

The Response of Gonadotrophin Hormone at Different Dose on Time of Oestrus, the Profile of Progesterone, Estrogen and Corpus Luteum of Ongole Crossed Cows

Lukman Affandhy¹, D.M. Dikman¹, Y. Widyaningrum¹

¹ Indonesia Beef Cattle Research Station, Grati-Pasuruan
Corresponding email: lukmansingosari@gmail.com

ABSTRACT: Pregnant mare's serum gonadotrophin (PMSG) was one of the gonadotrophin hormones which often used for improving the process of ovarian follicular development and formation of egg cells (oocytes). This study aims to determine the effect of inducing hormone gonadotrophin (PMSG) at different doses on the incidence of oestrus, estrogen and progesterone concentrations in the blood and the number of corpus luteum. The research was conducted approximately four months at Indonesia Beef Cattle Research Station (IBCRS). The treatment of different PMSG dose, namely A = 1000 IU, B=1300 IU and C = 1600 IU. The implementation of gonadotrophin hormones began with the ovulation synchronization (ovsynch) using a combination of Gonadotropin Releasing Hormone (GnRH) and Prostaglandin (PGF) 2 alpha and PMSG. Completely randomized design was used in this research and collected data were analyzed one-way ANOVA. Variables measured were: time of oOestrus and mating, the concentration of the hormone estrogen, progesterone and the number of corpus luteum. The results showed that there was no difference between treatment of PMSG hormones or oestrus sign. PMSG treatment of the time of first oestrus at different dose showed treatment A = 48.0 ± 50.3 hours, B = 45.6 ± 12.9 hours, C = 55.2 ± 48.1 hours. The second of oOestrus and mating evidence at different dose showed treatment A, B and C, were 67.2 ± 47.7 ; 69.6 ± 44.5 and 105.6 ± 68.1 hours, respectively. Effect of different doses of PMSG treatment was also not different on the concentration of estrogen and progesterone, namely, 16.4 ± 19.4 pg/ml and 7.2 ± 7.1 ng/ml (treatment A), 25.9 ± 17.4 pg/ml and 6.7 ± 5.8 ng/ml (treatment B), and 20.9 ± 20.0 pg/ml and 5.0 ± 6.4 ng/ml (treatment C), while the number of corpus luteum in ovarian right and left on the treatment, also showed no difference, namely 2.5 ± 2.4 ovaries (treatment A), 3.3 ± 1.4 ovaries (treatment B) and 2.1 ± 1.9 ovaries (treatment C). It can be concluded that the treatment of combination hormone of GnRH, PGF 2 alpha, PMSG and showed positive response to the appearance of oestrus and the number of corpus luteum in Ongole Crossed cows.

Keywords : Ongole Crossed Cows, Progesterone, Estrogen, Corpus Luteum.

INTRODUCTION

Pregnant mare's serum gonadotrophin (PMSG) is a gonadotrophin hormone which can be used to improve performance in the ovarian follicle growth process and the formation of the oocyte. Maximizing resource follicles as endogenous hormones can be done by super ovulation. Super ovulation is a way to increase the number of oocytes in the ovaries until ovulation occurs. The next development was followed by an increase in the number of corpus luteum that one of its functions is as a producer of progesterone to maintain pregnancy and support the life of the fetus until birth.

Super ovulation in cattle can use the PMSG as PMSG injection can be performed only once

with a 40-125 hour time interval (Gonzalez *et al.*, 1994; Hernawan, 2003) compared to Follicle Stimulating Hormone/FSH (injection twice) at intervals of 12 hours for 3 -5 days (Situmorang and Triwulaningsih, 2004). PMSG also has the ability as hormones FSH and LH as well as stimulating the secretion of hormones in the formation of the hormone progesterone, ovulation (Bindon and Piper, 1982; Bono *et al.*, 1991; Anchap Akesan, 1997). Synchronization programs with combination of PMSG and PGF2 α can increase the number of corpus luteum, oestrus and pregnancy (Barile *et al.*, 2007; Shu-Bin Fu *et al.*, 2012).

This study aims to determine the effect of the hormone gonadotrophin (PMSG) at different dose on the incidence of oestrus, estrogen and progesterone concentrations in blood and the amount of the corpus luteum in Ongole Crossed cows.

