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## Milk Production of Sows Superovulated with PMSG and hCG Through Superovulation Before Mating

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### Abstract

This research has been conducted to study the effect of superovulation prior to mating toward gilts reproduction performance. Sixty gilts were divided into two treatments 1) gilts without superovulation and 2) gilts with superovulation. Once the gilts shows a standing heat symptoms, the boar inserted into the pig pen to mat the gilts. During the study, the pregnant gilts kept together in postal pens, then two weeks before farrowing each pregnant gilts then placed in 2.5 x 3.5 m<sup>2</sup> individual cages equipped with feeding and drinking devices. A Completely Randomized Design (CRD) was used in the first phase of study, consisting of two treatments with 30 replicates each, while analysis of data based on the mathematical model procedures, as follows:  $Y_{ij} = \mu + \alpha_i + \epsilon_{ij}$ .

All data were then analysed using variance (Steel and Torrie, 1989). The results showed that the superovulation treatments were highly significant affected ( $P < 0.01$ ) respectively against the daily sow ration consumption (DPRC)  $4.87 \pm 0.77$  and  $5.48 \pm 0.45$  kg, the sows milk production (SMP) per suckling  $0.32 \pm 0.10$  and  $0.39 \pm 0.05$  kg, the daily sows milk production (SMP) per day  $6.23 \pm 1.89$  and  $7.74 \pm 1.00$  kg, the sows milk production (SMP) per lactation  $305.54 \pm 92.40$  and  $379.44 \pm 11.08$  kg

It is concluded that the superovulation treatment in the parent before mating can improve milk production of sow which is described by the improvement of consumption of rations and the sow milk production.

### OBJECTIVE

Pig reproduction performance is highly dependent on the success of the reproductive process. The ability of the sows to produce milk would be an advantage to the growth of the piglets. Piglet growth is determined by the production of milk from the mother to the care of children during pre-weaning period (Kimet al.2000; valroset al.2003).

Improvement of milk production that can be done with superovulated using hormones such as PMSG and hCG has been proven in sheep (Manaluet al.1998), cattle (Sudjadmogoet al.2001), goat (Adrianiet al.,2005) and swine (Megeet al.2007). Through increased production of milk, the growth and development of piglets can be improved. This study aims to assess the effect of superovulation in sows before mating to the milk production of the sows.

### MATERIALS AND METHODS

As many as 60 *Landrace*, *Yorkshire*, and *Duroc* sows weighing between 100-107 kg was used in this study.

Analysis using completely randomized design (CRD), consisting of two treatments with 30 replications was designed. Data analysis followed the procedures of mathematical models as follows:  $Y_{ij} = \mu + \alpha_i + \epsilon_{ij}$ . All data were analyzed using analysis of variance (Steel and Torrie, 1989).

#### Research procedure

30 sows was injected by PMSG and hCG with dose 400/200 (superovulation 600) IU per cow and another 30 sows were only injected with physiologic saline 0.95%. Before the injection of PMSG and hCG, all animal was injected with one ml PGF<sub>2</sub>  $\alpha$  twice with an interval of 14 days for heat synchronizing. After having birth, all sows were measured daily sow ration consumption, the sows milk production per suckling, the daily sows milk production, and the sows milk production per lactation

### RESULTS AND DISCUSSION

Effect of Treatment to sows milk production can be seen on Table 1

Table 1. Sows Reproduction Performance With (SO) and Without (TSO) Superovulation

Description: Different superscript on the same row and column showed highly significant different ( $P < 0.01$ ) and significantly different ( $P < 0.05$ ); TSO = without superovulation, SO = superovulation

## Sows Milk Production

Sows milk productions are measured based on the frequency of lactating sows, milk production per suckling, daily milk production, and milk production per lactation.

