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Significant Influence of Mammae Hand Massage on Milk Yield in Dairy Cattle

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Abstract

Objectives of the research were to study different long time *mammae hand massage* o n milk production dairy cattle. The hand massages pressure mammae 1 - 1.6 equivalent to volt to measure by piezoelectric sensor PVDF Film as a standard. The function of mammae massage should usual is stimulated *pituitary posterior* impact release oxytocin hormone. Serves to contraction *myoepithel* cells lining the alveolus could result in milk ejection. Materials research twelve dairy cows Fries Holland crossbreed; purposive sampling was used in taking samples. The research Method used was the experimentation with using Randomized Block Design. Block by duration of lactation is the early lactation (1-3 months), mid lactation (4-6 months) and late lactation (7-9 months). The treatments were no massage, massage 20, 50 and 80 seconds. Before the implementation of milking, milking preparation done by means of mammae massage a pressure massage 1 - 1.6 equivalents to volt and have interval between the finish mammae *massage* with the implementation of milking 90 seconds. The result of the research showed that on block: early lactation = 13,75±1,45 liter liter [a], mid lactation = 12,83±1,52 liter a and late lactation = 7,60±1,21 liter [b], and on Treatment no massage = 9,84±2,92 liter [a]; massage for 20 seconds = 11,65±3,40 liter [ab]; massage for 50 seconds = 13,08±3,38 liter [bc] and massage for 80 seconds = 11.01±3,60 liter [a]. Based on the statistical analysis, the treatment had a significant effect on the amount of milk production ($P < 0,1$). It is concluded to the best method is to massage for massage 50 seconds with a pressure massage 1 - 1.6 equivalent to one volt and an interval between the finish of the mammae massage with the implementation of milking to 90 seconds.

Keywords: Piezoelectric sensor, lactation, milk letdown, milk production

1. Introduction

The goal is to produce milk in large quantities, good quality and keep the mammae healthy. Good milking management will affect the productivity of dairy cattle. By doing massage to the mammae of the dairy cattle before the milking is one of the important milking management method. Function of the mammae massage is to stimulate the pituitary to release the hormone oxytosin which serves contraction myoepithel cells lining the alveoli (Weiss, Dzidic, and Bruckmaier. 2003), and will result in ejection of milk. so milk let down process is expected to be perfect, they can minimize the residual milk.

When put through mammae hand massage, dairy cattle must feel comfortable, but if the pressure mammae hand massage too hard will cause the animal to feel pain and stress, it will cause the hormone oxytocin in inhibition by the hormone adrenaline, will affect in milk production. Mammae hand massage pressure among 1 – 1,6 equivalent to one volt measured using piezoelectric sensors comfortable enough for dairy cows that will do the milking (Kentjonowaty, Trisunuwati, Susilawati and Surjowardojo (2013). Piezoelectric sensor material change movie received mechanical pressure into electrical charge, the use of the conversion is used as a sensor (Santoso, 2005 and Santoso, Abdurrouf, Nurriyah, 2011). Massage by hand is effective enough to stimulate milk let-down and there should be no delay between the time of initial stimulation with milking, and according to research results Donald, Roark, Beck and Fryer (2004) the long massage 10, 30 and 60 seconds is influential to the milk production, while, according to Wagner and Ruegg (2002) stimulation for 15, 30, 60 and 120 seconds in a way forest ripping not affect milk production. Cording Bruckmair and Wellnitz (2008) that the time it takes from the udder stimulation until milk ejection occurred about 40 seconds to over 120 seconds and will be increased in accordance with the rate of decline in the udder filling. Kentjonowaty, Humaidah, Trisunuwati and Aulanni'am (2009) to and that the hormone oxytocin is the best presentation when the time interval between the stimulation of the udder by milking is 90 seconds. Bruckmaeir and Hilger (2001) found that hormone oxytocin to effective for only about 6 to 8 minutes, so that's why milking must be completed within 8 minutes. When massaging the mammae, dairy cattle should not feel pain, but should feel comfortable because it is necessary to measure the pressure of the massage of the mammae which could cause a sense of comfort to cow. In connection with the foregoing, it is necessary to research on long mammary hand massage with pressure from 1 to 1.6 volts equivalent to the milk production of dairy cattle.

