



## Some anatomical and histological studies on the placenta of goats in Dhamar, Yemen

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### ABSTRACT

The aim of study was to perform a comparative analysis of the morphological features of the placenta of Yemeni goat breeds. The study was carried out on twenty placentae of pregnant goats obtained from Dhamar slaughterhouses. The samples were collected from both uteri of different CVRL from 1 – 30 cm. Their fetal ages were estimated according to the CVRL. The results revealed that the type of placenta in goats is typical syndesmochorial. The chorionic villi were not branched. One type of epithelium was distinguished covering the villi, those cells were the syncytiotrophoblasts. Interdigitation was observed between the villi and the endometrial folds. The Hofbauer's cells were detected in the last stages of gestation. The number of placentomes was ranged from 40 – 60. It is concluded that that the Yemeni pregnant goats possess polycotyledonary placenta. The modification in the shape and size of placenta increases with gestational age in response to pregnancy progresses.

**Key words:** Dhamar, Goat s, Placenta, Studies, Yemen.

### INTRODUCTION

The goats have been received considerable attention in Yemen by many studies due to their importance in increasing income of farmers and rural people as well as country economy. They provide food of high biological value necessary for human body, raw materials for various industries and natural fertilizer to keep the fertility of agricultural soil.

The placenta is pivotal to foetal development because it mediates the supply of substrates and waste products between the dam and the foetus (Igwebuike, 2010).

A huge data knowledge on placenta morphology of ruminant animals are reported by many workers in different geographical regions of the world (Moniem, 1976; Sharma et al 1988; Chazi et al., 1994; Basha, 1994; Lee et al., 1995; Wooding et al., 1997; Schmidt et al., 2004; Leiser and Pfarrer, 2005; Igwebuike, 2006 and Udensi et al., 2013). However, there is a paucity of information on the structure of the placenta of the Yemeni goat breeds. Therefore, the present study was carried out to investigate anatomical and histological modifications of the placenta of the Yemeni goat breeds in Dhamar, Yemen.

## MATERIALS AND METHODS

The uteri and placentae of twenty pregnant female goats were collected from slaughterhouses of Dhamar areas, Yemen and examined. The gestation stages were determined by measuring the crown-rump lengths (CVRL) of foeti. The gestation period was divided into three stages early, mid and late stages of pregnancy.

The gross anatomical features of the placenta, including the shape and distribution of the placentomes were studied according to the techniques described by Igwebuike (2010). The number of placentomes in each gravid uterus was determined.

Histological studies were carried out according to techniques described Wooding (2006). In brief, whole placentomes from each of the gravid uteri were cut free in a Petri dish containing a fixative agent, Bouin's fluid. Each placentome was positioned in a manner that the foetal side was uppermost. The placentome was sliced across the centre to produce 3-4 mm thick slices, the full length of the placentome. The slices were immersed in Bouin's fluid for 5 minutes. Thereafter, each slice was placed flat on a Petri dish in a pool of fixative, and "matchsticks", about 3 x 3 mm in cross section across the full depth of the placentome, from the foetal to the maternal surfaces were cut. These were fixed in Bouin's fluid overnight. Following dehydration in graded concentrations of ethanol, the specimens were passed through xylene and embedded in paraffin wax. A rotary microtome was used to cut 6-7  $\mu$ m thick sections that were subsequently stained with haematoxylin and eosin for light microscopy. Photomicrographs were captured using digital camera.

## RESULTS

The anatomical studies results revealed that, The placenta of the goats take several shape in gross distribution of the chorionic villi, the villi developing scattered patches or cotyledons opposite the endometrial caruncles, each cotyledon and associated caruncle forms a separate unit or placentome, the number of

placentomes was ranged from 40 – 65. The caruncles varies in shape from early pregnancy (0.5 cm - 1.5 cm), mid period of pregnancy (1.5 cm -2.5 cm) to the last stages of pregnancy (2.5 - 3.5 cm). The shape of placentome has no development a caruncle stalk. (Fig.3).

The endometrium of goat uterine has rounded to ovoid dome shaped and gland free caruncles, of covers by simple columnar epithelium of non ciliated occur in the epithelium of intercaruncular areas (Fig.7-8). The terminal villi have trophoblastic lining over the connective tissue, it has high density of giant cell in trophoblast, The chorionic epithelium contain giant binucleated cell and bear microvilli.

