# Estrus and pregnancy rate of Simmental-Ongole Crossbred and Ongole Grade heifer after being synchronized and inseminated

*by* Daud Samsudewa

**Submission date:** 24-Jun-2020 08:48AM (UTC+0700)
**Submission ID:** 1348826993
**File name:** Estrus_and_pregnancy_rate.pdf (139.94K)
**Word count:** 3879
**Character count:** 21355

**J I T A A**
Journal of the Indonesian Tropical Animal Agriculture
Accredited by Ditjen Penguatan Risbang No. 60/E/KPT/2016

J. Indonesian Trop. Anim. Agric.
pISSN 2087-8273 eISSN 2460-6278
http://ejournal.undip.ac.id/index.php/jitaa
43(4):438-444, December 2018
DOI: 10.14710/jitaa.43.4.438-444

# Estrus and pregnancy rate of Simmental-Ongole Crossbred and Ongole Grade heifer after being synchronized and inseminated

**S. Sutiyono*, D. Samsudewa and A. Suryawijaya**
*Faculty of Animal and Agricultural Sciences, Diponegoro University,*
*Tembalang Campus, Semarang 50275 - Indonesia*
**Corresponding E-mail: barep.sutiyono@gmail.com*

*Received February 19, 2018; Accepted November 22, 2018*

**ABSTRAK**

Penelitian ini bertujuan untuk mengkaji hasil sinkronisasi estrus dan inseminasi buatan pada sapi dara peranakan Ongole dan peranakan Simental-Ongole. Materi yang digunakan adalah 19 ekor sapi peranakan Ongole (PO) dan 18 ekor sapi hasil silangan Simental-Ongole (SSO). Materi ditentukan secara *purposive sampling* dengan spesifikasi gigi seri sudah tanggal (poel) dan belum pernah bunting. Materi diidentifikasi kenormalan organ reproduksinya dengan metode palpasi rektal, kemudian disinkronisasi berahi menggunakan 50 mg *medroxy progesterone acetat* dalam spon vagina, dan sapi dara yang mengalami berahi selanjutnya diinseminasi menggunakan semen beku. Parameter penelitian adalah jumlah sapi dara yang mempunyai alat reproduksi normal atau abnormal, mengalami berahi dan bunting. Analisis data menggunakan analisis deskriptif. Hasil penelitian menunjukkan bahwa sapi PO dan sapi SSO yang mempunyai organ reproduksi abnormal masing-masing satu ekor (5.56%) dan 7 ekor (36.84%). Respon sinkronisasi berahi sapi dara yang mempunyai organ reproduksi nomal dan abnormal pada sapi PO masing-masing 94.17% dan 100%, sedangkan pada sapi PSO 100% dan 42.86%, sedangkan hasil kebuntingan pada sapi PO 70.59 dan 0.00%, sedangkan pada sapi SSO 50.00 dan 0.00%. Kesimpulan dari penelitian ini adalah jumlah sapi PSO yang memiliki ketidaknormalan organ reproduksi lebih banyak dibandingkan sapi PO. Sinkronisasi berahi menggunakan 50 mg *medroxy progesterone acetat* dalam spon vagina dapat meningkatkan jumlah berahi dan kebuntingan pada sapi dara yang mempunyai organ reproduksi normal.

*Kata kunci: sapi dara,sapi peranakan, berahi, bunting*

**ABSTRACT**

The aim of the study was to examine the synchronization of estrus and artificial insemination in heifers of Ongole grade and Simental-Ongole grade. The research used 19 Ongole Grade (OG) and 18 Simental-Ongole Crossbred (SOC) heifers. This research applied purposive sampling to determine the research population. The criteria to select the population were heifers which have in mature body. The normality of heifer's reproductive organs were identified by performing rectal palpation, then 50 mg of *medroxy progesterone acetate* on vaginal sponge was used to synchronized estrus. The estrus heifer was inseminated using frozen semen. The observed parameters were the number of heifers with normal and abnormal reproductive organs, estrus sign and pregnancy. Data were analyzed descriptively. This study showed that OG and SOC with abnormal reproductive organs was 1 heifer (5.56%) and 7 heifers (36.84%), respectively. The responses of estrus synchronization in heifers with normal and abnormal reproductive organs were 94.17% and 100% in OG, and 100% and 42.86% in SOC. Meanwhile, the pregnancy rate was 70.59 and 0% in OG, and 50.00 and 0% in SOC. In conclusion, the number of SOC heifers with abnormal reproductive organs is higher than OG. Estrus synchronization using 50 mg

*medroxy progesterone acetate* increase the amount of estrus and pregnancy in heifers with normal reproductive organs.

