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RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

Morphometric traits as indicator of body weight at various ages in Sudanese Rabbits

Khalid M. Elamin[1*], Ibrahim A Yousif[2], Asma A Tameem Eldar[3], Hind A.A.Elagib[4] and Hassan E Hassan[5]

[1]Department of Animal Breeding, Faculty of Animal Production, University of Gezira, Sudan; [2]Department of Genetics and Animal Breeding, Faculty of Animal Production, University of Khartoum, Sudan; [3]Department of Animal Nutrition, Faculty of Animal Production, University of Gezira, Sudan; [4]Department of Poultry Production, Faculty of Animal Production, University of Khartoum, Sudan; [5]Department of Meat Production and Technology, Faculty of Animal Production, University of Gezira, Sudan

Abstract

In this trial 10 linear traits were measured to formulate regression equations for body weight prediction in Sudan local rabbits. Traits measured beside body weight (BW) were ear length (EAR), heart girth (HG), height at withers (HTW), body length (BL), abdominal circumference (ABC), distance from nose to shoulder (NTS), length of the fore limb (FL), length of the hind limb (HL), thigh girth (TG) and tail length (TL). These traits were measured at 3, 4, 5 months and over 5 (mature) months of ages in both sexes. We found the highest correlations (highly significant at P≤0.01) with body weight in all age groups. HG, BL and ABC were chosen as the indicator traits in the regression equations. The generated sex combined equations were Y= -749.76+41.89 HG+ 23.41 BL+17.15 ABC, Y=-348.17+24.52HG+27.02BL+14.19ABC and Y=-2197.23+69.46GH+45.41BL+33.68 ABC for 3, 4 and above 5 months of age. Obtained prediction equations have high values of R^2 at 3 and mature ages (84-0.59), moderate values at 4 months of ages (0.57-0.37) and low values at 5 months of age (0.31-0.15). These values suggested that prediction equations can be used efficiently in Sudanese rabbits to predict live weight at 3, 4 months of age and mature ages.

Keywords: Abdominal circumference; Heart girth; Tail length; Thigh girth

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Introduction

Different parts of the animal body develop in different manners and such morphological changes determine, at a given time, the shape, conformation and body proportion (Olutogun et al., 2003). Estimates of body conformation and carcass traits are vital aspects in the field of meat production in farm animals (Osario et al., 2002). Linear traits have been used to evaluate breed performance, characterize breeds and predict live body weight (Ibe and Ezekwe, 1994). Moreover, it is very vital to measure animal size and shape quantitatively on the way in estimating genetic parameters in animal breeding programs (Chineke, 2000). The use of linear body measurements to predict live body weight of animals is perceived more reliable compared to the use of weighing scales which could introduce bias as a result of feed in the gut (Obike et al., 2010). Local rabbits in Sudan are sold in rural markets where weighing devices are not available thoroughly. Predictive equations were generated by many researchers for different animal species (Chineke, 2005; Yakubu and Ayoade, 2009; Egena, 2010; Musa et al., 2011; Muasa et al., 2012). Morphometric traits were studied in Sudan by Elamin et al. (2012) and Hassan et al. (2012) without generating weight prediction equations. Thus the objective of this study is to determine the morphometric traits that are strongly associated with body weight, then to formulate regression equations that can be used to predict live weight.

Corresponding author: Khalid M., Department of Animal Breeding, Faculty of Anim. Prod., University of Gezira, Sudan

Materials and Methods

Study location

This experiment was conducted within the premises of the Extension and Rural Development Centre, Faculty of Animal Production, University of Gezira, Managil town, Gezira Province. The town is about 76 km west Wad-Medani and is located between the Blue and White river Niles (14.25N- 32.99 E).

Experimental Animals

Experimental animals used in this study consisted of 75, 57, 75 and 79 rabbits at 3, 4, 5 and over 12 month of age respectively. The animals were lodged in metal cages constructed in large rabbit building and each animal was identified by plastic ear tag. Plastic feeders and drinkers were used. Feed and fresh water were given *ad libitum*. Concentrate diet containing 16% CP was used in addition to fresh fodder being given at frequent intervals.