2. Materials and methods

Research conducted at Unit Pelaksana Teknis Pembibitan Ternak dan Hijauan Makanan Ternak (UPT PT & HMT) Batu town in eastern Java Indonesia. Research materials 12 dairy cows Fries Holland crossbreed. Equipment included a type of bucket milking machine, measuring the amount of milk, and a piezoelectric sensor. Experiment used a randomized block design (Hanafiah, 2002). Block included by month of lactation the early lactation (1-3 months), mid lactation (4-6 months) and late lactation (7-9 months). Treatments were: no massage, massage for 20 seconds, massaging for 50 seconds, massaging for 80 seconds. After the massaging treatment, there was an interval of 90 seconds before milking.

3. Result and Discussion

The results of statistical analysis showed that the massaging effect is highly significant ($P < 0.01$) (Table 1). The resulting milk production of dairy cows, either differences block or treatment, can be attributed to differences in the month of lactation, mammary hand massaging treatment, and sense of comfort at the time of mammary massaging.

Table 1. Average Milk Production (liters/Cow/day) Results Block Lactation Adjustment Energy Corrected Milk (Hemme, 2010)

\Block	Milk Production
Early Lactation	13,75±1,45 [a]
Mid Lactation	12,83±1,52 [a]
Late Lactation	7,60±1,21 [b]

The late lactation was significantly differently (Table 1). In early lactation milk produced the most, but the middle lactation was not significantly different. In early lactation milk produced the most, it is because all of the feed consumed by the majority of dairy cattle nutrition is focused on the synthesis of milk cow have enough fat reserves, but that with the breast when mammae hand massaging, then the role of the hormone oxytocin optimize milk production being generated.

Mid lactation on milk production begins to decline, this is due to the nutrients consumed dairy cows cannot be focused on the synthesis of milk, as most of the nutrients are used for unborn foetus growth. Milk yield in late lactation at least in number, and this is due in part to unborn foetus growth, because at the late lactation period (months 7-9 months of lactation) dairy cow is pregnant, This is time even if hormone oxytocin is optimally, if raw milk synthesis only slightly the parent body fat stores also have reduced milk production is also not much, other than that at late of lactation, the alveoli in the mammae alveolus was less than optimally, because it needs to be done accompaniment in the month of lactation to 10 in order to improve the alveoli, the alveoli are not functioning, in addition to the nutrients consumed by the mother can be used to focus the focus of growth foetus and store its parent body fat reserves, so the days of the next lactation milk production could be more. The results with the studies of Damron (2003), Dahl (2008) and Anggraeni (2011) which stated that the milk production curve rises to a peak in the next 1-2 months of lactation will begin slowly until the late lactation.

Table 2. Average Milk Production (liters/cow/day) and Results Treatment Long Time Massage Adjustment Energy Corrected Milk (Hemme, 2010)

Treatmen	**Milk Production**
No massage	9,84±2,94 [a]
Massage for 80 seconds	11,01±3,60 [a]
Massage for 20 seconds	11,65±3,40 [ab]
Massage for 50 seconds	13.08±3,38 [bc]

No massage was not different from Massage for 80 seconds producing less milk production relative to Massage for 20 and 50 seconds. This is because not massaging the mammae, results in release of posterior pituitary hormone oxytocin not being optimal, so that the milk ejection process cannot operate perfectly. This is supported by the research of Momongan, Schmidt (2003) and Reimers (2003) have shown that stimulation of the mammae before milking produces higher levels of the hormone oxytocin when compared with no stimulation. According to research results by Jeffery and Reneau (2001) showed that the stimulus is less than 10 seconds will not be able to respond milk let down.

