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Pregnancy Examination and Fetal Development of Indonesian Domestic Rabbits by Ultrasonography

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INTRODUCTION

Ultrasonography has added benefits such as fetal sexing, early embryonic detection and is less invasive than rectal palpation. Besides, it also has the ability to visually characterize the uterus, fetus, ovary, corpus luteum, and follicles. In order to study the influence of fetal growth on further development in animal models like the rabbit, methods of measurement of fetal and placental size must be measured and viability must be established and validated (Chavatte-Palmer et al. 2008). This research is carried out to detect the earliest day of conception in Indonesian domestic rabbits by means of ultrasonography as well as to study the fetal development by analyzing the images produced during the pregnancy check on embryonic vesicle, body diameter and head diameter.

MATERIALS AND METHODS

The animals used for this research were six pregnant and healthy female Indonesian Domestic rabbits. The does weighed between 1.75 – 3.90 kg. The rabbits were fed commercial rabbit food and water (ad libithum). The does were kept in a cage with nesting boxes for them to give birth in. Ultrasound console used for this research was Landwind Medical Mirror5. A curved and linear transducers with frequencies between 5.5 MHz and 7.5 MHz were also used alongside this research. The does were examined on day 5 after mating and later, every 2 to 3 days until they gave birth. Prior to examination, the ventral abdomen towards the pubic area of the doe was clipped and shaved from cranial to caudal. The doe was restrained at dorsal recumbency throughout the examination using USG.

During the first week of gestation period, starting on day 5, a scan to identify and estimate the number of embryonic vesicles were carried out. Complete embryonic vesicle examination was performed on both uterine horns. The embryonic vesicle was measured when the largest surface area appeared on screen. The cross-section of the abdomen was measured when two hyperechogenic lines were seen at the sides of the abdomen. The head diameter was measured from an image when the cerebral falx was clearly visible. Since the wall of the skull was very thin, at a 90° angle with the cerebral falx, the widest distance between the outer borders of the cranium were measured. Observations on the liver, heart, lungs were made occasionally when possible. The results measured were the size of the embryonic vesicle, body diameter and head diameter using the average value and is displayed in the form of tables and graphs with the analysis of linear regression equation.

RESULTS AND DISCUSSIONS

Based on the results obtained, the embryonic vesicles were observed and identified five days after the rabbits mated. These results were later compared to Chavatte-Palmer et al (2008) and Ypsilantis and Saratsis (1999) that embryonic vesicles were seen on day 7. This was not much of a difference because according to El-Gayar et al. (2014), by USG, uterine fluid was detected at an average of six days after mating. Sexually, the smaller rabbits usually mature earlier than the larger breed, therefore it is highly possible that due to the size of the Indonesian domestic rabbit, the embryonic vesicle was seen much earlier.

Figure 1 shows the interrelation between the number of days and the development size of the embryonic vesicle. Using the data to analyze the linear regression, a new equation was formulated, x=y+0.2/0.245, where x is represented by the number of days and y is the vesicle size. However, this formula can only be used if the sample size is similar to the ones used in this research.

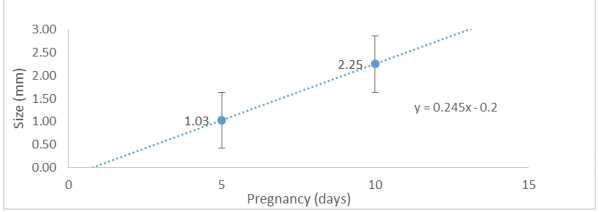

Figure 1. Interrelation between number of days and the development size of the embryonic vesicle

of pregnancy and the standard deviation in Indonesian domestic rabbit using analysis of linear regression.

Figure 2 shows the interrelation between the number of days and the body diameter as well as the standard deviation on day 18 until day 29 of pregnancy using the analysis of linear regression. After analyzing the data, a new equation was formulated, x=y-0.0021/0.0562. Y is represented by body diameter and x is the number of days. As seen in the figure below, there is a dramatic change in body diameter from day 18 until day 24 due to the rapid growth of the fetus. Whereas from day 24 till day 29, there is only a gradual change which is constant. The formula generated can be used if the sample size used is almost the same.

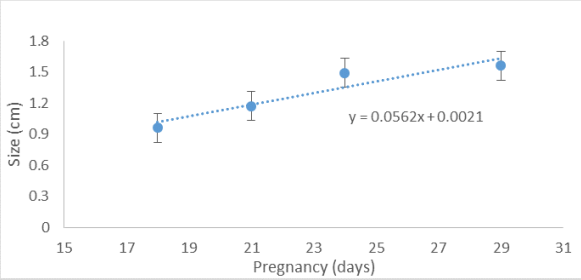

Figure 3. Interrelation between the number of days and the body diameter and the body diameter and the standard deviation from day 18 until day 29 of pregnancy in Indonesian domestic rabbit using analysis of linear regression.

Figure 3 depicts the interrelation between the number of days and the head diameter and the standard deviation from day 18 until day 29 of pregnancy using the analysis of linear regression. Head diameter can be measured using the equation formulated, x=y+0.5073/0.0723. Y is represented by head diameter and x is number of days. This equation can be used to determine the head diameter in fetuses once the rabbit goes into day 15 of pregnancy and above and when the sample size is similar. This is due to the development that takes place once the embryo implants itself in the uterus of the mother.

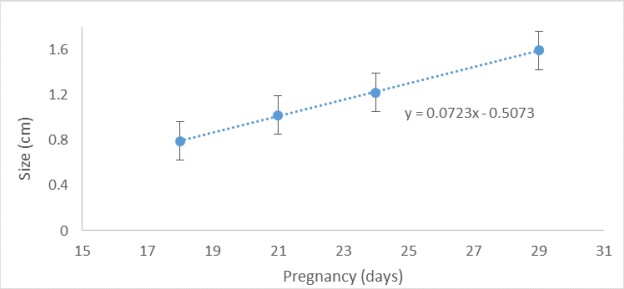

Figure 4. Interrelation between the number of days and the head diameter and the standard deviation from day 18 until day 29 of pregnancy in Indonesian domestic rabbit using the analysis of linear regression

As conclusion, the earliest day of conception was determined on day 5 in Indonesian domestic rabbits using ultrasonography. The gestation age of Indonesian Domestic Rabbits can be defined by formulas using the images of embryonic vesicle, body diameter and head diameter.

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