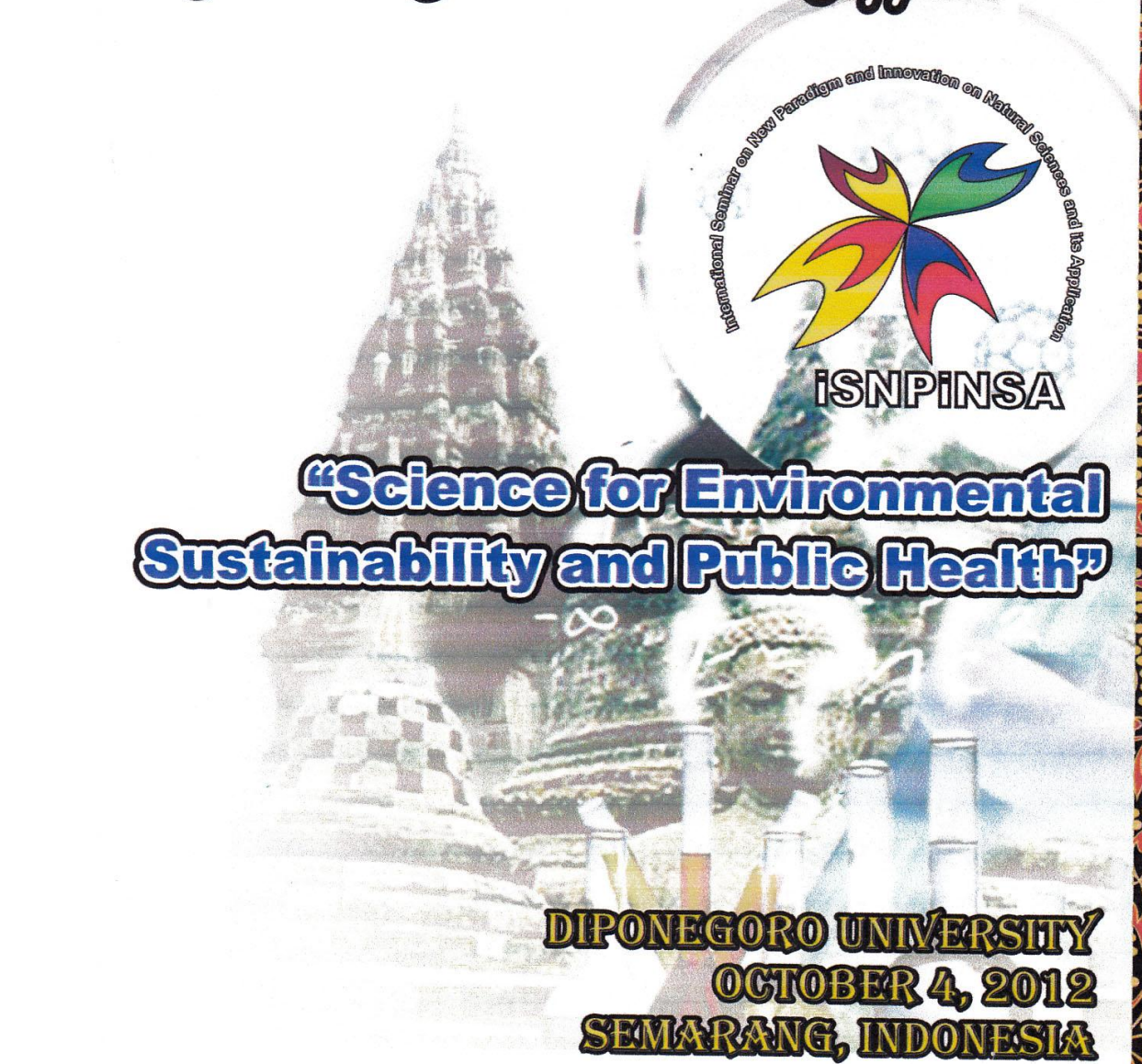
ISBN : 978-602-18940-0-2

The 2nd International Seminar on New Paradigm and Innovation on Natural Sciences and its Application

PROCEEDING



International Seminar on New Paradigm and Innovation on Natural Sciences and its Application

ISNPINSA

"Science for Environmental Sustainability and Public Health"

DIPONEGORO UNIVERSITY
OCTOBER 4, 2012
SEMARANG, INDONESIA

organized by :

FAKULTAS
SAINS DAN MATEMATIKA
UNIVERSITAS DIPONEGORO

supported by :

Kementrian Perindustrian
REPUBLIK INDONESIA

KEMENTRIAN LINGKUNGAN HIDUP
REPUBLIK INDONESIA

Published by the Faculty of Science and Mathematics
Diponegoro University
Prof Jl. Soedarto, Semarang, Indonesia

