Anatomy and physiology

[Name of the Writer]

[Name of the Institution]

**1. Dissection**

**a. Dissection of sheep heart and cardiovascular system of fetal pig:**

**Similarities:**

* Numbers of the chamber are the same (four) in both fetal pig and sheep's heart. These four chambers are right and left atria as well as left and right ventricle.
* Both don’t have much fat on their heart as compared to the mammalian hearts.
* Both have thick muscles.

**Differences:**

* Fetal pig's heart is bigger if we talk about the size of the ventricles, diameter, thickness and the outer wall of atria and aorta.
* The left ventricular wall is thicker in sheep as compared to the ones in a fetal pig's heart.

**b. Values of heart: (name, location, and function)**

**Fetal pig’s heart valves:**

Tricuspid valve, mitral valve, pulmonic valve, and aortic valve.

**Location and function:**

**Tricuspid valve:** It is present between the right ventricle and the atria. It is consists of three-flaps-like cusps. It makes sure the correct way of blood through the heart.

**Mitral valve**: It helps in treating the disease.

**Pulmonic valve**: Aortic valve: This valve allows the backflow in the heart rather than the direct blood flow in the lungs.

**c) Similarities and differences in the left and right side of the heart**

**Similarities:**

In both pig and sheep, muscular mass is the same in both the left and right side of the heart.

**Differences:**

Size, thickness, and diameter of atria, aorta, ventricles and outer wall in pig are bigger than a sheep's heart. Pulmonary truck in sheep is larger than the pulmonary trunk of pig[[1]](#footnote-1).

**d) Structure comparison between atrioventricular valves and semilunar valves**

**In pig**

Atrioventricular valves separate a structure called atria from the ventricles while on the other hand, semilunar valves separate great arteries from ventricles.

**In sheep**

The atrioventricular vales on the right side of the heart have three cusps and the atrioventricular on the left side has the two cusps. Left semilunar valve n sheep's heart is identical to the semilunar valve of the left side.

**e) The appearance of papillary muscle**

**In fetal pig**

There are two papillary muscles in pig (anterior and posterior) and it looks like a duct or tube with many tendineae. Its color is creamish yellow and in texture is soft like tissues.

**In sheep**

It is a tendon like strand of connective tissues (commonly known as heartstrings). It helps in preventing the backflow of the blood into the atrium that directly comes from ventricles.

**f) Blood circulation**

**In pig**

Blood reaches in the inferior vena cava that is the major vein connected to the heart. In the right atrium, blood enters[[2]](#footnote-2).

**In sheep**

In sheep, the deoxygenated blood enters into the right atrium via both anterior and posterior vena cava.

**2. The texture of Trachea and Esophagus (Comparison)**

The trachea is the anterior part of the esophagus, it contains rings that are made of cartilage and their function is to open the airway. The trachea is then connected to the bronchi which pave the way to lungs. Behind trachea is the esophagus which does not contain cartilaginous rings. The major difference is, esophagus contains muscles that facilitate peristalsis, accompanied by wave-like motion in the esophagus. This movement facilitates the pushing of food through the throat and connects to the oral cavity than to the stomach, serving as a major part of the digestive system.

**Structures of the respiratory system and their functions**

**Larynx**

The larynx is involved in the breathing, production of sound and then the protection of diaphragm from the food. It also acts as a house to vocal cords by protecting them[[3]](#footnote-3).

**Trachea**

In pigs, the trachea is divided into two different branches that enter the cavities of the lung, It is important to note that trachea has a lining that comprises of cells that are capable of secreting mucus. The function of this secretion is to trap the tiny particles of the debris.

**Lungs**

Lungs facilitate the exchange of gases between blood and air, taking into account that it provides oxygen by removing carbon dioxide.

**Bronchi**

It directs air to lungs. Bronchi are divided by lungs.

**Diaphragm**

It separates the chest from the abdomen and it is also called the main muscle of respiration.

**Texture of Lungs**

Lungs have multiple lobes; the right lung has four lobes and the left lung has three lobes. The texture of lungs is spongy and there are bronchi which are further divided into bronchioles.

**Differences and similarities between right and left lung**

Both the lungs facilitate respiration, however, there are certain differences**.** The left lung has only two lobes instead of three, present in the right lung. Both the lungs are divided by the oblique fissure. The left lung is narrower than the right lung that is shorter and wider. The base of the right lung is more concave as compared to the left lung. The left lung is lighter than the right lungs.

**3. Unitary system of Pig:**

**Difference between the structure of pig kidney and sheep kidney**

It is asserted that the structure of the kidney in a pig and a sheep seems quite similar. There are minor differences between the two, taking into account the physical structure. The structure of the pig and sheep kidney is alike except for the size. The kidneys of both the animals comprise of pyramids also called renal pyramids. However, the size of the kidney of the pig is smaller as compared to that of sheep**.** The fetus of a pig has a kidney as small as that of the size of peanut enclosed within the shell.

**Location of kidney**

The location of the kidney is dependent on the gender of the pig. In male pigs, the ureters and the bladder will be connected to the umbilical cord while in females; kidneys are located deep in the intestines. Kidneys are located on the right and left side of the posterior wall of the kidney, moreover, it is located dorsal to the intestines and to see them, it is necessary to remove the peritoneum.

