# MORPHOLOGICAL STUDIES OF THE LIVER IN MARWARI GOAT (*CAPRA HIRCUS*)[#]

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**ABSTRACT**

Present study was conducted on the livers of 50 adult Marwari goats. The liver was situated entirely in the right abdominal cavity except a small portion of the ventral lobe directed obliquely downward and forward from 13th rib to 6th intercostal space. It was reddish brown in colour and somewhat rectangular in shape with two surface and four borders. The parietal surface was convex and adopted to the diaphragm. The dorsal border was thick and it was related to the right kidney. The ventral border was thin and curved. The medial border presented the oesophageal notch. The lateral border presented an umbilical fissure. The liver exhibited three distinct lobes as to dorsal, ventral and caudate. The common bile duct joined the pancreatic duct before its termination into the duodenum.

***Key words*:** Marwari goat, liver, parietal, visceral, oesophageal notch and pancreatic duct

## Introduction

Goat is well known for its production qualities and resistance to adverse climatic conditions prevailing in the arid and semiarid zone (Chahar and Barhat, 2002). In the developing countries, a number of large and small farmers rear goat for their livelihood. It is sometimes referred to as ''Poor man's cow''. Research on this species has been largely neglected, especially its anatomy. So the detailed study of the different aspects of goat anatomy is required. Selection of the species is based on the local inhabitance and meagre availability of literature on this quadruped. In present study, detailed topography of liver of Marwari goat has been enlighten.

## Materials and Methods

The present study was conducted on fifty apparently healthy adult Marwari goat (*Capra hircus*) of either sex. The livers were procured from the freshly slaughtered animals at Municipal Slaughter House, Bikaner. After dissecting the abdominal viscera relations of the liver with other visceral organs and its topography were studied.

## Results and Discussion

The liver was somewhat rectangular, exhibiting two faces and four borders (Fig. 2 and 3). It was distinctly lobated and strongly curved and accurately adopted to the abdominal face of the diaphragm. It's colour was brown to reddish-brown in the fresh state. In this study, the goat liver was somewhat rectangular, exhibiting two surfaces and four borders and was distinctly lobated.

## Position

In the present study, the liver of Marwari goat was situated entirely to the right of the median plane in the abdominal cavity except a small portion of the ventral lobe. Its long axis was directed obliquely downward and forward from the 13th rib to the 6th intercostal space (Fig.1). In sheep May (1955) and Pareek (2000) found similar position of liver. While in ruminants Sisson and Grossman (1958), Raghavan (1964), Prasad and Sinha (1980) and Dyce *et al.,* (1996) found similar position of liver.

## Borders

The medial border presented oesophageal notch below its middle, above which the posterior venacava was deeply embedded in this border. It was in agreement with the findings of May (1955), Getty (1977) and Pareek (2000) in sheep, while Raghavan (1964) and Nickel *et al.,* (1979) have reported that in ruminants the posterior venacava was partly embedded in the medial border above the oesophageal notch. The lateral border of the liver in Marwari goat, presented a deep umbilical fissure as reported by May (1955), Raghavan (1964) and Getty (1977) in domestic animals. Dyce *et al.* (1996) described the much deeper notch in sheep and goat as a differentiating point between liver of large and small ruminants. The dorsal border in Marwari goat was noted to be very thick. It presented a deep impression formed by the right kidney and a smooth area related with caecum. These findings resembled with the finding of May (1955) and Pareek (2000) in sheep and Raghavan (1964) in ox. It was compared with the findings of Grossman (1960) in camel, Getty (1977) in ox and Prasad and Sinha (1980) in buffalo, who observed adrenal impression on the dorsal border, in addition with impression of right kidney. The ventral border was smooth and curved which was agreed by Raghawan (1964) in ruminant liver, with an exception in the finding of Smuts and Bezuidenhout (1987) who stated that the ventral border was thick and marked by numerous fissures in camel, whereas Grossman (1960) mentioned the thin ventral border in camel.

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**Surfaces**

The parietal surface was convex, which for the most part, adopted to the right half concavity of the diaphragm; remaining surface was related to the 10th to 13th ribs and the intercostal muscle and impressions of respective ribs were seen. The falciform ligament was attached to this surface, extending from the oesophageal notch to the umbilical fissure. A small area at the dorso-medial part was adherent to the diaphragm (Fig. 2).

The visceral surface was concave and very irregular, faced caudoventrally. It presented a portal fissure, almost in middle, little towards medial border. The fissure was a depression bounded by the lesser omentum. The portal vein, hepatic artery, lymph vessels, hepatic nerves and the hepatic duct entered and left the gland through the portal fissure (Fig.3). The parietal surface was convex in Marwari goat and the convexity for the most part adapted to the right half concavity of the diaphragm. The remaining surface was related to the 10th to 13th ribs and impressions of respective ribs were seen. It was not confirmed by May (1955) and Pareek (2000) who reported in the sheep that the parietal surface was related to the diaphragm and to a small extent to the last two or three ribs near their angles. But the findings of the present study were similar to Prasad and Sinha (1980) who described the costal impressions of the last four ribs on the parietal surface of the liver in buffalo.

The visceral surface of the liver was related to the reticulum, omasum, duodenum and gall bladder. The visceral surface also exhibited relation with few coils of small intestine in Marwari goat, which was not reported previously in any species of ruminants although Sission and Grossman (1958) mentioned that coil of small intestine may also lie on this surface in horses. They have also reported an impression of spleen on this surface in the horse, which was not found in sheep.

