Birth Type and Ewe Age on Milk Yield of Local Sheep at UP3 Jonggol (Jonggol Animal Science Teaching and Research Unit)

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ABSTRACT

Indonesian local sheep (in Indonesia reffered to as local sheep) have a unique characteristic as a animal tropic which could well adapted in low vegetation and global warming also. The aim of this study is to know the effect of age and birth type on milk yield do the relation with meat producing. Sheep that we used were local type. Local type means crossing beetwen javanese thin tailled ewe, garut and fat tailled ewe (because there are no detailed recording for many years). Ewe that we were used are 92 heads which has 78 single lamb and 14 twin lamb type. Lamb suckling weight differences technique were used to calculate milk yield of ewe. I_3 (ewe third years) have given the highest milk yield 443.43 ± 102.62 g/ewe/day. In the contrary I_1 (ewe first year) have gotten the lowest one which is 254.53 ± 49.67 g/ewe/day. That could be explained with the maturity stage. The maturity stage in I_3 faster than I_1 and I_2. The second aspect is about birth type, twin type have given higher milk yield 344.95 ± 66,22 g/ewe/day than single type 413.99 ± 128,62 g/ewe/day. Higher milk yield in twin ewe could be explained with increasing of mammary secretory cell. The nutrient requirement in twin type more than single one.

*Key words***:** *Indonesia, sheep, local, milk, yield, age, birth type*

INTRODUCTION

Indonesian local sheeps have many desirable characters adapted to low quality vegetation and to withstand seasonal shortages of food and water during dry season. They could resistant to paracyte, louse and tropic climate. Of course, it is the advantage of Indonesian local sheep. This local sheep have prolifik character too. So that, it is become a benefit for the economic aspect.

Sheep as a small ruminant which produce certain products would be animal protein sources. Animal proteins serve as elements for growth and development of cells and the development of healthy brain cells. Fulfillment of animal protein is needed to significantly improve the intelligence. It could be good human resources in Indonesia.

Indonesia have ± 8,307,000 heads sheep in 2005 (BPS, 2008). Sheep curve population is increasing rapidly and get seventh rank after goat (get fifth rank, which number is ± 13,182,000 heads). However, sheep population in Bogor is ± 229,012 heads which is get the first rank (BPS, 2008). That could be happened because sheep could well adapted in tropic climate and has a good rate reproduction. Therefore, sheep production should be increased both quantity and quality. One of way to make them success is from milk yield aspect. Milk yield, its mean relation between milk and survival of lamb and quality of nutrient to make a better sheep production.

Many researches have been conducted to study milk yield on dairy sheep, and mostly conducted in Australian sheep, Awassi and Assaf from Palestine, East Friesian from the Mediterranean and Sarda from Italy. However, fewer research has been focused on Local Sheep. Therefore, the research could become a data base of Local Sheep (Jonggol Sheep) and increase sheep production.

Pollot and Gootwine (2004), Pullina and Nudda (2004), Snowder and Glimp (1991) said that birth type and age could effect milk yield in dairy sheep. So that, we want to know what a level of in a local sheep which is non-dairy sheep (meat production). In such a way that, we would be know the pattern of age and birth type related to milk yield in local sheep.

MATERIALS AND METHODS

Materials

The research was conducted at Jonggol Animal Science Teaching and Research Unit, Faculty of Animal Science, Bogor Agricultural University. The research is done on June-September 2007. That area are ± 169 Ha which consisting of ewe cages and pastures area. The conditions of pasture are wet damp (humid) situation on June, July, and August. The grass condition is dry (temperature is 33^{o}C, rainfall 8.50-15.90 mm) and water supplies are not adequate. Nevertheless in last August and September the condition is rainy (rainfall 25.20 mm). Therefore, the quantity of grass is quite enough. The humidity is 89.40% -91.70% which describing damp shaded or wet air condition.

Ewe were grazing in ranch which have grown *Brachiaria humidicola*, *Brachiaria decumbens*, *Pennisetum purpuroides*, weed (Eupatorium sp, Melastoma sp, Cantana sp), and legume. The rotation in ranch would be done if the supplies of grass or water were empty. The area of *Brachiaria humidicola* is ± 55 Ha, *Brachiaria decumbens* ±19 Ha and *Pennisetum purpuroides* ± 2 Ha. Ewe was grazing at 09.00am-04.00pm during the research. That is done to avoid bloat or tympanic in sheep. The reason for them is from the content of water before at 09.00am was still very high. The tropic condition at that time can cause bloat or tympanic disease and intestinal worms.

