

## Study of stomach morphogenesis in sheep fetus

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**Abstract :** This study is performed to specify the rate and method of different parts of stomach and per formation, evolutionary and topography of them in sheep fetus, 14 sheep fetus in 38, 40, 45, 47, 52, 58, 66, 75, 80, 88, 103, 130, 150 days old was selected. 50 sheep pregnant uterus was selected from slaughter house and after aging and tagging, established in buffer 10% formalin. Then, we do autopsy on samples and evaluate the stomach position. Omasum in near 30 days old was seen toward of reticulum and results showed that grow thing mode is on vertical axis in 38 days old rumen is the biggest part and is in front of reticulum. In 47 days old rumen and reticulum size is equivalent. In near 52 days old rumen is grow thing and moving toward caudal and reticulum is moving for ward. In 66 days old rumen was the biggest part comparably and reticulum was seen in front of the other parts. In 103 days old, abomasums is very larger and extended and in 110 days old was the biggest part of stomach. Evaluations showed that at first rumen is in anterior position gradually rumen is growing and is moving to caudal, dorsal side of abomasums. At the end, reticulum is moving forward from under side of rumen and will be the highest anterior part of stomach. [Sajjad Hejazi, Hossein Erik-aghaji, **Study of stomach morphogenesis in sheep fetus**. *Life Sci J* 2013;10(5s):659-663] (ISSN:1097-8135). <http://www.lifesciencesite.com>. 116

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### Introduction

Ruminants stomach are composed of four parts, rumen, reticulum, omasum and abomasums that the first three part is non glandular and the last part is glandular because of the appearance different ideas are based on that the first part is result from esophagus gradually growth and the other part from primary stomach stomach is the biggest sac shape of animal digestive tract that is between esophagus and duodenum. The primary stomach is positioning on longitudinal axis because of rations changes and moving from dorsal position to the left side. Also, a simultaneously torsion on horizontal axis is occurring that cause pylorus moving to the right and forward side. This study is performing to specify the rate and method of different parts of stomach and per formation and evaluation of them. It is important to notice that we studied biometric sizes also.

### Materials and method

Embryo samples were selected from slaughter house in 3 months and the ages of them were computed as  $X = 2.1(Y+1)$  formula. Then samples were tagged and holded in 10% formalin for 2 weeks. Perior to study, embryos were divided into 14 age groups. These age groups were divided into 38, 40, 45, 47, 52, 58, 66, 75, 80, 88, 103, 110, 130 and 150 days old groups. 3 samples were selected for all of the ages and the most suitable of them were evaluated. Studies started from light ages, in mature are available autopsies was started by opening of

abdominal cavity of embryos, at first, we extracted the liver and then separated whole of stomach from abdominal cavity, we used loop in small samples for watching better. The cases were registered and finally compare with the other findings.

### Results

In abdominal cavity topography findings in 38 days old embryo, stomach is tube form and that means is that it is originated from digestive tract. There are some small bulbs in digestive tract that transforms to rumen, reticulum, omasum and abomasums. Rumen bulb is hardly visible in front of treat and reticulum and omasum bulb side too. Omasum is seen as a very small swelling between rumen and reticulum at right side. In 40 days old embryo the findings distinguished that all of the four parts of stomach is seen as a longitudinal tube with swelling bulbs. The most cranial bulb is rumen with dorsal cranial position and reticulum's position is as a caudal ventral position to rumen. Pylorus has a pup shape and abomasums is the biggest bulb. Omasum bulb is in front of reticulum. In 45 days old embryo, rumen is at the most cranial part of the stomach. Reticulum is swelling at the left side of rumen and whole of abomasums was seen as larv shape in caudal part. Pylorus is moving to the bottom side with a hard angle in 47 days old embryo, rumen is at the most cranial part of stomach and reticulum is extended as high as rumen.



Fig1: Topography of sheep fetus abdomen at 38days gastation, A,C)right & B,D)left view. 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor 6)crown 7)rump



Fig2: Topography of sheep fetus abdomen at 40days gastation, A,C)right & B,D) left view, 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor

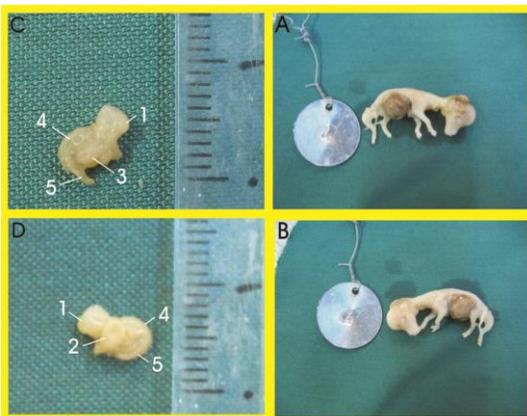


Fig3: Topography of sheep fetus abdomen at 45days gastation, A,C)right & B,D)left view, 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor

