

## Original Research Article

# Studies on Gross Anatomical Organizations of the Different Components of Female Genitalia of Black Bengal Goat

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## ABSTRACT

The present study was conducted in the department of anatomy, histology and embryology, Faculty of Veterinary and animal sciences, West Bengal university of animal fishery science Kolkatta. Total 15 specimens of adult black bengal goat where collected from different slaughter house of kolkatta. After slaughter of animal the samples where collected and brought to the departmental laboratory for details study. Female genital system comprised of ovaries, fallopian tube, horn of uterus, vagina and vestibules. There were two ovaries and each of them was found to be an oval shape pale in colour organ situated in the corresponding abdominal cavity behind the kidneys and supported by the broad ligament named utero-ovarianligament. The vagina was placed along the middle floor of pelvic cavity. Vagina, vestibule and vulva exhibited usual character of other small domesticated animal. Broad ligament was attached to the lesser curvature of horn. All the above mentioned findings may be utilized by the physiologist, embryo-transfer technologist, animal breeder and other related workers for the development of the goatery husbandry.

### Keywords

Ovaries, Horn of uterus, Fallopian tube

## Introduction

Goat is the first domesticated animal for food purpose. Domestication of goat took place about 10,000 year ago in the mountains of west Asia. Goat is small, sturdy and easily adaptable animal and is the species of food animal having widest distribution over the glob the animal husbandry practice is mainly dependent upon the reproductive performances of the species consumed because highly variable structural differences are encountered particularly in the female reproductive systems among the domestic animals. It is therefore become matters of prime

importance to study the structural organization of the female genitalia of a particular species.

Goat meat has no religious bar in all sections of society, also goat meat has less fat which is desirable feather liked by man. Goat meat has ready market due to heavy demand. So the reproduction is outcome of a coordinated series of physiological phenomenon in male and the female goat. For reproduction of animal the details knowledge of gross anatomical disposition on varies components of female genitalia of Black Bengal goat is

required. The female reproductive system includes two ovaries, two uterine tubes (fallopian tubes or oviduct), uterus, vagina and vulva the oviduct has three part isthmus, ampulla and infundibulum. The uterus consist of two horns and a body and cervix. The vagina extends from uterus to vulva. Vulva consist of two labia, vestibules, clitoris. The ovum is expelled from the ovary and received by the infundibulum and carried to the uterine tube where fertilization normally occurs. The result of this investigation will certainly be a useful tool to the animal physiologist and breeders for better understanding and functional aspects of all these organs in this animal under normal as well as altered physiological condition.

### **Materials and Methods**

The present study was conducted in the department of anatomy, histology and embryology, Faculty of Veterinary and animal sciences, West Bengal university of animal fishery science Kolkatta. Total 15 specimens of adult black bengal goat where collected from different slaughter house of kolkatta. After slaughter of animal the samples where collected and brought to the departmental laboratory for details study. Immediately after collection, gross anatomical observations were done by dissecting microscope and naked eye. The length, the width, thickness of different parts of genital system was measured by electronic slide caliper. The weight of ovaries where taken by weighing balance the reproductive tracts where incised and internal structure was seen by dissecting microscope and stereoscopic microscope.

### **Results and Discussion**

Gross anatomical structure of all the different components of female genitalia of

Black Bengal goat have been study in this investigation. Female genital system comprised of ovaries, fallopian tube, horn of uterus, vagina and vestibules. There were two ovaries and each of them was found to be an oval shape pale in colour organ situated in the corresponding abdominal cavity behind the kidneys and supported by the broad ligament named utero-ovarianligament.

Both the fallopian tubes were found to be narrow and extended from the tip of horn of uterus to the level of the situation of the ovary in a tortuous manner. Each of the tube was tortuous, long and supported by mesosalpinx.

