

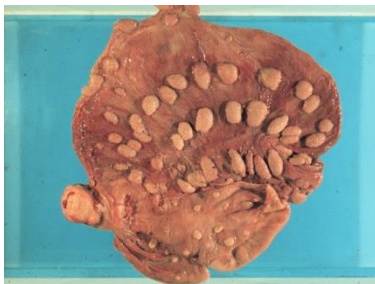
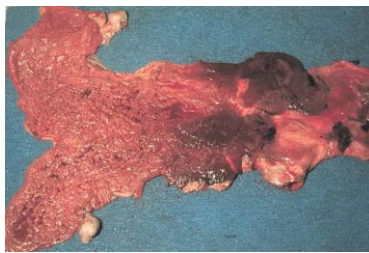
# SECTION 1 FEMALE THERIOGENOLOGY

## 1.6.2 GROSS EXAMINATION OF THE PLACENTA

### GENERAL INTRODUCTION

Functional anatomy of the placenta is a study of form and function that highlights great diversity amongst the species. Dr K Benerischke spent a lifetime studying comparative placentation and his ebook has an extensive listing of placentas (<http://placentation.ucsd.edu/homefs.html>).

The fundamental purpose of the placenta is to provide for the fetus.



**Figure 1. Normal postpartum endometrial surface of the mare (upper), cow (middle) and dog (lower).**

The three main membranes are the chorion, allantois and amnion. The common names of the

membranes you see are Chorioallantois and Amnion (which is actually the allantoamnion).



**Figure 2. Placental membranes and bovine fetus.**

The amnion is a smooth translucent membrane that surrounds the fetus. It holds amniotic fluid. This fluid is produced by the amniotic membrane, and within it floats squames from the epidermis of the fetus. The fetal side can usually be identified by the presence of epidermal tissue known as amniotic plaques. These are most numerous on the umbilical cord.



**Figure 3. Amniotic plaques on the fetal side of the amnion. Bovine.**

Mineral is often present in the chorioallantois in early pregnancy.



**Figure 4. Normal placental mineralization. Bovine.**

Amniotic fluid is swallowed by the fetus; post partum sampling of amniotic fluid is possible by taking stomach content. Fetuses do not inhale amniotic fluid past the larynx – unless they are stressed. Likewise, meconium is not normally present in the amniotic fluid unless the fetus is distressed and defecates. Fetuses covered with meconium are said to have ‘fetal diarrhea’.

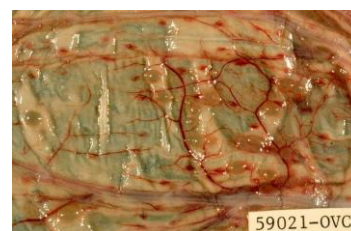
The chorion is the layer that contacts the mother. It is an important barrier between maternal and fetal tissues. Maternal blood does NOT flow through the fetus. The fetus has only fetal blood. In most species it is fused with the allantois to form the chorioallantois. Some call it the allantochorion though!

The allantoic cavity, where it exists, contains fetal urine, and other fluids that arise from the membrane itself. The umbilical cord takes blood to and from the placenta, and it has the urachus that empties into the allantois. It has 2 umbilical arteries, an umbilical vein and a urachus. The cord in the amniotic cavity is often dotted with amniotic plaques, and is occasionally gently twisted.

Schlafer DH, Fisher PJ, Davies CJ. (2000) The bovine placenta before and after birth: placental development and function in health and disease. *Animal Reproduction Science* 60-61: 2000. 145-160.

## **THE PIG**

The chorionic surface of the porcine placenta has small microscopic projections or villi. They are barely recognizable grossly. Chorionic cysts are found in the placenta of pigs – these are where the secretion of uterine glands is trapped. This secretion is part of what is called histotrophic nutrition. Prominent mineralization of the membranes is seen. Pig placentas have necrotic tips where adjoining placentae touch.



**Figure 5. Chorionic surface with mineralization and chorionic cysts in a porcine placenta.**

## **THE HORSE**

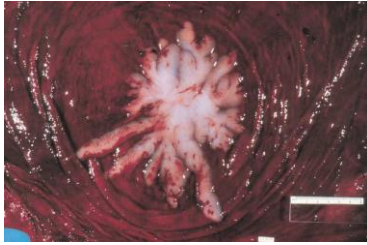
In the horse, the amnion and the chorioallantois are completely separate. The chorionic surface is microcotyledonary and gives it a luxuriant velvety appearance. The equine placenta, like the pig placenta, received nutrition from uterine gland secretion (histotrophic nutrition) and from diffusion from maternal tissues (hemotrophic nutrition).