The visceral surface presented a distinct portal fissure, from where the portal vein, hepatic artery, hepatic nerve entered into the liver and lymph vessels and hepatic duct left the gland. Ventral to the portal vein three or four hepatic lymph nodes of various sizes were found at the fissure. Similar description was also mentioned by May (1955) and Pareek (2000) in sheep, Modekar *et al.* (2003) in the goat, Prasad and Sinha (1980) in buffalo, Raghavan (1964), Getty (1977), Nickle *et al*., (1979) and Dyce *et al.* (1996) in ruminants.

Other than portal fissure, this surface exhibited following features (Fig.3).

- A fossa extending from the fissure upto the lateral border which was the impression of the gall bladder. There was a rough area of adhesion of gall bladder on the middle of the fossa.
- In between caudate lobe and gall bladder fossa, the duodenum and part of the caecum were related to the surface.
- Below the fossa, it presented a fissure for the round ligament called umbilical fissure.
- Below the fissure the surface exihibited abomasal impression and few coils of small intestine were also related to this surface.
- The reticular impression was present left to the above.
- The Omasal impression was situated left to the portal fissure, above the reticular impression.

**Lobation**

The goat liver presented distinct lobation. It was divided

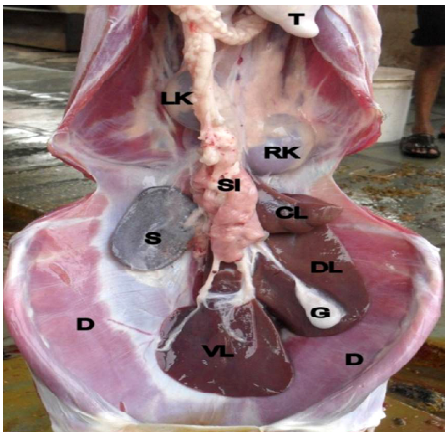


Fig. 1: Photograph showing position and relation of the liver. (CL) caudate lobe, (DL) dorsal lobe, (VL) ventral lobe, (S) spleen, (RK) right Kidney, (LK) left Kidney, (D) diaphragm, (SI) small intestine, (G) gall bladder

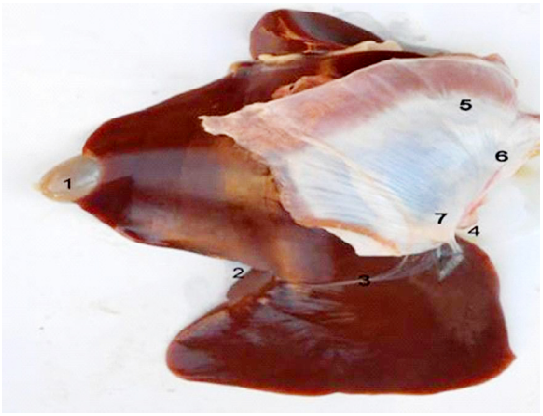


Fig. 2: Parietal surface of liver. (1) gall bladder, (2) umbilical fissure, (3) falciform ligament, (4) oesophageal notch, (5) right lateral ligament, (6) coronary ligament, (7) left lateral ligament.

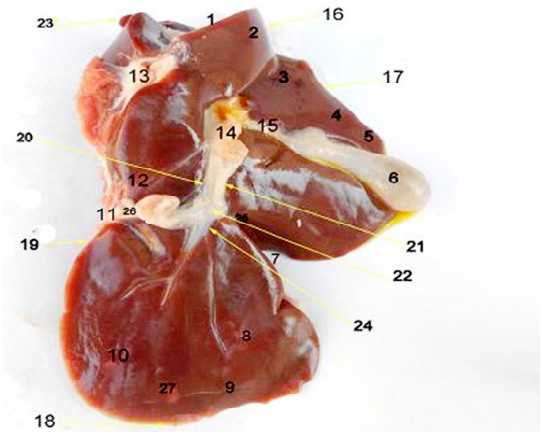


Fig. 3: Visceral surface of liver. (1) Rt. kidney impression, (2) caudate lobe, (3) caecum impression, (4) duodenal impression, (5) dorsal lobe, (6) gall bladder, (7) umbilical fissure, (8) abomasal impression, (9) coils of small intestine, (10) reticular impression, (11) oesophageal notch, (12) omasal impression, (13) posterior venacava, (14) lymphnode, (15) cystic duct, (16) dorsal border, (17) lateral border, (18) ventral border, (19) medial border, (20) portal vein, (21) hepatic duct, (22) hepatic artery, (23) papillary process, (24) portal fissure, (25) round ligament, (26) lesser omentum, (27) ventral lobe.

into three lobes (Fig. 3**)** on the visceral surface the round ligament extended from the umbilical fissure to the umbilicus which divided the organ into a large dorsal and a small ventral lobe. On the parietal surface the line of attachment of falciform ligament marked the division of ventral and dorsal lobe (Fig. 2), which was also observed by Nickel *et al*., (1979) in ruminants, Prasad and Sinha (1980) in buffalo and May (1955) and Pareek (2000) in sheep. The visceral surface exhibited other two distinct lobes. A caudate lobe above the portal fissure, which was somewhat pyramidal, blunt pointed, overlapped the part of dorsal lobe, having a deep indentation for the right liver. A nodular papillary process was also present. The dorsal lobe was large and caudate lobe was the smallest.

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