The Effectiveness of Lugol on the Increasing of Pregnancy Rate in Aceh Cow with Endometritis

(Efektivitas larutan lugol untuk meningkatkan persentase kebuntingan pada sapi Aceh yang mengalami endometritis)

Amalia Sutriana1*, Arman Sayuti2, Budianto Panjaitan2, Teuku Armansyah TR3, Aisyah Fadillah Tunnisa4, Juli Melia2, Tongku Nizwan Siregar5, Hafizuddin6, and Dwinna Aliza7

1Pharmacology Laboratory, Faculty of Veterinary Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia
2Clinical Laboratory, Faculty of Veterinary Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia
3Veterinary Study Program, Faculty of Veterinary Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia
4Reproduction Laboratory, Faculty of Veterinary Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia
5Pathology Laboratory, Faculty of Veterinary Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia

ABSTRACT. The objective of this study was to determine the effect of lugol on the increasing the pregnancy rate in repeat breeding (RB) Aceh cows due to endometritis. This study used six endometritis’s cows, aged 5-7 years, weighed 150-250 kg which were divided into two groups (n=3), KI and KII. The cows in group 1 (K1) were injected with 5 ml PGF2α, while the cows in group 2 (KII) were treated with 50 ml of 2% lugol intra-uterine and continued with an injection of 5 ml PGF2α after healing. The detection of estrus was performed twice a day following by artificial insemination (AI) about 10-16 hours after the onset of estrus. Determination of pregnancy was performed by ultrasonography (USG) on the 25th day after AI. The data obtained were analyzed descriptively. The results showed that all endometritis’s cows in KI and KII present estrous signs (100%). However, only one cow was recovered in K2, whereas in K1 did not. After AI, one pregnant cow was observed in KII (33.3%), while none of the pregnant cows was found in K1 (0.0%). It is concluded that the lugol treatment for endometritis’s Aceh cows can improve the pregnancy rate.

Keywords: Aceh cow, endometritis, lugol, pregnancy rate

INTRODUCTION

Various efforts have been adopted to increase cattle population, including the elevation of gene quality and reproductive efficiency using artificial insemination (AI) technology (Priyanto, 2011; Susilawati, 2013). However, the high occurrence of repeat breeding (RB) becomes a major constraint in cattle population improvement. Repeat breeding is defined as the cow with normal estrus cycle but fail to conceive after at least three times mating with the fertile bull, despite the absence of clinical symptoms indicative of reproductive diseases or abnormalities (Juliana et al., 2015). The possible influencing factors include maintenance management failure (31.70%), hormonal disorders (18.03%), reproductive infections (14.75%) (Singh et al., 2010), and decreased organs function in the cows due to early embryonic loss (39.10%) (Gebrekidan et al., 2009).

Uterine infection is one of the causes of failure in reproduction. A study by Ahmed and Elsheikh (2014) showed the presence of bacteria infection in the uterus of all repeat breeding cows (100%). This causes subclinical endometritis, which consequently results in fertilization or
The Effectiveness of Lugol on the Increasing of Pregnancy Rate in Aceh Cow with Endometritis. (Amalia Sutriana, et al.,)

implantation failure. Thasmi et al. (2018) reported the changes in anatomy pathology and histopathology of repeat breeding Aceh cows with endometritis caused by subacute and chronic infections. Various therapies have been applied for repeat breeding cows due to endometritis, including the use of antibiotics and prostaglandins (Drillich, 2006; Hussain et al., 2013; Ahmed and Elsheikh, 2014; Mido et al., 2016; and Szenci, 2016). Recently, lugol has been the main focus for RB and aneustrus treatments (Ahmed and Elsheikh, 2014; Ahlawat et al., 2016), due to its ability to overcome the infertility cases effectively as well as cost-effective (Sarkar, 2006; Ahlawat et al., 2016).