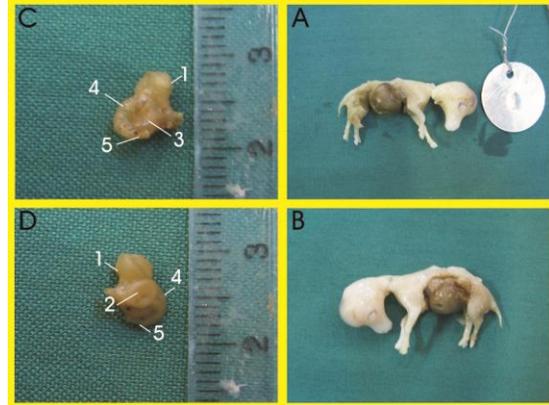


Fig4: Topography of sheep fetus abdomen at 47days gastation, A,C)right & B,D)left view, 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor

Also, reticulum is in posterior part of rumen and abomasums is in posterior part of stomach too. Pylorus is in the larv form towards and omasum was seen at the right side of stomach in 52 days old embryo, rumen is pushing reticulum toward by a caudal movement. Rumen clefts are obvious and clear and reticulum is the most cranial part of stomach abomsum is moving dorsally to the bottom part of rumen and reticulum. Abomasums is moving forward with a hard angle in 58 old embryo, the situation is like 52 days old embryo reticulum is on forward side of rumen and longitudinal clefts is very obvious omentum connections is visible and abomasums is standing as horizontal position at left side obomasum's pylorus is moving forward.

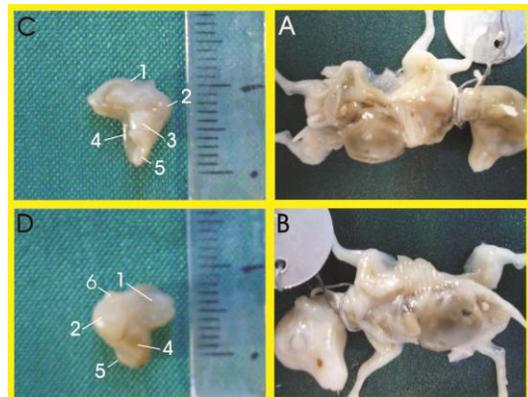


Fig5: Topography of sheep fetus abdomen at 52days gastation, A,C)right & B,D)left view. 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor

Omasum is at right side and under reticulum. Behind in abomasum's fundus. In 66 days old embryo, rumen septum is completely hyaline and thinner than other parts of stomach in these embryos group blind sacs is seen un-noteable.

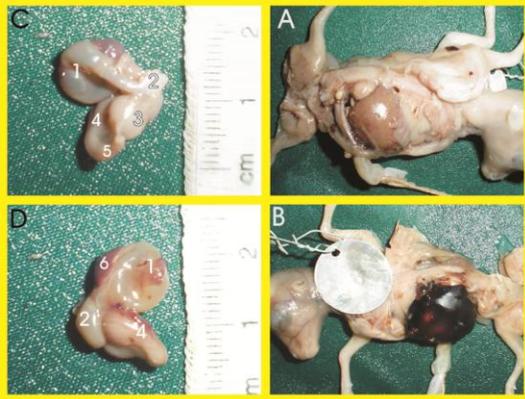


Fig6: Topography of sheep fetus abdomen at 58days gastation, A,C)right & B,D)left view, 1)rumen 2)retinaculum 3)omasum 4)abomasum 5)pylor 6)spleen



Fig7: Topography of sheep fetus abdomen at 66days gastation, A,C)right & B,D)left view, 1)rumen 2)retinaculum 3)omasum 4)abomasum 5)pylor 6)spleen

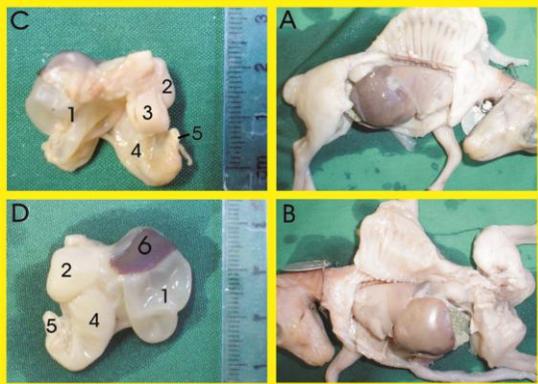


Fig8: Topography of sheep fetus abdomen at 75days gastation, A,C)right & B,D)left view, 1)rumen 2)retinaculum 3)omasum 4)abomasum 5)pylor 6)spleen

In 75 days, old embryo, reticulum is on front of rumen and rumen is standing caudal – dorsal position. Rumen septum is very thin than other stomach parts.

