Morphology and Morphometry of Male Genital System of Zovawk: An Indigenous Pig of Mizoram

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ABSTRACT

The morphology and morphometry of the male genital system was conducted on six adult Mizo local pigs. A highly significant correlation was observed between gross testicular weight and body weight and net testicular weight and body weight. This gonadosomatic index showed negative correlation with body weight and gross testicular weight. A moderate correlation was observed between body weight and albuginea weight. The percentage of tunica albuginea varied from 4.93 to 5.34%. The different biometrical values with regard to the length, width, thickness and weight of different male genital organs were found to be low as compared to common large breed of pig.

Key words: Male genital system, Mizo local pig, Morphology, Morphometry, Zovawk

Zovawk is an indigenous pig of Mizoram. Morphology and morphometry of the genital system is important for artificial insemination programme and andrological problems. The information on the male genital organs of Zovawk is sparse. Hence, the study was planned to generate information on this aspect in adult male pigs.

MATERIALS AND METHODS

The present investigation was conducted on male genital organs collected from six adult (1 to 1½ years of age), apparently healthy Mizo local pigs, slaughtered in the college pig farm. The external morphological data of these animals was recorded before slaughtering. The genital organs were collected and the epididymis was separated from the testis. The gross weight of the testis was observed between 25.50 to 29.50 gm with an average of 27.63 ± 0.42 gm. A highly significant correlation was observed between GTW and BW (r = 0.98) Costa and Silva (2006) also reported lower body weight of wild boars at twelve months of age but higher body weight was observed by Almeida et al. (2006) than the present study. These differences could be due to variation in breed, age and reproductive status of animal. The high correlation observed in this study between testicular weights with body weight was also similar to that described for domestic pigs (Franca et al., 1988; Thomas and Raja, 1980) and other mammalian species (Johnson et al., 1991; Assis Neto et al., 2003; Ferreira et al., 2004). The equation estimated

RESULTS AND DISCUSSION

The body weight of adult Mizo local pigs (1 to 1½ years of age) was recorded between 27.0 to 38.0 Kg with an average of 32.98±1.56 Kg. The overall size and weight of the organs was smaller than observed in the common large breed pigs by Schummer and Nickel (1979) and Getty (2012). The scrotum was divided by a deep groove into right and left halves and situated ventral to the anus.

Testes and epididymis: The gross testicular weight was observed between 25.50 to 29.50 gm with an average of 27.63 ± 0.42 gm. A highly significant correlation was observed between GTW and BW (r = 0.98) Costa and Silva (2006) also reported lower body weight of wild boars at twelve months of age but higher body weight was observed by Almeida et al. (2006) than the present study. These differences could be due to variation in breed, age and reproductive status of animal. The high correlation observed in this study between testicular weights with body weight was also similar to that described for domestic pigs (Franca et al., 1988; Thomas and Raja, 1980) and other mammalian species (Johnson et al., 1991; Assis Neto et al., 2003; Ferreira et al., 2004). The equation estimated
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from the regression of body weight and gross testicular weight was \( Y_1 = - 48.926 + 2.964 \times X_1 \) (where \( Y_1 = \) body weight and \( X_1 = \) gross testicular weight). The estimated regression equation showed highly reliable \( (R^2 = 0.966) \).

In the present study, the net testicular weight was between 24.17 to 27.98 gm with an average of 26.22±0.40 gm. The NTW showed highly significant correlation with the BW \( (r = 0.99) \) as reported by Murta et al. (2013). The equation estimated from the regression of body weight and net testicular weight was \( Y_2 = - 47.890 + 3.0854 \times X_2 \) (where \( Y_2 = \) body weight and \( X_2 = \) net testicular weight). The estimated regression equation showed highly reliable \( (R^2 = 0.966) \) in the present study. The NTW was obtained by subtracting the AW and the mediastinum from the GTW \( (Johnson et al., 1981) \). The volumetric ratio of the albuginea and mediastinum was close to 9.4% reported for adult wild boars \( (Costa and Silva, 2006) \). For methodological difficulties, the weight of the mediastinum was not taken. The percentage occupied by the mediastinum in the testes of mammals is relatively low, about 0.69% in fetal pigs \( (Costa et al., 2005) \) and 2.9% in collared peccaries \( (Costa et al., 2007) \), indicating that this value was little significant compared with the gross testicular weight.

