Biometry of Genitalia, Incidence of Gynecological Disorders and Pregnancy Loss in Black Bengal Goat : An Abattoir Study

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ABSTRACT

This study was aimed to determine the biometry of genital organs, incidence of gynecological disorders and pregnancy loss in Black Bengal goat (*Capra hircus*). Genitalia of 118 does were collected from local abattoirs. Biometric parameters of genital organs were measured and gross and histopathological examinations were carried out for detection of abnormalities. For gravid uterus, age of the fetus was determined by measuring crown-rump length. There was no significant difference in the length, width and weight of right and left ovaries ($P>0.05$). However, the number of follicles between left (5.3 ± 2.3) and right ovaries (7.4 ± 2.7) varied significantly ($P<0.05$). The mean length of right fallopian tube and uterine horn were not varied with those of left fallopian tube and uterine horn. The length of uterine body, cervix and vagina were 1.3 ± 0.1 cm, 3.3 ± 0.5 cm and 6.8 ± 1.3 cm, respectively. Overall, 29 (24.6%) genitalia had abnormalities. Fifteen genitalia (12.7%) had ovarian abnormalities including ovaro-bursal adhesions (6.8%), parovarian cyst (5.1%) and follicular cyst (0.9%). Uterine abnormalities were found in 12 genitalia (10.2%) and predominant uterine lesion was endometritis (6.8%) followed by adenomyosis (1.7%), hemorrhagic lesion on endometrial surface (0.9%) and cyst in broad ligament (0.9%). In addition, cyst in fallopian tube (0.9%) and vagina (0.9%) were recorded. The proportion of slaughtered pregnant goats was 15.3% (18/118). The pregnancy wastage was highest in the first month (50.0%) followed by second (33.3%) and third (16.7%) month. It can be concluded that ovaro-bursal adhesions, parovarian cyst and endometritis are the gynecological disorders of major concern in Black Bengal goat.

(Key words : biometry of genitalia, gynecological disorders, pregnancy loss, Black Bengal goat)

INTRODUCTION

The Black Bengal goats (*Capra hircus*) are the main small ruminant of Bangladesh. They act as a great source of income for the poor people of Bangladesh. Besides, goat farming does play a very important role in reducing unemployment and poverty, increasing meat production and achieving currency from foreign country. There are about 24.15 millions of goats in Bangladesh (Osmani, 2012). Most of those goats (90%) are Black Bengal (Amin*et al.*, 2001), reputed for their meat and skin production. Moreover, those indigenous goats have an excellent ability to accommodate and adapt to fluctuation in environment. In addition, Black Bengal goats are prolific and give birth every six months (Chowdhury *et al.*, 2002). In each kidding, two to three kids are born. There is no seasonal trend, but the kidding rate of this species is higher in winter during the period from November to February (Chowdhury *et al.*, 2002).

Reproductive performance is economically important in small ruminants because of its effect on the number of offspring produced per year (Greyling, 2000). To maintain a good reproductive performance, detail information about the reproductive organs of goat is essential (Gupta *et al.*, 2011). Moreover, the knowledge of the biometrical parameters of female genitalia is most important to perform artificial insemination, pregnancy diagnosis and dealing with the infertility problems (Kunbhar *et*

al., 2003) and their treatment (Kumar *et al.*, 2004). The biometry of female genital tract of Black Bengal goats could provide basic information regarding the anatomical structure of normal reproductive organs and to establish baseline data on the normal dimensions of different segments of the reproductive tract of the Black Bengal goats kept in Bangladesh.

Although the Black Bengal goats of Bangladesh have good reputation for their high prolificacy, good fertility, early sexual maturity but they often show some degree of reproductive failure. Infertility of does in many cases is manifested by abnormalities in the reproductive organs. There are some gynecological disorders diagnosed during post-mortem examination of goats, which might be congenital or acquired in origin (Bhuiyan *et al.*, 1988; Ahmed, 1993). However, reports on gynecological conditions of Black Bengal goats in abattoir materials are still inadequate. This study was, therefore, aimed to determine the biometry of female genital organs, incidence of gynecological disorders and proportion of pregnancy wastage of Black Bengal goats in abattoir materials.