Proceedings of the second ISNPINSA
ISBN: 978-602-18940-0-2

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Epidemiologic Study on Nutrition and Management Related Diseases in Feeding Cattle Agricultural By-products

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ABSTRACT

The aim of the study was to reveal the major facets animal health status as *related to feeding, farming management, environment and animal production. A cross-sectional study was conducted in Boyolali region, Central Java, involving* 50 *randomly selected farms covered* 129 *lactating FH cows,* 15 *FH heifers,* 41 *FH calves,* 1 *FH bull, 110ngole* cows, 3 *Ongole bulls. Information was obtained from personal interview with smallholder farmers, measurement of milk yield and feedstuff given to the animal, clinical evaluation and mastitis test (Bovive(i). The result showed that based on net energy for lactation(NEL) the feedstuff could only provide* 6 *f/day. The prevalence proportion* was *10.85% for clinical mastitis,* 34.8% was *for nutritional diseases which bloat was the most frequent fatal occurrence. Skin diseases were attacking* 85.92% *of selected cows, while* 13% *of cows were in helminthiasis treatment. Although it* was *not significant different (P>0.05) utilization of* 22.2% *agricultural by-products in mixed roughages with field grass was preferable compared with other feedstuffs combination* as *related to milk production level of >10 l/day. Governmental and non-governmental husbandry sector should cooperate in order to make progress and to help the farmers in decision making process to minimize risk factors.*

Keywords*: smallholder farmer, milk production, agricultural-by-products, feeding regime, diseases*

1. INTRODUCTION

Boyolali region is situated in Central Java developed as centre of milk production zone. Milk production in this region was 46.260.000 liter /year which is mostly supported by smallholders and 87.793 dairy cows (DISNAKKAN Boyolali, 2012). Smallholder dairy is a farming system that promotes regul'ar monetary earnings to people who normally access cash once a season after the sole harvest crops (Ngongoni *et al,* 2006). Musuk was one among 19 districts in Boyolali considered as the most dense dairy popu!ation. Since Boyolali predominantly an agricultural area, the agricultural by-product and crop residues play important role as feedstuff. In general agricultural by-product and crop residues represent a major proportion of livestock feeds in Central Java although they are obviously insufficient in nutrient content, especially when they fed as a single feedstuff.(Preston and Leng, 1987}.

Farmers in Boyolali as many other smallholder farmers in devetoping countries have many purposes in keeping the livesto.ck such as for reduction of risk from cropping, accumulation of capital, to render services e.g. traction, fuel, and fertilizer, to satisfy cultural needs, to ensure status of prestige,. provision of food and generation income (Falvey and Chantalakhana, 2001) Although integrated farming systems have been introduced to the farmers for quite a long time, it seems that ar, interdisciplinary approached is needed to make the program a success as technological improvement alone is not the answer. Identification of prevailing problems and understanding of the existing dairy production system in the such area is essential to devise appropriate development intervention (Tassew and Seifu, 2009). However, due to the traditional mind set of most of the smallholder fanners in the area, a little is known about the existing dairy production system include health management which may cause substantial losses to the dairy industry. Therefore this study was designed to determine the major facets of animal health as related to dairying in the area.

2. MATERIAL AND METHOD

Description of the study area

The study area was selected purposively based on the potential for milk production. Musuk was one among 19 districts in Boyolali considered to be the highest density of dairy population. The area is upland with elevations bel\'Veen 200-700 meters above sea level and average rai nfall of 2571 mm/year, while average temperature of 26°C and humidity of 76% (BPS Kabupaten Boyolali 2009) The major cultivated crop grown in the area were,

rice, cassava, corn, peanut, sugarcane, however the most frequent of being utilized were rice straw, cassava, while the other crop were utiliz.ed occasionally or seasonally.

Sampling procedure

Primary and secondary data were used in the study. Sampling target of population were 50 dairy smallholders that randomly selected among the smallholders having lactating cows in the area. A single visit to the farmer was conducted to collect data. Primary data sources were obtained from measurement of feedstuffs analyses, milk production and clinical symptoms of respected diseases. Questionnaire call farm data sheet was used as a tool to obtain the information from the farmer. The question types were dichotomous in term of yes or no and multiple choice, while open-ended questionnaires were used to collect more information on aspects of sociodemographic characteristics (age, sex, educational background, household size and income derived from keeping livestock), husbandry practices (number of cattle, breed, feeding management, health management), and disease incidences. Interview with the farmers were done as regard to historical disease problem in the past. Each of feedstuff given to the cattle was collected from the barn directly and weighted approximately 2 kg each for further feedstuffs analyses. Milk sampling and measurement were carried out in the milking times (morning and afternoon) in each selected farm. Disease incidence was evaluated based on the clinical symptom. Secondary data was taken from Central Java Province Statistic Office and respective region of Animal Husbandry Service. The samples taken were on the base of farm level '3nd individual level which were lactating cows. Other animal which were existing on the farm level then will be analyzed descriptively.

