Effect of Curcumma, Zn-Proteinate, and Cu-Proteinate Supplements on Milk Production of Subclinical Mastitis Fries Holland Cows

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Abstract. The objective of the research was to find out the effect of Curcumma, Zn-proteinate, and Cu-proteinate supplementation on subclinical mastitis status in term of 4% FCM milk production. The research was conducted using 24 heads of lactating dairy cows in Randomized Block Design with six treatments, and four groups of milk production as replication i.e. I= >14 kg/day ; II= 12-13.99 kg/day ; III= 10-11.99 kg/day; IV= <10 kg/day. Treatments were: R_1 (Control); R_2 (R_1 + 2% Zn proteinate); R_3(R_1 + 2% Cu-proteinate); R_4(R_1 + 2% Curcumma); R_5(R_1 + 2% Zn-proteinate + 2% Cu-proteinate); R_6 (R_1 + 2% Zn-proteinate + 2% Cu-proteinate + 2% Curcumma). Parameters observed were 4%FCM milk production and subclinis status. The results showed that ration supplemented with Curcumma, Zn-proteinate, and Cu-proteinate decreased mastitis subclinic status and 4% FCM milk production increased significantly. Supplementation of Curcumma, Zn-proteinate, and Cu-proteinate resulted is the best for decrease in subclinical mastitis indicator and increase 4% FCM milk production.

Key Words : dairy cows, subclinic mastitis, curcumma, Zn-proteinate, and Cu-proteinate

Introduction

Healthy udder status in dairy cow was important to supporting milk productivity and milk quality in lactation period. Although, it was no dramatic occured, mastitis could be damage of milk secretory tissues, and decrease of milk production and quality at lactation period (Harmon, 1994 and Dewhurst RJ, 2002). Generally, udder tissue was protected from antibody system according to anatomic, chemical, and cellular (Scaleti et al., 2003 and Ma JF et al., 2007). Streak canal could be protected from pathogen bacteria in that tissue. Apolactoferrine and lactoperoxide as a chemical agent could barrier reproduction of microbe in the udder (de Haas et al., 2008). Other antibodies, like phagocyte (neutrophyl and macrophage) (Cengiz et al., 2000 and Nickerson, 2005) in dairy cow with subclinical mastitis, the number of phagocyte cell more than 500.000 cell/cc (Nickerson, 2005; Hettinga et al., 2008 and de Haas et al., 2008).

Indonesia, have many indigenous animals containing antioxidant agent, which were protected of animal feeding, could be improved animal performance and maintained of cell membrane. Curcummin, one of antioxidant could protect the cell membrane in tissue udder from microbe infection. Curcumma as a herbal plant, content of important nutrient, like Vitamin C, E and selenium mineral, curcummin and atsiri oil could be as a antioxidant agent. According to chemical mechanism, curcummin as a primary antioxidant agent could break free radical chain by self producing a free radical (Sidik and Muhtadi, 1992). Curcummin, also as a secondary antioxidant agent, which decreased the level of metal as a peroxydative agent, other antioxidant agent like, vitamin C, E and betacarotene. Function of curcummin like seruloplasmine as a antioxidant agent and binding with free radical oxygen, produced from inflamated phagocyte (Yost et al., 2008 and Cope et al., 2009). By using curcummin as a healing agent and medical treatment needs more time, so that necessary to combine with other mineral supplement.

In developed country, supplementations of Zn and Cu were used for mastitis problem. Harmon and Torre (1997), Yost et al. (2008), Siciliano et al. (2008) and Cope CM et al. (2009)

suggested that Zn ad Cu minerals could was e increase immune system in dairy cow and decreased of mastitis cases. Zn mineral close connected with mastitis, according to deficiency of Zn (Wright and Spears, 2004; Li et al., 2005 and van Hulzzen et al., 2009) in animal ruminant could weak of skin and ephitel, abnormalities in the udder (swelling, heat, redness, pains) and bacteria pass through the teat canal and enter the cisternal area (McDowell, 2000; Nocek JE, 2006**;** and Norman et al., 2000). Cu mineral plays role in many enzymes like cytochrome, seruloplasmine and superoxide dismutase (SOD) (Cope CM et al., 2009). Seruloplasmine as an antioxidant agent were bound free radical oxygen produced from imflamanted phagocyte (Scaleti et al*.,* 2003 and Wang J et al., 2007). SOD enzymes have catalyst function in dismutation reaction superoxydative radical to hydrogen peroxide and oxygen. Seruloplasmine and SOD displayed anti inflammation action and could prevent tissue damage, which were produced from infection and inflammation (Hristov N, 2007 and de Haas et al., 2008). Purposes of the research was to find out the effect of Curcumma, Zn-proteinate, and Cu-proteinate supplementation on decreased mastitis subclinic status and increase of 4%FCM milk production.

