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APPLICATION OF TECHNOLOGY TO IMPROVE OF EWES REPRODUCTION AND LAMB PRODUCTION PERFORMANCE IN FAT TAIL SHEEP

by

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ABSTRACT

Twenty fat tail ewes with similar body weight and age were used to study the effects of application of technology on improvement of ewes reproduction and lamb production performance. The experimental ewes were adapted to the experimental conditions two months before being injected twice with 1 ml of synthetic PGF2 α (7.5 mg luprostiol/tail) to synchronize the estrous cycle and to remove previously existed corpus luteal prior to mating period. The experimental ewes were allocated base on complete randomize of factorial pattern. The first factors (A) were consist of two levels (a_1 = multiple ovulation with injected of 700 IU PMSG, a_2 = injected saline solution of 3.5 ml NaCl as control). The second factors (B) were litter size (b_1 = litter size of 1, b_2 = litter size ≥ 2). All ewes were inseminated with fresh semen. The variables observation was conception rate base on non-return rate, the average of lamb birth weight, long and high body. The experiment result shows that conception rate were higher than non-multiple ovulation ewes. The production of lamb performances were also increased of long and high body, while lamb birth weight was numerically increased of 12.56 %. It was concluded that the application of technology by multiple ovulation could increase lamb growth and development, and conception rate in ewes.

Key Words: multiple ovulations, PMSG, reproduction, lamb birth.

INTRODUCTION

The Improvement of population and productivity in fat tail sheep depend on efficacy of ewes to yield healthy lamb at the time of weaned in one reproduction cycle. This improvement still gives opportunity which earns to be pledged, considering sheep have the characteristic of very prolific. It means able bearing of lamb one even four per birth. Practically, prolificacy level in sheep was very heterogenic depend on ovulation and lamb mortality rate, especially since growth of lamb in pregnant (from zygote, embryo, fetus until born) till weaning. More and more contained lamb smaller weight born, so that survival rate to lamb progressively pass a period of preweaning the criticalness.

The mortality of high lamb before weaning, especially at ewes bearing lamb twin because of weight born

the lowness, beside produce milk which do not fulfill requirement of lamb during growth of preweaning. The weight born lamb determined by growth of prenatal (during in pregnant) is growth accumulation since zygote develop into embryo and fetus until born (Dziuk, 1992). As for growth rate in pregnant influenced by micro environment of uterus, both as source of nutrition or support of life for embryo which is implantation (Ashworth, 1992; Arkaravienien and of Kendle, 1992).

During pregnancy, growth at embryo phase very influenced by readiness of endometrial uterine to provide nutrition, and growth factor to guide growth of embryo (Gandolfie et al., 1992). The growth and development of uterine under control of conceptus hormones which yielded by corpus luteum (Et al Mulholland., 1994; Keys

and of King, 1995; Et al Manalu., 1998). On the other hand, milk production of ewes during lactation influenced by development of mammary gland during pregnancy.

The prior of research result, that conceptus or mammogenic hormone secretion (progesterone, estrogen) increasing in appropriate with the amount of corpora luteal (Sumaryadi and of Manalu, 1995a). Even have been reported, that hormone be able of expression modulation some growth factors of peptide in tissue of uterine (De Groot and of Hochberg, 1993; Et al Schultz., 1993; Tabibzadeh, 1994), and also have impact which is substantial to improvement of wight of uterine, embryo and fetus weight (Et al Kleemann., 1994; Et al Robinson., 1995; Manalu and of Sumaryadi, 1996; Et al Manalu., 1997; Et al Manalu., 1998).

The fetus phase, embryo will go into placenta then will get nutrition of circulation system of ewes through placenta (Fowden, 1995). This means growth of fetus depend on growth and development at prior period of embryo. The good growth at the moment is starting points to determine weight born as accumulation result growth of embryo until fetus.

