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Gross anatomical picularities of the one humped camel's rectum (*Camelus dromedarius*)

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Abstract
This research work was carried out on 6 rectums of recently died camels of both male and female from 5 to 6 years age group. Rectum was situated in pelvic cavity. Rectum was present from the level of pelvis to the caudal opening of digestive tract called anus. From outer region rectum presents two parts peritoneal and retroperitoneal. The rectum of the camel was tubular in shape and was situated in the pelvic cavity. The rectum was darker at outer surface compare to inner surface and longitudinal mucosal folds present at inner surface.

Keywords: Gross, one humped camel, rectum

Introduction
The rectum is a site for temporary storage of faces. Fecal material reaches at rectum from the descending colon. Wall of rectum expands due to feces and stretch receptors of rectum stimulate to pass feces. (Barrett *et al*., 2019) [3].
Rectum is also uses to take body temperature through thermometer. Rectum is also uses in to gives medicine in animals due to absorption capacity of rectum. This results a good amount of drug absorption in circulation (Lowry, 2016) [13].

Materials and Methods
Rectum of adult camel was used to carry out this research work. Department of anatomy, CVAS RAJUVAS Bikaner was the place where this research work was conducted. Gross anatomy of rectum was conducted on 6 samples of the rectum. Samples were collected from VCC, college of veterinary, Bikaner of dead camel.
For the gross anatomical studies, dead camel was carefully dissected at pelvic cavity to get rectum due to rectum was present at pelvic cavity. Many of the physical parameters like lenth, diameter and volume were took with rectum. Measuring tape was used to take lenth and diameter of rectum. Volume of rectum was measured by water displacement method. Diameter of the rectum was took at three different portions.

Results and Discussion
The shapes of rectum was tubular, whitish red in color and opened into the anus (fig. 2 and 4) as reported previously by Hussain (2010) [9] in goat and Getty, R (2012) [7] in cattle.
The rectum present from beginning of sacculation at colo-rectal junction to recto- anal junction. These sacculations gave shape of fecal material oval to round shape. These finding were in consonance with König and Liebich (2004) [11], Bello *et al.* (2015) [5], Pérez *et al.* (2016) [14] in camel. The result was in disagreement with Heryani *et al.* (2020) [8] who mentioned that the between the colon and rectum there was no demarcation, in bali cattle descending colon continue with rectum.
It was situated from pelvis level of animal to caudal part of digestive tract called anus. These results were similar with that of Konig and Liebich (2004) [11] in horse, Getty, R. (2012) [7] in horse and Evans and Lahunta (2013) [6] in dog.

Rectum was present in the pelvic cavity as reported earlier by Hussain (2010) [9] in goat, Pérez, *et al.* (2016) [14] in camel. Rectum was attached dorsally and laterally to the pelvic walls and ventrally to the prostate, urethra's pelvic part, urinary bladder and bulbo urethral gland in male and the vagina and uterus in female (fig. 2). Raghavan (1964) [16] described similar result in horse.

Peritoneal and retroperitoneal part were present on rectum at outer region (fig. 4) as reported earlier in horse by Raghavan (1964) [16], in sheep by Raney (1968) [17], in camel by Bezuidenhout (1987) [18], in horse by König and Liebich (2004) [11] and Getty (2012) [7] in horse.

Through mesorectum, rectum's peritoneal part connected to pelvic cavity. Muscular bands and connective tissue were present arround retroperitoneal region of rectum (fig. 1), in horse and dog by Raghavan (1964) [16], in sheep by Raney (1968) [17], in goat by Hussain (2010) [9], in horse Getty (2012) [7] and Aronson (2016) [2] in dog agreed with these findings.

Inner and outer surface was present in rectum. Rectum's outer surface was darker than the inner surface (fig. 3 and 4). The inner surface of rectum had longitudinal mucosal folds as reported earlier by Smuts and Bezuidenhout (1987) [18] in camel and Agarwal *et al.* (2002) [1] in rabbit.

The result disagreed with Agarwal *et al.* (2002) [1] who mentioned that the mucosal folds were absent in dog's rectum.

Rectum's lenth was taken from the beginning of the sacculation at colo-rectal junction to the ano-rectal junction. Rectum's average length was 37.53±0.38 cm with a mean from 35 to 40 cm (Table 1).