Materials and Methods

The research was conducted using 24 heads of lactating dairy cows in Randomized Block Design with six treatments, and four groups of milk production as replication i.e. I= >14 kg/day; II= 12-13.99 kg/day; III= 10-11.99 kg/day; IV= <10 kg/day. Treatments were :

R_1 (Control);
R_2 (R_1+2% Zn proteinate);
R_3(R_1+ 2% Cu proteinate);
R_4(R_1 + 2% Curcumma);
R_5(R_1 + 2% Zn-proteinate + 2% Cu-proteinate);
R_6(R_1 + 2% Zn-proteinate + 2% Cu-proteinate + 2% Curcumma).

Parameters were observed 4%FCM milk production and mastitis sub clinic status. Variety of the data was analysed with multivariate analysis of Randomized Block Design model (Steel and Torrie, 1993).

Results and Discussion

Influence of Curcumma, Zn-proteinate, and Cu-proteinate Supplement on Mastitis Subclinic Status

Table 1 shows, that the number of somatic cell in Control was decreased 0.63% in day 15 and 4.9% in day 30, then increased 28.29% in day 45 and 17.83% in day 75. In Zn-proteinat supplement decreased of the number of somatic cell in day 0 until day 75 (91.44%). Cu-proteinate supplement decreased of the number of somatic cell in day 75 about 83.09%, curcuma supplement about 83.02%, Zn-proteinate and Cu-protein ate supplement about 85.45%, and curcuma, Zn-proteinate and Cu-proteinate supplement about 93.21% as a biggest decreasing of the number of somatic cell.

Response of dairy cow on mastitis status and the number of somatic cell were different time of decreasing. To find out effective time of decreasing of mastitis status could be calculated with estimate curve model and the result shows in graphic model and could be known that the dairy cow recovered of subclinical mastitis (if the number of somatic cell less than 500.000 cell/ml (Middleton JR. et al., 2005; Riekerink et al., 2008 and W Steeneveld et al., 2008) (Figure 1).

Result using CMT shows that curcumin, Zn-proteinate, and Cu-proteinate supplement could be reduced subclinical mastitis status and the faster of decreasing started in week 3-4 in dairy cow, the number of somatic cell negative mastitis status could be estimated less than 500.000 cell/ml. The longer time of decreasing in dairy cow with Cu-proteinate supplement and dairy cow with Zn-proteinate supplement in week 5-6, whereas dairy cow in control group was increased of mastitis status from positive 2 to positive 3 ($\pm$ 5.000.000 cell/ml). Limit of the number of somatic cell according to Middleton et al. (2004) and Tripaldi et al. (2003) could be less than 500.000 cell/ml, so according to estimate function curve Zn-proteinate supplement effective decrease of subclinical mastitis in day 48 and the number of somatic cell decrease until 494.000 cell/ml, dairy cow with Curcumma supplement effective decrease subclinical mastitis in day 45 with the

number of somatic cell decreased until 495.000 cell/ml, Zn-proteinate and Cu-proteinate supplement effective decrease subclinical mastitis in day 35 with the number of somatic cell decreased until 497.000 cell/ml and the faster decreasing of the number of somatic cell was curcuma, Zn-proteinate and Cu-proteinate supplement, it was in day 23 with the number of somatic cell decreased until 487.000 cell/ml and day 75 with the number of somatic cell decreased about 188.000 cell/ml.

Influence of Curcumma, Zn-proteinate, and Cu-proteinate Supplementation on 4%FCM Milk Production

4%FCM Milk production dairy cow with curcuma, Zn-proteinate and Cu-priteinate supplement highly different (P<0.05) compared with curcumma supplement; Cu-proteinate supplement; Zn-proteinate supplement and control group, but no significant different with Zn-proteinate and Cu-proteinate supplement, whereas cow at curcumma supplement was no different with Cu-proteinate supplement; Zn-proteinate supplement ; Zn-proteinate and Cu-proteinate supplement but different (P<0.05) with control group.

The cows with Curcumma, Zn-proteinate and Cu-proteinate supplement could be increased 4% FCM milk production highly compared with control group; Zn-proteinate supplement; Cu-proteinate supplement; and Curcumma supplement; Zn-proteinate and Cu-proteinate supplement.