**Frequency of Lactating Sows** Average of lactating sows frequency is  $19.41 \pm 0.58$  times per day, with a range of 13.57-24.29 times/day. Based on the value of, it can be obtained that the duration of lactation of piglets was every 74.81 minutes (1:15 hours). Observations obtained are still lower than the results of Xu and Cranwell (2003) that shows as much as 20 times. Data frequency lactating sows are presented in Table 1. The results of analysis of variance showed that the effect of different superovulation treatment were significantly difference ( $P < 0.01$ ). The average frequency of lactating sows per day with and without superovulation is  $18.93 \pm 0.23$  times and  $19.89 \pm 0.40$  times respectively.

Superovulation treatment in sows increases the frequency of sows to lactate piglets. Sows with high milk production will more often to lactate piglets. This shows that the piglets from superovulation parent consistently and better maintain the frequency of lactation until pre weaning than piglets from sows without superovulation. This is due piglets born without superovulation parent body weight ( $1.34 \pm 0.14$  kg) lower than superovulation ( $1.46 \pm 0.19$  kg), so it needs more milk and more aggressive than those without superovulated.

### Figure 1. Frequency of Lactating Sows Without and with Superovulation

Figure 1 explains that the frequency of lactation will follow the amount of milk production from its mother. The frequency of lactation is very high at the beginning of lactation up to week 2 with the average 22 times for superovulated sows and 21 times for sows that are not superovulated. The frequency of lactation began to decline after the 3<sup>rd</sup> week to the lowest frequency at week 7 with the average 15 times.

**Sows Milk Production Per Suckling** The average for milk production (PASI) per suckling is  $0.35 \pm 0.08$  kg. Milk production of sows per suckling is very important for piglets, especially in early lactation where piglets are totally dependent on its mother's milk before the piglets learn to eat other foods such as rations. When the piglets cannot utilize milk in early lactation the growth and development will be disrupted. Analysis of variance showed that the effect of treatment were significantly different ( $P < 0.05$ ) against PASI pigs per feeding. The mean PASI per suckling without and with superovulation is  $0.32 \pm 0.10$  kg and  $0.39 \pm 0.05$  kg respectively.

Milk production of superovulated sows increased because of the work of endogenous hormones of pregnancy which increase the concentration of progesterone and estradiol, so as to enhance the growth and development of the mammary glands are depicted with an increasing number of cell secretory glands udder formed and increased activity of the synthesis of milk (Manaluet *al.* 1999; Mege *et al.* 2007). The role of progesterone and prolactin are indispensable for the development of alveoli. Milk production aircraft produced by the mammary gland depending on the number of cells in the gland, so the more a producer of milk, the more milk production that will be produced (Delaval 2008). Figure 7 presents the sows milk production per suckling from the parent without and with superovulation.

### Figure 2. Sows milk production per suckling

Figure 7 shows that the pattern of milk production of lactating sows reached the peak at week 3 and then decreases linearly until the lowest production on the 7<sup>th</sup> week. Figure 7 also explained that the production of milk per lactation of the superovulated sows higher than the production of milk of non-superovulated sows.

**Daily Sows Milk Production** The average of Daily Milk production (PASI) was  $6.99 \pm 1.68$  kg/day. This is higher than PASI obtained from the research of Silalahi (2011) that shows as many as  $5.45 \pm 1.64$  kg/day. According to Mephram (1987) milk production of sows depending on the number of children who suckle although not necessarily guarantee optimum needs of piglets (Parakkasi 1983). The analysis of variance showed that there is highly significant effect ( $P < 0.01$ ) in the PASI pigs per day. The average PASI without and with superovulation respectively is  $6.23 \pm 1.89$  kg/day (KK = 30.24%), and  $1.00 \pm 7.74$  kg/day (KK = 12.97%). Milk production of sows per day can be enhanced through superovulation treatment because of the increase in the number of cells that form the secretory gland or udder due to increased activity of milk synthesis. Increasing in growth and development of the mammary gland is influenced by hormones of pregnancy, especially estradiol and progesterone and placental lactogen (Manaluet *al.* 1998; Manaluet *al.* 1999; Manaluet *al.* 2000; Sudjatmogoet *al.* 2001; Adriani 2005; Hurleyet *al.* 2001). Increasing in growth and development of the mammary gland during pregnancy due to increased secretion of estrogen and progesterone sows superovulated (Mege *et al.*, 2007).