At 20-30 cm CVRL:

The chorionic villi were highly vascular and appeared longer and thinner than in preceding stages, also the maternal folds were highly vascular and contained vasculated or edematous regions (Fig.9). The folds were interdigitated in long chorionic villi of placenta, the covers of villi were still filled with loose mesenchymal tissue. The endometrium in some areas revealed deep crypts in which the chorionic villi of the Placenta was lodged (Fig. 11). The cores of villi stroma revealed large Hofbauer cells of rounded or ovoid shapes with an eccentrically situated deeply stained nuclei. The villi (Fig. 12) were covered only one type large polyhedral cytotrophoblasts with highly acidophilic cytoplasm in between the basal portions of cells an extended blood capillaries were seen as pale or clear small areas , The cells were stratified in some regions of the villi but of only one layer in others some large or giant cells with binucleation could be observed in between the cytotrophoblasts at this stage the placenta could be considered as typical epitheliochorial type.

## DISCUSSION

In this study, the goat placenta is classified as cotyledonary and syndesmochorial on the basis of its gross anatomical and histological characteristic. The chorioallantois is lined by cells of trophoectodermal epithelium from

external surface as trophoblast cells. These cells are mononucleated trophoblast cells. The results of this study are in agreement with findings of Wooding et al. (1997); Black et al. (2002); Igwebuikwe (2006), and Leiser et al. (2006) in ruminants, while in contrast with findings of Basha (1994) and Ghazi et al. ((1994) who studied the placenta of camels and other ruminant placentae. The contrary between current study results and some above workers could be attributed to some changes during development of animals. Furthermore, Enders et al. (2004) reported that the placenta of sheep is syndesmoeplithelichorial. This result in line with finding of present study.

The number of placentomes in the present study was ranged from 40-60. This is disagreed with findings of Wooding et al. (1997). The differences could be attributed to the factor of maternal nutrition and body conditions.

The results of this study revealed that, the caruncles is covered by simple columnar epithelium of non ciliated cells. These results are in accordance with findings of results Schmidt et al. (2004) whos studied the placenta of ruminants.

Regarding the vascularity of the chorionic villi, Basha (1997) found, in human, the vascularity begins at the second month of pregnancy and in the second trimester, the

stroma of villi was containing Hofbauers cells, in the present study, the vascularity appeared well at 18 cm CVRL and increasing to full term, though the invading of blood capillaries to the deep situations of the cytotrophoblasts on the chorionic villi was only apparent in the latter stages of pregnancy. Lee et al. (1995) cited that high vascularity of the epithelium of cytotrophoblasts are occurred along with the whole gestation period in same species.

In this study, the cytotrophoblasts in the intervillous areas were taller that those on the villi, it has been suggested that the areas of intervillous situations to be sites of absorption of nutrition substances from the mother through the agency of the uterine glands (hostatroph), while the vascular villi constitute the sites of transimission of the more diffusible substanes (haemotrophas). Moniem(1976) studied the placenta of camels and reached to similar results.

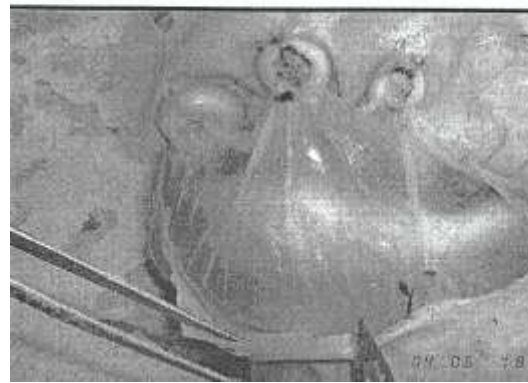
In conclusion, this study has demonstrated that the Yemeni pregnant goat posses cotyledonary placenta. The modifications in shape and size placenta increases with gestational age in response to pregnancy progresses

#### **. ACKNOWLEDGMENT**

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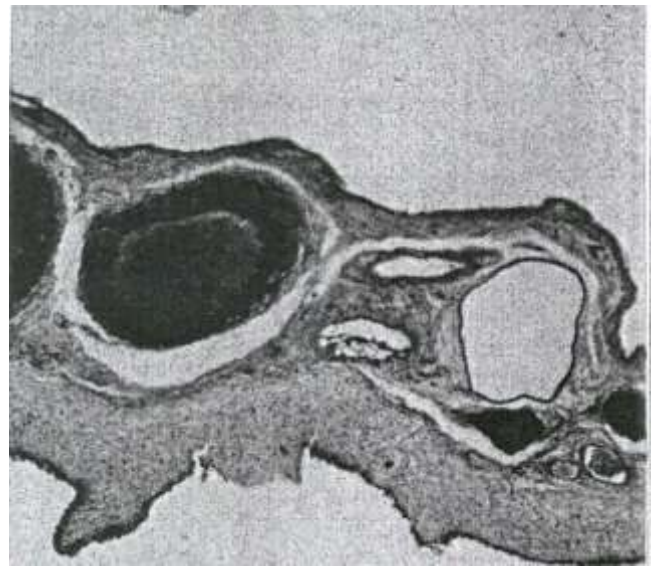
**Fig.(1):** Pregnant uterus of the goat showing the fetal portion of placenta.