*Keywords: grade cows, heifer, estrus, pregnant*

## INTRODUCTION

Mating is the process of generating offspring from male and female animals. The bull produces and ejaculates sperm while the cow produces ova, pregnant, partus, and nourishing the offspring. In cattle breeding, the female should have normal reproductive organs and physiology. The activity of reproductive organs affected to the rate of pregnancy (Geres *et al.,* 2011).

Heifers are essential in cattle breeding because they will be cows that reproduce in a long term (Diskin and Kenny, 2014). Therefore, heifer should be carefully selected. Reproductive performance of heifers is strongly influenced by genetic, conditions of weaning time, and the growth starting from weaning to puberty (Pereira *et al.,* 2017). Genetic factors and poor growth can lead to organ abnormalities and physiology disorders of reproduction. The abnormality reproductive organ and physiological disorders are factors causing infertility and sterility in cow buffalo (Azawi *et al.,* 2008). Abnormalities of reproductive tract and ovaries are factors causing infertility in goats, reaching 91.3% (Mushonga *et al.,* 2017).

Farmers in Sukoharjo villages district still apply traditional method in raising their cattle with low knowledge on reproduction aspects. Low succesfull rate of cattle production will contributes to food security and household income (Nyamushamba *et al.,* 2017). Livestock breeding programs that correlate positively to their benefits are conventionally selected based on fertility (Gizaw *et al.,* 2010). The selection of cow based on reproductive organs was done by rectal palpation in order to determine normality of ovaries, uterus, cervix and vagina. The abnormalities in the reproductive organs occurred in womb or uterus, cervix, ovary, oviduct and vagina with the percentage of 70.8%, 64.6%, 60.0%, 49.2% and 38.5% respectively (Kunbhar *et al., 2003*). The efforts to improve reproduction quality of the herds based on genetic is necessary. Superior genetic identification in livestock populations can be used in the selection process. Reproduction organ abnormality identification will continuously contribute quantitavely and qualitatively to improve genetic quality (Haskell *et al.,* 2014).

Synchronization is an attempt to make estrus in a livestock population appearing simultaneously (Khumran *et al.,* 2012). Estrus synchronization makes estrus detection and artificial insemination (AI) efficient. In AI program, estrus detection and insemination are performed during 3-5 days (Khumran *et al.,* 2012*)* and in average insemination was done on 60 hours after the medication is stopped (Echternkamp and Thallman, 2011; Mallory *et al.,* 2011). The use of progesterone in estrus synchronization can increase the size of follicles which positively correlate to the quality of the ovum (Pfeifer *et al.,* 2012). The use of controlled internal drug release (CIDR), Ovsynch and Norgestomet ear implant protocols resulted in 100% estrus with conception rates reach 60%, 50%, and 50%, and the overall of three cycles as 80%, 80%, and 70%. (Dhami *et al.,* 2015).

Intra vaginal progesterone implants that were sanitized in lactating primaparous and multiparous of Holstein cows, affected reproductive variables, such as timing and synchronization of follicular wave emergence, and size of the ovulatory follicle (Melo *et al.*, 2018). Response of estrus synchronization using 50 mg *medroxy progesterone acetate* in heifers and cows were 91.67% and 65.79% (Sutiyono *et al.,* 2014). Estrus synchronization using progesterone in CIDR followed by artificial insemination in beef cows can increase pregnancy by 7.1% (Stevenson *et al.,* 2015). On other hand, some case found that heifer with mature body did not come to the estrus cycle because of the reason of bad management and physiological disorder (Sutiyono *et al*., 2017). Therefore, need to do the research effect of estrus synchronization used *Medroxy Progesterone Acetate* (MPA) to the estrus performance and pregnancy. The aim of this research was to examine the synchronization of estrus and artificial insemination in heifers of Ongole Grade and Simental-Ongole Crossbred.