MATERIALS AND METHODS

1. Collection and Transportation of Genitalia

A total of 118 female genital tracts of Black Bengal goats were collected from the local abattoirs of Gazipur Municipal city of Bangladesh during the period from February to June 2013 and transported to the laboratory in an icebox maintaining +4∼8℃.

2. Biometric Measurements

In the laboratory, genital tracts were cleaned and freed from adjacent tissues and kept in table in normal position. Biometric parameters of female genitalia were measured as a method described by Gupta *et al.* (2011). Length and weight of different segments of genital tract *viz.* ovary, fallopian tube, uterus, cervix and vagina were measured by using slide calipers and electric balance, respectively and recorded in centimeter and gram, respectively. For pregnant does, the approximate age of the fetus were determined by measuring crown-rump length (Fig. 1).

3. Examination of Genitalia for Detection of Abnormalities

Examination of genitalia involved the systemic examination of the female reproductive organs that included evaluation of
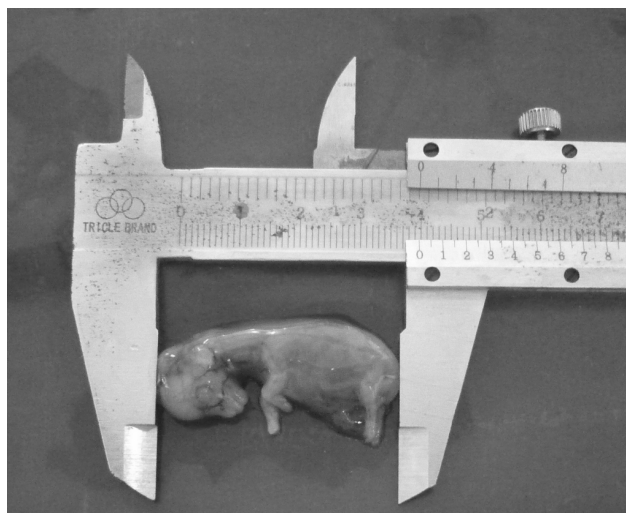

Fig. 1. Measuring of crown-rump length of fetus using a slide calipers.

ovaries, fallopian tube, uterus, cervix, vagina and broad ligament. Gross abnormalities of the genital organs were recorded as described by McEntee (1990). Evaluation was done by visual appraisal, palpation and incision. Lesions were recorded by their size, consistency, colour, shape or location of the abnormalities. Particular organs were preserved for histopathological study in suspicious case for confirmation. For histopathological examination, tissue sections were fixed in 10% formalin. Tissue samples were processed for Hematoxylin-Eosin staining procedure as per the method described in the Manual for Laboratory Methods in Histotechnology (AFIP, 1994). The prepared slides were examined in light microscopy (×10∼40) and matched with gross lesions for final diagnosis.

4. Statistical Analysis

The data generated from this experiment were entered in Microsoft Excel worksheet, 2007. Descriptive statistical analysis was performed with the help of Statistical Packages for Social Sciences, version 10.0 for windows (SPSS, Inc., Chicago, IL, USA). *T*-test was done to compare the number of follicles found between left and right ovaries. The difference was considered statistically significant when *P*<0.05.

RESULTS

The morphological data of left and right ovaries is shown in Table 1. There was no significant difference between length

Table 1. The mean ± S.D. length, width, weight, number of follicle and number of CL in ovaries of female Black Bengal goats

Measurements	Left ovary	Right ovary
Length (cm)	1.2 ± 0.2	1.3 ± 0.2
Width (cm)	0.8 ± 0.2	0.9 ± 0.2
Weight (gm)	0.6 ± 0.2	0.7 ± 0.3
No. of follicle	5.3 ± 2.3[a]	7.4 ± 2.7[b]
No. of CL	0.2 ± 0.4	0.4 ± 0.9

[a,b] values having different superscripts within the same row significantly differ ($P>0.05$).