Data analysis and calculation

Collected data were analyzed descriptively using SAS software (1998), epidemic analysis was using crosssectional study and epidemiologic measures of association for independent proportions were done in 2x2 tables (Martin *et ai,* 1987). For nutritional aspects Weende and Van Soest analyses were carried out to analyze nutrient content of feedstuffs (Van Soest, 1994). Diseases occurrence were recorded based on the finding of clinical symptoms and medical treatment applied. Especially for mastitis, evaluation upon clinical symptoms was done combined with Mastitis Indicator paper (Bovivet®) to fix the diagnoses.

3: RESULT AND DISCUSSION

There were some factors which interacted among each other in related to milk production, among other were smallholder pattern of farming, diseases, and feeding management.

Smallholder

Socio-demographic analyses showed that the household size was 4.7. The active group (>15-55 years old) was 67.2%, the group of < 15 years old was 26.4% of the sample was, the group of > 55 years old was 6.4%. The higher proportion of the working age is important to undertake agricultural and husbandry activities although most of them were only have basic school education. The cattle in the study area were not grazing due to limited communal grazing land. Each household had 1 to 5 lactating dairy cows, 0-2 heifers, 0-3 calves, only 7 families had On90/e cows, only 4 families looked· after bull beside the dairy cows. For generate income 66% of the selected farmers intended to keep the cattle for milk production, 8% for fattening. and 26% for multiple purposes, this showed that milk production was not a single sources of income as typical for smallholder farm (Devendra, 2007)

Milk production and diseases

In general the milk yield on the day of visit was between 5 to 16 liters /day regardless the lactation period and the peak level of milk production was ranged from 18 to 22 liters per day. Drying of the lactating cow varied among the farmers (Devendra, 2007) but usually 7 months of pregnancy, or immediately when the milk production was not profitabfe Based on the diseases evaluation on the day of visit the diseases occurred in the area of study were clinical mastitis, nutritional diseases, skin dise ses and medical treatment for helminthiasis which indicated that the respected cows were having problem with endoparasites. As was the case in tropical countries (Hall, 1987) clinical mastitis was the most problematic disease in the area of study. Based on clinical symptom and the used of Mastitis Indicator Paper (Bovivet®) the prevalence proportion clinical mastitis was 10,85. The association between mastitis occurrence and various volume of field grass, mix-roughage, concentrate given to the animals were not significant (P=O.7; P=0.52; P=0.93), however the number of person milking the cows was the risk factor of the mastitis occurrence. Seventy-eight percent of the incidence of mastitis were associated with 2-3 milkers (P=068) It should be considered by the farmer that the different pressures on the teat done by different milker will affect the circular and longitudinal muscles cause

the damage of teat cistern and streak canal. This condition will lead the pathogen to enter the mammary gland (Frandson, 1986) and cause mastitis.

Temperature and feedstuff and given to the animal may provoke certain disease such as metabolic disease due to metabolic stress and homeostatic failure as etiology (Wheelock *et ai,* 2010). The nutritional diseases observed were not specified, however based on the farmer's information the common nutritional disease were bloat, indigestion, and poisoning, The frequency of nutritional diseases was significantly different (P=O.05) between the cows fed with concentrate 1-3 kg as compared to the cows having no concentrate in the ration (1:2.3 times). On some farms, the concentrate replaced by mix-roughage contented of wistaria, peanut vines and maize stem and leaves when the concentrate was not avajlable. These plants contain high levels of rapid degradable protein and carbohydrate in the rumen which contribute to the production of froth and subsequently bloat (Patra, 2007). Besides, due to the lower price some times the farmers might give a high amount of rice bran which finely ground instead of concentrate. The finely ground rice bran without being mixed with long physical form feeds will sink and escape into the ventral sac of rumen and provoke depressed digestion (N0rgaard, 1989; Cheng et *ai,* 1998; Villalba *et ai,* 2009). Medical treatment for helminthiasis which was given to 14% of the selected cows showed that the diseases caused by endoparasites were put in attention of the farmers, whilst the skin diseases which attacking 85.3% of the selected animal were ignored by the farmer • since this skin disease have been there for a very long time, and difficult to be erased due to lack of water to clean the animal.