In the Massage for 80 seconds., basically the posterior pituitary hormone oxytocin can optimal, but due to the long of massage added to the interval between his finishing massage with the implementation of milking for 90 seconds. So when the milking starts, the profile is close to peak levels of oxytocin, so the duration effectiveness of the hormone oxytocin is low. Because the levels of oxytocin are going down, this result in milk ejection speeds of the process to also decline. This is supported by Bruckmaeir and Hilger (2001) which states that the effectiveness of the hormone oxytocin is only 6 - 8 minutes, so that is why milking should be completed soon. Milk yield in the massage for 20 seconds and massage for 50 seconds is higher than the no massage and massage for 80 seconds, while treatment that produces the most milk production (13.08±3, 38 liter) is the massage for 50 seconds. This is due to a long massage 50 seconds able stimulation with posterior pituitary well, so it can release the hormone oxytocin is optimally. The implementation of the milking begins at oxytocin levels start to rise, but was able to ejection process, so as to have the opportunity milking longer than the massage for 80 seconds with a gap of 30 seconds (Figure 1) as a result massage for 50 seconds is able to produce the most milk production, it is supported by Bruckmair and Wellnits (2008). Milk ejection of about 40 seconds to more than over 120 seconds, while according to Sjaunja and Olsson (2005) the hormone oxytocin into about one or two minutes after the beginning of reflexes by stimulus.

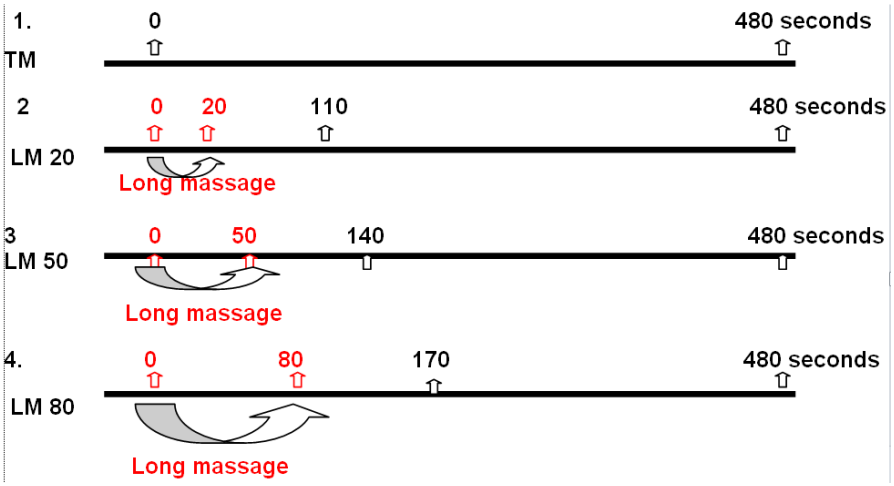

Figure 1. Long time mammae hand massage and implementation of milking (red cooler is long time mammae hand massage, black color is time of milking)

The pressure of the massage can be measured by the piezoelectric sensor (Santoso, 2005). For the 50 seconds massage, massage was done with a pressure of mammae 1 - 1,6 equivalents of one volt. This situation creates a feeling of comfort in dairy cow, so that the function of the hormone oxytocin that contract myoepithel cells can take place. According To Santoso (2005), Santoso, Abdurrouf, Nurriyah (2011) pressure equivalent to 1.6 volt which as measured using piezoelectric sensors, this pressure is not too strong. Mammae massage pressure is too strong, it will cause pain on dairy cows, and the hormone oxytocin will be inhibited by adrenaline. In this case the milk ejection cannot be optimally, and as a result, milk production is not optimal. The massage stimulates the posterior pituitary hormone oxytocin, which serves contracts myoepithel cells lining the aleveolus (Weiss, Dzidic, and Bruckmaier.2003), and this it will cause milk ejection (Tancin, Kraetzl, Schams, Rupert and Bruckmair, 2001). Manual massage by moving the palm of the hand will give same physiological effects. This stimulates anabolic aspects of metabolism that increases the activity of nerve vegal and anti-stress cortisol and lower blood pressure will cause the behavior of cattle to be calm, and the production of milk.

4. Conclusions

Based on the results, it can be concluded that mammae hand massage is the best for 50 seconds and interval between mammae hand massage is completed with the implementation of milking 90 seconds with a large mammae hand massage pressure equivalent to 1 - 1.6 volt.

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