These findings were in contrary with Jit (1974) [10] who mentioned the monkey's rectum was situated at 4th caudal vertebrae and lenth of rectum was 4-6 cm. Kotpal (1989) [12] noted that rabbit's rectum was 7.5 cm in length and Agarwal *et al*., (2002) [1] analyzed that dog's rectum was 5.30 cm ± 0.64 cm in length, Getty, R. (2012) [7] noted that the rectum of horse about one feet in length, Alpaca's rectum was 0.3-0.4 meter in length according to Maierl and Vater (2018) [19] and Heryani *et al.* (2020) [8] noted that the intestine of Bali cattle was about 50 cm in length.

The rectum's diameter ranged from 8.14 to 9.41 cm at the cranial portion, 9.47 to 12.16 cm at middle portion and 13.35 to 14.10 cm at caudal portion (Table 1).

The findings were contrary with Maierl and Vater (2018) [19] reported that the alpaca's rectum diameter was 3.5 cm and noted that Bali cattle' s intestine lenth was 36.78 cm, 371.21, 50.00 cm cecum, colon and rectum respectively and the width was 9.65 cm, 11.47 cm, and 8.85 cm. In the present study, the rectum's volume ranged from 3.23-4.24 litters. The average volume of rectum of camel was 3.64 ± 0.16 litters (Table 1).

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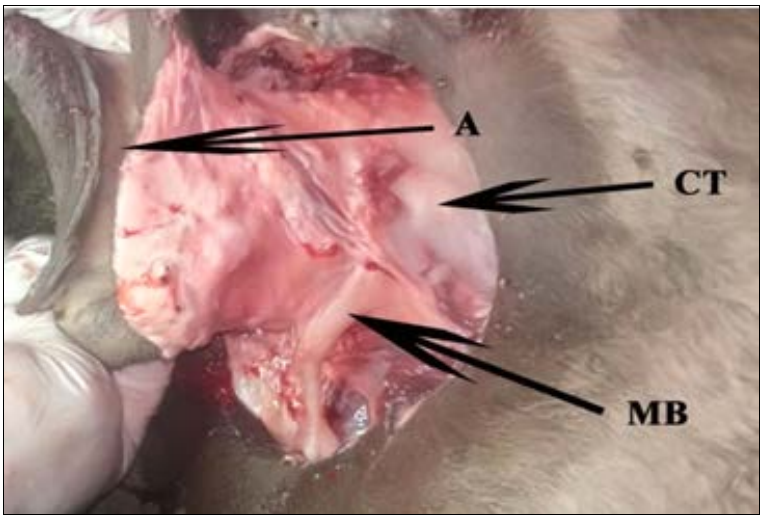

Fig 1: Photograph showing camel's rectum attachment. A- anus CT- Connective tissue and MB- Muscular band

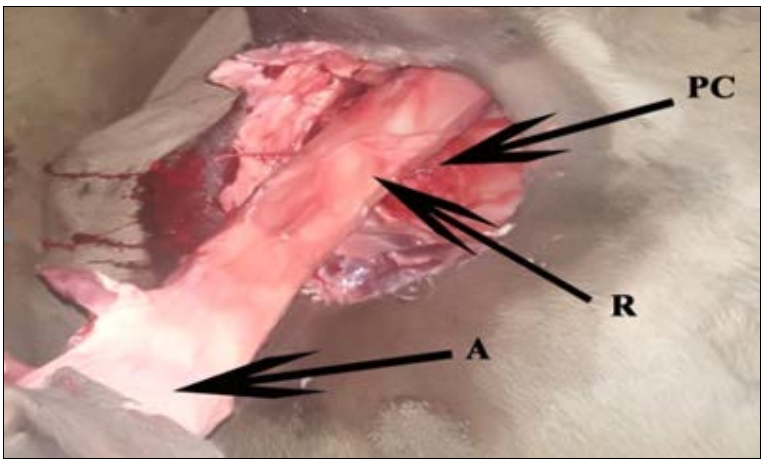

Fig 2: Camel's rectum attachment showing photo graph. R- Rectum, A- Anus, PC- Pelvic cavity

