The postpartum anestrus period of lowland anoa (Bubalus depressicornis) in captivity

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Abstract. Information about the estrus cycle in anoa is particularly important to determine the optimal mating time. The purpose of the study is to determine the duration of the estrus cycle reversion in anoa while they are in their postpartum period. Estrus cycles are determined by observing estrus behavior/signs. Observations were conducted on 1 female postpartum anoa without any lactating activity and 1 female postpartum anoa with lactating activity at Anoa Breeding Center, Manado. The result shows that the postpartum anestrus length period of the lactating anoa is longer than the one without it. The first anoa was giving a birth on June 2016, estrus reappears 3 months 9 days after. The second anoa was giving a birth on February 2017, estrus reappears 6 months later after the calf weaned. With all these information, the captive center would be able to make a better mating and reproduction plan for the anoa. It is going to rise the percentage of anoa’s mating success rate.

1. Introduction
The hormonal cycle and maturity of the female reproductive organs are important for anoa breeding process [1]. The success rate of animal mating strongly influenced by information of reproductive biology. It can be observed through the behavior and image of vaginal epithelial cells change, it is necessary for determining the proper mating period [2]. Females are having four periods of the hormonal cycle called estrus cycle consisting of metaestrus, diestrus, proestrus, and estrus [3]. The accurate estrus detection is essential for successful pregnancy and increases reproductive performance [4].

The most influential factors in the reproduction are maintenance, feed, temperature, health condition and mating plan [5]. The fertility rate is indicated by calving interval which can be measured from lactation period, dry period (puerpureum), and long gestation [6]. The postpartum cows will have anestrus period when they fail to exhibit estrus and ovulate which is caused by the presence of inactive ovarian conditions [7]. The anestrus conditions also occur due to the lack of nutrients. Poor nutrition is strongly associated with the appearance of puberty, hormonal imbalances, estrus delay, anestrus or silent heat [8]. Eventually the postpartum anestrus will ultimately affect the calving
interval in cattle. Poor nutrition can extend the calving interval and decrease the reproductive efficiency [9]. Long calving interval occurs due to delay of the appearance of the first postpartum estrus [10]. This can be overcome by providing feed supplementation during pre and postpartum to improve reproduction. The nutrition content is affected by the season so additional feed is needed to spur reproduction [10]. In addition to nutrients that affect the condition of body size and physic, age factor, lactation process, and offspring also affect the reproductive character [11].

Anoa is categorized as Endangered by IUCN and belongs to appendix I Cites [12,13]. This animal is protected by Government Regulation No. 7 of 1999 concerning preservation of plant and wildlife species. Because of the lack information, the study about the postpartum periode of anoa will give us important information about postpartum aneustrs. The purpose of the study is to determine the duration of the estrus cycle reversion in anoa while they are on the postpartum period at captivity.

2. Materials and method

2.1. Study area
The research was conducted at Anoa Breeding Center Manado which is located in The Environment and Forestry Research and Development Institute of Manado, Ministry of Environment and Forestry. The study was conducted on February to August 2017.

Figure 1. The location of the Anoa breeding centre Manado.

2.2. Materials
The equipment that have been used are camera, logbook and ABC activity reports of 2016. Observations were conducted on 1 female postpartum anoa (anoa 1; 6 y.o) and 1 female postpartum lactating anoa (anoa 2; 7 y.o). The anoa 1 gave birth on Juny 23, 2016, but the calf did not survive. It was placed in reproduction enclosure sized 6 x 11 m, next with the male anoa. The anoa 2 gave birth on February 7, 2017. Anoa 2 and its calf were placed in quarantine enclosure which is about 350 m from the breeding enclosure.

Above: Anoa 1 (6,5 y.o), below: Anoa 2 (7,5 y.o)

Figure 2. The female anoa at Anoa Breeding Centre.
2.3. Procedure

The anoa was fed with 12 kg of *Paspalum dilatatum* grass, and additional feeds that are vegetables and fruit per day, given in the morning and afternoon. In the quarantine enclosure they also eat tree bark, leaves, and some species of wild grass that grow naturally inside it. The observation were conducted for 6 months after anoa gave birth. Estrus cycles are determined by observing estrus behavior/signs by the intensity of urination, anxiety, wagging tail, vulvar changes (red, swollen and wet), and mucus release and the changes of epithelial vagina cell reviews [1,14].

Steril cotton swab (2,2 mm x 150 mm) were used for cell collection. Cotton swab were moistened with NaCl 0,9% and introduced into the vagina approximately 1,5 cm, quickly and gently rotated against the floor of the vagina. The epithelial cells obtained were immediately prepared by rotating the cotton swab along a glass side. The smear was fixed using bunsen burner to dry. The preparation was stained using Giemsa and air dried for 10-20 minutes. The preparation was washed by draining the tap water on it. After dry, the preparation were observed using a microscope.

2.4. Data analysis

The collected observation data is processed and presented descriptively in the table.