**Fig.(2-3):** Pregnant uterus of the goat showing the maternal portion of placenta.



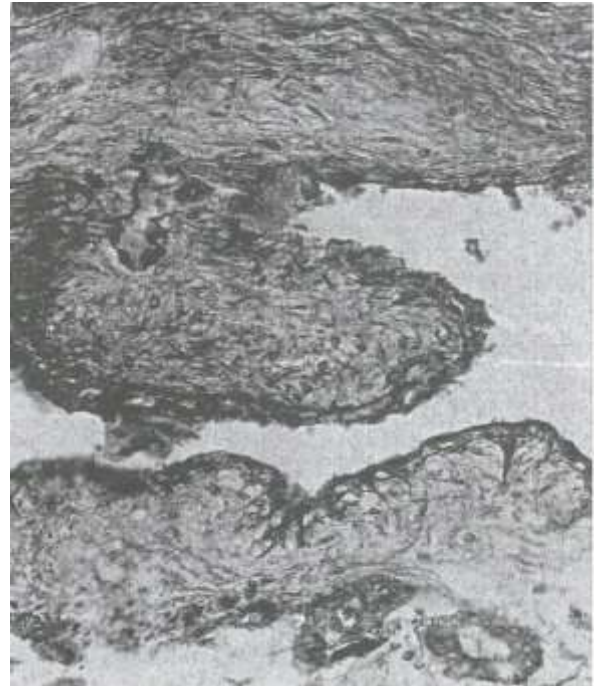
**Fig.(4):** Placenta of the goat fetus of 7 cm CVRL showing slaughter sheet of epithelium of the endometrium in some areas , compact endometrial layer and endometrial glands. H&E st. X40.



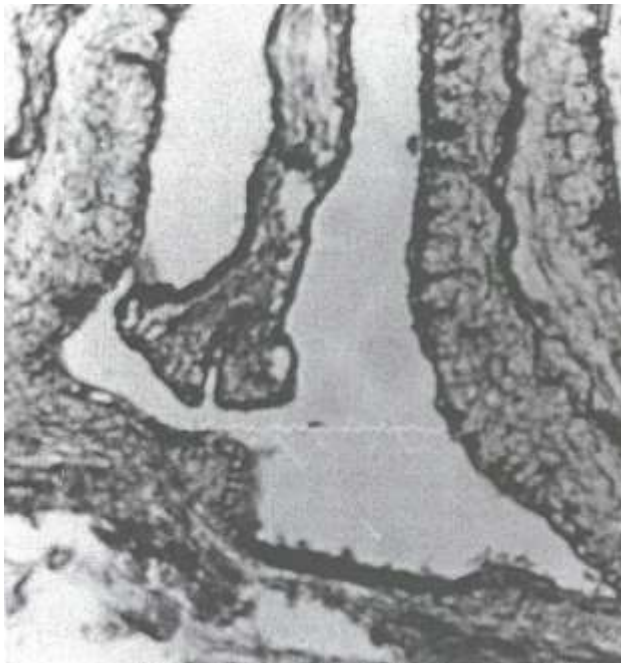
**Fig.(5):** Placenta of the goat fetus of 18 cm CVRL showing sheet of unbranched villi, blood vessels of chorion engorged with blood. H&E st. X100.



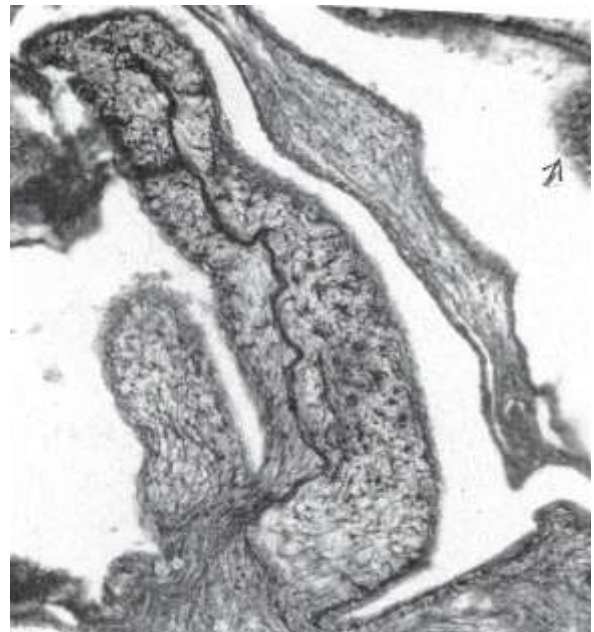
**Fig.(6):** Placenta of the goat foetus of 18 cm CVRL showing the chorion ering epithelium of deciduas basalis of cuboidal or flat cell and endometrial gland. H&E st. X40.