Table 2. The length and width (mean ± S.D.) of tubular part of female reproductive tract of Black Bengal goats

Organ	Side	Length (cm)	Width (cm)
Fallopian tube	Left	14.7 ± 1.4	-
	Right	15.5 ± 0.5	-
Uterine horn	Left	12.3 ± 2.6	4.8 ± 1.4
	Right	12.8 ± 3.5	5.1 + 1.4
Uterine body		1.3 ± 0.1	2.5 ± 0.8
Cervix		3.3 ± 0.5	1.8 ± 0.1
Vagina		6.8 ± 1.3	4.0 ± 0.1

Table 3. Abnormalities of female genital organs in Black Bengal-goats. Total number of genital tract examined was 118

Organ	Abnormality	No. of cases	(%)
Ovary	Follicular cyst	1	0.9
	Parovarian cyst	6	5.1
	Ovaro-bursal adhesion	8	6.8
	Sub-total	15	12.7
Fallopian tube	Cyst in fallopian tube	1	0.9
	Sub-total	1	0.9
Uterus	Endometritis	8	6.8
	Adenomyosis	2	1.7
	Hemorrhage on endometrium	1	0.9
	Cyst in broad ligament	1	0.9
	Sub-total	12	10.2
Vagina	Semi-solid cyst in vaginal wall	1	0.9
	Sub-total	1	0.9
Total		29	24.6

(cm) of right and left ovaries (1.3 ± 0.2 vs. 1.2 ± 0.2). The mean width of right and left ovary was 0.9 ± 0.2 cm and 0.8 ± 0.2 cm, respectively. The weight (gm) of left ovary (0.6 ± 0.2) was not varied with that of right ovary (0.7 ± 0.3. The significant ($P<0.05$) difference was observed in number of follicles between left (5.3 ± 2.3) and right ovaries (7.4 ± 2.7). However, there was no significant difference in the number of corpus luteum (CL) between right (0.4 ± 0.9) and left ovaries (0.2 ± 0.4).

The length and diameter of tubular reproductive organs of female Black Bengal goat is presented in Table 2. The lengths of right and left fallopian tube were 15.5 ± 0.5 cm and 14.7 ± 1.4 cm, respectively. There was no significant difference in the length between right and left uterine horns (12.8 ± 3.5 vs. 12.3 ± 2.6). The length and width of the uterine body were 1.3 ± 0.1 cm and 2.5 ± 0.8 cm, respectively. The mean length and width of cervix were 3.3 ± 0.5 and 1.8 ± 0.1, respectively. The mean ± SD length of vagina was 6.8 ± 1.3 cm and width was 4.0 ± 0.1 cm.

Frequency of abnormalities of female genital organs in Black Bengal goats is shown in Table 3. Of 118 genitalia, 29 (24.6%) showed abnormalities in this study. In this study, the highest rates of abnormalities were found in ovaries (12.7%) followed by uterus (10.2%), fallopian tube (0.9%) and vagina (0.9%). In ovaries, two major lesions such as ovaro-bursal adhesions (6.8%) and parovarian cysts (5.1%) were observed. The predominant lesion of uterus was endometritis (6.8%). Apart from that, adenomyosis (1.7%), hemorrhagic lesion on endometrial surface (0.9%) and cyst in broad ligament (0.9%) were recorded. Moreover, cysts were found in fallopian tube (0.9%) and vagina (0.9%). The picture of different gross ab-

normalities of genital organs is presented in Fig. 2 (a～i).

The data on pregnancy wastage of goats in abattoirs is shown in Table 4. The proportion of pregnant goats slaughtered was 15.3% (18/118) with 39 fetal losses in total. The pregnancy loss was highest in the first month (50.0%) followed by 33.3% in second and 16.7% in the third month.

DISCUSSION

Fig. 2. Gross abnormalities of genital organs in Black Bengalgoat. (a) Ovarian cyst, (b) Parovarian cyst, (c) Ovaro-bursal adhesion, (d) Cyst in fallopian tube, (e) Hemorrhagic lesions on endometrial surface, (f) Endometritis, (g) Adenomyosis, (h) Cyst in broad ligament and (i) Semisolid cyst in the wall of vagina.