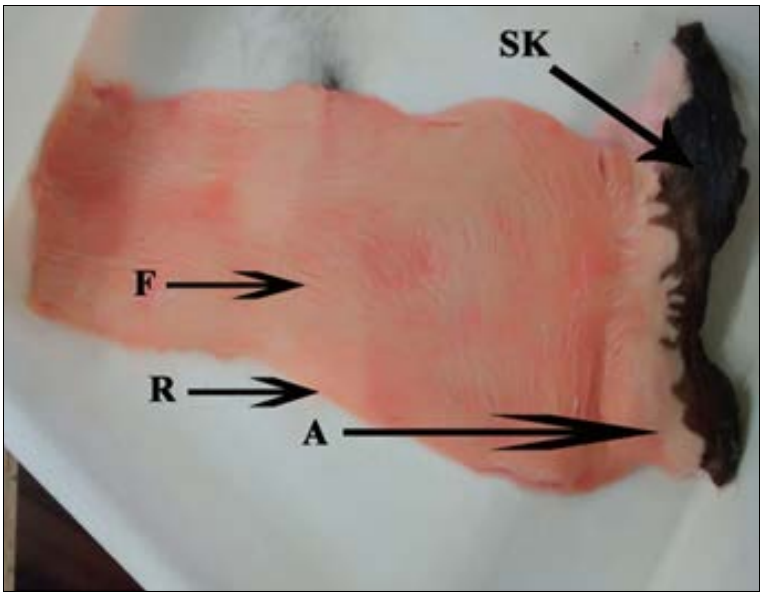

Fig 3: Rectum's internal surface showing photo in camel. F- Folded mucosa, A- Anus, R- Rectum, SK- Skin

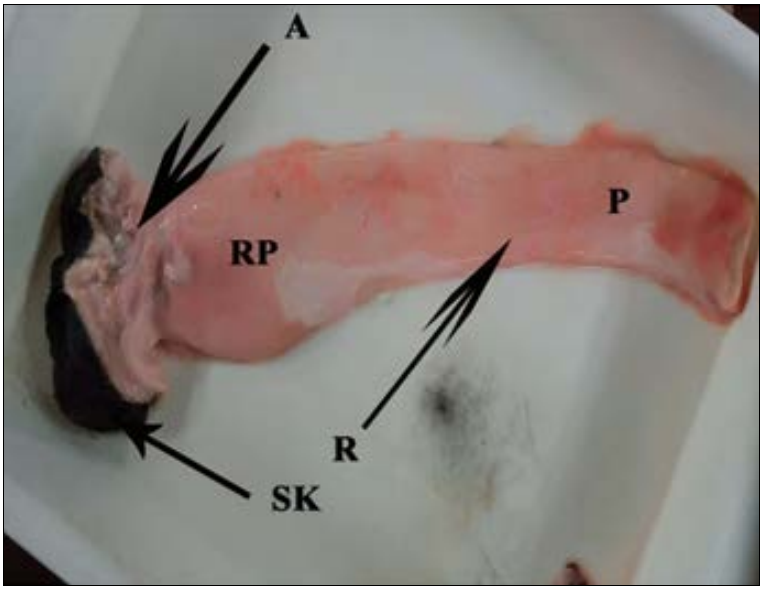

Fig 4: Rectum's outer surface showing photo in camel. A- Anus, R- rectum, P- Peritoneal, RP- Retro-peritoneal, SK- Skin.

Table 1: Table showing many physical parameters of camel rectum (*Camelus dromedarius*)

S. N.	Length(cm)	Diameter(cm)			Volume (lt)
		Caudal D1	Middle D2	Cranial D3	
1	37.00	13.49	10.47	9.02	3.58
2	36.00	13.35	10.11	8.19	3.23
3	38.00	14.10	11.14	9.35	3.94
4	38.45	13.48	10.14	8.49	3.63
5	37.40	13.49	9.47	8.14	3.23
6	38.32	13.45	12.46	9.41	4.24
Mean	37.53	13.56	10.63	8.77	3.64
Standard deviation	0.93	0.27	1.05	0.57	0.40
Standard error	0.38	0.11	0.43	0.23	0.16

Conclusion

The present study of gross anatomical study on rectum of camel tells us about that the rectum of camel was situated in pelvic cavity and it was terminal portion of large intestine which was attached with anus. The shape of rectum was tubular and situated in straight direction. It was composed by two portion peritoneal and retroperitoneal in which peritoneal part was presented before retroperitoneal. The length of camel rectum was 38-40 cm and diameter of rectum was increased from cranial to caudal. (Table no. 1)

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