Rumen clefts is more obviously and blind sacs of rumen were visible noticeable in these embryo's group, abomasum has a horizontal position and pylorus is moving forward with a hard angle. Omasum was visible at right side too. In 80 days old embryo, rumen's longitudinal clefts and blind sacs were very noticeable. Reticulum is standing at the most cranial part of stomach and abomasum is at left side completely, and slant form. Pylorus was moving to the middle side of body and forward. Omasum was seen at right side with a extended dimension. In 88 days old embryo has a caudal–dorsal position and is the biggest part of stomach. Rumen's longitudinal clefts is more deep and reticulum is at most cranial part of stomach. Abomasum is under rumen and reticulum and is vertical. Pylorus is moving forward with a hard angle and omasum is standing under reticulum at right side' behind the fundus.

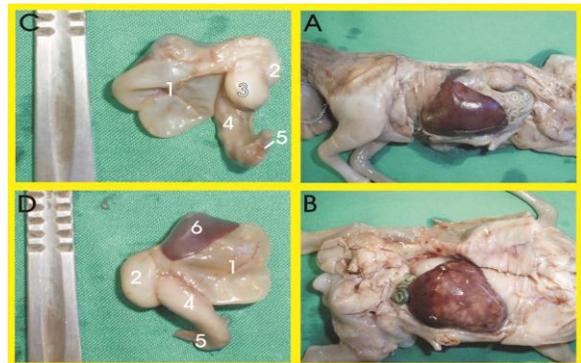


Fig 9: Topography of sheep fetus abdomen at 80days gastation, A,C)right & B,D)left view 1)rumen 2)retinaculum 3)omasum 4)abomasum 5)pylor 6)spleen

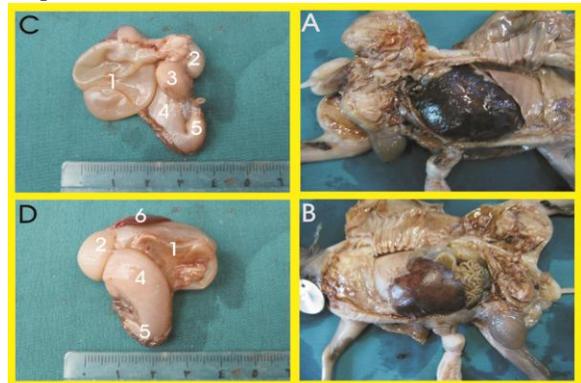


Fig10: Topography of sheep fetus abdomen at 88days gastation, A,C)right & B,D)left view, 1)rumen 2)retinaculum 3)omasum 4)abomasum 5)pylor 6)spleen

In 103 days old embryo' omentum connection to rument longitudinal clefts is obvious reticulum is the most cranial part of stomach and

beehavely scene is obvious from outside abomasums has a noticeable volumetric expansion and is the biggest part of stomach omasum is the smallest part of stomach.

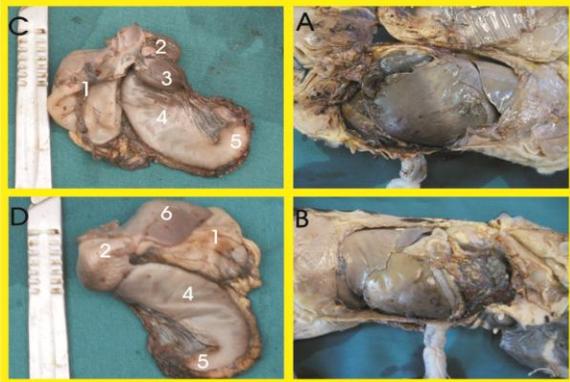


Fig11: Topography of sheep fetus abdomen at 103days gastation, A,C)right & B,D)left view 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor 6)spleen

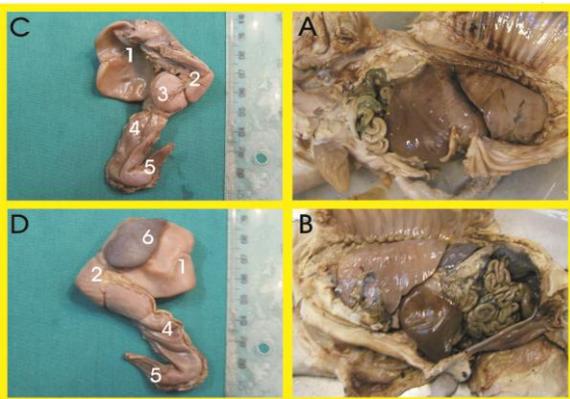


Fig12: Topography of sheep fetus abdomen at 110days gastation, A,C)right & B,D)left view 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor 6)spleen