Table 4. Pregnancy wastage of Black Bengal goat in abattoirs

No. of pregnant goats slaughtered	No. of fetal loss	Mean crown-rump length (cm) (minimum~maximum)	Probable age (days) of gestation[*]
9	18	0.8 (0.7~1.1)	21~28
6	15	4.1 (2.4~5.2)	33~49
3	6	9.1 (8.6~9.5)	60~69

Total no. pregnant goats slaughtered = 18; total no. of fetal loss = 39.
[*] Martinez et al. (1998) and Amer (2008).

We aimed this study to determine the biometry of female genital organs, incidence of gynecological disorders and proportion of pregnancy loss of Black Bengal goat in abattoir derived samples. Biometric parameters of each genital organ of does are recorded, gynecological abnormalities are found mainly in ovaries and uterus and the study identified a remarkable percentage of pregnant goats are routinely slaughtered in the local abattoirs.

In our study, the length of right ovaries was higher than that of left ovaries but difference was not significant ($P<0.05$). Similarly, Gupta et al. (2011) reported that length of right ovaries were higher than that of left ovaries in goats. There was no significant difference between mean width of right and left ovaries. This finding is also consistent with the result of Gupta et al. (2011. The mean weight of ovaries recorded in our present study is higher than the value reported by Islam

et al. (2007) and Gupta *et al.* (2011). The significant ($P<0.05$) difference was found in mean number of follicles between left (5.3 ± 2.3) and right ovaries (7.4 ± 2.7) in this study and values were higher than the findings of Islam *et al.* (2007) and Gupta *et al.* (2011). The number of corpus luteum (CL) between left and right ovaries was not significantly varied in our study. Similarly, Gupta *et al.* (2011) reported that average number of CL was almost same in both left and right ovaries. Overall, right ovaries were longer, wider and heavier in comparison to left which confirms the fact of right ovaries being more active than left.

In this study, the mean length of right and left fallopian tube did not vary significantly. This result of our study is supported by findings of Adigwe and Fayemi (2005) who reported that mean length of fallopian tube was 13.73 ± 2.88 cm. However, Gupta *et al.* (2011) reported that the length of the fallopian tube was 10.08 ± 1.697 cm in Black Bengal goats. The length and width of right uterine horn were also higher than that of left uterine horn although differences were not significant in this study. This finding is supported by Gupta *et al.* (2011). The length of uterine horns in Black Bengal goat was within the range from 10 to 12 cm reported by Sisson and Grossman (1972) in small ruminants. But the width of uterine horn is higher than that mentioned by Gupta *et al.* (2011).

The length and width of the uterine body observed in present study is smaller than the value reported by Sisson and Grossman (1972) and Gupta *et al.* (2011). However, the average length and width of cervix found in this study is almost similar with the value reported by Gupta *et al.* (2011). The mean ± SD length and width of vagina in our study is consistent with the findings of Sisson and Grossman (1972) and Adigwe and Fayemi (2005). However, result of Gupta *et al.* (2011) is slightly higher than the present study.

Overall, 24.6% genitalia showed abnormalities in this study. The result is consistent with the report of Moghaddam and Gooraninejad (2007) who recorded 25.8% genitalia had pathological lesions. However, the result of present study is lower than that of Rahman *et al.* (2008) who reported that out of 51 genitalia 52.9% showed genital abnormalities in goats. In this present study, the highest rates of abnormalities were found in ovaries (12.7%) followed by uterus (10.2%), fallopian tube (0.9%) and vagina (0.9%). On the contrary, Rahman *et al.* (2008) recorded 35.2% abnormalities in uterus and 11.8% in ovaries in goats.