Local sheep from Thin Tail Javanese Sheep and crossing with local species (because there are no detailed recording for many years) were used in this experiment. Ewe has chosen for natural matted in the paddocks. The total number of ewe that we used for this research are 92 heads which is 78 single births (I_1 = 9 heads, I_2 = 18 heads, I_3 = 16 heads, I_4 = 35 heads) and 14 twins (I_1 = 3 heads, I_2 = 3 heads, I_3 = 1 head, I_4 = 7 heads). Lamb and ewe have been located in colony cages. Nevertheless, ewe and lamb were separated and still in eye contact during milk counting.

Procedure

Ewe was taken which birth June 16th until August 31th 2007. Lamb were weaning with ewe for 4-5 days postpartum. It is done to improve the sensor senses of maternal ability and to make sure lamb get the colostrums from his ewe. Colostrums as antibodies and nutrients that are very important for lamb (Owen, 1976).The calculation of milk yield using the differences in lamb's body weight method (Suckling lamb weight differential technique). This method is done by considering the difference weight in lambs before and after suckling. Lamb which been calculate were fasting for six hours before and then do the weight calculation base on the method above. Interval milk calculations were performed at 05.00 am, 11.00am, 05.00pm, and 11.00pm. Milk yield calculation was conducted twice each week. This method was usually done for non dairy sheep only (Doney et al., 1979; Owen, 1976).

Analyzing data was done in variables named: average milk yield (g/ewe/day), and the shrinkage rate (g/day), then performed the processing of statistical analysis base on the design formula that have been written bellow (Pollott and Gootwine, 2004).

Statistical Method

Statistical design that we used is randomize block design with factorial 2 x 4, as a factor are the type of birth (the level of single and twinning) and age of ewe (with age level I_1, I_2, I_3, and I_4). Tukey test was conducted if further analysis shows the variety of significantly different results. Variables had been observed in this research were: (1) Milk yield base on difference body weight of lamb before and after suckling; (2) Type of birth of ewe (single or twin); and (3) Age of ewe.

RESULTS AND DISCUSSION

Sheep Milk Yield

Local sheep is a non-dairy sheep (non-dairy ewe) so it has lower than the dairy sheep. In Table 1 shown that the averages of milk yield of local sheep were 355.29 ± 72.43 g/animal/day. The milk yield from, local sheep was lower than from the East Friesian dairy sheep (EF) which a minimum of 1,420 ± 0.04 g/animal/day (McKusick et al., 2001) and from Priangan Sheep 671.98 ± 4.56 g/animal/day (Pulina and Nudda, 2004; Sumaryadi, 1997). Local sheep have lower milk yield is caused by the environmental factors, feed, and limitation of feed during the dry season. That could be explained with a significant effect on the development secretory cell of glandulla mammae. According to Sumaryadi (1997) and

Inounu (1996) the development of secretory cells of the udder glandular accour during pregnant or pre-lactation of ewe, thus the nutrition indispensable enough to produce milk.

Breed differences is one of the effect on milk yield aspect. The proportion of milk yield on sheep are different in each breeds, which caused by breed differences or genetics (Pulina and Nudda, 2004; Sumaryadi, 1997).

Low production of local sheep's at UP3 Jonggol is caused by the high quality of single births and a lack of superior ewe. Single births will produce less milk than twin type. Ewe which is get twin lamb will be respond by enough milk producing. It could be explained by secretory cells and hormonal functions. Thus, twinning milk yield will be higher than single one (Capuco et al., 2003).

Tabel 1. Local sheep milk yield at UP3J on 60 days lactation

Matter	Local Sheep (n = 92 ewe)
Litter size	1.15
Avarage of daily milk yield (g/ewe/days)	355.29 ± 72.43
Declining rate (%)	4.89

Local sheep is relatively higher for 355.29 ± 72.43 g/ewe/day compared with the research conducted by Adriani (1998) using sheep Priangan with oxytocin injection method of producing milk 0.3 µU of 355.13 ± 130.52 g/ewe/day.

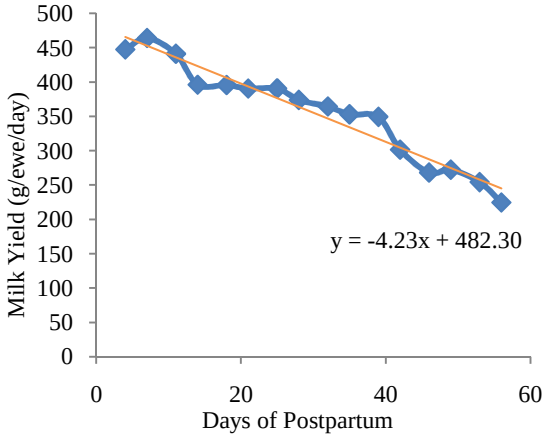

Figure 1. Milk Yield Curve of Local Sheep at UP3 Jonggol.

Figure 1 showed that milk production likely to decline during the 56 days after birth or postpartum. The declining of milk was 4.89 g/day. This was caused by shrinkage of cells in the lymph sekretori, decreasing laktogenic hormones and increase of connective tissue and the high concentration of collagen (Adriani, 1998; Capuco et al., 2003). This condition can occur by increasing age of the ewe in the lactation period.