Besides weight birth, the growth and endurance lamb influenced by milk yield of ewes during lactation (Tiesnamurti, 1992). Milk production of ewes during lactation influenced by growth and development of mammary gland during pregnancy, availability of nutrient in mammary gland. The growth and development of mammary gland is especially arranged by mammogenic or conceptus hormones (estrogen, progesterone, relaxin, and lactogen placenta) with sufficiency of hormones of prolactine, somatotrophine, cortisol and thyroxin (Knight and of Peaker, 1982; Forsyth, 1986; Manalu and of Sumaryadi, 1998a,b,c). Thereby, availability of conceptus or mammogenic hormone yielded by corpora luteal and placenta during pregnancy period very role to

growth of uterine tissue, embryo and fetus, development of placenta and mammary gland, milk production, which whole will determine efficacy of ewes until weaning is reproduction process final purpose.

This observation result accompany us to a hypothesis that reproduction performance of ewes and lamb of postpartum before weaned can improved with increase hormones concentration influencing uterine tissue and mammary during pregnancy period. One of the alternatives approach of which conducted by exploitation of rice follicle as biologic resources which had female animal as hormone source of endogen natural.

During the time have happened inefficiency usage of follicle. Both of female ovaries contain hundreds of thousand follicles, but only some egg cells which ovulated during his life. Exploiting of follicle which is ovulation through technique of multiple ovulations with injected of PMSG (Pregnant Mare's Serum of Gonadotropin) meant multiply the amount of corpora luteal as sources producer of conceptus or mammogenic hormone endogen secretion. The result of research expected can improve reproduction of ewes and lamb production performance in fat tail sheep.

RESEARCH METHOD

This Research series is a field experiment as cooperation with Office of Animal Husbandry, Brebes regency during one reproduction cycle, since mating, pregnancy until birth, with exploited technology of estrous synchronization, multiple ovulation and artificial insemination.

Animal and Experiment Protocol

This research use 20 fat tail ewes selected base on similarity of parity, body weight, and age from farmer group of building of Animal Husbandry Office, Brebes

regency. The experiment ewes injected [by] prostaglandin (7.5 luprositol mg / tail) as much as twice with interval s 11 day to uniform phase growth of follicle [at] ovary. . The experimental ewes were allocated base on complete randomize of factorial pattern. The first factors (A) were consist of two levels (a1 = multiple ovulation with injected of 700 IU PMSG, a2 = injected saline solution of 3.5 ml NaCl as control). The second factors (B) were litter size (b1 = litter size of 1, b2 = litter size 2). All ewes were inseminated with fresh semen. The variables observation was conception rate base on non-return rate by 30 days and mammary

RESULT AND DISCUSSION

The research result about effect of multiple ovulations to ewe's reproduction

gland palpation. Performance of lamb production was determined through the average of lamb birth weight, long and high body.

Data Analysis

To know influence of treatment of multivel ovulation with giving of PMSG to conception rate of ewes analyzed by using model categorize chi square, while to know influence of interaction factor of multivel ovulation and litter size to ewes reproduction and lamb production performance by variants analysis. Then analyzed simple effect if happened interaction significantly (Gomez and of Gomez, 1986).

and lamb production performance [at] various parity and litter size can be seen [at] Tables 1.

Tabel 1. ewe's reproduction and lamb production performance [at] various parity and litter size pada

| Variable Observation | of | Treatment | | | |
|-------------------------|----|-------------------|-------|---------|-------|
| | | Induction of PMSG | | Control | |
| | | Single | Twin | Single | Twin |
| Ewes Reproduction | | | | | |
| N (ekor) | | 6 | 4 | 7 | 3 |
| Conception Rate (%) | | 75 | 85 | 55 | 65 |
| Lamb Production | | | | | |
| Weight Birth (kg) | | 2,41 | 2,06 | 2,09 | 1,88 |
| Body Lenght (cm) | | 45,60 | 43,19 | 40,12 | 39,28 |
| Body High (cm) | | 41,40 | 39,61 | 38,95 | 36,34 |