The uterus comprised of two horns (left and right horn) and a body. The body of uterus was wall developed and the length of horns varies slightly but shape and sized almost equal. The vagina was as elongated comparatively thin wall tube placed in the pelvic cavity in between the rectum and urinary bladder. The canal of gartner was clearly visible. The external urethral orifice was situated in the ventral wall. The vestibule is short and vulva was the terminal part of the genitalia and was placed below the anus and surrounded by long hairs.

### **Ovary**

Both the ovaries were oval in structure with pale yellowish colour. The ovary was observed intimately attached to the fold of peritoneum. It was placed in a cranio-caudal direction within a fold of fallopian tube. The ovary was situated a little above the middle of the pelvic inlet and attached to the broad ligament by mesovarium.

Well developed ovarian artery was found in broad ligament. The length of the right ovary range from 1.61 to 1.24 cm, average

length was  $1.36 \pm 0.68$  cm. the width of right ovary range from 1.14 to 0.81 cm. the average length was  $1.05 \pm 0.68$  cm. the length of left ovary range from 1.49 to 1.0 cm and average length was  $0.69 \pm 0.18$  cm. the width of the left ovary range from 1.20 to 0.9 cm and average length was  $1.13 \pm 0.13$  cm. the length of the right ovary was slightly greater than the left ovary. The dorsal surface was free and ventral surface was attached to the broad ligament. The length of each ovary was greater than the width. Both the ends were rounded.

The surface of ovary was smooth, convex and found the presence of prominent mature follicles. These prominences were found to be translucent. The caudal end was rounded and cranial end was wider and a part of fimbriated margin of the infundibulum of the fallopian tube was attached to this end. The average weight of the left and right ovaries were  $0.76 \pm 0.071$  gm, range from 1.2 to 0.56 gm and  $0.73 \pm 0.073$  gm range from 0.972 to 0.55 gm respectively.

Both the ovaries were oval in structure with pale yellow in colour. The ovary was observed to be intimately attached to the fold of the peritoneum. The ovary was placed in a cranio-caudal direction with in a fold by fallopian tube. The ovary was situated at a little above the middle of the pelvic inlet and attached by broad ligament. These findings are in virtual agreement with those of Andrews et al (1962), Brazile et al (1971), Nickel et al (1973), Ommer et al (1995), Banerjee (1998), Pineda (2003), Gupta et al (2004), Tyagi et al (1993).

The average length of the right and left ovary were  $1.36 \pm 0.198$  and  $0.69 \pm 0.18$  cm respectively the average width of right ovary and left ovary were  $1.05 \pm 0.068$  cm and  $1.13 \pm .013$  cm respectively. These findings are more or less similar to the findings of

Gupta et al (2004), May et al (1970), Nickel et al (1973), Getty(1975), Ommer et al (1995). The average weight of right ovary was  $0.73 \pm 0.073$  gm and left ovary was  $0.76 \pm 0.074$  this observation is similar to the observation of Banerjee (1998) but it is not similar to the finding of Pineda (2003).

### **Fallopian tube**

The fallopian tube was slender flexuous tubular structure from the cranial part of genitalia of the Black Bengal goat and was continuous with the uterine horn. The beginning part and the terminal part was closed together. This part was extended from the tip of the corresponding horn of uterus in the form of narrow thick walled tube. The first part represented isthmus and second part was ampulla. The ampulla part was thinner than the isthmus. The part represented a thin funnel shaped structure infundibulum. The margin of the infundibulum was fimbriated.

The average length of fallopian tube of right side ranges from 14 to 9 cm, average  $12.18 \pm 1.073$  cm. The average length of left side range from 15 to 11 cm and average length was  $13.24 \pm 1.051$  cm. the broad ligament was enclosed the whole length of this tube.

The fallopian tube was slender tubular flexuous structure found the cranial part of the genitalia of the Black Bengal goat and it was continuous with the uterine horn the beginning part and terminal part was closed together. This part was extended from the tip of the corresponding horn of the uterus in the form of narrow thick walled tube. The first part was Isthmus, second part was Ampulla and terminal part was funnel shaped Infundibulum. The margin of Infundibulum was fimbriated. The present findings are similar to the findings of Andrews et al (1962), May et al (1970), Brazile et al (1971), Pineda et al (2003) but

not clearly mentioned regarding the different three parts of fallopian tube. Dyse et al (1987) and Hafez (1993) was has been clearly divided into 3 parts and described in literature.