Traits studied

Body weight (BWT) and the other linear measurements (EAR, HG, HTW, BL, ABC, NTS, FL, HL, TG and TL) were taken using a 10 kg scale and a plastic tape. Measurements were taken by a single person early morning before feed distribution.

Statistical analysis

Coefficients of correlation for body weight with morphometric traits and the regression equations were obtained by SPSS software program.

Results and Discussion

Table 1 shows the estimates of phenotypic correlation of body weight (BW) with the linear traits measured (EAR, HG, HTW, BL, ABC, NTS, FL, HL, TG and TL) at various ages. Coefficients of correlation were found to be significantly high and positive ($P \leq 0.01$) for BW with HG, BL and ABC. These traits

Table 1: Phenotypic correlations of body weight at various ages with studied morph metric traits

Age	EAR	HG	HTW	BL	ABC	NTS	FL	HL	TG	TL
3Month	0.37**	0.75**	0.41**	0.50**	0.67**	0.27*	0.58**	0.42**	0.72**	0.59**
4Month	0.49**	0.47**	-0.07	0.48**	0.51**	0.16	0.04	0.22	0.38**	0.35**
5Month	0.12	0.40**	0.15	0.39**	0.27*	0.08	0.23*	0.25*	0.28*	-0.03
Mature	0.35**	0.72**	0.23*	0.33**	0.61**	0.23*	0.16	0.26*	0.28*	0.35**

EAR=ear length, HG=heart girth, HTW= height at withers, BL=body length, ABC= abdominal circumference, NTS= nose to shoulder, FL, fore limb, HL= hind limb, TG= thigh girth, TL= tail length.
**Significant at 0.01, *significant at 0.05

Table 2: Regression equations for rabbits at 3 months of age (sex combined, male and females)

Item sex	Equations	R^2	Sig.
Combined	Y= -749.76+41.89 HG+ 23.41 BL+ 17.15 ABC	0.73	0.000
Males	Y= -711.27+ 34.27HG+ 29.84 BL+ 15.96	0.59	0.000
Females	Y= -775.86+ 44.24HG+ 19.77BL +19.58ABC	0.84	0.000

HG=heart girth, BL=body length, ABC= abdominal circumference

Table 3: Regression equations for rabbits at 4 months of age (sex combined, male and females

Item sex	Equation	R^2	Sig.
Combined	Y= -348.17+ 24.52HG+ 27.02BL+14.19ABC	0.48	0.000
Males	Y=-153.04+ 26.01HG+20.48 BL+11.82ABC	0.37	0.060
Females	Y=-507.00+23.20HG+35.03BL+13.54ABC	0.57	0.010

HG=heart girth, BL=body length, ABC= abdominal circumference

Table 4: Regression equations for rabbits at 5months of age (sex combined, male and females)

Item sex	Equation	R^2	Sig.
Combined	Y =-182.05+26.881HG+25.98BL+10.85ABC	0.26	0.000
Males	Y= 299.62+299.62+27.96HG+8.22BL+9.23 ABC	0.15	0.178
Females	Y=-462.34+24.35HG+38.62BL+11.35ABC	0.31	0.005

HG=heart girth, BL=body length, ABC= abdominal circumference

Table 5: Regression equations for rabbits at over 5 months of age (sex combined, male and females)

Item sex	Equation	R^2	Sig.
Combined	Y= -2197.23+69.46GH+45.41BL+33.68ABC	0.69	0.000
Males	Y=-3889.67+64.21HG+92.36BL+59.41ABC	0.81	0.000
Females	Y=-1896.67+76.98HG+36.66BL+23.76ABC	0.67	0.000

HG=heart girth, BL=body length, ABC= abdominal circumference

were used to formulate the prediction equations. Positive and significant correlations were obtained by Egena (2010) in Guinea pig, Chineke (2005) in rabbits, Yakubu and Ayoade (2009) in New Zealand white and chinchilla rabbit cross, and Shahin and Hassan (2000) in Egyptian local and Newzealand White breeds.