Result of Tanuwiria research (2004) shows that Zn-proteinate and Cu-proteinate supplement could be increased 4% FCM milk production on lactating dairy cow about 2.42 kg/day (26.76%) compared with control group. The cows with Curcumma, Zn-proteinate and Cu-proteinate supplement was influenced to increase 4% FCM milk production and to physiological normal status, the decreasing of milk production post peak of milk production more stable compared with control group, Zn-proteinate supplement; Cu-proteinate supplement; Curcumma supplement; and Zn-proteinate and Cu-proteinate supplement.

That condition occurred, because curcumma, Zn-proteinate and Cu-proteinate suplemments could be recovered subclinical mastitis (van Knegsel et al., 2007 and Hagnestam-Nielsen, 2009) so that metabolic process in alveoli more optimal and persistency

Table 1. Influence of curcumma, Zn-proteinate and Cu-proteinate supplementation on decrease of somatic cell amount

Times	Treatments					
	R_1	R_2	R_3	R_4	R_5	R_6
day	..... x 10^5 (Cell/ml)					
0	16.25	16.35	16.26	16.34	16.33	16.36
15	16.15	15.70	9.10	12.88	9.28	6.68
30	15.45	7.30	4.05	4.63	6.98	3.10
45	20.85	8.73	4.30	6.28	5.13	3.90
60	19.85	6.30	3.90	5.00	5.35	2.65
75	19.15	1.40	2.75	2.78	2.38	1.13

R_1=; R_2= Zn-proteinat supplement; R_3= Cu-proteinat supplement; R_4= curcummin supplement; R_5= Zn-proteinat and Cu-proteinat supplement, and R_6= curcummin, Zn-proteinat and Cu-proteinat supplement.

Tabel 2. Influence of curcumma, Zn-proteinate, and Cu-proteinate supplemention on 4% FCM milk production

Treatments	4% FCM Milk Production
	..... kg .....
Control	$9.43^{a} \pm 1.32$
Zn-proteinat	$11.64^{b} \pm 2.39$
Cu-proteinat	$11.52^{b} \pm 2.60$
Curcummin	$11.05^{b} \pm 3.01$
Zn-proteinat and Cu-proteinat	$12.04^{bc} \pm 2.05$
Curcummin, Zn-proteinat and Cu-proteinat	$12.60^{c} \pm 2.71$

Different superscript in same column shown significant different (P<0.05).

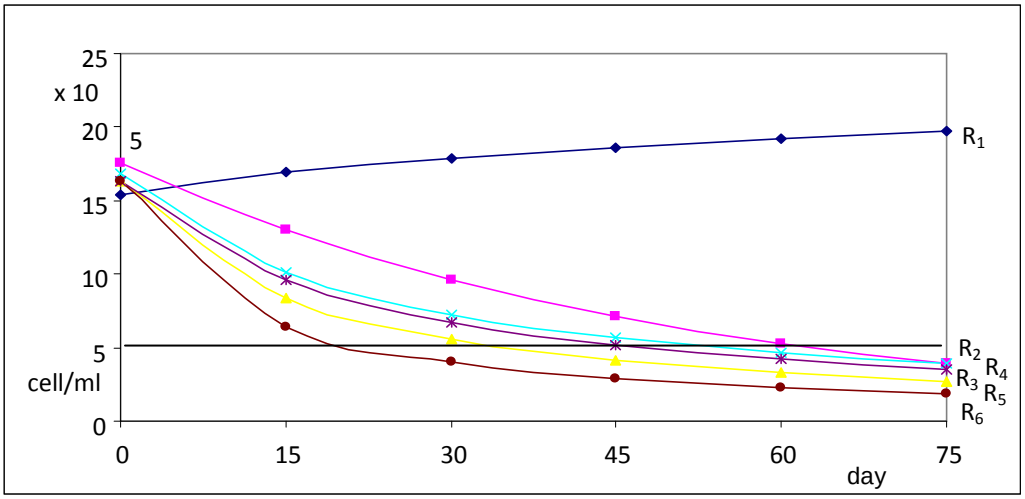

Figure 1. Decreasing number of somatic cells.

influence decreased. The curcumma could be increased activity of microbe in rumen (Hariani, 2004), so the nutrient absorption in rument more efficient because of curcumoid, atsiri oil, selenium, vitamin C and vitamin E contents as a natural antioxidant.

Conclusions

(1). Curcumma supplement; Zn-proteinate supplement; and Cu-proteinate supplement in animal rations could be decreased subclinical mastitis status. Curcumma, Zn-proteinate and Cu-proteinate supplement as the best to discovered subclinical mastitis at day 23; (2). Curcumma, Zn-proteinate and Cu-proteinate supplement in animal rations could be increased 4% FCM milk production and as the best treatment.

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