100	1623	11.07
Body length	31.49±0.45	29.8	34.6	4.55
Chest circumference	27.86±1.33	22.6	35.1	11.18
Ear lenght	10.52±0.14	9.8	11.2	21.08
Dressing percentage	57.8±0.42	55.9	60.0	2.31
Hot carcass weight	761±26.7	618.2	925.4	11.09
Cold carcass weight	641.3±27.0	562.2	810.4	13.32

Table 2. simple coefficient of correlation between body measurements and carcass traits.

	PSW	BL	CC	EL	DP	HCW	CCW
PSW		.95***	.46	.75	-.03	.98***	.99***
BL			.60	.72*	-.06	.92***	.92***
CC				.57	-.43	.37	.38
EL					-.19	.70*	.72
DP						.17	.12
HCW							.99***

PSW=preslaughter weight, BL= body lenght , CC= chest circumference, EL =ear lenght , DP= dressing percentage, HCW= hot carcass weight , CCW = cold carcass weight. *=P<0.05, ***=P<0.001.

Table 3.Statistical characteristics of canonical variate pairs

Canonical variate pairs	Eigen values	Canonical corr	F-Value	Prob
1	19727.82	0.999	26.0	0.000
2	0.83	0.674	0.41	0.794
3	0.22	0.421	0.43	0.676

Table 4. Standardized canonical coefficient for the predictor and criterion variables

	Predictor variables					Creterion variables		
	PSW	BL	CC	EL		DP	HCW	CCW
V1	.993	.010	.011	-.011	W1	-.233	1.205	-.074

Table 5. canonical loading of the original variables and their canonical variables

	Predictor variables					Criterion variables		
	PSW	BL	CC	EL		DP	HCW	CCW
V1	.999	.938	.466	.643	W1	-.325	.976	.981

Table 6. Cross-loading of original variable with opposite canonical variables.

	Predictor variables					Creterion variables		
	PSW	BL	CC	EL		DP	HCW	CCW
W1	.999	.938	.466	.642	V1	-.325	.976	.982

CONCLUSION

It can be concluded that prediction of carcass performance can be achieved through body weight and linear traits, providing valuable information in selection process for increase carcass.

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