MATERIALS AND METHODS

Research was conducted approximately four months at Indonesia Beef Cattle Research Station (IBCRS). The treatment of different PMSG doses were: A = 1000 IU, B=1300 IU and C = 1600 IU. Before the injection of PMSG, injection combination Prostaglandin (PGF) 2 alpha with super ovulation schedule on the first day injected GnRH (1 cc IM), day 8 was injected PGF 2 alpha (5 cc IM), day 10 was injected GnRH (1 cc IM), day 11 early oestrus, days to -21 injected PMSG appropriate dose and on days 22-28 of lust and mating.

Implementation of gonadotrophin hormones began with the synchronization of ovulation using a combination of GnRH, and PGF2 alpha. Collected data were processed using the Completely Randomized Disign and one-way ANOVA. Variables measured were: time of oestrus and mating, the concentration of the hormone estrogen, progesterone and the number of corpus luteum (CL).

RESULTS AND DISCUSSION

Oestrus and Mating

Oestrus in cows depends on several factors, such as lactating cows still produce the hormone prolactin to stimulate the anterior pituitary to secrete FSH and LH which could lead to oestrus in cows. The incidence of oestrus in cattle after injected GnRH, PGF2 alpha, and PMSG with different doses are presented in Table 1.

Table1. Time of oOestrus and mating in PO cows who received treatment gonadotrophin hormone

Item	Treatment doses			Value P
	A	B	C	
Oestrus time after injection of hormones Gn RH and PGF 2 alpha (hours)	48.0 \pm 50.3	45.6 \pm 12.9	55.2 \pm 48	0.875
Oestrus and mating time after the injection of PMSG (hours)	67.2 \pm 47.7	69.6 \pm 44.5	105,6 \pm 68.1	0.179

Note : A=Dose PMSG 1000 IU, B=dose PMSG 1300 IU dan C= dose PMSG 1600 IU

The results showed that there was no difference between the dose of combination hormone ovulation to the oestrus and mating time (Table 1). Research results together with a report

(Gonzalez *et al.*, 1994; Hernawan, 2003) showed that the half-life ranging from 40 hours to 125 hours PMSG, so only required one injection. Thus dose of PMSG 1000 IU is sufficient to indicate the time oestrus and mating in cattle PO, so it is necessary to add dose of PMSG as suggested by Situmorang and Triwulaningsih (2005) that for the injection of PMSG just once, whereas FSH injections twice at intervals of 12 hours for 3-5 days. Lower doses of PMSG were suggested to increase of the percentage of pregnancy rate in cow's lower side effects (Shu-Bin Fu *et al.*, 2012).

Estrogen, Progesterone, Corpus Luteum

Table 2. The concentration of the hormones estrogen and progesterone in PO cows who received treatment gonadotrophin hormone

Name of Hormone	Treatment doses			Value P
	A	B	C	
Estrogen hormone levels (pg / ml)	16.4±19.4	25.9±17.4	20.9±20.0	0.519
Progesterone hormone levels (ng / ml)	7.2±7.1	6.7±5.8	5.0±6.4	0.740

Note : A=Dose PMSG 1000 IU, B=dose PMSG 1300 IU dan C= dose PMSG 1600 IU

The concentration of the hormone estrogen and progesterone on third PMSG treatment were no different, but the concentration was enough progesterone and estrogen combination with a GnRH injection, PGF 2 alpha and PMSG 1000 IU doses, to super ovulation with the number of corpus luteum marked more than one (Table 3). The concentration of progesterone on the day of initiation of superovulation was positively correlated with ovulation rate and the level on the day of oestrus was negatively correlated with superovulatory response (Anchap Akesan, 1997) and PMSG have the ability as hormone FSH and LH as well as stimulating secretion of hormones in the formation of the hormone progesterone, ovulation (Bindon and Piper, 1982; Bono *et al.*, 1991; Anchap Akesan, 1997).

