CHAPTER I INTRODUCTION

1.1 Background

The Etawa Crossbred goat is a potential goat as a provider of animal protein through both meat and milk. Etawa Crossbred goat can be categorized as superior types of dairy goats, because they can produce milk as much as 1.5 - 3 liters/day. Therefore, Etawa Crossbred goats are significant enough to be developed (Matualesi, 2017). Some of the superiority of Etawa Crossbred goats is the fast reproductive cycle, the adaptability to the environment is very high, easy to maintain, so that it has a high socio-economic value if maintained well by farmers (Yanti *et al*., 2013). In livestock business, reproductive management is important to improve productivity in addition to maintenance management and good breeding.

The reproductive process is related to the hormonal system mechanism, that is the relationship between hypothalamic-pituitary-gonad hormones, namely Gonadotropin Releasing Hormone (GnRH), Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH), ovarian hormones (estrogen and progesterone) and uterine hormones (prostaglandin) (Hafez and Hafez 2000). Ovarian hormones that have a large role in reproduction are estrogen and progesterone. During pregnancy, uterine growth and development is affected by increased concentrations of the progesterone and estradiol (Anderson, 2003). Progesterone can be used as a pregnancy test because the corpus luteum is present during pregnancy in all livestock species. Progesterone levels can be measured in

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biological fluids such as blood and milk. Progesterone concentration is low when the animal not pregnant and is high in pregnant animals (Lestari, 2006).

Research on the profile of the progesterone needs to be done to increase reproductive efficiency in livestock (Katongole and Gombe, 2006). Accurate information about reproductive hormones during the estrus cycle is important to examine as a basic concept of ovulation, the regression cycle of the corpus luteum, the presence of estrus hormone manifestations, pregnancy, and birth (Akusu *et al*., 2006). The presence of the progesterone can also be used for early pregnancy detection (Amiruddin *et al*., 2011).

Research was done by Siregar (2009) on the Local Aceh goat, conclude the highest concentration of progesterone on day 14 (luteal phase) and the lowest concentration on day 0 and 21 of the estrus cycle (follicular phase). The progesterone concentration is high on days 7 and 14 cycles, because the 7th to 16th day is the luteal phase. With the activation of the corpus luteum, progesterone secretion will increase. On the 21st day of the estrus cycle, the progesterone concentration is relatively low because the corpus luteum regression and the new estrus cycle will begin. The existence of the corpus luteum is very dependent on the occurrence of pregnancy. If pregnancy occurs, the estrus cycle stops and the corpus luteum will be maintained. Thus, at the time of pregnancy the corpus luteum will still secrete progesterone.

Progesterone concentration was measured using the ELISA (Enzyme Linked Immunosorbent Assay) technique. ELISA can be used for detection and quantification of antigens, antibodies, hormones, and other molecules (He, 2013).

The ELISA method has been widely used in clinical laboratories and research because it does not use radioactive isotopes and proven effective and accurate for assessing hormone levels (Hall, 2016).

This study need to be done in order to add hormonal status information which can later be useful for increasing reproductive efficiency of Etawa Crossbred does.

1.2 Problem Statement

Based on the background above, the problem statement in this study : How is the progesterone profile of Etawa Crossbred does on day 0, day 21 after mating, day 42 after mating, day 63 after mating and day 84 after mating?

1.3 Research Aim

To know the progesterone profile of Etawa Crossbred does on day 0, day 21 after mating, day 42 after mating, day 63 after mating and day 84 after mating.

1.4 Research Outcome

The results of this study are expected to be used as a reference for increasing reproductive efficiency of Etawa Crossbred does through knowing progesterone concentration.

1.5 Theoretical Base

Progesterone is one of the important hormones, related to reproduction, which is secreted by luteal cells of corpus luteum (CL) (Hafez and Hafez, 2000). During pregnancy, progesterone is mainly produced by corpus luteum and placenta. Progesterone act to maintain uterine during pregnancy by inhibiting expression of contractile genes in uterus (Yahi *et al.,* 2017). Progesterone is

considered the standard for evaluation of the reproduction status to observe estrous, pregnancy, embryonic mortality, prolonged acyclicity after partus, and the occurrence of ovarian cysts (Andriaens *et al*., 2017).

During post-partum anestrus the adrenal gland cortex produce the small amount of progesterone (<0.1 ng/mL serum) (Silvia *et al*., 2005). The cyclic part starts with the onset of follicular activity. When the first dominant follicle ovulates, a corpus luteum (CL) starts the production of P4. During its development phase, the progesterone production is proportional to the size of the CL (Mann, 2005). Around day 14, the uterus endometrium produces luteolytic factors of PGF-2-alfa, which results in the regression of the CL and a drop in drop progesterone. The last part of the fertility status (pregnancy) starts after successful insemination and is accompanied by an increase in progesterone produced by the developing of pregnancy CL (Humblot, 2001).

Progesterone has physiological actions in the uterus and ovarium for ovulation, facilitating of implantation, and maintenance of pregnancy (Al-Asmakh, 2007). Progesterone plays key role in facilitating of implantation, by blocking the proliferative effect of estrogen on uterine epithelial cells and inducing genes that allow the normally refractory endometrium to respond and permit attachment of the embryo (Halasz and Julia, 2013).

Progesterone reacts synergistically with estrogen to induce estrus in livestock. In addition, progesterone also plays a role in stimulating the development of secretory tissues (alveoli) of the mammary glands. High

progesterone levels can inhibit estrus. Progesterone also affects the vagina and cervix in the thickening of epithelial excretion (Ismudiono *et al*., 2010).

Progesterone metabolism is fast and occurs mainly in the liver. Endogenous progesterone is metabolized approximately 50% to 5a-dihydroprogesterone in the corpus luteum, 35% to 3-dihydroprogesterone in the liver, and 10% to 20a-dihydroprogesterone (Anderson *et al*., 2004). Progesterone metabolites are released from the liver into the blood circulation and excreted by the kidneys into the urine. Changes in the total circulation of progesterone in the blood have been widely used for accurate monitoring of reproductive status in cattle. More than 80% of circulating progesterone is bound to plasma proteins (Mekonnin *et al*., 2017). From this explanation it can be concluded that the measurement of progesterone concentration can be done through blood.

Measuring progesterone levels in the blood has several uses, one of which as an indicator of the presence of a functional corpus luteum (Rahman, 2002). According to the study of Islam *et al* (2014), progesterone was detected as a pregnancy hormone and was evident with the increase in pregnancy stage, the progesterone concentration in the blood of Bengal Goat also increased. The concentration of the hormone progesterone in the blood is directly proportional to the number of follicles that will form the corpus luteum that occurs in the ovary. Thus the analysis of the concentration of the hormone progesterone can be used as an indicator to determine the number of ovulated ovum (Tjiptosumirat, 2009).

On day 0 and 21st day of the cycle, the corpus luteum has not yet formed so that progesterone is relatively very low. Hafez and Hafez (2000) said that the

progesterone will decrease when estrus occurs to levels that cannot be measured. Furthermore the results reported by Alwan *et al*. (2010) were also in accordance to the results recorded in the current study. They reported that the progesterone concentration was reached up to 2.9±2.5 and 3.34±2.3 ng/ml in pregnant ewes and does, respectively. Early Pregnancy reliably can be diagnosed at day 21 after breeding with ELISA kit method in Kamori does with the progesterone concentration was 2.71±1.06 ng/mL (Kunbhar *et al.,* 2019). Research on progesterone levels from blood in pregnant Etawa Crossbred does were 9.50 ng/ml (Adriani, 2008).