## MATERIALS AND METHODS

This research was conducted in Polokarto, Mojolaban and Nguter District, Sukoharjo Regency. The materials used were 18 Ongole

Grade (OG) and 19 Simmental-Ongole Crossbred (SOC) heifers. The materials were selected using purposive sampling by selecting the heifers which mature body.

Materials (OG and SOC) were identified as having normal or abnormal reproductive organs used rectal palpation for observation of the cow. The number of OG and SOC having normal and abnormal reproductive was 17 and 1; 12 and 7, respectively. The heifers were synchronized with 50 mg *medroxy progesterone acetate*. Medroxy progesterone acetate was applied using vaginal sponge for 17 days. On the day-18, the vaginal sponge was removed. Estrus was observed three times a day (8:00 am to 09:00 am; 12:00 noon to 01:00 pm; and 04:00 pm to 05:00 pm). Heifers that responded to the synchronization were inseminated using frozen semen of pure simmental bull.

Parameters observed in this study were the normality of reproductive organ, the rate of estrus and pregnancy. Here is the method to determine abnormality in reproduction, estrus and pregnancy in heifers:

a. Reproductive organ disorders were abnormalities in ovaries, uterus (corpus and cornua), cervix and vagina, which were determined by rectal palpation.
b. Estrus of the heifers was determined using an indicator of uterine tension (recommended by Inseminator), vocalization, redness vulva and mucous discharge.
c. Pregnant cow was determined based on the rectal palpation diagnosis 4 months after AI.

**Data Analysis**

The data of the number of heifers with normal and abnormal reproductive organs, estrous and pregnancy were analyzed descriptively (Abebe *et al.*, 2000).

## RESULTS AND DISCUSSION

**Reproductive Organs**

Female reproductive organs have a very important role in the success of generating offspring. Female reproductive organs produce ova and reproductive hormones, copulation, sperm duct, the site of fertilization, fetal growth and birth canal. Abnormality in female reproductive organs can cause infertility or sterility. Normality and abnormality of reproductive organs through rectal palpation of OG and SOC heifers are presented in Table 1.

Table 1 shows that the number of OG heifers was only one (5.56%) which was abnormal cervix. Meanwhile, SOC had 7 abnormal reproductive organs (36.84%) which were in ovary, uterus or womb, vagina and cervix 3, 2, 1 and 1 respectively. Abnormalities in the ovary were undeveloped follicle and one follicle was small in size. The uterus was asymmetric, and the cornua was twisted. The cervix was small in size and the vagina was narrower. The percentage of abnormal reproductive organs in SOC (36.84%), higher than OG (5.56%). The high percentage of reproductive organ abnormalities in SOC can be affected by genetic and nutritional factors. Abnormal reproductive organs can be caused by abnormal growth and by the interaction of genes from both parents (Connell *et al.,* 2013). Abnormalities in SOC reproductive organs were the result of interactions between of *Bos taurus* and *Bos indicus* gene. The differences shown in

Table 1. Appearance of Reproductive Organs Ongole Grade and Simmental-Ongole Crossbred, Different Age-Based Dental Series Release (GSR)

| GSL | Ongole Grade | | | Simmental-Ongole Crossbred | | |
|---|---|---|---|---|---|---|
| | Sample (n) | Normal | Abnormal | Sample (n) | Normal | Abnormal |
| | ..... head ..... | | | | | |
| 1 | 11 | 11 | 0 | 9 | 5 | 4 |
| 2 | 3 | 2 | 1 | 6 | 3 | 3 |
| 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 4 | 4 | 0 | 1 | 1 | 0 |
| Total | 18 | 17 | 1 | 19 | 12 | 7 |
| % | 100 | 94.44 | 5.56 | 100 | 63.16 | 36.84 |

genetic characteristics between *Bos taurus* and *Bos indicus* as well as some of their physiological and behavioral differences (Nogueira, 2004). The quality of feed given by local farmer was generally low (Nyamushamba *et al.,* 2017), and low quality feed given during the growth, since weaning period, tends to be the cause of abnormalities in reproductive organ (Izquierdo, 2016). Abnormalities in reproductive organs of female animals can occur in the ovary, oviduct, uterine, vaginal and cervix.