Table 3. Total of corpus luteum in PO cows who received treatment gonadotropin hormone

Number of Corpus Luteum	Treatment doses			Value P
	A	B	C	
corpus luteum right side (ovary)	1.5±1.3	2.3±1.2	1.4±1.2	0.335
corpus luteum left side (ovary)	1.0±1.4	1.2±1.0	0.6±0.7	0.636
Total of corpus luteum (ovary)	2.5±2.4	3.3±1.4	2.1±1.9	0.563

Note : A=Dose PMSG 1000 IU, B=dose PMSG 1300 IU dan C= dose PMSG 1600 IU

Rectal palpation results showed that the number of corpus luteum was no difference between the combination of GnRH, PGF 2 alpha and PMSG doses, but the number of corpus luteum seems to have more than one (Table 3). Giving PMSG combined with PGF 2 Alpha can also increase the number of corpus luteum, oestrus and pregnancy ((Barile *et al.*, 2007; Shu-Bin Fu *et al.*, 2012). Similarly, the opinion Udin *et al.* (2007) showed that PMSG directly affect oocyte maturation by stimulating the development of the oocyte nucleus so that the number of oocytes that stops its development only slightly. With the development of oocytes that more and more and the faster it will effect the number of corpus luteum which will be formed after ovulation (Anchap Akesan, 1997).

CONCLUSION

It is concluded that combination hormone of GnRH, PGF 2 alpha, and PMSG showed positive response to the appearance and the number of corpus luteum oestrus in cattle of local PO.

REFERENCES

- Anchap Akesan, S.P. 1997. "Progesterone level and superovulatory response in Kangeyam and Crossbred cows treated with PMSG and FHS. Thesis submitted in part UII for the degree of Doctor of Philosophy in Animal Biotechnology to the Tamil Nadu Veterinary and Animal Science University Chennai Department of Animal Biotechnology Madras Veterinary College Tamilnadu Veterinary and Animal Sciences University Chennai - 600 007.
- Barile, V.L., G.M. Terzano, S. Allegrini, M. Maschio, M. Razzano, G. Neglia, C. Pacelli. 2007. Relationship among preovulatory follicle, corpus luteum and progesterone in oOestrus synchronized buffaloes. *J.Anim.Sci.* Vol. 6, (Suppl. 2), 663-666.
- Bindon, B.M and L.R. Piper. 1982. Physiology Base of Ovarian Response to PMSG in Sheep and Cattle, in ET in Cattle, Sheep and Goats. Aust.Soc. Passport to the year 2000. AIHOCHIS.
- Bono, G. G., G. Gabai, L. Silvestrelli, A. Comin. 1991. Uperovulatory and endocrinological responses of Simmental cows treated either with PMSG or HMG or in combination. *Theriogenology* : 35(6):1179-1190.
- Gonzalez, A., H. Wang, T. D Carruthers, B. D Murphy, and R. J. Mapletoft. 1994. Super ovulation in the cow with pregnant mare serum gonadotrophin: effects of dose and ant pregnant mare serum gonadotrophin serum. *Can. Vet J.* 35 (3): 158-162.
- Hernawan, E. 2003. *Peningkatan kinerja reproduksi pada phase kebuntingan melalui tehnik superovulasi pada ternak domba. Peternakan.blogspot.com/2007/12/peningkatan-kinerja-reproduksi-pada.html* (22 July 2015).
- Situmorang, P. dan E. Triwulaningsih. 2004. *Aplikasi dan inovasi teknologi transfer embrio (TE) untuk pengembangan sapi potong. Prosiding Lokakarya Nasional Sapi Potong 2004. Balai Penelitian Ternak, Ciawi. Bogor.*
- Udin, Z., Jaswandi, T. Afriani dan E. Leonardo. 2007. *Penggunaan Pregnant Mare's Serum Gonadotropin (PMSG) dalam Pematangan In Vitro Oosit Sapi.* *JITV* 12(1): 55-59.
- Shu-Bin Fu, Hua-Lin Zhang, Hasan Riaz, Sibtain Ahmad, Xiao-Min Wang, Xiang Li, Guo-Hua Hua, Xiao-Ran Liu, Ai-Zhen Guo and Li-Guo Yang. 2012. Effects of different doses of PMSG on reproductive performance in Chinese Holstein Dairy Cows. *Pakistan Veterinary Journal.* ISSN: 0253-8318 (PRINT), 2074-7764 (ONLINE).