3. Results and discussion

3.1. Results

| Parameters                      | Postpartum without lactation | Postpartum with lactation |
|---------------------------------|------------------------------|---------------------------|
|                                 | Anoa 1                       | Anoa 2                    |
| Enclosure location              | Reproduction (Red line Fig. 1)| Partum (Yellow line Fig. 1)|
| Pregnancy                       | Reproduction (Red line Fig. 1)| Partum (Yellow line Fig. 1)|
| Partus / Age                    | June, 23rd 2016 / 6,5 years old | February, 7th 2017 / 7,5 years old |
| Obstacle factor                 | Dystocia                     | Dystocia                  |
| Treatment                       | Normal labour, Episiotomy, retraction | Normal labour, reposition, retraction |
| Fetus                           | Male, weight 6,3 kg          | Male, weight 5,4 kg,      |
| Survival                        | Not survive                  | Survive                   |
| Lactating activity              | No                           | Yes                       |
| Estrus while lactation          | No                           | No                        |
| Estrus 1st signs                | Oktober, 2nd 2016            | September 6th 2017        |
| Length of anestrus postpartum   | 3 months 9 days              | 6 months                  |
| Observation method              | Behaviour signs: often urinating when approached by a male, change in the vulva (red, swollen) | Behaviour signs and vaginal swab cytology: aggressive and anxious. Rambo (males) approach the Denok enclosure, seen anxious, erect and ejaculate |
| Mated                           | No                           | No                        |
| Estrus 2nd                      | 14 November 2016             | -                         |
| Observation method              | Behaviour signs: anxious, dull and cluttered fur, change in the vulva (red, and swollen), wagging and lifting tail, often urinating when approached by a male | -                        |
| Mated                           | No                           | No                        |

3.2. Discussion

The occurrence of postpartum anestrus in cattle is affected by the age of individual, health condition, nutrition before and after labor, dystocia, psychology, and managerial factor [7]. Several factors have been summarized in the following paragraphs.
Based on data, anoa 1 aged is 6 years and anoa 2 is 7 years. Their age difference is not too far away. The age factor is very influential on postpartum anestrus and calving interval [10]. The older the cattle the longer the anestrus period, resulting in a longer calving interval. Age also affect the fertility of cattle [10]. Meanwhile, in the people livestock, the fertility rate is more indicated by calving interval which can be measured from lactation period, dry period (puerpureum), and long gestation rather than age factor [15].

The two anoas are equally experiencing dystocia, so the veterinarian must intervene during the labor. Unfortunately, the anoa 1 fetus did not survived. Dystocia is one of the minor factors affecting fertility of cattle which is commonly caused by the fat deposits in the pelvic [16]. During the pregnancy, anoa was placed in different enclosure. The anoa 1 enclosure was smaller than anoa 2. With a narrow space, the movement is very limited. Nevertheless, the anoa 1 enclosure was located next to the male enclosure. There were still social interaction between the male and female anoa. The anoa 2 at the end of pregnancy was moved to the quarantine enclosure which is wider than anoa 1 enclosure. It also resembles a natural habitat so that the anoa 2 can move more active and freely. It’s just located far from the other enclosure and crowd (office). The enclosure which is located away from the crowd will be positively effect the cattle live [10]. The physiological processes can run normally, stress incidence can be prevented, so reproduction cycle is not interfered. Inadequate enclosure management can lead to increased bacterial proliferation and may affect the performance of reproductive organs resulting in lower fertility rates [17].

The nutrition is very influential for the buffalo reproduction process such as puberty and calving interval [18]. Poor nutrition in postpartum can cause estrus delay, hormonal imbalance can cause anestrus or silent heat in cattle [19]. The increasing nutrition at the birth time will increase the size of the parent body, while in the postpartum will improve the quality of lactation, fitness, and reproduction. Lack of nutrition is characterized by a thin body that will cause the post-partum anestrus period occurred longer [9]. Anoa 1 and anoa 2 were provided with the same feed supplemental during the pregnancy and after labor. The feed requirement of anoa 2 is greater than anoa 1 to sustain both lactation and growth. Both anoa also injected with vitamins.

During the lactation periode, anoa 2 never shows signs of estrus. When someone approaches the enclosure, its behaviour shown tend to be aggressive and protective, crashes and gores the fence, hides the calf, and forbade it from approaching the fence. When anoa 2 weaned and moved to the breeding enclosure, next back to the male, the estrus sign started occur. In anoa 1 case, the first estrus appeared after 3 months 9 days post-partus, while anoa 2 at 6 months post-partus. It is known that the length of anestrus postpartum period in anoa with lactating activity is longer than the one without lactating activity. The lactation periode also positively correlated towards calving interval [10]. The longer the cows lactating the calf, the longer calving interval. The lactation periode thought to affect the estrus periode of both anoa [15, 18, 19].

4. Conclusion
Based on the results, it is assumed that the main factor of the anestrus postpartum that occur longer in the anoa at ABC is the lactating activity.

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