The Result of Tables 1 indicating that conception rate of ewes in group which induced [by] hormone of PMSG have opportunity to yield twin lamb (85%). But that way, lamb performance [at] ewes bearing an single lamb showt performance of weight birth, body length, and body high [of] better each 2,41 kg, 45,60 cm and 41,40 cm. Same thing seen [at] twin lamb result of treatment of hormone induction of PMSG show reproduction performance which better than control ewes bearing an only single and twin lamb. This means that treatment of hormone induction of PMSG can improve to conception rate and improve to lamb production performance than control. This matter in line with

statement of Mcdonald (1980), that PMSG is one of [the] hormone which play a part in stimulant growth and development of follicle. Increasing of follicle and corpora bluteal formed, hence reproduction hormone concentration (estrogen, progesteron) progressively be on the increase. Even have been reported, that both hormone can be expression modulation to some growth factors of peptide in uterine tissue (De Groot and of Hochberg, 1993; Et al Schultz., 1993; Tabibzadeh, 1994) having impact of substansial to growth of foetus (Et al Kleemann., 1994).

The statistical analysis result show that the both type birth of lamb or interaction were not significant

influence ($P>0,05$) to performance of ewes reproduce and lamb production. But treatment of hormone induction of PMSG have an effect significant ($P < 0,05$) to performance of ewes reproduction and lamb production. This matter is estimated [by] the limited

amount of livestock especially ewes bearing lamb twin.

The outside for type birth of ewes show that the average of performance of reproduction ewes and lamb production result of hormone induction of PMSG and control can be seen [at] Tables 2.

Table 2. Performance of ewe reproduction and lamb production result of hormone induction of PMSG and control

| Variable of Observation | Treatment | |
|-------------------------|--------------------|--------------------|
| | Induction of PMSG | Control |
| Ewes Reproduction | | |
| N (ekor) | 10 | 10 |
| Conception Rate (%) | 80,00 | 60,00 |
| Lamb Production | | |
| Birth Weight (kg) | $2,24 \pm 0,35^a$ | $1,99 \pm 0,21^a$ |
| Body Length (cm) | $44,40 \pm 2,41^a$ | $39,70 \pm 0,84^b$ |
| Body High (cm) | $40,51 \pm 1,79^a$ | $37,65 \pm 2,61^b$ |

Superscrip which different in same row indicate significantly different ($P<0,05$)

The prior research result have been reported, that ewes was given treatment of hormone induction of PMSG, in the reality improve the amount of corpus luteum (CL) as source producer of conceptus reproduction hormone (endogen progesteron) counted 6,23 1,75 or increase as much as to 189,77 % ($P<0,01$) compared to control (2,15 1,67). This matter in line with average of concentration of progesteron 19,17 0,98 ng / ml or increase as much as 33,87 % ($P<0,05$) compared to control (14,32 1,15 ng / ml). Result of correlation in the reality the amount of CL have

positive correlations with concentration of progesteron ($r + 0,78$) (Et al Sumaryadi., 2002).

This matter show the existence of relation between amount of CL and progesteron hormone. As according to opinion of Mcdonald (1980) that CL is one of the source producer of hormone of progesteron. The increase of progesteron concentration followed with increase of amount of corpus luteum (Jarell and of Dziuk, 1991; Sumaryadi and of Manalu, 1995a). Data about of conception rate of ewes result of research presented [at] Tables 3.

Tabel 3. Conception Rate (%) of Ewes base on *Non Return Rate* by 30 days

| Physiology Status | Treatment | |
|-------------------|--------------------|--------------------|
| | Control | Induction of PMSG |
| Pregnant | 50,77 ^a | 63,44 ^a |
| Non Pregnant | 39,23 ^a | 26,56 ^b |

Superscrip which different in same row indicate significantly different ($P<0,05$)

Result of Tables 3 after tranformed to arcsin indicate that conception rate [of] ewes was [do] not different ($P>0,05$) [at] ewes of control group. On the contrary, conception rate [at] ewes group which is hormone induced of PMSG, in the reality the amount of pregnant sheep (63,44%)

higher than which do not pregnant (26,56%). The increase of follicles amounts which is ovulated (CL) [at] ewes by induced hormone of PMSG, in the reality will improve the amount of egg cells which ready for fertilized by sperma. The prior observation have also

indicated that ovulation rate have positive correlation [to] to pregnant efficacy [of] sheep [at] the first estrus (Sumaryadi and of Manalu, 1996) and amount of lamb birth (Et al Bradford., 1986).

