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Evaluation of Dairy Cows Farm Management and Health in Several Regencies in East Java Province

(EVALUASI MANAJEMEN BUDIDAYA DAN KESEHATAN SAPI PERAH DI BEBERAPA KABUPATEN DI PROVINSI JAWA TIMUR)

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ABSTRACT

The demand for cow milk in Indonesia increases every year, but optimal production is not met. This study aimed to assess dairy cattle production management and health in East Java Province to construct improvement strategies and increase milk production. The research method was conducted through interviews with 63 dairy farmers from Sidoarjo, Mojoketo, Malang, Pasuruan, Probolinggo, Jember, and Banyuwangi regencies. This study indicates that 81% of farmers joined to livestock groups and sold fresh milk products to cooperatives or KUD (Koperasi Unit Desa). The average livestock ownership is 6.7 heads, with an average number of lactating cows of 4.5. The average price of milk sold to cooperatives or KUD was 5810 IDR/L and if it sold independently the price was 9769 IDR/L. Breeders provide forage feed as much as 34.67 kg/head/day and concentrate as much as 4.8 kg/head/day. The forage and concentrate feeding frequencies were 2.7 and 1 times a day. As many as 44% of farmers did not experience any problems or obstacles in the cultivation process carried out. A total of 66% faced obstacles that were dominated by feed factors (19.05%) and disease (17.46%). Diseases that infect (besides mastitis) are bloat (29%), hypocalsemia (18%), and diarrhea (7%). As an effort to prevent and increase production, farmers carry out preventive actions through the application of good farming practices (40%), maintaining the cleanliness of housing and livestock (24%), not making any effort (18%), applying feed management (10%), giving supplements and feed additives (8%). In conclusion, dairy farming management in East Java Province needs to be improved, and good husbandry practices need to be carried out by all farmers to increase cow's milk production.

Keywords: dairy cows; good farming practices; milk production strategy

ABSTRAK

Permintaan susu di Indonesia semakin tahun semakin meningkat, namun tidak diimbangi dengan produksi yang optimal. Tujuan penelitian ini adalah untuk mengevaluasi manajemen produksi dan kesehatan sapi perah di Provinsi Jawa Timur guna menghasilkan strategi perbaikan dalam peningkatan produksi susu. Metode penelitian dilakukan melalui wawancara dengan 63 peternak sapi perah yang berasal dari Kabupaten Sidoarjo, Mojoketo, Malang, Pasuruan, Probolinggo, Jember, dan Banyuwangi. Hasil penelitian ini menunjukkan bahwa 81% peternak tergabung dalam kelompok ternak dan menjual produk susu segar ke koperasi atau ke koperasi unit desa (KUD). Kepemilikan ternak rata-rata 6,7 ekor dengan jumlah ternak laktasi rata-rata 4,5 ekor. Rata-rata harga susu yang dijual ke koperasi atau KUD sebesar Rp 5810/L dan jika dijual secara mandiri dengan harga sebesar Rp 9769/L. Peternak memberi pakan hijauan sebanyak 34,67 kg/ekor/hari dan konsentrat sebanyak 4,8 kg/ekor/hari. Frekuensi pemberian pakan hijauan dan konsentrat

adalah 2,7 dan satu kali sehari. Sebanyak 44% peternak tidak mengalami kendala dan masalah dalam proses budidaya yang dijalankan. Sebanyak 66% menghadapi kendala yang didominasi oleh faktor pakan (19,05%) dan penyakit (17,46%). Adapun penyakit yang menyerang (selain mastitis) adalah bloat (29%), hipokalsemia (18%) dan diare (7%). Sebagai upaya pencegahan dan peningkatan produksi, peternak melakukan Langkah-langkah pencegahan melalui penerapan *good farming practices* (40%), menjaga kebersihan kandang dan ternak (24%), tidak melakukan upaya apapun (18%), aplikasi manajemen pakan (10%), pemberian suplemen dan pakan imbuhan/*feed additive* (8%). Dapat disimpulkan bahwa manajemen budidaya peternakan sapi perah perlu ditingkatkan dan *good farming practices* perlu dilakukan oleh seluruh peternak guna mengingkatkan produksi susu sapi perah di Provinsi Jawa Timur.