Observations of daily PASI in each week of the measurement are shown in Figure 8. The results of this study are

consistent with the statement of Kimet *al.* (2000) that the mammary gland of sows during lactation reached the peak from 5 to 21 days of lactation.

Figure 3. Average of Sows Milk Production/Day/Animals

The level of development of the udder gland in early lactation will determine the peak of livestock lactation (Forsyth, 1986) and start to decrease from the fourth week to the seventh week. Sows milk production per day on a weekly measurements show that superovulated sows better in terms of maintaining production as compared than sows without superovulation.

**Sows Milk Production Per Lactation** The average of sows milk productions per lactation was  $342.49 \pm 82.12$  kg. In detail the effect of treatment of swine PASI per lactation can be seen in Table 3. Results of analysis of variance showed that the treatment was highly significant ( $P < 0.01$ ) in the sows PASI per lactation. The average sows PASI without and with superovulation was  $305.54 \pm 92.40$  kg/lactation, and  $379.44 \pm 49.20$  kg/lactation respectively. Sows milk production per lactation are capable of being upgraded through superovulation treatment, because increasing in sows PASI per lactation would increase animals lactation per day and per lactation.

**CONCLUSION**

Reproduction performance of sows through multiple ovulation by PMSG and hCG before mating can improve milk production of sows.