**Path of Urine**

In pigs, the urinary system is much similar to that of the urinary system of a human being. It would not be wrong to say that the path of urine is the same to some extent. In pigs, kidneys are responsible for the filtration of blood at the top of the urinary system; this blood is supplied by the renal arteries to remove unwanted substances. It also includes the secretion of waste into urine. From the renal pelvis, urine is transferred to the ureters. From there urine is pushed down through the ureters into the bladder. Urine flows from the ureters into the urinary bladder that stores urine for a few hours until it is full. After that, the urine is passed out of the body.

**4.** **Dissection of the endocrine system of pig**:

**Throat region**

In the pig, the endocrine system is made of glands and it produces hormones. Organs of the endocrine system are mainly involved secretion and include the following two organs of the endocrine system in the throat region:

**Thyroid:** it is located at the dorsolateral side of the trachea and very close to the larynx. It secretes thyroid hormones, one is known as tri-iodothyronine (T3). Another of its major secretion is to secrete tetra-iodothyronine (T4 also known as thyroxin). Its function is to maintain the metabolic rate. It also helps in controlling the blood calcium concentration.

**Parathyroid:** it is present near the thyroid gland. It is embedded in the same tissue capsule of connective tissues in which thyroid tissues are embedded. Its function is to regulate the level of phosphate and calcium in the blood.

**Three Endocrine organs in abdominal or pelvic cavities:**

Following are the three endocrine organs in the abdominal cavity of the fetal pig:

**Pancreas:** In the abdominal cavity, the pancreas produces enzymes that are used for digesting the food chemically.

**Adrenal glands:** It is located at the top of each kidney in the abdominal cavity. Adrenal glands are slender, smaller and elongated that are near the aorta. It helps in regulating the metabolism.

**Female gonads:** They produce the hormones (follicle stimulating hormone and luteinizing hormone) that help in stimulating the production of hormones present in ovaries along with estrogen and progesterone.

**5. Major digestive organs**

The fetal pig’s digestive system is comprised of several major components or organs. These organs are known as Mouth, Esophagus, Stomach, Small and Large intestine.

**Mouth**

The mouth is an integral part of the digestive system and includes three salivary glands. Together with these salivary glands and chewing of the food the digestive process begins.

**Esophagus**

It lies behind the trachea. It looks like a long narrow tube that is pinkish in color. This tube is muscular in nature and provides the pathway for the movement of food from the mouth to the stomach.

**Stomach**

It is located under the liver on the extreme right side and is bean shaped. The esophagus brings food into the stomach for the digestion of food. The stomach has four portions esophageal, cardiac, fundic and pyloric regions that help in the digestion process.

**Small and large intestine**

The small intestine is 350 cm long and the large intestine is far shorter than this. These are located after the stomach and have an elastic texture. This is where the major nutrients are absorbed during the digestive process.

**b) Accessory Digestive Organs**

In the digestive system of the fetal pig, it contains three accessary organs that form up the whole digestive system. These accessory organs are known as Liver, Pancreas, and Gallbladder.

**Liver**

It is under the diaphragm and lungs and is the largest gland in a fetal pig. It is a large blackish/brown organ having multi-lobes.

**Pancreas**

It lies between duodenum and stomach. It has white color and its texture is almost as of a cauliflower. The pancreas is home to digestive enzymes and buffers.

**Gallbladder**

It is on the right side of the liver. The gall bladder is greenish in color. This is due to it containing bile inside it. The primary function of the gallbladder is to store, concentrate and releases the bile.

End Notes:

1. Lock, M.C., Darby, J.R., Soo, J.Y., Brooks, D.A., Perumal, S.R., Selvanayagam, J.B., Seed, M., Macgowan, C.K., Porrello, E.R., Tellam, R.L. and Morrison, J.L., 2019. Differential response to injury in fetal and adolescent sheep hearts in the immediate post-myocardial infarction period. *Frontiers in physiology*, *10*, p.208.
2. Rodrigues, M.S.A.C., Silva, A.C., Aguas, A.P. and Grande, N.R., 2019. The coronary circulation of the pig heart: comparison with the human heart. *European Journal of Anatomy*, *9*(2), pp.67-87.
3. Xiong, J., Zhu, Q., Yang, S., Zhao, Y., Cui, L., Zhuang, F., Qiu, Y. and Cao, J., 2019. Comparison of pharmacokinetics of tilmicosin in healthy pigs and pigs experimentally infected with Actinobacillus pleuropneumoniae. *New Zealand veterinary journal*, (just-accepted), pp.1-16.

1. Rodrigues, M.S.A.C., Silva, A.C., Aguas, A.P. and Grande, N.R., 2019. The coronary circulation of the pig heart: comparison with the human heart. *European Journal of Anatomy*, *9*(2), pp.67-87. [↑](#footnote-ref-1)
2. Lock, M.C., Darby, J.R., Soo, J.Y., Brooks, D.A., Perumal, S.R., Selvanayagam, J.B., Seed, M., Macgowan, C.K., Porrello, E.R., Tellam, R.L. and Morrison, J.L., 2019. Differential response to injury in fetal and adolescent sheep hearts in the immediate post-myocardial infarction period. *Frontiers in physiology*, *10*, p.208. [↑](#footnote-ref-2)
3. Xiong, J., Zhu, Q., Yang, S., Zhao, Y., Cui, L., Zhuang, F., Qiu, Y. and Cao, J., 2019. Comparison of pharmacokinetics of tilmicosin in healthy pigs and pigs experimentally infected with Actinobacillus pleuropneumoniae. *New Zealand veterinary journal*, (just-accepted), pp.1-16. [↑](#footnote-ref-3)