Kata-kata kunci: sapi perah; *good farming practices*; strategi produksi susu

INTRODUCTION

Increasing milk consumption in Indonesia requires more significant efforts to balance the national milk demand and supply. Consumption of fresh milk in Indonesia is 0.006 liters per capita per week, consumption of preserved milk packaged in 250 mL amounted to 0.119, sweetened condensed milk, milk powder, baby milk powder, cheese and other milk products as much as 0.070, 0.017, 0.014 and 0.024, per capita a week, respectively (Directorate General of Animal Husbandry and Animal Health, 2021). Milk production in 2019 was 944,537 tons, and in 2020 it was 947,685 tons and milk import reached up to 35 million tons to accomplished milk demand (Ministry of Industry, 2017). The increase in fresh milk production is at less than one percent (0.003%) (Statistics Indonesia, 2020). The prediction of milk consumption increasing in Indonesia is line with the increasing of population, which is also supported by the development of economic growth, education level, changes in lifestyle, and public knowledge to consume healthy food that has good nutritional value (Bórawski *et al.,* 2020).

One of the practical efforts of the government to meet national milk needs is through imports. The factors affecting milk import were Gross Domestic Product (GDP) per capita, milk production, and milk exports positively associated with import. Meanwhile, the exchange rate was negatively associated with milk imports (Budiraharjo *et al*., 2021). Dairy farms in Indonesia are generally smallholder farmers that run independently or are incorporated in a livestock group institution and can maintain a cow's milk production business even during the Covid 19 pandemic (Setyawan *et al.,* 2021a). On the other hand, overall milk production in Indonesia is relatively low (Lestari *et al.,* 2015; Astuti and Suripta, 2020) and the incidence of subclinical mastitis is relatively high (Khasanah *et al.,* 2021) so improvements are needed in various production sectors, including feed, cage hygiene management, and milking management (Khasanah *et al.,* 2021; Sun *et al.,* 2019). Furthermore, dairy cows' health aspects also need to be considered. Farmers must have the initiative to learn about livestock health and welfare to implement Good Husbandry Practices to optimize milk production (Singh *et al.,* 2020; Lovarelli *et al.,* 2020). The health status and management also essential factors that support the milk productivity in dairy cattle. Therefore, this study was aimed to evaluate the management and health of dairy cattle in East Java to produce strategies for improving and increasing milk production.

RESEARCH METHODS

This study involved 63 dairy farmers from eigth districts in East Java, namely: Sidoarjo, Mojoketo, Malang, Pasuruan, Probolinggo, Jember, and Banyuwangi. The selection of farmers was carried out by purposive sampling in each City/Regency in East-North Java which has a high population of dairy cattle. Qualitative and quantitative data were obtained from interviews with farmers and direct observations in each dairy farmer's cage. The discussion and interviews were prepared to follow a semi-structured technique and were performed using the interview guide (questionings and terminology) for all interviewees. The observed variables included the farmer's profile, feed management, health management, and livestock ownership. Participants were first asked general queries about themselves and their dairy farm, like how long they carried farming, their dairy

cattle population, and their production systems (Brennan *et al.,* 2016). They were then asked to explain what they considered the biggest threat to their farm, what disease infected a dairy farm, and how to solve and prevent the problems. The data from the interviews were tabulated and analyzed descriptively and then displayed in tables and figures. Observation results are also used as a reference to perform strengths, weaknesses, opportunities, and threats (SWOT) analysis to describe the condition of dairy farming and identified strategy to improve productivity (Sirappa *et al.,* 2019).