KEYWORD : superovulation, milk production, sow

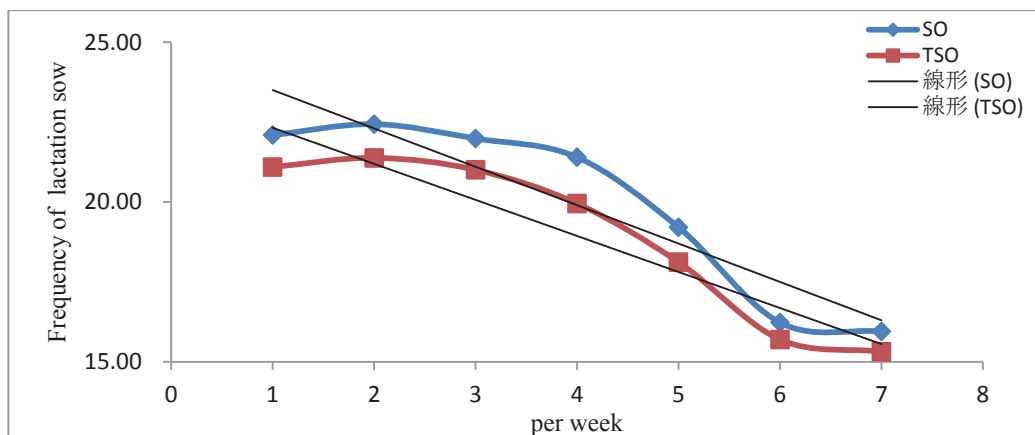


Figure 1. Frequency of Lactating Sows Without and with Superovulation

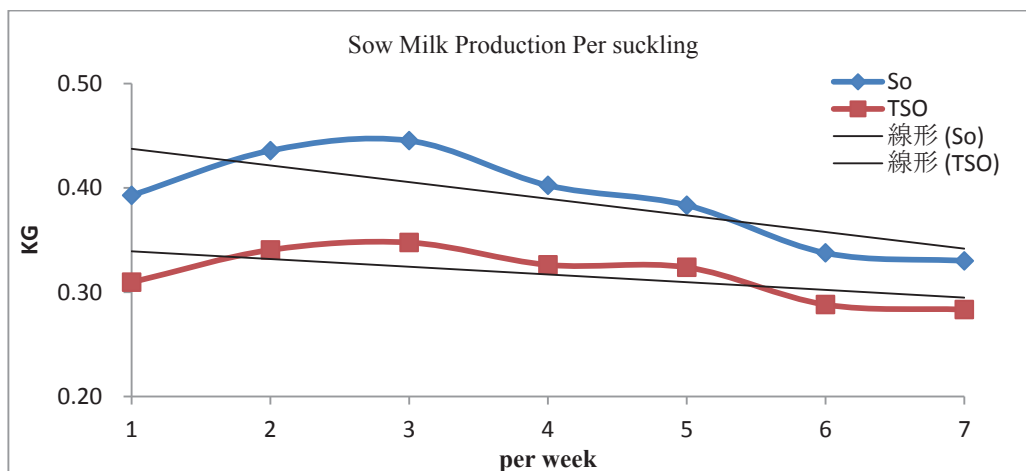


Figure 2. Sows milk production per suckling

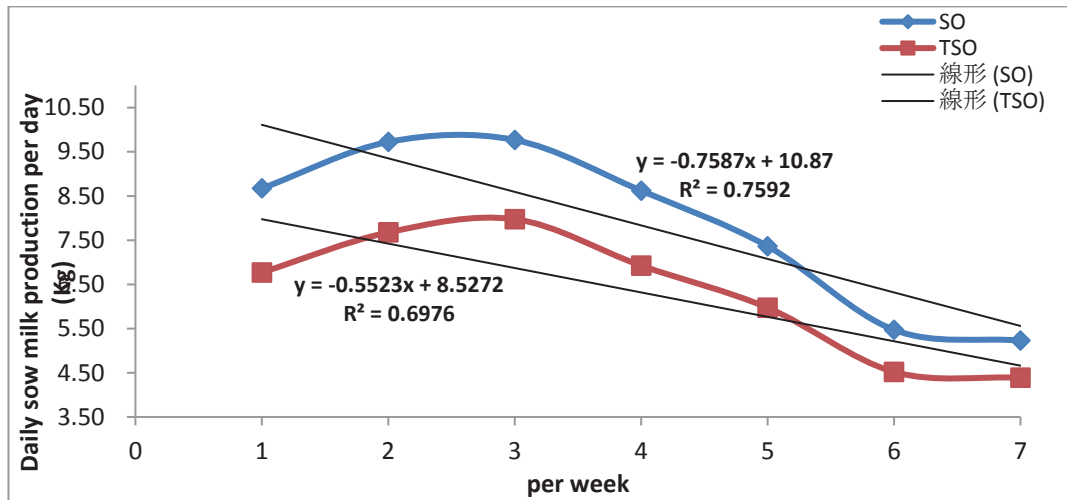


Figure 3. Average of Sows Milk Production/Day/Animals

Table 1. Sows Reproduction Performance With (SO) and Without (TSO) Superovulation

Parameter	Treatment		Mean
	TSO	SO	
Sows milk production (PASI)			
1. Frequency of lactating sows	18.93 ± 0.23 <sup>A</sup>	19.89 ± 0.40 <sup>B</sup>	19.41 ± 12.58
2. Sows Milk Production Per Suckling (kg)	0.32 ± 0.10 <sup>a</sup>	0.39 ± 0.05 <sup>b</sup>	0.35 ± 12.08
3. Daily Sows Milk Production (Kg)	6.23 ± 1.89 <sup>A</sup>	7.74 ± 1.00 <sup>B</sup>	6.99 ± 1.68
4. Sows Milk Production Per Lactation (Kg)	305.54 ± 92.40 <sup>A</sup>	379.44 ± 11.08 <sup>B</sup>	342.49 ± 82.12

Description: Different superscript on the same row and column showed highly significant different (P < 0.01) and significantly different (P < 0.05); TSO = without superovulation, SO = superovulation

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