**Response of Estrus Synchronization and Artificial Insemination**

Estrus synchronization is a reproductive technology to make a herd of cows in estrus simultaneously for the efficiency of AI. Another benefit of estrus synchronization is to produce heifers with similar body weight, therefore it will be easier to manage. The result of estrus synchronization and AI in OG and SOC which had normal and abnormal reproductive organs is shown in Table 2.

**The Estrus**

Table 2 shows that OG and SOC having normal reproductive organs responded to estrus syncronized were 16 (94.17%) and 12 (100%), respectively, while they having abnormal reproductive organs were 1 (100%) and 3 (42.86%), respectively. The heifers which had abnormal reproductive organs still responded to synchronization only if they still had an active ovary. Basically, estrus syncronization works by using progesterone to inhibit the production of the Follicle Stimulation Hormone (FSH), thus, after the treatment is stopped, the follicle is no longer growing. Graafian follicle growth was followed by egg cell maturation process (Khumran *et al.,* 2012).

The response of estrus sync process using progesterone was influenced by body condition, nutrition and ovaries activity. The reproductive disorders of heifers and cows tended to be caused by body conditions, which are reflected in the body condition score (BCS) which is 1-3 with maximum score 9 (Sutiyono *et al.,* 2018). Nutritional supplementation given significantly affected the condition of the body and the quality of cell produced so that it can be repaired the reproduction process (Marume *et al.,* 2014). Nutritional deficiency affected hypothalamus to produce Gonadotrophin releasing hormone (GnRH) and Pituitary gland for the production of FSH and LH low so that ovary activi lasts longer (Pradhan and Nakagoshi, 2008 and Bindari *et al.,* 2013). Teshome *et al.* (2016) stated that the failure of ovulation was caused by neuroendocrine disorders in the hypothalamus, pituitary and ovary. Good quality feed given to weaning calves will lead to a good performance of reproductive organ for breeding (Izquierdo, 2016). Meanwhile imperfect growth due to genetic interaction and nutritional deficiency will lead to deformity and reproductive organ activity disorders (Patel *et al.,* 2012).

**The Pregnancy**

Table 2 shows that pregnant heifers having normal and abnormal reproductive organs in OG were 70.59 and 0%, respectively, while in SOC were 50 and 0%, respectively. The percentage of pregnant heifers with normal reproductive organs was high. It was because both groups of heifers had no history of reproductive physiological abnormalities. Synchronization using progestagen was useful to increase progesterone concentration in blood during luteal phase. This can provide bigger ovulatory follicle which positively correlates to the success of pregnancy

Table 2. Number of Heifers Estrus and Pregnant from Heifer Having Normal and Abnormal Reproductive Organ

| Parameters | Ongole Grade | | | | Simmental-Ongole Crossbred | | | |
|---|---|---|---|---|---|---|---|---|
| | Normal (n=17) | | Abnormal (n=1) | | Normal (n=12) | | Abnormal (n=7) | |
| | Head | % | Head | % | Head | % | Head | % |
| Estrus | 16 | 94.17 | 1 | 100 | 12 | 100 | 3 | 42.86 |
| Pregnant | 12 | 70.59 | 0.00 | 0.00 | 6 | 50.00 | 0.00 | 0.00 |

(Echternkamp and Thallman, 2011; Mallory *et al.,* 2011). The provision of balanced nutrition significantly affects body condition and the quality of genital cells produced. Thus, this increases pregnancy (Marume *et al.,* 2014). Estrus synchronization in cattle using controlled internal drug release (CIDR) containing 1.38 g progesterone resulted in 44.4% of pregnancy after AI (Beuchat *et al.,* 2012).