Nutritional aspect

In practice, it found that the purpose of keeping the animal can affect the farmer's attitude to look after their animals (Payne, 1990; Slowey, 1990). The difference manner of looking after the animal might be related to a property as in this part to feeding regime and feeding time. Although there is no Significant difference between feeding regime that applied on the farms related to the purpose of keeping the animal (P=0.48), neither among feeding frequencies. The results show that 38% of farmer gave restricted feeding to the cattle, 34% ad libitum and 28% was feeding the animal in seasonal variation, which mean that the vol'ume and the kind of feedstuffs given to the animals were varies depend on the available sources. Most of feeding time was 2 times/day (82%) while some of the farmer fed the animal 3 times/day. Beside agriculture by-products concentrate also given to the cattle regularly. Cassava tuber, papaya and pasture grass were given to the cattle optionally as they were given more on the base of seasonal variation (Widiyanto *et aI,* 2011). Mixed roughages content of wistaria, peanut vines, maize stem and leaves were given to the cattle as substitution to the regular feedstuffs.

Table1 : Major nutrient composition of feed as ration ingredient

Item	DM(%)	DP(%)	NEI (Mcal/kg)	Ca (%)	P(%)
Concentrate	86	12.5	1.99	0.07	2
Cassava Leaves	92	18.7	1.92	0.70	0.31
Field Grass	30	5.3	1.71	0.29	0.36
Rice Straw	I 90	2.1	0.62	0.21	0.05

Table2 : Consumption of dry matter and nutrient ingredient of the ration.

Item	DM(%)	DP(%)	NEI (Mcal/kg)	Ca (%)	P(%)
Concentrate	1.72	215	3.422	1.2	34.4
Cassava Leaves	0.92	172	1.766	6.44	2.85
Field Grass	7.5	397	12.825	21.75	27
Rice Straw	0.9	118.9	0.55	1.89	0.75
Total	11.04	802.9	18.563	31.28	64.7
Requirement	11.2	785	15.7	45	34

Based on NRC (2001), the nutrient requirement for dairy cow with the body weight of about 400-450 kg and 10 l/ day of average milk yield were as followed:

DM(%)	DP(%)	NEI (Mcal/kg)	Ca (%)	P(%)
11.2	785	15.7	45	34

The tables 1 and 2 showed that the dry matter (DM) , protein and net energy for lactation (NEL) had fulfilled the requirement. The Ca and P ratio was not in balance whilst the NaCI given to the animal was too much than the requirement and should be 0.45% from the DM consumption.

Based on the nutrient composition and the consumption of each ingredient the consumption of nutrient then could be calculated. Tables 1 and 2 showed that the DM, digestible protein (DP) and NEL quantitatively fulfilled the requirement for about 10 I/day of milk yield . According to NRC (2001), the consumption of DP 802.9 g /day and NEL 18.5 Mcal/day could provide 13 litters of milk per day. The lack of efficiency in utilizing the respected nutrient for milk production might be due to, among other, the low quality of protein (McDonald *et al* .2011). This can be predicted from the fact that the legume was not mixed and be a part of the ration. As it is known that legume contain of protein with complete essential amino acid as compared to non-legume (Preston and Leng, 1987).The higher environment temperature from the normal range in the study area gave the impact on heat increment (HI) caused the decreasing of net energy (NE), therefore the actual available NEL became lower than it was tagged in the list (Mc.Donald, 2011). The shortage of energy efficiency could be caused by toxic compound in the transport electron system, which reduced ATP fonnation. This condition could be happened due to the remaining HCN in the cassava leaves (Stryer, 1988). The low efficiency in the utilization of nutrient could also be caused by mineral imbalance. Table 2 showed that Ca supplied was not fulfilled the requirement since the ratio of Ca and P was imbalanced (1 :2), that at least the Ca/P ratio was 1: 1. The Ca/P imbalance reduced enzyme activity which caused low milk production (Underwood and Suttle, 2010)

4. CONCLUTION AND SUGGESTION

Milk production was not optimal in the study area. Based on the study the performance of production was not optimal eaused by several aspects. The major factor affecting the herd health program was the reliable animal health and production records that could be analyzed regularly. Eventually the low zoo-technique skill, lack of attention to the disease occurrence, and nutritional aspect especially inconsistently on feeding management, fluctuation in the supply of feedstuffs, and imbalance mineral status were important causal factors as regard the level of milk production. The improvement of feeding management can be achieved through the better knowledge about nutrition and ration. Based on study about mineral interrelationship among soil, plant and animal the mineral supplementation is required. The success of animal health program depends upon the competence arid enthusiasm of the related government institution, the management expertise of the farmer, and the ability of the program applied to demonstrate progress through improved performance.

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