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Impact of Dairy Cow's Comfort Using Zero-Flies Fence on Feed Intake and Nutrient Utilization

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ABSTRACT

Uncomfortable condition such as flies' invasion may prevent cows in providing sufficient precursor for milk synthesis because of limited time for prehension, laying down for rumination and nutrient metabolism. An experiment to study the impact of zero-fly fence on feeding behavior, intake and nutrient utilization have been conducted. Twenty two lactating cows were used in an unbalanced experimental design. The experiment to test with (T1) or without (T2) zero-fly fence treatments. Fly population, cattle behavior, milk production and feed and nutrient intake were observed. The result showed that zero-fly fence reduced fly population, increase feed intake and milk production. It is suggested to use the fence in area affected by flies' invasion.

Keywords: Dairy, Zero-flies, Flies' invasion, Cow's comfort, Milk production

INTRODUCTION

Lactating dairy cow requires three times higher amount of nutrient in compare to other physiological statues of cattle (Despal et al. 2017; NRC 2001). The nutrients are supplied from feed consumed, digested and metabolized. Therefore, providing sufficient feed, and cow's comfort are necessary to guarantee the fulfilment.

Most of dairy farm are located in a highly mountain area surrounded by horticultural land. During planting season, the farmer applied poultry litter wastes as organic fertilizer. Most of the litters contained flies egg which developed faster into larva and pupa in fertile and moist soil (Prabowo, 1992) to become adult fly after 2 – 4 weeks fertilizer application (Ishartadiati, 2010). Adult fly invasion on dairy farm have been observed to reduce cow's performances not only in smallholder farm but also in large industrial scale that apply high biosecurity level.

Zero-flies fence contained deltametrin have been used effective and economically to prevent flies invasion in human such as tsetse or malaria in Africa. The fence protected human physically and chemically. However, their utilization for dairy cows were not popular. This experiment was aimed at improving dairy cow's performances by providing cow's comfort and providing information on effectiveness of the fence on cow's behavior and comfort to improve feed intake and nutrient available for milk synthesis.

MATERIALS AND METHODS

The experiment were conducted at the traditional dairy farm located in Manoko and Cicalung villages of Lembang, Bandung-West Java. Twenty two lactating Frisian Holstein cows were used in this experiment to test with a zero-flies fence (15 cows) and without a zero-flies fence (7 cows). The cows were fed as usual, twice a day consisted of forage, concentrate, tofu waste and silage. The net were produced by Vestergaard Frandsen Group S.A. (Switzerland). The net contained active compound of deltametrin. The net were hung with the help of wood or bamboo frames, 1 - 2 m high from the ground. At lower part of the fence, plastic fence were hung due to its easier to be cleaned.

The amount of flies population entering the stall were counted from flies trapped in the glue stick (PT Megasari Makmur). The stick were located in a representative location inside and outside the fence. Cow's movement were counted for 1 minute from video recorded within 10.00 – 12.00 AM. The movement were categorized as tail flicks, skin twitches and leg stamps. Milk production were measured volumetrically from morning and afternoon milking. Milk component (protein, fat, lactose and SNF) were scanned using Lacto-scan type S_L. Feed intake were calculated by subtracting feed residues from the amount of feed offered. Cow's feeding behavior were observed manually for 10 hours (7.00 – 17.00) to differentiate time for prehension, standing still, laying down and regurgitation.

The experiment tested with (T1) and without (T2) zero-flies fence treatments. Treatment T1 were repeated 15 times, while T2 only 7 times. Imbalance experimental design were used in this experiment. T-test were used to analyze the different using software statistical package for social science (SPSS) version 20.

RESULTS AND DISCUSSION

A number of flies, cow's movement, feeding behavior, feeding and nutrient intake, milk production and component are shown in table 1. A number of flies in T2 were significantly higher than T1. The net prevented flies from entering the stall and killed them (Efiyatni, 2013). The flies were phototropic animals which active during daylight (Prabowo, 1992). Back sides and legs were the most invaded area by flies because the areas were frequently dirty due to contact with feces when the cow laying down on the floor. The cow's neck also frequently attacked by the flies due to skin rashes in the area after concentrate eating. The cow flickered its tail to chase the flies away, trampled its leg or twitches its head and neck skin. Cows' movement measured within 10.00 – 12.00 AM showed that T1 were less than T2. Lower flies' population inside T1 stall improved cow's comfort which were shown by less of tail flicks, leg tramps and skin twitches (Siregar, 2000).

The cow's comfort increased feed intake in T1 (10.71 kg DM) in compare to 5.94 kg DM in T2. A cow with 400 kg BW and 10 liter milk production required 10.8 kg DM intake (Despal et al., 2017). The DM intake in T1 were sufficient to fulfill the requirement, but T2 were deficient. The T2 stall were heavily invaded by flies. Although DM intake in T1 were sufficient, their nutrient content were low. Low nutrient content were caused by the low feed quality used by the farmer. The cow's deficient of CP and mineral Ca and P. According to NRC (2001), the cow need 13.4% CP, 0.8% Ca and 0.5% P. In T1, ration CP intake only 9.01%, while Ca and P were only 0.31% and 0.03% respectively. There is a need to improve feed quality of the cow.

Table 1. Flies population, cow's movement, feeding behavior, feed intake and milk production

Parameters	T1	T2
Flies population, head stick^{-1} d^{-1}	9.83 ± 4.01^{b}	80 ± 1.89^{a}
Cow's movements		
Tail flicks	4.07 ± 1.82^{b}	20.76 ± 9.11^{a}
Leg stamps	5.69 ± 2.51^{b}	11.86 ± 3.58^{a}
Skin twitches	0.87 ± 0.73^{b}	15.57 ± 6.43^{a}
Feed Intake, kg DM head^{-1} d^{-1}	10.711 ± 3.988^{a}	5.945 ± 1.009^{b}
Nutrients intake (% DM)		
Ash	17.57	19.52
CP	9.01	7.83
Fat	3.31	3.51
CF	29.03	30.13
NFE	40.74	38.57
Ca	0.31	0.41
P	0.03	0.03
Feeding behavior, minutes		
Prehension	299	252
Standing still	131	229
Laying down	135	80
regurgitation	35	39
Milk production	13.19 ± 4.04a	8.48 ± 1.99b
Milk components		
Protein	2.93	2.93
Fat	4.16	4.35
Lactose	4.37	4.42
SNF	7.91	7.99

Feeding behaviors were also affected by the treatments. The T1 cows have more time to eat and lay down for rumination and less time for standing still or chasing flies. Cow like to do regurgitation while laying down on the floor than standing (Hafez, 1975). Such feeding behavior significantly influenced feed and nutrient intake, feed digestion and metabolism (Ensminger, 1993). The T1 cows provided more precursor for milk synthesis which resulted in higher milk production although milk composition were not affected.

CONCLUSIONS

Zero-flies fence were effective in improving cows' comfort by reducing a number of flies population so that the cow have more time to eat, digest and metabolize the food and provided more precursor for milk synthesis. It is suggested to the dairy farmer in affected area to use the fence.

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