The GSI expresses the relationship between total testicular mass and body weight, representing the percentage of body mass allocated in the testicles. The GSI, among the animals under study, ranged from 0.16 to 0.19% with an average of 0.17%. This index showed negatively significant correlations with body weight \( (r = -0.96) \) and gross testicular weight \( (r = -0.94) \). Murta et al. (2013) reported 0.16% GSI in twelve months wild boar which was in close proximity with the present finding. At twelve months of age, the GSI was 0.16%, which was close to that reported in cathetus \( (Costa et al., 2004) \) and capybaras \( (Paula et al., 2002) \). However, it was much lesser than that described for adult wild boars \( (Almeida et al., 2006) \) and domestic pigs \( (Godinho et al., 1979; Franca et al., 2000) \). The lower percentage of GSI observed in the present investigation is related to the lower testicular development in relation to the body weight. It might be due to absence of a selection program giving preference to animals of larger testes. The equation estimated from the regression of body weight and GSI in the present investigation was \( Y_1 = 0.266 - 0.003X_i \) (where \( Y_1 = \) body weight and \( X_i = \) GSI). The estimated regression equation was highly reliable \( (R^2 = 0.964) \). The equation estimated from the regression of GTW and GSI was \( Y_2 = 0.408 - 0.009X_2 \) (where \( Y_2 = GTW \) and \( X_2 = GSI \)). The estimated regression equation showed highly reliable \( (R^2 = 0.858) \) under study.

The weight of the tunica albuginea varied between 1.34 to 1.52 gm with an average of 1.42 ± 0.03 gm under study. The present finding was almost similar to the findings of Murta et al. (2013), who recorded 1.37 ± 0.28 gm in wild boars. In the present investigation a moderate correlation was observed between BW and AW \( (r = 0.70) \). The equation estimated from the regression of body weight and tunica albuginea weight was \( Y_3 = 0.408 - 0.009X_2 \) (where \( Y_3 = \) body weight and \( X_3 = \) tunica albuginea weight). However, the estimated regression equation showed reliable \( (R^2 = 0.489) \) in the present study.

The percentage of tunica albuginea varied from 4.93 to 5.34% with an average of 5.14% under study. The present finding was slightly lower than that recorded by Murta et al. (2013) in twelve months old wild boar. Further, they observed that the percentage of albuginea in the testis decreased after birth to twelve months of age, probably because of the greater development of the tubular tissue which concurrence the reports of present study. The weight of the testicular parenchyma was obtained by subtracting the weights of the albuginea and the mediastinum from the gross testicular weight \( (Johnson et al., 1981) \). The volumetric ratio of the albuginea and mediastinum was reported 9.4% for adult wild boars \( (Costa and Silva, 2006) \) and the percentage occupied by the mediastinum in the testes of feral pigs was 0.69% as reported by Costa et al. (2001). The percentage of albuginea in the testis decreased after birth to twelve months of age, probably because of the greater development of the tubular tissue which concurrence the reports of present study. The weight of the testicular parenchyma was obtained by subtracting the weights of the albuginea and the mediastinum from the gross testicular weight \( (Johnson et al., 1981) \). The volumetric ratio of the albuginea and mediastinum was reported 9.4% for adult wild boars \( (Costa and Silva, 2006) \) and the percentage occupied by the mediastinum in the testes of feral pigs was 0.69% as reported by Costa et al. (2005). The biometrical data of the testes and epididymis are presented in Table 2. The testicles were large compared to body weight and elliptical in contour. The long axis of the testicles was directed dorsally and caudally. The testicular dimensions varied between 4.30 and 5.50 cm in length, 2.60 and 3.20 cm in width and 2.70 and 3.60 cm in thickness. These present findings were lower than the findings of Singh and Parihar (1998) in crossbred pigs. These variations might be attributed to the difference in breed, body weight and status of reproduction. There was a non-significant difference between right and left testis in respect to length, width and thickness of the testicles in the present study.