The average length of left and right fallopian tube was  $13.24 \pm 1.051$  cm and  $12.18 \pm$

$1.073$  cm respectively. Hafez (1993) started that fallopian tube was 20 to 30 cm long. This statement is not similar to the present findings. Where as the present findings are in accordance with Banerjee (1998). Pineda (2003) reported that fallopian was 15 to 19 cm long. The present statement is partial agreements with the Pineda (2003).

**Table.1 Ovary**

S.n	Name of the organs	Max. range	Min. range	Mean	Standard Error	Standard Deviation
1.	Left Ovary Length (cm)	1.49	1.0	0.69	0.2135	0.18
2.	Left Ovary Width (cm)	1.20	0.9	1.13	0.1314	0.13
3.	Right Ovary Length (cm)	1.61	1.24	1.36	0.1978	0.198
4.	Right Ovary Width (cm)	1.14	0.81	1.05	0.0548	0.068
5.	Right Ovary Weight (gm)	0.97	0.55	0.73	0.123	0.073
6.	Left Ovary Weight (gm)	1.2	0.56	0.76	0.104	0.074

**Table.2 Fallopian tube**

S.n	Name of Organs	Max. Range	Min. Range	Mean	Standard Error	Standard Deviation
1.	Left fallopian tube length (cm)	15	11	13.24	1.0631	1.051
2.	Right Fallopian Tube Length (cm)	14	9	12.8	1.0347	1.073

**Table.3 Uterus**

S.n	Name of Organs	Max. range	Min. range	Mean	Standard Error	Standard Deviation
1.	Right Horn of Uterus Length (cm)	14.00	9.5	1.08	0.6354	0.61
2.	Left Horn of Uterus Length(cm)	12.5	10.00	10.93	0.6527	0.63
3.	Body of Uterus Length (cm)	1.8	1.5	1.59	0.2419	0.21

**Table.4** Vagina

S.n	Name of Organs	Max. range	Min. range	Mean	Standard Error	Standard Deviation
1.	Vagina Length(cm)	8	7	7.5	1.2135	1.98
2.	Vagina Width (cm)	7	5.5	5.98	0.3875	0.373
3.	Vulva Length (cm)	4.6	4	4.3	0.3817	0.354
4.	Vulva Width (cm)	1.4	1.2	1.32	0.1987	0.173

**Uterus**

The uterus was largest component of the genitalia. The uterus was found to be completely bicorunate. The horns were curved slightly flexuous narrow thick wall cylindrical tube and it was extended at the beginning and then became forward, upward direction. Subsequently it was downward from a small length and then proceeded forward along the floor of the corresponding aspect of the abdomen. The terminal part of the horn ended as the isthmus of the fallopian tube. The length of the horn, right and left sides were  $14 \pm 0.61$  cm and  $12.5 \pm 0.63$  cm respectively. In the horn of the uterus there was found good number of prominent mucosal folds.

The body of uterus was well developed and ranged from 1.8 to 1.5 cm and average length was  $1.59 \pm 0.21$  cm. the body was larger due to presence of common peritoneal covering on the caudal most part of the horn it was found to be dorso-ventrally flat tube and was laterally attached with the broad ligament.

The broad ligament was moderately thick and contained the vessels. The body was bifurcated cranially, formed horns and caudally continued with the cervix. The cervix was well developed and clearly visible. The wall very thick and centrally there was narrow canal.