The failure of pregnancy in heifers having normal reproductive organs can be influenced by management of local farmer, hormonal disturbances, reproductive organ infections and low sperm quality. But, in this research the quality of semen is good with 70% motility and 12% abnormality. This quality is fulfill the standarization of semen (Samsudewa *et al*., 2018). Repeated breeding caused by raising management, storage of hormone and infections of reproductive organs in cattle were 1.70, 18.03 and 14.75% respectively (Singh *et al.,* 2008). Nutritional deficiency will decrease the activity of reproductive organs resulting in failure in pregnancy (Geres *et al.,* 2011). The high rate of pregnancy failure in SOC (50%), may be caused by physiological disorders (failure or fertilization and implantation). In this research the cow with abnormalities reproductive organ was not successfull to be pregnant (0%). According to Nogueira (2004), the strains formed from Bos taurus and Bos indicus can cause physiological or reproductive organ abnormalities. The failure of pregnancy in heifers is likely due to nutritional deficiency. Nutritional deficiency in heifer is the cause of delayed puberty. Meanwhile in cows, the causes are fertilization failure and embryo death in early pregnancy (Izquierdo, 2016)

Table 2 shows that all SOC and OG having abnormal reproductive organs were not pregnant. Normal reproductive organs highly support the process of pregnancy (Geres *et al.,* 2011), and high rate of abnormalities in reproductive organs of female herds indicates that the fertility of the herd was low (Patel *et al.,* 2012). Abnormalities of female reproductive organs in ovaries, uterus, cervix, oviduct, and vagina occur mostly in growth period due to genetic and environmental factors that adversely affect reproductive process (Connell *et al.,* 2013). Abnormality in ovary causes the ova produced to have low quality. In fallopian tube, it causes fertility failure. Abnormality in uterus causes sperms to fail to reach the site of fertilization. In cervix and vagina, it causes difficulty in mating and performing artificial insemination. Ovary abnormalities are the main factors causing the failure of ova production, whereas the failure of implantation and pregnancy was caused by endometrial disorder (Connell *et al.,* 2013).

## CONCLUSION

The number of Simmental-Ongole Crosbred having abnormal reproductive organs was higher than Ongole Grade. Estrus synchronization using progesterone improved reproduction performance of heifers which have normal reproductive organs, but not in heifers which have abnormal reproductive organs. In breeding process, heifers should be selected carefully, and the breeder should make sure that the selected heifers have normal reproductive organs in order to reproduce successfully.

## ACKNOWLEDGEMENT

This research was funded by the research program and application of science and technology, Research and Development (Research and Development) in Central Java for fiscal year 2016.

## REFFERENCES

Abebe, A., J. Daniels and J.W. McKean. 2000. Statistics and Data Analysis. Western Michigan University, Kalamazoo, MI.

Azawi, O.I., A.J. Ali and E.H. Lazim. 2008. Pathological and anatomical abnormalities affecting buffalo cows reproductive tracts in Mosul. Iraqi J. Vet. Sci. 22(2):59-67.

Beuchat, F., P. Berthold, L. Gerber, R.M. Bruckmaler, A. Steiner, J. Husler and G. Hirsbrunner. 2012. Conception rate using the select-synch protocol in combination with a lower dose progesterone-releasing intrvaginal insert (1.38 g) in Swiss dairy cows. J. Vet. Med. 3: 6-10.

Bindari Y.R., S. Shrestha, N. Shrestha and T.N. Gaire. 2013. Effects of nutrition on reproduction- a review. Adv. App. Sci. Res. 4 (1): 421-429.

Connell, M.T., C.M. Owen and J.H. Segars. 2013. Genetic syndromes and genes involved in the development of the female reproductive tract: A possible role for gene therapy. J. Genet. Syndr. Gene. Ther. 4:127.

Dhami, A.J., B.B. Nakrani, K.K. Hadiya, J.A.

Patel and R.G. Shah. 2015. Comparative efficacy of different estrus synchronization protocols on estrus induction response, fertility and plasma progesterone and biochemical profile in crossbred anestrus cows. Vet. World. 8(11):1310-1316.

Diskin M.G. and D.A. Kenny. 2014. Optimising reproductive performance of beef cows and replacement heifers. Anim. 8(1):27-39.

Echternkamp, S.E. and R.M. Thallman. 2011. Factors affecting pregnancy rate to estrous synchronization and fixed-time artificial insemination in beef cattle. J. Anim. Sci. 89: 3060-3068.

