

Organic Milk Production in Rural Dairy Farms in Lembang West Java – Indonesia

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ABSTRACT

Milk contaminations such as heavy metals and organophosphate/chlorines cause high risk for human health. In the same time, these contaminants reduce the price accepted by farmers from the Industrial Milk Processing companies (IPS). Bioplus probiotics and *Cytophaga sp* were introduced to rural milk production system to overcome the problems thus improving organic milk quality. Sixty heads of lactating dairy cattle (Frisien Holstein cross) were divided into two groups of 30 cows. Group 1, animals were offered 200 g Bioplus and 0.5 ml *Cytophaga sp*/head/day. Group 2, 30 cows were used as control which was common practice in rural condition. Milk quality was evaluated 1 week before, and 4 weeks after treatments. The initial results showed that heavy metal Pb was found both in feedstuffs and milk. Pb in feed sources ranged from 0.11 to 0.66 ppm while in milk ranged from 0.15 to 0.32 ppm (permissible level is 0.30 ppm; SNI, 1998). Pb in milk sample after Bioplus probiotic application became 0.05 – 0.08 ppm. Pesticide residues were found in feed, but in small quantity. Conclusion that can be drawn from the current experiment is the pesticide residue from organochlorine group is rarely found in the milk produced by rural farmer around Lembang West Java. Pb contained in milk is decreased below 0.30 ppm four weeks after probiotic application.

Key words: milk contaminants, Pb, pesticides, probiotic, feed additives

INTRODUCTION

Milk demand increases as the wealthy of Indonesian people increase. The quality of milk will affect the health of consumers. It is found that in some rural area, milk produced by farmer is contaminated by some hazardous substrates, such as heavy metal particularly plumbum (lead, Pb) and pesticides (Ilyas *et al.*, 1986; Indraningsih *et al.*, 1988; Indraningsih *et al.*, 1990; Indraningsih *et al.*, 2003). Similar cases were also reported in other countries such as Australia, Yunani and Hongkong (Corrigan and Seneviratna, 1990).

Source of Pb contaminant is mostly from air pollutant resulted from automotive. In some area, farmers harvest grass around the traffic area. Therefore, most of the grasses might be contaminated by Pb. Pesticide residue usually comes from agricultural by-product. Many farmers use agricultural by-product as source of forage for their animals.

Pesticide residue and Pb contaminant have negative effect on human health such as toxicity and skin irritation. For a long period, it causes immunosuppressive and carcinogenic (Goebel *et*

al., 1982; Stopkes *et al.*, 1995; Kishi *et al.*, 1995).

Probiotic *Cytophaga sp* is reported to be able to degrade pesticide residue from organochlorine group at 100 % after 3 days (Prihartini, 2006). The level of Pb contaminant is reported can be reduced by increasing the rumen bacteria population. This is because the bacteria can bind Pb in the rumen, and this bound Pb is excreted through feces (Sunaryadi, 2006). Probiotic Bioplus offered to ruminant animals has been reported to increase the number of rumen bacteria (Winugroho *et al.*, 2003). Probiotics Bioplus offered to the animals would increase population of rumen bacteria. Therefore, this experiment is conducted to study the effects of Bioplus probiotics and *Cytophaga sp* introduction to rural milk production system to overcome the problems and to improve organic milk quality.

MATERIALS AND METHODS

The experiment was conducted in rural dairy farming at Lembang – West Java. Sixty lactating dairy cattle (Frisien Holstein cross) were used.

These cattle were divided into two groups of thirty cows. Group 1, 30 cows were offered 200 g Bioplus and 0.5 ml *Cytophaga sp*/head/day. Group 2, 30 cows were treated as control which was common practice in rural condition. Feed offered to the animals consisted of elephant grass, agriculture by product and concentrate. Milk quality was evaluated 1 week before, and 4 weeks after treatments. Feedstuffs offered to the animals were sampled for analyzing the Pb and pesticide contamination.

Bioplus probiotic was given one dose during the experiment. It was offered to the animals by mixing with concentrate. *Cytophaga sp* probiotics was offered daily at 0.5 mL orally.

Milk sample (500 mL/head) was collected in the morning, and then was kept in the cool box prior to analyze for milk quality. Pesticide residue was analyzed by using GC-ECD method on 7 type of organochlorine, namely Lindan, Aldrin, Dieldrin, Heptaklor Ep, DDT, Endrin, and Endosulfan. Pb contamination was analyzed by using AAS method.

RESULTS AND DISCUSSION

The data of Pb concentration on the feedstuff offered to the cattle located in some area in Lembang West Java is presented in Table 1. The results show that most of the feedstuffs offered to the animals are contaminated by Pb. The concentrations are above the permitted level (0.3 ppm) according to SNI (1998), except for the agricultural by-product (0.11 ppm). Pb content in water source used for drinking water is still below the permitted level.

Sources of Pb contamination in grass are predicted to come from the traffic; this is because most of the grass is harvested from the places closed to the main road. Pb consumed by the animals will be excreted in milk or feces.

Table 1. Concentration of Pb in feedstuffs offered to the animals used in the experiment

No	Feeds	Pb concentration (ppm)
1	Field grass	0.66
2	Corn	0.45
3	Onggok	0.38
4	Agricultural by-product	0.11
5	Water	<0.01 ppb

Pb content in milk sample collected before and after the treatment application is shown in Table 2. The data indicate that milk collected from the animals fed with the forage and grain contaminated by Pb also contains Pb. The

concentration (range from 0.36 ppm to 0.97 ppm) was detected above the permitted concentration on the basis of SNI (0.3 ppm).

Table 2. Concentration of Pb in milk collected before and after treatment was applied

No	Initial sample (ppm)	After 4 weeks of treatment application (ppm)	Permitted concentration (SNI, 1998) (ppm)
1	0.21	0.07	0.30
2	0.32	0.08	0.30
3	0.19	0.05	0.30
4	0.29	0.05	0.30
5	0.26	0.06	0.30
6	0.15	0.05	0.30

However, application of Bioplus probiotic to the animals has reduced the Pb content in the milk. The concentration has decreased from 0.15 – 0.32 ppm to 0.08 – 0.05 ppm. This result indicates that Bioplus probiotic has positive effects on reducing Pb concentration in milk.

The pesticide residue indicated by concentration of dieldrin type has been detected at about 0.0074 ppm in feed sample (corn), while concentration of other types was detected below 1 ppb. However, the pesticide residue is not detected in milk both before and after the application of *Cytophaga sp*.

CONCLUSIONS

Conclusion that can be drawn from the current experiment is the pesticide residue from organochlorine group is rarely found in the milk produced by rural farmer around Lembang – West Java. Pb contained in milk has decreased below 0.30 ppm four weeks after probiotic application.

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