The epididymis was closely attached to the testicle. The tail was very large and formed a blunt conical projection at the caudal end of the testicle as recorded in common
large breed of pigs by Schummer and Nickel (1979) and Sisson (1975). The proper ligament of the testis was prominent. The head, body and tail of the epididymis varied from 2.70 to 3.90 cm, 2.0 to 3.70 cm and 2.30 to 3.20 cm in length; 1.30 to 2.30 cm, 0.45 to 0.61 cm and 1.80 to 2.50 cm in width; 1.50 to 2.20 cm, 0.12 to 0.21 cm and 1.95 to 2.30 cm in thickness, respectively. The weight of the epididymis varied from 11.40 to 14.40 gm. These biometrical values could not be compared due to the lack of available literature. A non-significant (P<0.05) difference was observed between the right and left sides in regards to different parameters of the epididymis.

Spermatic cord and vas deferens: The vas deferens was flexuous in its testicular part and closely attached by the vaginal tunic. The ampulla was indistinct. The cremaster muscle was well developed. The width and thickness of the vas deferens varied from 0.17 to 0.24 cm and 0.08 to 0.15 cm, respectively. The right and left sides didn’t vary significantly.

Accessory genital glands: The biometrical data regarding the length, width, thickness and weight of different accessory genital glands of right and left sides were found non significant in the present study.

The paired vesicular glands were very large (Fig. 1). They shaped like three sided pyramid and connected medially by connective tissue. The glands were extended up to the abdominal cavity and related ventrally to the caudal part of the bladder, neck of the bladder, prostate gland, and cranial part of the pelvic urethra (Fig. 1). The length, width, thickness and weight of the seminal vesicle varied from 6.0 to 7.50 cm, 3.40 to 4.60 cm, 2.0 to 3.50 cm and 24.0 to 28.50 gm, respectively which were lower than the reports of Schummer and Nickel (1979) and Sisson (1975). This might be due to the smaller body size of Mizo local pig.

The paired bulbourethral glands were very large (Fig. 1). Located on either side on the caudal two-thirds of the pelvic urethra. They had a lobulated surface. The length, width, thickness and weight of the bulbourethral gland varied from 6.20 to 8.30 cm, 1.02 to 2.0 cm, 1.52 to 2.50 cm and 12.50 to 17.50 gm, respectively. However, these values were lower than the values reported by Schummer and Nickel (1979), Singh and Parihar (1998) and Getty (2012) in common large breed pigs. The length, width and thickness of the free part of the penis varied between 3.50 to 4.50 cm, 0.45 to 0.75 cm and 0.25 to 0.35 cm, respectively.

In the present investigation the prepuce was found longer than the free part of the penis. The preputial orifice was formed by a thick annular fold of skin covered with a tuft of stiff hairs. The dorsal wall of the prepuce was wide with a preputial diverticulum. Similar types of observations were also recorded by Schummer and Nickel (1979) and Getty (2012) in common large breed pigs.

The urethra of Zovawk was divided into pelvic and penile parts. The length of the pelvic urethra varied between 9.50 to 13.50 cm. It was covered by a thick urethralis...
muscle ventro-laterally. The dorsal part was covered by dense fibrous tissue. The penile part of the urethra was surrounded by erectile tissue. The length of the penile urethra was recorded in between 23.10 to 27.0 cm.

REFERENCES