Ahmed and Elsheikh (2014) reported that the repeat breeding cows caused by subclinical endometritis could be treated intrauterine with infusion of 1% iodine lugol. The treated cows showed the significant improvement of service per conception compared to the untreated cows (1.1±0.1 vs. 4.5±0.2). The application of this therapy on buffalo showed an increase on the pregnancy rate from 33.3% to 85.71% (Ahlawat et al., 2016). It was assumed that lugol acts as a potential bactericide which can improve the uterine environment. The improvement of the uterus environment increases the tendency for ovaries to release good quality oocytes and enhances the ability to produce more uterine milk which was required in embryo implantation (Oakley, 1992 cited in Ahmed and Elsheikh, 2014). Iodine lugol is known to possess broad bactericidal activity, implicated in the enhanced healing of endometrium to restore activity (Sarkar, 2006), and consequently elevating the percentage of pregnancy.

Aceh cattle has been established as one of the national cattle in 2011, based on the Decree of Minister of Agriculture of the Republic of Indonesia Number 2907/Kpts/OT.140/6/2011. The prevalence of RB in Aceh cows has been previously reported has been reported in Pidie District is higher and achieved 58.3% (Subagyo, 2016). However, the study regarding the effect of lugol therapy on the increasing of the pregnancy rate in Aceh cows with endometritis is not available. Hence, there is a need to investigate the effect of lugol for improving the pregnancy rate in endometritis’s an Aceh cows.

MATERIALS AND METHODS

Experimental Animals

This study used 6 Aceh cows which were obtained from UPT (Unit Pelaksana Teknis) of Experimental Animals, Faculty of Veterinary Medicine, Universitas Syiah Kuala, Banda Aceh. The cows aged 5-7 years old with liveweight ranged from 150-250 kg. The cows were mated previously and diagnosed with endometritis.

Determination of Endometritis Cows

Aceh cows were diagnosed with endometritis using Metricheck. The observation was made based on the score of uterine mucus as follows; 0 = no mucus, 1 = clear mucus, 2 = mucopurulent, 3 = mucus containing less than 50% purulent material, 4 = mucus containing more than 50% purulent material 5 = smelling mucus. Score of 0-1 are declared normal or negative for endometritis, while 2-5 were declared abnormal or positive for endometritis (McDougall et al., 2007). Six endometritis cows were then divided into two treatment groups consisting of 3 endometritis’s cows each group. The cows in group 1 (K1) were injected with 5 mL of PGF2α (LutalyseTM). The cows in-group 2 (KII) were treated with 50 ml of lugol 2% intra-uterine. This was followed by the daily observation of the healing process using transrectal ultrasound (USG, Shenzhen Mindray Bio-Medical Electronics Co., Ltd.), based on the measurements of uterus diameter, endometrium thickness, as well as the presence of pus and mucus. The examination was conducted twice, before and after a 24-day therapy. The cows were considered recovered if the uterus diameter decreased; endometrium thickness is stagnant with the absence of pus and mucus. At the end of the 24th day, all the cows were injected with 5 ml of PGF2α (LutalyseTM).

Estrus Determination and Artificial Insemination

Estrus detection was performed twice a day, in the morning (08:00 a.m) and in the afternoon (04:00 p.m) for 30 minutes based on estrus physical signs. The physical signs that indicate estrus for cows include the swollen and reddened vulva, restlessness, loss of appetite, mounting activity, and the presence of cervix mucus discharge. The artificial insemination was carried out about 10-16 hours after the estrus was confirmed.
**Determination of Pregnancy**

Determination of pregnancy was performed using an ultrasound at 25 days post artificial insemination. The positive result was confirmed by the presence of anechoic fluid in one of the uterine horns (Caudhary and Purohit, 2012). The data were presented as the pregnancy rate of Aceh cows after treated with lugol and analyzed the descriptively.

**RESULTS AND DISCUSSION**

Cervical mucus scoring in endometritis cows from both groups before treatment showed score ranged 2-5. After treatment, one of endometritis cows in group K2 (treated with lugol) was recover, while none of the endometritis cows in group K1 (without lugol treatment) was recover (Table 1). This result was lower (33.3%) compared to the previous study reported by Kumar (2010) in which the percentage of recovery rate of endometritis’s cows was 62.5% following lugol treatment.