Geres, D., B. Zevrnja, D. Zubcic, R. Zobel, B. Vulic, N. Staklarevicn and K. Gracin. 2011. Asymmetrical functional activities of ovaries and tubular part of reproductive organs of dairy cows. Vet. Arhiv. 81(2): 187-198.

Gizaw. S., H. Komen and J.A.M. van Arendonk. 2010. Participatory definition of breeding objectives and selection indexes for sheep breeding in traditional systems. Livest. Sci. 128:67-74

Haskell M.J., G. Simm and S.P. Turner. 2014. Genetic selection for temperament trait s in dairy and beef cattle. Front Genet. 5:368.

Izquierdo, A.C. 2016. Best practices in animal reproduction: impact of nutrition on reproductive performance livestock. J. Adv. Dairy Res. 4(1): 1-4

Khumran, A.M, Y.Rosnina, M.O. Ariff, H. Wahid, G. Dhaliwala, M.P. Khanh, K.C. Yap, M. Fahmi and M.E. Asmil. 2012. Comparison of estrus and pregnancy rates of beef cows synchronzed whit progesterone and protaglandin bases protocols. J. Anim. Vet. Adv. 11(9): 3561-3567.

Kunbhar H.K., M.U. Samo., A. Memon and A.A. Salangi. 2003. Biometrical studies of reproductive organ of thari Cow. Pakistan J. of Biol. Sci. 6(4): 322-224

Mallory, D.A., J.M. Nash, M.R. Ellersieck, M.F. Smit, and D.J. Patterson. 2011. Comparison of long-term progestin-based protocols to synchronize estrus before fixed-time artificial insemination in beef heifers. J. Anim. Sci. 89:1358-1365.

Marume, U., N. T. Kusina, H. Hamudikuwanda, M. Ndengu and O. Nyoni. 2014. Effect of. Dry season nutritional suppementation on fertility in bulls in Sanyati smallholder farming area, Zimbabwe. Afr. J. Agric. Res. 9(1): 34-41.

Melo, L.F., P.L.Jr. Monterio, A.B. Nascimento, J.N. Drum, C. Spies, A.B. Prata, M.C. Wiltbank and R. Sartori. 2018. Follicular dynamics, circulatingL.F progesterone, and fertility in Holstein cows synchronized with reused intravaginal progesterone implants that were sanitized by autoclave or chemical disinfection. J. Dairy Sci. 101(4):3554-3567.

Mushonga, B., S. Twiyizeyimna, G. Habarugira, E. Kandiwa, S. Chinyoka, A. Samkange, and A. Bishi. 2017. Study of incidence of gross urogenital lesions and abnormalities on does slaughtered at Nyagatare slaughterhouse, Eastern Province, Rwanda. J. Vet. Medic. Article ID 7564019: 1-7.

Noguera, G.P. 2004. Puberty in South American *Bos Indicus* (Zebu) cattle. J. Elsevier Anim. Reprod. Sci. 82-83:361-372.

Nyamushamba, G.B., C. Mapiye, O. Tada, T.E. Halimani, and V. Muchenje. 2017. Conservation of indigenous cattle genetic resources in Southern Africa's smallholder areas: turning threats into opportunities. Asian-Australas J. Anim. Sci 30(5):603-621.

Patel, D.J., A.J. Patel, R.K. Patel and P.R. Parekh. 2012. Chromosomal analysis of breeding bull using lymphocyte culture. Bangladesh Vet. 29:17-21.

Pereira, G.R., J. O. J. Barcellos, A.G. Sessim, J.U. Tarouco, F.D. Feijo, J.B. Neto, Ê.R. Prates and M. E. A. Canozzi. 2017. Relationship of post-weaning growth and age at puberty in crossbred beef heifers. R. Bras. Zootec. 46 (5):413-420

Pfeifer, L.F.M., S.C.B.S. Leal, A. Schneider, E. Schmitt, M.N. Correa. 2012. Effect of the ovulatory follicle diameter and progesterone concentration on the pregnancy rate of fixed-time inseminated lactating beef cows. R. Bras. Zootec. 41(4):1004-1008.

Pradhan, R. and N. Nakagoshi. (2008) Reproductive disorders in cattle doe to nutritional status. J. Inter. Develp. Coop. 14(1):45-66.