Performance of lamb production which indicated with birth wight (Tables of 3) in the reality statistically [do] not different ($P>0,05$), although by numerically lamb birth weight from ewes which induced [by] hormone of PMSG (2,24 vs 1,99) kg increase as much as to

12,56 %. But lenght and high [of] body of lamb were signifificant different ($P<0,05$) between treatment with control. The lenght and high of body of lamb of ewes which induced [by] hormone of PMSG higher than control. This matter is estimated [by] relation with limitation of volume of uterine. But that way, this is starting points which good to supporting growth of post partum, only remaining to optimalization giving of ration and milk before weaned.

CONCLUSIONS

Multiple ovulation with hormone induction of PMSG to performance of ewes reproduce in the reality happened increase of as much as to 33.33 higher % than ewes which do not induce [by] hormone of PMSG. Applying of technique of multiple ovulation [at] ewes with induction 700 IU PMSG by numerically can increase lamb product wight as much as to 12.56 % compared

to control, and also can improve manifestly lenght and high [of] birth.

To improve performance of ewes reproduced and lamb production can be conducted with applying of technique of multiple ovulation through modulation of hormones endogen, but require to study furthermore improve of nutrient for the child of post partum before weaned.

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REFERENCES

- Arkaravienien, W.K. dan K.E. Kendle, 1992. Fetal viability and fetal growth after prolonged uterine contractions induced by progesteron withdrawal in late pregnancy in rats. *J. Reprod. Fertil.* 90:299-308.
- Ashworth, C.J., 1992. Synchrony embryo-uterus. *Anim. Reprod. Sci.* 28:259-267.
- De Groot, N. dan A. Hochberg, 1993. Gene Imprinting during placental and embryonic development. *Mol. Reprod. Dev.* 36:390-406
- Dziuk, P.J., 1992. Embryonic development and fetal growth. *Anim. Reprod. Sci.* 28:299-308.
- Forsyth, I.A., 1986. Variation among species in the control of mammary growth and function: The roles of prolactin, growth hormone, and placental lactogen. *J. Dairy Sci.* 69:886-903.
- Fowden, A.L., 1995. Endocrine regulation of fetal growth. *Reprod. Fertil. Dev.* 7:351-363.
- Gandolfie, F., T.A.L. Brevini, S. Modina, and L. Pasoni, 1992. Early embryonic signals: embryo-maternal interaction before implantation. *Anim. Reprod. Sci.* 28:269-276.
- Gomez, K.A. and A.A. Gomez, 1986. *Statistical Procedure for Agriculture Researh.* IRRI. Los Banos. Philippines.