RESULTS AND DISCUSSION

Dairy Cattle Management

The management profile of dairy cattle in East Java is presented in Table 1. Most dairy farmers in East Java join a group, as much as 81%, and 19% do not join groups or conduct their farms independently. Dairy farmers in East Java run their businesses according to the conditions and potential of their respective regions. In Sidoarjo, Jember, and Mojokerto regency, they prefer to run their businesses independently, while in Malang, Pasuruan, Probolinggo, and Banyuwangi regency, they choose to be part of a livestock group that sells their milk products in cooperatives. The availability of institutions for dairy farming can help farmers develop their businesses, especially on economic, social, environmental resources (Amam *et al.,* 2020), physical, technology and financial resources (Soetriono and Amam, 2020).

The total number of dairy cow ownership was an average of 6.7 heads, with details of 4.5 heads lactating cattle, 2.2 heads in dry period, 1.4 heifers, and 1.8 calves. The scale of the dairy cattle business can be categorized by the number of cows owned by farmer which are small scale dairy farmer (*usaha peternak rakyat*) with the cattle owned about 1 to 10 heads, small scale dairy industry (*usaha peternak kecil*) with the cattle owned about 10 to 30 heads, middle industry (*usaha menengah*) with the cattle owned about 30 to 100 heads and big industry with the cattle owned more than 100 heads (Yusdja, 2005) . Furthermore, the ideal one consists of 7 productive cows (Sejati *et al.,* 2017). The number of cows and milk production influences economic revenue. The more cows, the more income, and it is significantly associated between age, education, farming experience, family responsibilities, and land area to ownership (Nurdiyansah *et al.,* 2020). The difference in milk production among cows sometimes becomes a challenge for the farmer. The usage of good genetic quality cows, management of feed amount and quality, and environmental can be considered as the prevention for the milk production diversity among the cows in the same farmer. Even though the number of cow is low, farmers have managed milk availability by scheduling the lactation period and preparing the heifer for cow replacement. Furthermore, according to Asmara *et al.* (2017) the commission of small-scale dairy farmers from milk-producing cooperatives is relatively low in productivity and profitability. There was a positive association between the assistance commission of dairy cooperatives, including technical assistance, milk marketing, education/training, and finance, with the performance of its members.

Cow's milk with the same quality can have different prices depending on the area and to whom it sells. Milk that farmers deposit to cooperatives is usually cheaper than milk sold directly to the market or consumers. The average price of milk sold for cooperative is about Rp. 5810 and Rp. 9769 for sold directly to consumers. The cooperatives are responsible for protecting and prospering members. Cooperatives are substantial in encouraging technological changeover, and commercialization is vulnerable in offering affordable prices. Cooperatives can be efficient enterprise organizations to facilitate rural growth and food security, including dairy farming (Chagwiza *et al.,* 2016).

The cows received feed dominated by forage as much as 34.67 kg/head/day and concentrated 4.8 kg/head/day. The balance of forage and different concentrates affects the efficiency of dairy cattle production (Anggiati *et al.,* 2016). According to Jayanegara (2014) dairy cattle feed formulations in Indonesia could follow the *National Research Council*/ NRC), but it would be better if Indonesian dairy cows had their standards. Several studies about forage and concentrate ration shows in Table 2. Ramírez-Rivera *et al.* (2019) reported several factors that affect milk production are: genetic factors have a more significant influence on milk production; special breeds have produced more milk, but higher milk negatively correlates to the fat content, protein, and total solids; season relates to the availability and quality of forage and milk production, given a larger supply of feed concentrate does not increase milk

Table 1. Profile of dairy cattle business management in East Java

Variables	Characteristic	Value
Type of business (%)	group	81
	independently	19
Number of cows (head)	total cows	6,7
	lactation	4,5
	dry period	2,2
	heifer	1,4
	calf	1,8
Milk price (Rp/litre)	sold to consumer	9769
	sold to cooperative/KUD	5810
Feed (Kg/head/day)	Forages	34,67
	Concentrate	4,8
Feeding frequency (time/head/day)	Forages	2,7
	Concentrate	1