Tables 2, 3, 4 and 5 shows the regression equations for rabbits at 3 months of age (sex combined, male and females). The coefficients of determination obtained ranged from 0.53 to 0.84, from 0.37 to 0.57, from 0.15 to 0.31 and from 0.67 to 0.81 at 3 months, 4months, and 5 months and above 5 months respectively. The coefficients were high in females followed by combined sex and males except at over 5 months of age where the males obtained the highest coefficients. The equations were mostly significant ($P \leq 0.05$). This is in accordance with Egena (2010) in Guinea pig.

Conclusion

It is concluded that morphometric traits can serve as vital tools in body weight prediction by generating regression equations. They can also help in rabbit breeding programs.

References

Chineke, C.A. 2005. The relationships among body weights and linear dimensions in rabbit breeds and crosses. *Journal of Animal and veterinary Advances*, 4(9):775-784.

Chineke, C.A. 2000. Characterization of physical body traits of domestic rabbits in humid tropics. Pages: 237-239. In : S N Ukachukwu, J A Ibeawuchi, S N Ibe, A G Ezekwe , S E Abasiekong (Eds). Book of Proceedings of the 25th Annual conference. Pp:19-23 March 2000, Michael Okpara university of Agriculture, Umudike,Abia State.

Egena, S.S. Acheneje. 2010. Body length, heart girth and trunk length as predictors of live body weight of guinea pig (*Cavia porcellus*) in the southern Guinea savannah zone of Nigeria. *New York science journal*, 3(2):9-14.

Elamin K.M., yousif A.I., Ahmed, M.K.A., Mohammed, S.A. and Tameem Eldar, A.A. 2012. Estimation of genetic, phenotypic and environ-mental parameters of morphometric traits in Sudanese rabbits. *Asian Journal of Animal Science* 6(4); 14-181.

Hassan, H.E., Elamin, K.M., Yousif, I.A, Musa, A.M. and Elkhairey, M.A. 2012. Evaluation of body weight and some morphometric traits at various ages in local rabbits of Sudan. *Journal of Animal Science Advances*, 2(4):407-415.

Ibe, S.N. and Ezekwe, A.G. 1994. Quantifying size and shape differences between Muturu and N Dama breeds of cattle. *Niergian journal of Animal production*, 21:51-58.

Musa, A.M., Elamin, K.M., Mohammed, S.A. and Abdalla, H.O. 2011. Morphometric traits as indicators for body weight in Sudanese Kenana cattle. *Online Journal of Animal and Feed Research,* 1(5):218-222.

Musa, A.M., Elamin, K.M., Mohammed, S.A., Abdalla ,H.O. and Elamin K.M. 2012. Linear measurements as indicators of Kenana cattle milk production. *Online Journal of Animal and Feed Research,* 1(6):259-262.

Obike. O.M. and Ibe, S.N. 2010. Effect of genotype on pre-weaning growth performance of the domestic rabbit in humid tropical environment. *Global Veterinaria*, 4(4):388-393.

Obike, O.M., Ibe, S.N. and Oke, U.K. 2010. Estimation of re- and post-weaning body weight of rabbit in humid tropical environment using linear body measurement. *American-Eurasian Journal of Agriculture and Environmental Science*, (4): 440-444.

Olutogun, O., Abdullah, A.R., Raji, A.O., Adetoro, P.A. and Adeyemi, A. 2003. Body conformation characteristics of white Fulani gudali (Zebu) cattle breeds of Nigeria. Proceeding of 28th Annual confrerence. Nigerian Society of Animal Production. Ibedan, Nigeria, 16th- 20th march 2003, pp:129-132.

Osario, J.C. Das de oliveira, N.M., Osorio, M.T.M., Jordim, R.D. and Pimente, M.A. 2002. Meat production in male lambsderived from crossing Border Leicester rams with Corridale and Polwarth ewes. *Revista Brasileria de Zootecnia*, 13:1469-1480.

Shahin, K.A. and Hassan, N.S. 2000. Sources of shared variability among body shape characters at marketing age in New Zealand and Egyptian rabbit breeds. *Annals Zootech*, 49:435-445.

Yakubu, A. and Ayoade, J.A. 2009. Application of principal component factor analysis in quantifying size and morphological indecies of domestic rabbits. *International Journal of Morphology* 27(4):1013-1017.