- Keys, J.L. dan G.J. King, 1995. Morphology of pig uterine subepithelial capillaries after topical and systemic oestrogen treatment. *J. Reprod. Fertil.* 105:287-294.
- Kleemann, D.O., S.K. Walker, dan R.F. Seamark, 1994. Enhanced fetal growth in sheep administered progesterone during the first three days of pregnancy. *J. Reprod. Fertil.* 102:411-417.
- Knight, C.H. and M. Peaker, 1982. Development of the mammary gland. *J. Reprod. Fertil.* 65:521-536.
- Manalu, W., M.Y. Sumaryadi, and N. Kusumorini, 1995. Maternal serum concentration of several hormones in does bearing different fetal number. *Bulletin of Animal Science, Special Edition*: 225-229.
- Manalu W., M.Y. Sumaryadi, and N. Kusumorini, 1996. Effect of fetal number on concentrations of circulating maternal serum progesterone and estradiol of does during late pregnancy. *Small Ruminant Res.* 23:117-124.
- Manalu,W. dan M.Y. Sumaryadi. 1996. Pengaruh peningkatan sekresi progesteron selama periode kebuntingan dalam merangsang pertumbuhan fetus pada domba *J. Il. Pert. Indon.* Vol.6(2):51-57
- Manalu, W., M.Y. Sumaryadi, Sudjatmogo, dan A.S. Setyaningtjas, 1977b. Pengaruh superovulasi sebelum perkawinan pada produksi susu selama satu periode laktasi pada domba yang menerima dua tingkat pemberian pakan. *Prosiding Seminar Nasional Peternakan dan Veteriner*. Jilid II : 417-423.
- Manalu, W., M.Y. Sumaryadi, Sudjatmogo, dan A.S. Setyaningtjas, 1998. Effect of superovulation on maternal serum progesterone concentration, uterine and fetal weight at weeks 7 and 15 of pregnancy in Javanese thin-tail ewes. *Small Ruminant Research*. 30:171-176.
- Manalu,W., and M.Y. Sumaryadi, 1998a. Correlations of litter size and maternal serum progesterone concentration during pregnancy with mammary gland growth and development indices at parturition in Javanese thin-tail sheep. *Asian Australian J. Anim. Sci.* 11:300-306
- Manalu, W., and M.Y. Sumaryadi, 1998b. Mammary gland indices at the end of lactation in Javanese thin-tail ewes with different litter sizes. *Asian Australian J. Anim. Sci.* 648-654.
- Manalu, W., and M.Y. Sumaryadi, 1998c. Maternal serum progesterone during gestation and mammary gland growth and development at parturition in Javanese thin-tail ewes carrying a single or multiple fetus. *Small Ruminant Res.* 27:131-136
- McDonald, L.E., 1980. Veterinary endocrinology and reproduction. Lea and Febiger. Philadelphia. pp. 560
- Mulholland, J., D. Roy and S.R. Glasser, 1994. Progesterone directed gene expression in rat uterine stromal cells. In *Endocrinology of Embryo-Endometrium Interactions*. S.R. Glasser, J. Mulholland, and A. Psychoyos Editor. Plenum Press. New York. pp 33-39.
- Robinson, J., S. Chidzanja, K. Kind, F. Lok, P.Owen, dan J.Owen, 1995. Placental control of fetal growth. *Reprod. Fertil. Dev.* 7:333-344.
- Schultz, G.A., A. Hahnel, A. Panlilio, L. Wang, S. Goubau, A.Watson, dan M. Harvey, 1993. Expression of IGF ligand and receptor genes during preimplantation mammalian development. *Mol. Reprod. Dev.* 35:414-420.
- Subandriyo, 1990. Ewe productivity in villages in the districof Garut

- West Java. *Ilmu dan Peternakan* 4: 307-310
- Sumaryadi, M.Y., and W. Manalu. 1995a. The Effects of Corpora Luteal Number on Serum Progesterone and Estradiol of ewes During Luteal Phase of Estrous Cycle and Pregnancy. *Bulletin of Animal Science, Special Edition*: 231-235.
- Sumaryadi, M.Y., and W. Manalu. 1995b. Contributions of Maternal Serum Progesterone and Estradiol Concentrations or Corpora Luteal and Fetal Number to Mammary Growth and Development of Ewes During Pregnancy. *Bulletin of Animal Science, Special Edition* : 243-247, 1995.
- Sumaryadi, M.Y., E. Pramono, dan A. Priyono. 2002. Efek induksi hormon PMSG terhadap perbaikan kinerja reproduksi induk dan anak domba ekor gemuk. Laporan Penelitian. Fakultas Peternakan Unsoed. Purwokerto.
- Sutama, I.K., 1992. Reproductive development and performance of small ruminants in Indonesia. In: *New Technology for Small Ruminant Production in Indonesia*. P. Ludgar and S. Scolz Ed. Winrock International Institute for Agriculture Development, Morritton, Arkansas. pp. 7-14.
- Tabibzadeh, S., 1994. Role of cytokinines in endometrium and at the maternal interface. *Reprod. Med. Rev.* 3:11-28.
- Tiesnamurti, B., 1992. Reducing the preweaning mortality rate of Javanese thin-tail sheep. In: *New Technology for Small Ruminant Production in Indonesia*. P. Ludgar and S. Scolz Ed. Winrock International Institute for Agriculture Development, Morritton, Arkansas. pp. 71-80.

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