Table 2. Balance of forage and concentrate on dairy cattle production effect on milk

Ration	Variables	References
Forage: Concentrated 50:50	Production efficiency 27,84% Digestible energy ration 16,05 (Mcal/ day) Fat 3,28% SNF 7,31% Protein 2,53% Lactose 3,82%	(Anggiati *et al.,* 2016) (Suhendra *et al.,* 2015)
Forage: Concentrated 55:45	Production efficiency 37,69% Digestible energy ration 13,66 (Mcal/day) Fat 3,45% SNF 7,75% Protein 2,68% Lactose 4,06%	(Anggiati *et al.,* 2016) (Suhendra *et al.,* 2015)
Forage: Concentrated 60:40	Production efficiency 39,62% Digestible energy ration 8,34 (Mcal/day) Fat 3,51% SNF 7,83% Protein 2,69% Lactose 4,12% DMD 12,670 kg/head/day OMD 10,833 kg/ head/day	(Anggiati *et al.,* 2016) (Suhendra *et al.,* 2015) (Kusuma *et al.,* 2021)

Note: SNF: Solid non fat; DMD: Dry matter digestibility; OMD: Organic matter digestibility.

Table 3. Problems faced by dairy farmers in East Java

Problems faces by farmers	Percentage (%)
Water problem	3,17
The cost of purchasing brood-stock	1,59
Weather	4,76
Animal waste	4,76
Feed	19,05
Disease and health	17,46
Air pollution	1,59
Decreased milk production	3,17
None	44,44

production; the number of calves positively affects milk production until the fifth calf, with the following reduction in production. Milk production generally increase at the beginning of lactation on 0-45 Days In Milk (DIM) to peak production (45-55 DIM) then start decrease in production or entering the late lactation phase (56-340 DIM) until the end of the milk production period (Strucken *et al.,* 2015). Another factor is that a good production system will result in higher and hygienic milk quality, including using cleanliness of milking equipment and containers.

Evaluation of Problems in Dairy Farms

The problems faced by farmers and how significant the occurrence, consist of air pollution was 1.59%, the cost of purchasing broodstock was 1.59%, decreased milk production was 3.17%, water problems were 3.17%, the weather was 4.76%, and the waste problem was 4.76% (Table 3). Unpredictable weather makes the ambient and temperature fluctuate. Conditions like this can affect the physiological status of dairy cattle. Herbut *et al.* (2018) reported that hot weather and environment could disrupt cattle metabolism and, if it occurs in the long term, can make cows stressed. Increasing the cage's temperature and temperature humidity index (THI) can increase the activity of the creatine kinase enzyme, which affects the energy supply if the livestock is in an unstable microclimate condition of the pen (Mushawwir *et al.,* 2020). Water is one of the essential aspects of dairy farming, especially for drinking cows. Most of the farmers's' water needs have been met, either for drinking or cleaning cows and housing. Sources of drinking water are obtained from drinking springs and river water. Drinking water from springs has better quality than river water (Sarwanto and Hendarto, 2017). Moreover, Challis *et al.* (1987) reported that cows who received distilled water drank more, had more concentrated intake, and produced more milk. Another problem encounter by farmers is livestock waste such as urine, feces, and feed residue. Dairy cow waste has economic value if processed, such as into clean energy like biogas and compost, and it will benefit other sectors (Gupta *et al.,* 2012). Some farmers use dairy cow dung as biogas, although some do not optimally. The price of superior dairy cows with good quality is also a challenge for the farmer, the good cows relatively have a high price and it can be a difficulty for farmers to get the cow replacer and need the breeding system and technology supporting smallholders dairy farm such as artificial insemination.