The uterus was longest component of

genitalia. It was completely bicornuate. The horns were curved slightly flexuous, narrow thick walled cylindrical tubes. It extended at the beginning then became forward, upward direction. Subsequently it went downward for a small length and then proceeded forward along the floor of the corresponding aspect of the abdomen. The average length of right and left horn was  $10.08 \pm 0.61$  cm and  $10.93 \pm 0.63$  cm respectively. This present findings are in accordance with Getty (1975), Frandson et al (1992), Banerjee(1998), Pineda (2003), Ommer et al (1995), whereas this present findings are not similar to the findings of Dyce et al (1987). The body of uterus was well developed and short. The average length was  $1.59 \pm 0.21$  cm this findings are in accordance with Frandson et al (1992), Getty (1975), Dyce et al (1987), Ommer et al (1995), Banerjee (1998) whereas the present finding is not similar to the findings of Pineda (2003), who stated that length of body of uterus could be as long as 10 to 12 cm. the body was continued with the cervix and attached by the broad ligament. The cervix was thick, well developed and centrally has a narrow canal. This present finding is similar to the finding of Andrews et al (1962), Hafez (1993), Bearden et al (1997), Banerjee (1998), Pineda (2003).

**Vagina**

The vagina was long muscular thick walled tube and capable of great distension. It was extended caudally from the uterus to the

vestibule and was placed along the mid floor of the pelvic cavity. It was related dorsally to the rectum and ventrally to the urinary bladder.

The fornix vaginae was clearly visible. The length of vagina varies from 8 -7 cm. the average length was  $7.5 \pm 1.98$  cm. the width was  $5.98 \pm 0.373$  cm. the canal of gartner was clearly visible.

The vagina was a long muscular thick walled tube capable of great distension. It was extended caudally from the uterus of the vestibule and was placed along the mid floor of the pelvic cavity. It was related dorsally to the rectum and ventrally to the urinary bladder. The fornix vagina was clearly visible and well developed. These findings are in agreements with those of Nickel et al (1973), Banerjee (1998) who have also described that vagina was long, strait muscular tube which extended along the floor of pelvic cavity. The average length of vagina was  $7.5 \pm 1.98$  cm and width was  $5.98 \pm 0.373$  cm. these observation is similar to the observation of May et al (1970), Getty (1975), whereas this present finding are not similar to the finding of Frandson et al (1992), Hafez (1993), Ommer et al (1995), Bearden et al (1997) and Pineda (2003).

### **Vestibule and vulva**

The vestibule was found to be short and extended from the level of external urethral orifice to the ischiatic arch. The vulva was external margin of the urogenital sinus which hanged downward just below the anus. It was covered by skin with hairs. Hairs were distributed over the external surface of vulva. The length of vulva was  $4.3 \pm 0.354$  cm and width was  $1.3 \pm 0.173$  cm. The external opening and vulval cleft was bounded by the thick labia major. It formed a thick pointed projection at the

ventral commissure. The ventral commissure was further extended backward and downward and enclosed to the clitoris. The clitoris was clearly visible and prominent.

Vestibule was short and extended from the external urethral orifice to ischiatic arch. The vulva was external margin of the urogenital sinus which was hanged downward just below the anus. It was covered by skin with hairs. Hairs were distributed along the margin of labia the clitoris was well established. These findings are in accordance with Nickel et al (1973), Dyce et al (1987), Getty (1975). The average length of vulva was  $4.3 \pm 0.354$  cm and width was  $1.32 \pm 0.173$  cm. these findings are similar to the finding of Pineda (2003). But not similar to the findings of Getty (1975), Frandson et al (1992), Hafez (1993).

In conclusion, there were two ovaries each of them was oval shaped and pale in colour, organ situated in abdominal cavity behind the kidneys and supported by utero ovarian ligament both the fallopian tubes were narrow flexious, tortuous manner lobular structure extended from the tip of horn of uterus and as isthmus, ampulla and infundibulum to the situation of ovary. The uterus represented two horns and a body. The body of uterus was well developed and short the lumen of each horn represented numerous prominent longitudinal folds in whole length of tubular structure. All the above mentioned findings may be utilized by the physiologist, embryo-transfer technologist, animal breeder and other related workers for the development of the goatery husbandry.

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