**Figure 6. Chorionic surface of equine placenta**

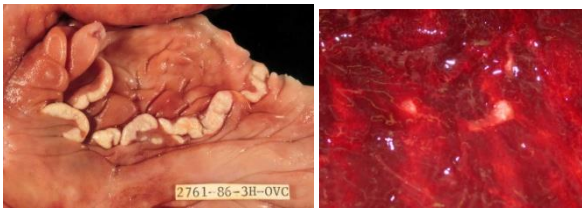
Avillous regions are located in those areas where the trophoblasts do not contact the endometrium – over large vessels, at the uterotubal junctions, and at the cervix

where the appearance of the avillous regions is star shaped to form the cervical star.



**Figure 7. An avillous region of equine placenta – the cervical star.**

The avillous chorioallantoic pouches are formed over the sites of the endometrial cups. The pouches are dotted around the chorion near the fixation (attachment) site of umbilical cord. Endometrial cups are formed by trophoblasts that invade the endometrium. They form the placental hormone equine chorionic gonadotrophin (luteinising hormone) from day 38 to 150 of gestation. They are immunologically destroyed by the mare.



**Figure 8. Endometrial cups (left) and corresponding chorioallantoic pouches (right). Horse.**

Hippomanes and allantoic pouches (also called polyps) are often found in the horse allantois. Hippomanes are present in virtually all equine placentae and are proteinaceous soft calculi. They also occur in the placentae of cows, sheep, and lemurs! Some are found in the amniotic cavity too.



**Figure 9. Hippomane from allantoic cavity. Horse.**

Allantoic pouches are pedunculated structures attached to the allantois. They are incidental in most cases.

Yolk sac remnants are less frequently found, and when present are attached to the umbilical cord at the junction with the allantois. They often are mineralized.

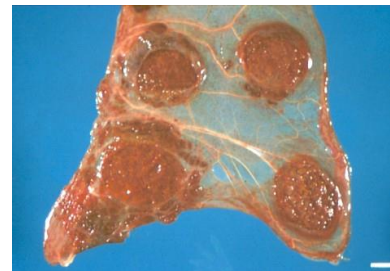


**Figure 10 Yolk sac remnant. Horse.**

The umbilical cord of the equine fetus is normally 36 and 83 cm long, and the insertion site should be at the junction of the horn and body of uterus. It can have up to 3 (or 4) twists)

### **THE COW**

The ruminant has a cotyledonary placenta with cotyledons and intercotyledonary regions.



**Figure 11 Cotyledons of a bovine placenta with adventitial placentation (left lower).**

The exchange unit is the placentome made up of cotyledon (fetal) and caruncle (maternal). The cotyledonary (chorionic) surface of the placental membranes often has additional regions or adventitial placentation. This is assumed to be an attempt at compensatory hyperplasia, however it is seen as an age associated change.

The amnion of ruminants is fused with the allantois over the dorsum of the fetus.

The normal intercotyledonary placenta is clear enough to read a book through. The normal cotyledon is red and evenly coloured. Autolysis makes the placenta appear paler than normal, and autolysis affects the entire placenta, not just one part.

The placentomes develop in 4 rows, two dorsal and two ventral. There are 70-140 placentomes that have an exchange area of more than 18 sq m. Fetal growth is correlated with vascular development within the placentome. Placentomes increase in size during pregnancy and the largest ones are found nearest the attachment of the umbilical vessels. A cotyledon larger than 15 cm diameter in the bovid is regarded as increased in size. After birth, the surface of the caruncles dies and is lost in the lochia, usually by day 12 postpartum (PP). Reepithelialization occurs in about 21 days PP. Because the outer part of the caruncle is lost anyway, it can be sampled without damage to the future reproductive capacity of the cow. Such sampling is recommended when there is no placenta for examination. Caruncles should never be twisted off, but the cotyledon can be gently peeled off the caruncle.

Placentomes have a capacity to compensate for loss, and they do so by hypertrophy, as functional area is lost; remaining placentomes become larger. There is also the facility for additional or adventitial placentation to occur.

### ***THE DOG AND CAT***

Domesticated carnivores have a zonary placenta. Interdigitation of fetal and maternal tissues occurs in the center of the girdle (called the labyrinth) and there are marginal hematomas at the edges of the girdle. The outer portion on each side is called the polar zone. The amnion is separate from the allantois.



**Figure 12. Zonary placenta. Canine**