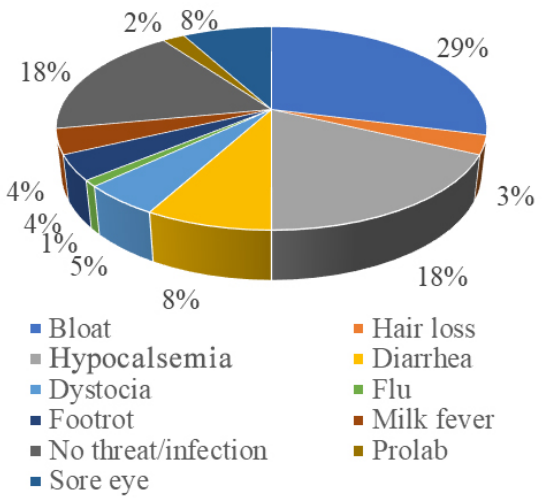

Figure 1. The incidence of diseases that often infect dairy cows other than Mastitis

Farmers' other problems were feed (19.05%) and livestock disease (17.46%) and almost a half farmer (44.44%) did not experience any problems raising their cows. Farmers usually get feedstock by taking forage from their homes or areas nearby, and some farmers buy agricultural waste like rice straw and corn straw. Other agricultural products such as vegetables, eggplant, and carrots are also used as animal feed in Malang regency because vegetable prices are falling rapidly during the Covid 19 pandemic. Other alternative feeds include waste bean sprouts, dried kangkong, fermented cobs and corn tumpi (Khasanah *et al.,* 2019) and taro leaves (Setyawan *et al.,* 2021b) can be feed supply solutions in dry season. In addition, good feeding management can also optimize animal production (Syaikhullah *et al.,* 2020).

Health and Disease Status in Dairy Farms

Many diseases can attack dairy cows, such as mastitis, bloat, diarrhea, food and mouth disease, and so on. Cows that are rarely cleaned and not appropriately treated have more potential for infection than cows that are cared for properly. An insufficient and polluted environment and poor cage management are among the causes of dairy cows being infected with mastitis. According to Khasanah *et al.* (2021), practical management associated with risk factors for subclinical mastitis in dairy cattle includes the type of milking (manual or by machine); washing the udder before milking,

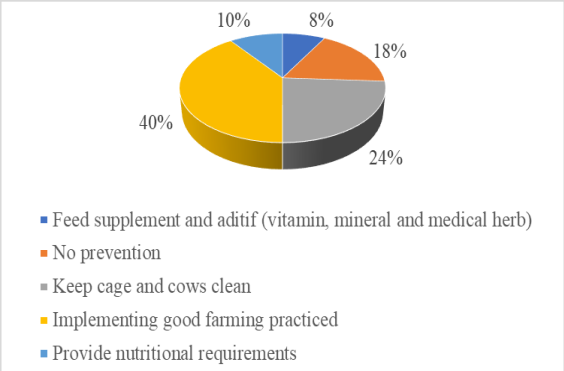

Figure 2. Disease prevention strategies in dairy farms in East Java

pre-dipping with warm water, and post-dipping using iodine after milking. Sub-clinical mastitis is a disease that has attacked dairy cows in all respondents. The interview results showed that flu/rhinitis and prolapse uterus are some diseases that attack dairy cows with a low percentage of 1% and 2%. Other diseases that infect livestock with a small percentage are 3% hair loss and 4% foot-rot. Prolapse of uterine is usually found in the last trimester of pregnancy. A study of uterine prolapse prevalence in Italy showed about 0,6% occurrence in dairy cows and to be higher in beef cattle at about 1% (Carluccio *et al.,* 2020). Therapy for uterine prolapse cows consisted of cleaning, giving local antibiotics, and inserting a harness for uterine bind. After treatment, the recovery rates were 81.1% in dairy and 84.2% in beef cows, and the chance of pregnancy after recovery and artificially inseminated was about 83.7% and 87.5% in dairy and beef cows (Carluccio *et al.,* 2020). Postulated prolapse etiologies are poor myometrial contractions during the postpartum time and traction during a difficult delivery (dystocia). A low calcium serum emerges to be an indication of uterine prolapse risk factor (Purohit *et al.,* 2018).