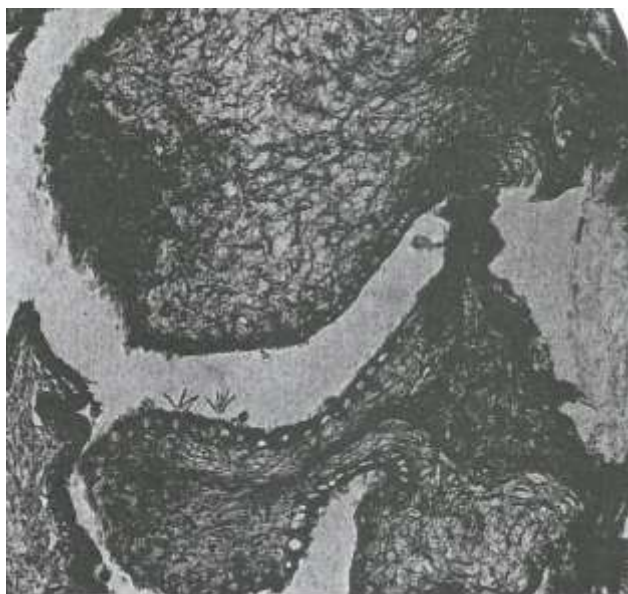
**Fig.(7):** Placenta of the goat foetus of 21 cm CVRL showing the syncytiotrophoblast (arrow) H&E st. X200.



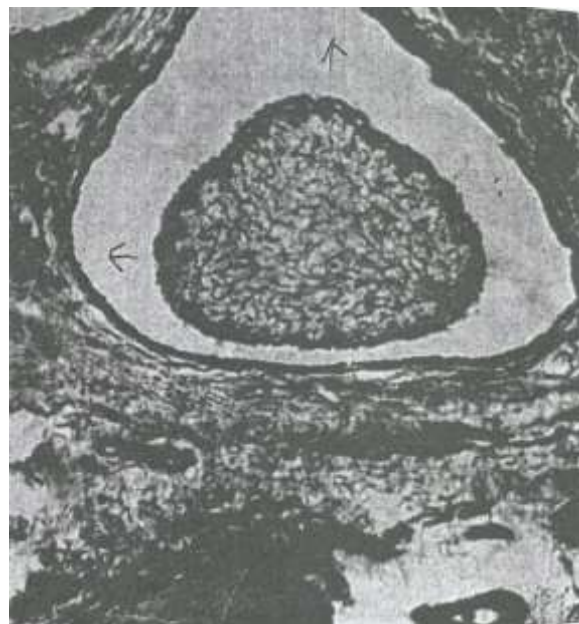
**Fig.(8):** Placenta of the goat foetus of 36 cm CVRL showing the villi of narrow neck, cytotrophoblasts and the core of villi. H&E st, X40.



**Fig.(9):** Placenta of the goat foetus of 40 cm CVRL showing highly developed villi and areolae. H&E st. X100.



**Fig.(10):** Placenta of the goat foetus of 40 cm CVRL showing cytotrophoblast were forming stratified layer and the maternal portion having an interrupted sheet of flat covering epithelium. H&E st., X100.



**Fig.(11):** Placenta of the goat foetus of 40 cm CVRL showing highly vascularized central core of chorionic villi and endometrial glands. Alcian blue-Pas combination, X40.

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## التركيب التشريحي والنسيجي للمشيمة في الماعز البلدي في محافظة ذمار – اليمن

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### الملخص

أجريت هذه الدراسة على ٢٠ عينة من الرحم به أجنة في أعمار مختلفة وذلك لتوضيح التركيب التشريحي والنسيجي للماعز البلدي في محافظة ذمار. ووجد أن المشيمة في الماعز البلدي تتكون من فلقات والمسافات بين الفلقية، وكان متوسط عدد الفلقات ٤٠-٦٠ فلقة. تتكون من القرص المشيمي والخملات. وقد لوحظ أن الخملات تبدأ بسيطة وغير متفرعة وتبادل ثنائياها مع الرحم مع ظهور خلايا هيغبر. وتم تسجيل ومناقشة النتائج مع ما سبق نشره في هذا المجال في كل من الحيوانات والإنسان.