The ovaro-bursal adhesions and parovarian cysts were found as two main disorders of ovaries in this experiment. Others reported 11.5% ovaro-bursal adhesion and 7.6% parovarian cysts in genital tract of ewes (Moghaddam and Gooraninejad, 2007) and 12.5% ovarobursal adhesions in goats (Gupta *et al.*, 2011). Parovarian cysts were found between ovaries and the fimbriae of the fallopian tubes. Parovarian cysts could arise from the cranial mesonephric tubules and occur in all animals (McEntee, 1990). Endometritis was identified as the prominent lesion of uterus in this study. Besides, adenomyosis, hemorrhagic lesion on endometrial surface and cyst in broad ligament were recorded. Rahman *et al.* (2008) reported a high frequency (27%) of uterine infection in goats similar to the 33.3% reported by Bhuiyan *et al.* (1988). Lower frequencies of uterine infection in goats were 0.3% and 1.8% by Srivastava *et al.* (1985) and Ahmed (1993), respectively. Poor veterinary health care of does at parturition may cause endometritis in most cases in Bangladesh. The proportion of adenomyosis recorded in this study is almost similar to that of Rahman *et al.* (2008) who found adenomyosis of 2.0%.

Unlike ovaries and uterus, lesions in fallopian tube and vagina were not notable; both organs had only one cyst. Abnormalities of fallopian tubes usually occur in association with uterine lesions. Salphingitis, pyosalphinx, agenesis, hydrosalphinx, neoplasia may occur independently or in association with similar uterine lesions in female animals. In our present study, only one case of cyst was recorded in fallopian tube. No case of salphingitis was found in this study although Rahman *et al.* (2008) reported 3.9% salphingitis in goats. The picture of different gross abnormalities of genital organs is presented in Fig. 2 (a~i) and microscopic lesions are presented in Fig. 3 (a, b).

The proportion of slaughtered pregnant goats was 15.3% with highest pregnancy loss in the first month (50.0%) followed by 33.3% in the second and 16.7% in the third month. The cause of the pregnancy and fetal loss was slaughter and there was no lesion in the reproductive organs of slaughtered goats. Similarly, Bokko (2011) reported the highest incidence (53%) of pregnancy wastage occurred during first trimester in goats and 25.82% pregnant goats were slaughtered. In our study, goats were not slaughtered at or after 3 months of gestation. This indicates that pregnancy were possible to diagnose by abdominal palpation and enlargement of abdomen at that stage of pregnancy by the butchers. Indiscriminate slaughtering
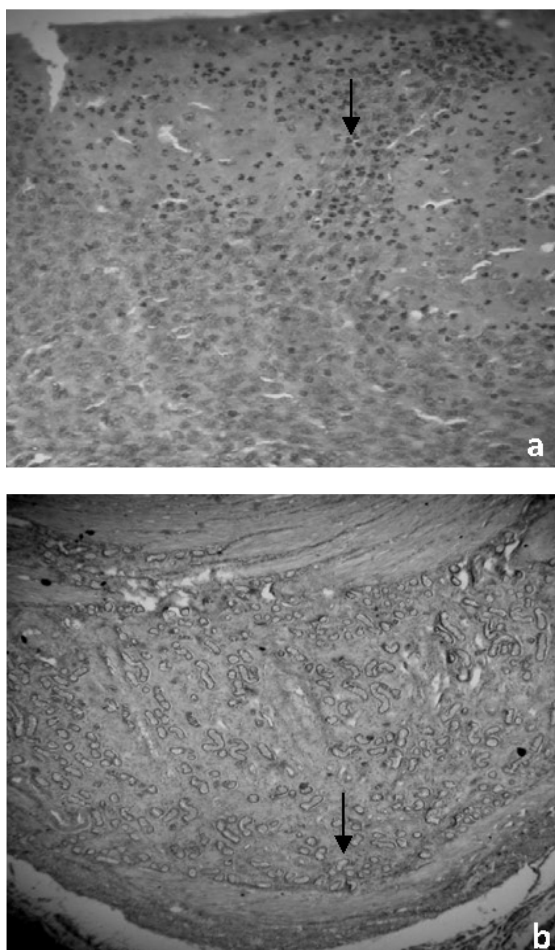
Fig. 3. Microscopic lesions of genital organs in Black Bengal goat. (a) Endometritis-presence of inflammatory cells in endometrium and (b) Adenomyosis-presence of endometrial glands in myometrium.

of pregnant goats not only causes economic loss but also conflicting to animal rights and welfare. Therefore, ultrasonographic scanning by skilled veterinarians should be performed prior to slaughtering the does in the abattoirs to reduce the pregnancy wastage, fetal loss and to ensure animal rights.