Foot-rot disease or rotten nails is caused by *Fusobacterium necrophorum* and *Dichelobacter nodosus*, bacteria that live and develop in the gaps of the cow's hooves, the hooves of cattle that are injured due to the impact of complex objects in a dirty place are one of the consequences of this disease. Damage to the hooves and the potential for other unwanted diseases result if the cow is not treated and handled immediately**.** Predisposing factors are inappropriate housing, overgrown or mishappen claws, metabolic disorder, high production, early lactation (immunosuppression and negative energy balanced), heat stress, lactation number (the first lactation has higher prevalence) and concurrent endemic infection with digital dermatitis (Purohit *et al.,* 2018).

In addition, milk fever was found in 4%, dystocia in 5%, diarrhea in 8%, eye pain in 8%, and bloat in 29%. Milk fever is a disease that interferes with metabolic processes and occurs around birth. The leading cause is the lack of calcium consumption during the lactation period (Tesfaye *et al.,* 2019). Furthermore, Yasothai (2014) state that a lack of calcium in dairy cattle could occur during parturition or a few days after and it is important for recovery reproduction system in cows. Supplementing calcium propionate at about 350 g per day can be a treatment of postpartum dairy cows to maintain the health status (Zhang *et al.,* 2022). Dystocia is a case in a cow has difficulty giving birth due to maternal or fetal factors, and human assistance is needed to support the birth process. Aprily *et al.* (2016) reported that one of the causes of dystocia is because the parent has given birth for the first time, so there is still less stress than the parent who has given birth several times (pluripara). Foetus abnormalities, incomplete cervix dilatation and twin birth, can also cause dystocia.

Diarrhea is found to infect cows quite often, about 8%. Many factors can cause it, including parasites of the *Eimeria spp.,* and *Cryptosporidium* groups, pathogenic bacteria such as *Salmonella spp., Escherichia coli* (Enterohemorrhagic *E. coli*/EHEC), enteropathogenic *E. coli* (EPEC), Shiga toxin-producing *E. coli* (STEC), and F5 (K99) *E. coli* and bovine rotavirus and coronavirus (Blanchard, 2012; Mawatari *et al.,* 2014). Infection with more than one pathogen can increase cattle morbidity and mortality. Some of these pathogenic bacteria were resistant to several antibiotics such as penicillin, tetracyclyn streptomycin, amoxicillin and trimethoprim-sulfametoksasol (Normaliska *et al.,* 2019). This occurrence was also found in Indonesia, where the *Non-Staphylococcus aureus* isolated from dairy cows's milk from Mojokerto, Probolinggo, Malang, and Banyuwangi regency has known to have a penicillin resistance gene (Widianingrum *et al.,* 2022).

Another disease that often attacks cows is bloat and according to Munda *et al.* (2016), bloat is a disorder that attacks the digestive system of ruminants and includes non-infectious diseases. Yanuartono *et al.* (2018) added that there are three types of bloat based on their

STRENGTHS

•Most farmers are members of an institution.
•Human resources will also increase due to exchanging ideas and discussions in groups.
•Adequate experience and knowledge in raising dairy cattle
•Adequate facilities and infrastructure
•The condition of the area is quite supportive
•Availability of veterinary service in every area
•Laws of the Republic Indonesia Number 19 the year 2013 about farmers' protection and empowerment
•Regulation of the minister of agriculture of the republic of Indonesia number 13/permentan/pk.240/5/2017about livestock business partnership

WEAKNESSES

•Presence of harmful diseases
•Low milk production
•Undirected waste management
•Awareness of farmers in implementing good farming practices is relatively low
•The fresh milk price is relatively cheap
•Inconsistency of milk quality
•Low breeding program system
•Low-quality of feed and unorganized good feed management system
•Fluctuation in milk production
•Low technology used, lack of breeding strategy and recording
•Milk collection remains unorganized and unrecorded