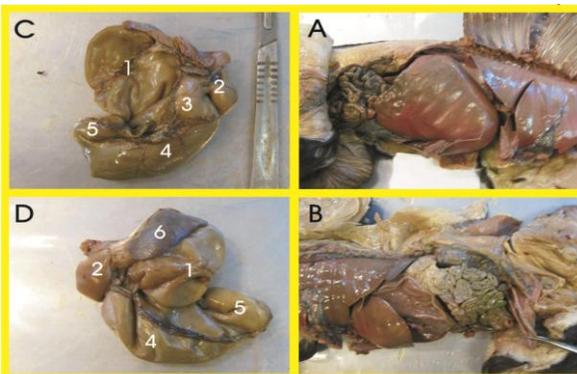


Fig13: Topography of sheep fetus abdomen at 130days gastation, A,C)right & B,D)left view

1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor 6)spleen



Fig14: Topography of sheep fetus abdomen at 150days gastation, A,C)right & B,D)left view 1)rumen 2)retinaculum 3)omasum 4)abomasums 5)pylor 6)spleen

In 110 days old embryo, rumen's longitudinal clefts have been more deep and blind sacs is seen obviously reticulum is at most cranial part of stomach. Abomasums position is changing from vertical from to slant form and is the biggest part of stomach pylorus is moving forward and beehive scene of reticulum is also obvious from outside. Omosum is visible under reticulum from right side as solid mode. In 130 days old embryo, the rumen's longitudinal clefts is deep and reticulum is standing at cranial position of stomach omasum is the smallest part of stomach and abomasums is the biggest part. Abomasums fundus has a slant form. Abomasum's pylorus is moving forward and right side and is standing behind of all parts of stomach.

In 150 days old embryo, the distal part of pylorus was seen at right side of abdominal cavity obviously: reticulum is standing in front of stomach completely and rumen's longitudinal clefts and it's blind sacs were visible obviously. Rumen's vestibule was seen obviously between cranial cleft and reticulum omasum is the smallest part of stomach and abomasums is the biggest one and was moving to the right side with a oblique form abomasums is under other parts of stomach and pylorus had been moved to the right side.

**Discussion**

In abdominal cavity topographical study of 38 days old embryo, become specified that stomach is originated from tube form primary intestine. In a study conducted on lambs, It is specified that different part of stomach origins unique in ruminants. Also, in on other study conducted on 50 deer embryos, it is specified that rumen originate from primary digestive tract, and it will be visible from 60 days later. In human, in fourth week, stomach

development is originated from cranial intestine as a spindle expansion and changes to bulbs in differentiation period. At the early sixth week of pregnancy, stomach fundus expands cranial-dorsal position and turns to the left side. This part of stomach in sheep creates primary rumen. A diverticulum from stomach fundus creates reticulum as caudal – ventral position. Rumen is the biggest part of stomach until 80 days old of embryo in 88 days old, rumen and abomasums sizes are near together and from 103 days old and after this day the growth rate of abomasums will be higher than rumen. This growth manner will continue after birth until the end of infancy period. In seventh week, rumen is changing from cranial – dorsal to caudal – dorsal position. In nearness of 58 days old omentum is visible in human stomach position changing, done by longitudinal and cranial caudal axes rotation. Stomach rotation is 90 degree on longitudinal axis and is like clock relation in dog unilateral enlargement of a part of cardia left side creates fundus. In this animal, rotation on longitudinal axis, will result in moving the stomach from dorsal position to the left side and finally turns to great, curvature. In Seventh week, reticulum is moving forward because of rumen moving to caudal side. In nearly 50 days old remen longitudinal clefts position and in nearly 66 days old it's blind sacs is appearing. In these days rumen is changing from quadre sheep to rectangle shape and growth in horizontal cranial – caudal axis. Beehive mucus of reticulum in 80-100 days old is visible from outside and has a dorsal – ventral axis growth. Also it is distinguished that omasum is the smallest part of small ruminants that in nearly 30 days old is produces as bulb form in front of reticulum. Study of development and growth of omasum distinguished that this organ has a vertical axis growth (dorsal – ventral). abomasum is standing under the reticulum and near fundus at the left side of stomach. In cow embryo at 28 m size, omasum is visible from lesser curved of stomach that is at time the right and ventral side of stomach. Abomasums pylorus position is changing at seventh week abomasums is the biggest part at birth time. Abomasums is facing with a lot of angle changing in developmental process. It means that abomasums in nearly 40 days old is at the most caudal part of stomach and then is pushing from caudal position to the under part of rumen. Abomasums is finally changing from vertical position to oblique form (from left to the right side). pylorus of Abomasum, at first, has a ahead angle that will pushing to the right and upper side. In the other sentence pylorus is visible from right side of abdominal cavity at the birth time. Rotation of rumen vestibulum between rumen cranial

cleft doesn't happen in sheep embryo stomach in comparison with simple stomach animals.

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