| Parameters                              | Treatment               | Percentage |
|-----------------------------------------|-------------------------|------------|
| Number of healing cows (%)              | PGF2α                   | 0 (0)      |
| Number of estrous cows/AI (%)           | PGF2α + lugol           | 1 (33,3)   |
| Number of pregnant cows (%)             | PGF2α                   | 3 (100,0)  |
|                                         | PGF2α + lugol           | 3 (100,0)  |

The percentage of estrus cows in each group was 100%, which was higher than the previous finding by Sarkar (2006), where 60% estrus cows were reported 5-10 days after the anestrus cows were treated with lugol. This probably due to the cows used in this study were the repeat breeding cows with endometritis. The repeat breeding of Aceh cow showed the estrus cycle regularly which is attributed to the higher percentage of estrus cows in this study. Moreover, Ahlawat et al. (2016) also reported the lower percentage of estrus cow compared to the results of the current investigation, where 70% and 30% were recorded in the treatment and control groups, respectively. These variation results might be due to a disparity in the types of livestock used. Ahlawat et al. (2016) used Jaffrabadi buffalo and generally buffalo is considered as livestock with silent heat. Therefore, the effect of lugol administration could not observed properly. After the artificial insemination process, the pregnancy rate of 33.3% (1 out of 3 cows) was found in K2 group which was treated with lugol, while none of the cows were pregnant in K1 group. This result was in line with the previous report which documented the pregnancy rate of 30.0% in repeat breeding cow after intra-uterine administration of 0.3% lugol (Bhardwaz et al., 2018). However, Pandey et al. (2011) reported higher pregnancy rate in dairy cows at first insemination on day 5 (68.75%) and 17 (71.43%) of the estrus cycle, after treated with 20 ml of 0.25% lugol.

The determination of pregnancy was based on the presence of embryonic vesicles, which shows an isoechoic/anechoic to hyperechoic coloration on a sonographic display, surrounding hyperechoic fluid originated from the embryonic (Sayuti et al., 2016). The embryonic vesicles observed in this study are shown in Figure 1.

Generally, the administration of lugol improves the pregnancy rate of cows, based on the report of Pandey et al. (2011), Bhardwaz et al. (2018), Ahlawat et al. (2016), Singh et al. (2010), Sarkar (2006), Ahmed and Elsheikh (2013), and Alyasiri et al. (2015). Singh et al. (1987) and Sane et al. (1982) stated that the positive response of the lugol solution on the improvement of
reproduction performance due to its effect on the uterus and ovaries. Lugol may irritate and increase blood circulation in the uterus and ovaries which increase the iodine absorption from the uterus. The increase of iodine absorption improves metabolic rate through stimulation of thyroid hormone secretion, maintains homeostasis of Ca and P, increases the body weight, and regulates the estrus onset.

Figure 1. The uterus sonographic display of pregnant Aceh cow on day 25 post insemination (ve= vesicular embryonic).

CONCLUSION

It is concluded that the lugol treatment to endometritis’s Aceh cows with endometritis can improve the pregnancy rate.

REFERENCES

Ahlawat, A., Gajbhiye, P., Ogedra, M., Dongr, V., Ghodosara, S., 2016. Effect of lugol’s iodine on estrus induction and fertility response in true anestrus Jaffrahadi buffaloes. Buffalo Bull. 35(3): 303-305.

Ahmed, F.O., Elsheikh, A.S., 2014. Treatment of repeat breeding in dairy cows with lugol’s iodine. IOSR J. Agricult. Vet. Sci., 7(4): 22-26.

Alyasiri, E.A., Alwan, A.F., Al-Hamedawi, T.M., 2015. Comparative study of some intrauterine treatment regimes on bacterial causes of repeated breeders in Iraqi buffaloes. Paripex-Indian J. Res. 4(9):188-190.

Bhardwaz, A., Nema, S.P., Mahour, S.S., Bagati, S., Kumar, S., 2018. Therapeutic efficacy of lugol’s iodine (I2KI) in infectious repeat breeder crossbred cows. Int. J. Curr. Microbiol. Appl. Sci. 7(12): 648-654.

Chaudhary, A.K., Purohit, G.N., 2012. Ultrasonographic detection of early pregnancy loss in dairy cows. J. Anim. Sci. Adv., 2(8): 706-710.

Drillich, M., 2006. An update on uterine infections in dairy cattle. Slov. Vet. Res. 43(1): 11-15.