In conclusions, biometric parameters of different segments of female genital system in Black Bengal goats are reported. A list of gynecological disorders in Black Bengal goats is figured out from abattoir derived samples. Ovaro-bursal adhesions, parovarian cyst and endometritis are identified as major gynecological conditions in Black Bengal goats. A high proportion of pregnant goats are often slaughtered in abattoirs and both pregnant goats and fetuses, before being born, are killed which is a serious threat to animal welfare and requires urgent action

for prevention of such illegal and inhumane activities.

REFERENCES

Adigwe PI and Fayemi O. 2005. A biometric study of the reproductive tract of the red, Sokoto (Maradi) goats of Nigeria. Pak. Vet. J. 25:149-150.

AFIP (Armed Forces Institute of Pathology). 1994. Laboratory Methods in Histotechnology. Washington DC: American Registry of Pathology. pp. 29-65.

Ahmed JU. 1993. Incidence of gynaeco-obstetrical disorders in Black Bengal goats. Bangladesh Agricultural University Research Progress 7:499-505.

Amer HA. 2008. Determination of first pregnancy and foetal measurements in Egyptian Baladi goats (*Capra hircus*). Vet. Ital. 44:429-437.

Amin MR, Husain SS and Islam ABMM. 2001. Reproductive peculiarities and litter weight in different genetic groups of Black Bengal does. Asian Australas. J. Anim. Sci. 14:297-301.

Bhuiyan MJ, Hossain MI, Moslehuddin and Shahasuddin M. 1988. Female reproductive disorders in Black Bengal goats of Bangladesh. Bang. Vet. 15:49-50.

Bokko PB. 2011. Pregnancy wastage in sheep and goats in the Sahel region of Nigeria. Nigerian Vet. J. 32:120-126.

Chowdhury SA, Bhuiyan MSA and Faruk S. 2002. Rearing Black Bengal goat under semi-intensive management: Physiological and reproductive performances. Asian Australas. J. Anim. Sci. 15:477-484.

Greyling JPC. 2000. Reproduction traits in the Boer goat doe. Small Ruminant Res. 36:171-177.

Gupta MD, Akter MM, Gupta AD and Das A. 2011. Biometry of female genital organs of Black Bengal goat. Intl. J. Nat. Sci. 1:12-16.

Islam MR, Khandoker MAMY, Afroz S, Rahman MGM and Khan RI. 2007. Qualitative and quantitative analysis of goat ovaries, follicles and oocytes in view of *in vitro* production of embryos. J. Zhejiang Univ. Sci. B. 8:465-469.

Kumar S, Ahmed FA and Bhadwal MS. 2004. Biometry of female genitalia of Murrah buffalo (*Bubalus bubalis*). Indian J. Anim. Reprod. 25:143-145.

Kunbhar HK, Samo MU, Memon A and Solangi AA. 2003. Biometrical studies of reproductive organs of Thari cow. Pak. J. Biol. Sci. 6:322-324.

Martinez MF, Bosch P and Bosch RA. 1998. Determination of early pregnancy and embryonic growth in goats by transrectal ultrasound scanning. Theriogenology 49:1555-1565.

McEntee K. 1990. Reproductive Pathology of Domestic Mammals. Academic Press, Inc. SanDiego, California 92101, USA.

Moghaddam A and Gooraninejad S. 2007. Abattoir survey of gross abnormalities of the ovine genital tracts in Iran. Small Ruminant Res. 73: 259-261.

Osmani TABMMG. 2012. Vision 2021: Role of veterinarian in Bangladesh. Bangladesh Veterinarians' Directory. pp. 90-103.

Rahman MH, Chowdhury EH, Shaha SS, Islam A and Alam MGS. 2008. Abattoir study of reproductive diseases in goat. Bang. Vet. 25:88-91.

Sisson S and Grossman JD. 1972. Anatomy of the Domestic Animals. 5th ed. Philadelphia, USA, W.B. Saunders.

Srivastava AK, Patil VK and More BK. 1985. Incidence of various disorders in local angora and crossbred goats. Indian Vet. J. 62: 935-939.