Samsudewa, D., S.S. Capitan, C.C. Sevilla, R.S.A. Vega and P.P. Ocampo. 2018. Hematologic profile and semen quality of male Timor deer (*Rusa timorensis*) in various hierarchies. IOP. Conf. Series: Earth Environ. Sci. 119(1):012027.

Sing, D. Dadarwal, M. Honparkhe and A. Kumar 2008. Incidences of various

etiological factors reponsible for repeat breeding syndrome in cattle and buffaloes. J. Vet. Med. 6(1):87-91.

Sutiyono, D. Samsudewa and A. Suryawijaya (2014) Dampak sinkronisasi berahi menggunakan progesteron terhadap berahi dan kebuntingan sapi betina milik rakyai Kabupaten Sukoharjo. J. Litbang Provinsi Jawa Tengah, 12(1):27-32.

Sutiyono, D. Samsudewa dan A. Suryawijaya. (2017). Identifikasi Gangguan Reproduksi Sapi Betina di Peternakan Rakyat. J. Vet.. 18(4):580-588

Stevenson, J.S., S.L. Hill, G.A. Bridges, J.E. Larson and G.C.Lamb. 2015. Progesterone status, parity, body condition, and days postpartum before estrus or ovulation synchronization in suckled beef cattle influence artificial insemination pregnancy outcomes. J. Anim. Sci. 93: 2111–2123.

Teshome, E, A. Kebede, N. Abdela and W.M. Ahmed. 2016. Ovarian cyst and its Economic Impact in dairy farms. Global Vet. 16(5):461-471.

# Estrus and pregnancy rate of Simmental-Ongole Crossbred and Ongole Grade heifer after being synchronized and inseminated

ORIGINALITY REPORT

| 7% | 5% | 4% | 5% |
|---|---|---|---|
| SIMILARITY INDEX | INTERNET SOURCES | PUBLICATIONS | STUDENT PAPERS |

PRIMARY SOURCES

| | | |
|---|---|---|
| 1 | worldwidescience.org<br>Internet Source | 1% |
| 2 | Submitted to Universitas Jenderal Soedirman<br>Student Paper | 1% |
| 3 | Submitted to University of New England<br>Student Paper | 1% |
| 4 | academic.oup.com<br>Internet Source | 1% |
| 5 | eprints.undip.ac.id<br>Internet Source | <1% |
| 6 | e-sciencecentral.org<br>Internet Source | <1% |
| 7 | www.kgd-ssv.ch<br>Internet Source | <1% |
| 8 | Submitted to iGroup<br>Student Paper | <1% |
| 9 | hdl.handle.net | |

| | | |
|---|---|---|
| | Internet Source | <1% |
| 10 | animalsciencepublications.org<br>Internet Source | <1% |
| 11 | Ahmed Abdel-wanees Gabr, Mohammed Fouad El Basuini. "Effect of tonophosphan, zinc oxide, and ascorbic acid on semen, sexual desire, and the fertility rate of Egyptian buffalo bulls", Annals of Agricultural Sciences, 2018<br>Publication | <1% |
| 12 | stpetersuniversity.org<br>Internet Source | <1% |
| 13 | adoc.tips<br>Internet Source | <1% |
| 14 | Submitted to Luton Sixth Form College, Bedfordshire<br>Student Paper | <1% |
| 15 | Submitted to Tarleton State University<br>Student Paper | <1% |
| 16 | Submitted to Massey University<br>Student Paper | <1% |
| 17 | www.instituteofcaninebiology.org<br>Internet Source | <1% |
| 18 | Rathbone, M.J.. "Conceptual and commercially available intravaginal veterinary drug delivery | <1% |

systems", Advanced Drug Delivery Reviews, 19971208
Publication

| | | |
|---|---|---|
| 19 | Submitted to Mansoura University<br>Student Paper | <1% |

| | | | |
|---|---|---|---|
| Exclude quotes | On | Exclude matches | Off |
| Exclude bibliography | On | | |

# Estrus and pregnancy rate of Simmental-Ongole Crossbred and Ongole Grade heifer after being synchronized and inseminated

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

**Instructor**

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7