Declining milk yield in postpartum was also caused by hormonal functions, namely: decreased levels of the hormone prolactin (Rensis et al., 1993). While before the lamb was born the role of hormones such as LH, follicular development, steroid genesis, and FSH (Rensis et al., 1993).

FSH and LH contribute indirectly to the yield of milk. FSH and LH are produced gonadrotropin by gonadal cells located in the pituitary gland. The function of FSH is to stimulate follicular maturation, whereas LH helps release the ovary from the follicle cells. The relationship of this hormone on milk production is indirect relation. It means of FSH and LH relating to children born. FSH and LH hormone in twin increase milk yield also. FSH and LH levels appropriate to produce more than one lamb will produce milk higher than single one (Rensis et al., 1993).

The peak yield is done at the first week or at 7th day 464.01 g/day. The highest differences or peak lactation occurs in early lactation (Cardelino and Benson, 2002). In addition, milk yield has a linear graph who give the formula y = 482.30 - 4.23x, which y is milk yield (gram) and x is the time of lactation or suckling (day).

Birth Type on Milk Yield

The litter size of local sheep on the UP3 Jonggol was 1.15 where 78 heads were a single type and 14 heads were twin. Ewe who has twin lamb was greater on milk yield than single type (16.67%). The average of daily milk yield from single type was significantly difference than twin (P<0.05). This corresponded with Cardelino and Benson (2002), Gonzalo et al. (2002), and Adriani (1998) said that milk yield is affected by type of birth (single and twin).

Table 2. Milk yield base on type of birth

Birth Type	Avarage of Daily Milk Yield (g/ewe/day)	Sampel (ewe)	CV (%)
Single	344.95 ± 66.22^{a}	78	19.20
Twin	413.99 ± 128.62^{b}	14	31.07

Note: ^{a,b} superscript later show difference (P<0,05).

As a physiologically, ewe which is twin would result a higher milk yield than single type. This is due to the adequacy of food provided for lamb. Thus the growth and development of the secretory cells of the udder glands must also higher in order to provide food for their children (Capuco et al, 2003).

In that implication, the ewe who have twin birth will have a large udder glands. So that milk yield lactation tend to be lower than single births (Adriani, 1998). It is shown in Figure 2, on 35 day twin give a significantly decreased firstly. The declining was done at the last day of lactation (Cardelino and Benson, 2002).

The factors were describing above have the same statement with Gonzalo (2002), he said that milk yield is influenced by litter size, ewe age, time of matting, weight and condition of the ewe and a genetic aspect also. The average of body weight from the ewe between single and twin did not different significantly 24.36 kg for single and 23.79 kg twin. There is not a factor as a directly affects the dominance of a single type of birth and milk yield.

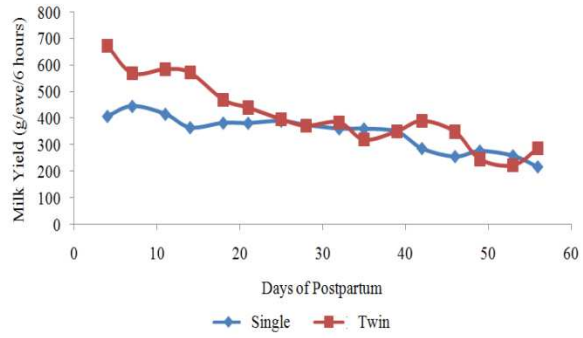

Figure 2. Milk Yield Base on Type of Birth

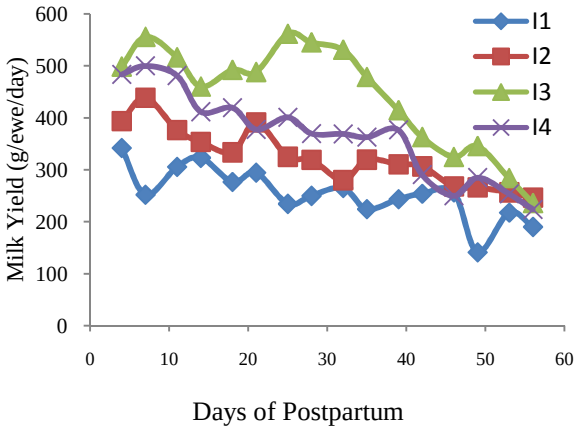

Figure 3. Milk Yield Base on Age of Ewe at UP3 Jonggol

The age factor in sheep have not influenced on milk production (P <0.05). This result is same with Cardelino and Benson (2002), Gonzalo (2002), and Adriani (1998) that age of the ewe had effect on milk yield too.