SO STRATEGY

1. Strengthening the role of institutions to support the smallscale dairy industry towards a broader market and funding
2. Livestock-agriculture integration
3. Scale up the business such us utilizing external funding throuhg cooperation or bank
4. Improving and updating farmers' knowledge and skills
5. Optimizing the use of natural resources
6. Optimizing institutional/ group/business partnership rol

WO STRATEGY

1. Digitalization in the implementation of business and milk production
2. The use of technology is good for feed processing, health status monitoring and waste treatment
3. Artificial optimization of insemination of high-yielding seedlings
4. Diversification of dairy products through milk processing

OPPORTUNITIES

•The need for fresh and processed milk is still high
•Increase in milk demand during the Covid 19 pandemic
•Potentially increasing milk prices during Covid 19
•The existence of an organic dairy cattle development program by the government
•Availability of local feed ingredients that have not been utilized properly
•Technological developments in animal health and feed processing
•Digitalization of livestock technology
•Potentially demand for a traditional and modern market
Development of culinary from milk-based like yogurt, kefir, milk for ice et
•access to inputs, including credit, hinders producers' investment in improving dairy production.
oduction

WT STRATEGY

1. Maintaining the cleanliness of residential areas and cows
2. Periodic mastitis screening
3. Collaboration and partnership with other stakeholders including the government
4. Strengthening the skills of farmers to get quality and good quantity milk production

ST STRATEGY

1. Optimizing existing technology in the field of health and feed processing
2. Government leads interventions to help farmers
3. Well-established breeding strategy for the dairy industry of small farmers
4. Used as an alternative feed source and well-established animal feed production

THREATS

•Competition with dairy product industry
•Difficulty getting good quality brooders
•High price of good quality of dairy broodstock
•Environmental influences such as weather and water difficulties in certain seasons
•Requires large fund
•Land use change
•Accustomed to raising cows in an extensive system
•Reduced labor in the field of livestock
•Milk and dairy product demand and consumption are increasing but at a slow rate.
•Imports high-quality dairy products as a competitor
•Unfavorable environmental influences of livestock production not being managed adequately

Figure 3. SWOT Matrix of dairy cows farming in several districts in East Java

classification: frothy bloat, free gas bloat due to feeding, and free gas bloat due to failure of eructation. Bloat can cause economic losses and even cows's death (Kerslake *et al.,* 2018). Those diseases that occur in dairy cattle in East Java need more attention, such as prevention by applying good husbandry practices, including good hygiene and management practices on the farm. Some of the prevention conducted by farmers are presented in Figure 2.

Each farmer has their ways of dealing with and preventing disease in their livestock. The data shows that the disease prevention of respondent includes 8% of supplements and feed additives, 10% of provides nutritional needs, 24% of keeping cages clean, 40% of implementing good farming practices, and no prevention of 18%. Meeting the dietary needs of dairy cows is one way to make cows physically stronger. Cattle will develop when the requirement for survival is fulfilled, so strengthening the immune system of the cow's body by providing good quality feed is one way to make the cow more robust and resistant to disease. A clean housing area also support the health status of cows.. In addition, the use of superior brood-stock that have high productivity and resistance to disease is also a strategy that needs to be considered.

SWOT Analysis of Dairy Farming and Health Management

The SWOT analysis of dairy farming in several districts in East Java describes the external factors and internal factors faced by farmers. The alternatif strategy is presented in the SWOT matrix in Figure 3.

CONCLUSION

Some dairy farms in East Java have implemented good farming practices but need advancements in feed, health, waste management, and production efficiency by implementing various innovations and technologies that support and assist milk manufacturing. Optimization prospects in diverse areas include increasing milk demand, business partnerships, groups, and government programs could be a strategy for milk production increment. Several disease that often to attack the cows were milk fever, dystocia and diarrhea (found more than 4%). However, farmer perform strategy to prevent disease infection including giving feed supplement, keep cage and cow clean, providing nutritional requirement and implementing good farmer practices.

SUGGESTION

Further research about assessment of dairy farm management dan production need to be conducted to elucidate the best management system related to production and health.

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