Elsheikh, A.S., 2013. Intrauterine infusion of lugol’s iodine improves the reproductive traits of postpartum infected dairy cows. IOSR J. Agricult. Vet. Sci., 5(2): 89-94.

Gebrekidan, B., Yilma, T., Solmon, N., 2009. Major causes of slaughtering of female cattle in Addis Ababa abattoir enterprise, Ethiopia. Indian J. Anim. Res., 43(4): 271-274.

Hussain, S.O., Al-Zubaidi, S.F., Asofi, M., 2013. Different endometritis treatments in ewe: Comparative study. IOSR J. Agric. Vet. Sci. 3(5): 91-94.

Juliana, A., Hartono, M., Suharyati, S., 2015. Repeat breeder pada sapi Bali di Kabupaten Pringsewu. J. Ilmiah Peternakan Terpadu, 3(2): 42-47.

Kumar, S., 2010. Computation of Judicious Treatment of Endometritis in Cows. Ph.D. Thesis. Sher-e-Kashmir University of Agricultural Sciences and Technology, Jammu, India.

McDougall, S., Macaulay, R., Compton, C. 2007. Association between endometritis diagnosis using a novel intravaginal device and reproductive performance in dairy cattle. Anim. Reprod. Sci. 99(1-2): 19-23.

Mido, S., Murata, N., Rawy, M.S., Kitahara, G., Osawa, T., 2015. Effects of intrauterine infusion of povidone-iodine on endometrial cytology and bacteriology in dairy cows with clinical endometritis. J. Vet. Med. Sci. 78(4): 551-556.

Pandey, P., Pandey, A., Sinha, A.K., Singh, B., 2011. Studies on the effect of lugol’s iodine on reproductive efficiency of dairy cattle. Ann. Rev. Res. Biol. 1(2): 33-36.

Priyanto, D., 2011. Strategi pengembangan usaha ternak sapi potong dalam mendukung...
program swasembada daging sapi dan kerbau. *J. Litbang Pertanian*. 30(2): 108-116.

Sane, C.R., Deshpande, B.R., Marathe, M.R., 1982. Infertility in Cows and Buffaloes. In Reproduction in Farm Animals. Kodagali. Edu. Varghese Pub. House Bombay, 292.

Sarkar, A.K., 2006. Therapeutic management of anoestrus cows with diluted lugol’s iodine and massage on reproductive organs-uncontrolled case study. *Res. J. Anim. Vet. Sci*. 1(1): 30-32.

Sayuti, A., Melia, J., Marpaung, I.K., Siregar, T.N., Syafruddin, S., Amiruddin, A., Panjaitan, B., 2016. Diagnosis kebuntingan dini pada kambing kacang (*Capra sp.*) menggunakan ultrasonografi transkutaneus. *J. Kedokt. Hewan*. 10(1): 63-67.

Singh, D.K., Sinha, M.P., Singh, R., 1987. Studies on the efficacy of secrodyl, Prajana and Lugol’s paint on anestrus goats. *Indian Vet. J*. 64(2): 178-179.

Subagyo, J., 2016. Kajian faktor risiko repeat breeding sebagai upaya perbaikan potensi reproduksi sapi Aceh betina (Studi Kasus di Kabupaten Pidie, Aceh). *Thesis*. Program Pascasarjana Universitas Syiah Kuala. Banda Aceh, Indonesia.

Susilawati, T., 2013. Tingkat keberhasilan inseminasi buatan dengan kualitas dan deposisi semen yang berbeda pada sapi peranakan Ongole. *J. Ternak Tropika*. 12(1): 15-24.

Szenci, O., 2016. Recent possibilities for diagnosis and treatment of post parturient uterine diseases in dairy cow. *JFIV Reprod. Med. Genet.*, 4(1): 1-7.

Thasmi, C.N., Siregar, T.N., Wahyuni, S., Aliza, D., Panjaitan, B., Nazaruddin, N., Sabila, F.N., Fallatanza, M., 2018. Anatomical and histological changes of uterine horn of Aceh cattle with repeat breeding. *J. Adv. Vet. Anim. Res*. 5(4): 445-453.