By implication, the parent of twin birth rate of depreciation will have a large udder glands so that the end of lactation milk production tend to be lower than single births (Adriani, 1998). It can be seen in Figure 2, on 35 day the twins significantly decreased firstly. Decreasing on milk yield is declining in the last day of lactation (Cardelino and Benson, 2002).

The factors described above in accordance with the opinion of Gonzalo (2002), which states factors that influence litter size of the parent age, time of marriage, weight and condition of the mother, and a genetic influence. The average body weight of the parent between single and twins did not differ significantly (24.36 kg for single and 23.79 kg twin for twin).There is not a factor that directly affects the dominance of a single type of birth and milk production.

The age factor in sheep was no influence on milk production (P <0.05). This corresponds with Cardelino and Benson (2002), Gonzalo (2002), and Adriani (1998) that the age of the ewe had effect on milk yield. Each age class is different and has its own pattern on milk yield. Table 3. and Figure 3, showed that age I_3 has highest milk yield, in contrast the age of I_1 has the lowest milk production (P<0.05). Milk production between the ages of age I_1 and I_2 to I_4 age I_2 did not differ significantly for the total and the average daily milk yield (P<0.05). Even though the age of I_1 to I_3 and I_4 age and I_2 to I_3 significantly different from the average daily milk yield (P<0.05). Even though the age of I_1 to I_3 and I_4 age and I_2 to I_3 significantly different from the average daily milk yield (P<0.05).

Tabel 3. Milk yield base on age of ewe

Age	Avarage of daily milk yield (g/ewe/day)	Sample (ewe)	CV (%)
I_1	254.53 ± 49.67^{a}	12	19.51
I_2	324.22 ± 55.16^{ab}	21	17.01
I_3	443.43 ± 102.62^{c}	17	23.14
I_4	366.02 ± 85.75^{b}	42	23.43

Note: ^{a,b} Superscript letter shows difference (P<0,05).

Figure 3 have shown that each age class were different and has its own pattern on milk yield. Table 3 and Figure 3, have shown that I_3 age has a highest milk yield. On the contrary the age of I_1 has the lowest one (P<0.05). Milk yield

between the ages of I_1 and I_2; I_4 and I_2 did not differ significantly for the total and the average of daily milk yield ($P<0.05$). Even though, the age between I_1 to I_3, I_1 to I_4, and I_2 to I_3 were significantly different from the average milk yield ($P<0.05$).

The Figure 3 shown the first week of milk yield was decreasing. The reluctance of ewe breastfeed to their lamb is one of causes. The young ewe show less maternal response. Probability, it is caused by less experience in caring for and milking. In addition, the maturity of reproductive function has not occurred up. As a result, the milk yield curve looks not so ideal and maximum occurred on the fourth day.

I_2 age group had third ranks on milk yield curve with an average 324.22±55.16 g/ewe/day. Peak yield had occurred in the first week 438.67 g/ewe/day and decreasing after that. I_2 looks quite in graph, although it is not too perfect. Increasing in maturity of reproductive function in I_2 compared with age I_1 have appeared in Figure 3.

I_3 age group had been the highest milk among the others 443.43 ± 102.62 g/ewe/day. Peak yield which occurred on 25th day 561.46 g/ewe/day. However, I_3 curve have had previous local peak maximum that occurred on the seventh day. After that, the decreasing drastically will be held. I_3 gradient is the greatest one. It cause by response of high milk yield before the depreciation of peak rate which make a large causing gland udder after. The shrinkage is affecting the decline on milk yield. As a consequence, the high yield is happen a decline on milk yield due to the depreciation rate of large udders glands (Adriani, 1998).

I_4 age group had a second rank after I_3 366.02±85.75 g/ewe/day. The peak yield is occurring on the seventh day or the first week of 500.12 g/ewe/day. Then, decreasing on milk yield followed. The declining on milk yield is not higher, I_4 slope have over a relatively small.

Ewe age factor on milk yield have noted in correlation with reproductive maturity. I_3 have mature on glandula mammae. On other hand, the lowest yield of I_1 could explain by the udder gland which is not really mature during the first year. Ewe who has a maturity of reproductive function is sufficient to produce a healthy lamb with an adequate milk production for their lamb (Capuco et al., 2003; Owen, 1976).

Table 3 was explained type of birth on each level in single births and twins would be a real effected on the age level I_1 and I_4 ($P<0.05$), whereas no obvious effect on the age level of I_2.

CONCLUSIONS

Age of ewe and type of birth have a significant effect on milk yield. The highest yield had been occurred at the age of I_3 and the lowest at I_1. Milk yield had overall increased on each age level. Milk yield in birth type aspect is higher in twin than single one. As a prospect to improve, Indonesian local sheep need more enhance in genetic aspect because in milk aspect were very low than another sheep. The advantage of Indonesian local sheep is from the tolerance in tropic climate condition (also in global warming) rather than meat and milk production.

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