

Status of animal welfare implementation by standard of *Office International des Epizooties (OIE)* on dairy cow in East Java Indonesia

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ABSTRACT: Animal welfare is life quality aspect of animal that relates to physical and psychological condition, as well as environment where the animals live. Statistically, populations of the dairy cows in East Java in 2017 were 273.881. Objective of the research was to study implementation of animal welfare on dairy cows in East Java. Survey was conducted from May to June 2020. Instruments used in this research were standard *Office International des Epizooties (OIE)* on *Terrestrial Health Code 7.11* that comprised of 8 aspects: behavior, morbidity, mortality and culling, the change of weight; body condition; and dairy production, reproductive efficiency, physical appearance, response of handling, and complication post general procedure. Result for the application of animal welfare using standard *Office International des Epizooties* on Dairy Cow in East Java was categorized adequate/sufficient by percentage 70.73%. Among 29 indicators of measurement, 1 indicator belongs to the least category. The category showed that an area for exercise with average score was 1.38 (27.57%).

Keywords: Animal Welfare; Dairy Cow; East Java

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INTRODUCTION

Concept of the standard animal welfare was introduced for the first time by *Office International des Epizooties* in 2005 that comprised of seven *Terrestrial Code* and two *Aquatic Health Standards Code (Aquatic Code)*. Conventionally, animal welfare is related to good health and excellent production, and today, modern perspective that concern with animal welfare is focused on animal feeling. This perspective will support the change of caring procedure to minimize negative affective and to promote positive state (von Keyserlingk & Weary, 2017).

Animal welfare should be applied to create comfortable environment for animal in order to increase quality of animal productivity. Recently, animal welfare emerges accompany with animal rights and also has been top issue in global warming (Firman et al., 2016). A study by Sinclair et al., (2019) suggested that application of animal welfare may increase animal productivity and quality of the livestock products. Stress cow will produce less milk and low quality of beef (Göncü et al., 2017) likewise a decrease in reproduction rates or an increase in mortality or disease should be clear signs that livestock welfare is declining, illness and injuries can indicate poor health (Pawelek & Croney, 2003). Animal welfare is applied on productive cattle in order to increase production and productivity, product safety, and increase quality, as well as competitiveness, and to prevent any unexpected problems, such as disease, stress, injury as a result of mishandling and improper management (Fathurahman & Jamilah, 2019).

Based on data from Statistics Book of Livestock and Animal Health 2018 as issued by Directorate General of Livestock and Animal Health, East Java Province had dairy cows population in 2017 were 273.881. It has made East Java to be the region that has the greatest population of dairy cows in Indonesia along with dairy production for about 508.894 tons in comparison with West Java Province, which produced 281.088

tons. It has made East Java occupied the top rank in contributing dairy production in the national level (55,9%) out of total dairy production 909.638 tons per year. Population of dairy cows in East Java will increase every year, but quality of their lives as part of animal welfare has not been examined yet. Based on the statement, it is expected that this study will provide description about the application of animal welfare on cow farming in East Java.

MATERIALS AND METHODS

Location of the study was in East Java Province that covers some areas as follow:

1. Tukur Sub district of Pasuruan Regency
2. Batu City
3. Jabung sub district, Pujon sub district, Ngantang sub district of Malang Regency
4. Sendang sub district of Tulungagung Regency
5. Semen sub district of Blitar Regency
6. Krucil sub district of Probolinggo Regency
7. Senduro sub district of Lumajang Regency.

Basic consideration of the selection was high population of dairy cows and active human resources in livestock breeding. Survey was conducted from May to June 2020. Method of the research used descriptive quantitative. Numbers of sample were based on application of *Sample Size Calculator* Raosoft.com by calculation of 5% margin error, 90% confidence level, 113.104 population, and 50% response distribution, so that numbers of sample were 270 dairy cows.

The sampling technique used in this study was *purposive sampling*. Sample selection was based on individual characteristic and criteria, such as, the breeder should have more than 2 dairy cows PFH, experience in animal breeding more than 3 years, and at least have experienced 2 time lactation phases. Instruments used in this study was closed questionnaire that refers to standard *Office International des*

Epizooties (OIE) on *Terrestrial Health Code 7.11*, which include

1. Behavior: Duration of the cattle to lie down, tempo of breathing, respiratory disorders, agonistic behavior, area for exercise, temperature and humidity of the cowshed (stall), sunlight gets into the cowshed, and artificial lighting sources.
2. Morbidity level: lameness, injury, mastitis, and leg disease, Body Condition Score, pedestal to lie down.
3. Mortality and culling: mortality last year.
4. Change of Weight, body condition, and dairy production: frequency of feeding, cleanliness of the crib (feeder), drinking water supply.
5. Efficiency of Production: dystocia level.
6. Physical Appearance: Ectoparasites, hair condition, mucks from 3 conduits (eyes, nose, and reproductive organ).
7. Response of handling: condition of the dairy cows when they were milked, floor condition, relationship between human-cattle, and wall/partition to protect the cattle.
8. Complication of post general procedure: application of *dehorning*, and *tail docking*

The assessment scores was using likert scale. Likert scale allows variables to be used as indicator variables. Then these indicators will be used as a starting point for compiling instrument items which can be in the form of statements or questions. Sugiyono, (2015) said that each instrument that uses a scale has a gradation from very positive to very negative, which can be in the form of words and then given a score as follows: (1) The Least, (2) Less, (3) Sufficient, (4) Good and, (5) Excellent. Besides that, data was obtained through structured interview (Sugiyono, 2015). And the assessment criteria (questionnaire) are attached on Appendix 1

Data from questionnaire of the research is quantitative data that will be analyzed by descriptive percentage with data calculation using application of

Microsoft Excel, calculation is initiated by steps as proposed by Ridwan (2004) as follow:

1. Calculate value of the respondent and each aspect or sub variable.
2. Recap the values.
3. Calculate mean value
4. Present mean value in percentage form by equation:

$$DP = \frac{n}{N} \times 100\%$$

Whereas:

- DP = Descriptive Percentage (%)
n = The obtained mean score
N = Maximum score

RESULT AND DISCUSSION

Based on result of the study concerning with measuring status of animal welfare implementation using standard OIE on Dairy Cows in East Java. As we know that implementation of animal welfare is categorized **sufficient/adequate** by percentage 70.73%. Furthermore, scores of the measurement are presented in separated table as below.

Behavioral category

Based on result of the survey, it showed that duration of the dairy cows to lie down was belonged to fewer categories, in which they just have lain down for 10 hours. Ideally, they should lie down at least 9 to 12 hours per day and chew a cud for second time for 8 to 10 hours (Anonymous, 2017). The ruminants are used to chew a cud for the second time by lying down. Therefore, comfortable pedestal may affect duration of the cattle to lie down.

Besides that, temperature in the cowshed also affects implementation of the animal welfare. As we know that temperature and humidity of the cowshed for the dairy cows in East Java is less, which in fact, the temperature ranges 25 – 30' C and humidity ranges 65% - 75%. Moran (2005) in *Tropical Dairy Farming* reported that optimal temperature for dairy cows to produce milk ranges 6° C – 18° C and critical

temperature is 27°C. High temperature will inflict a loss upon the cattle breeders because it effects on behavior, decreased appetite, and increased drinking water. On

high temperature region, dairy cows may experience heat stress and they would be failed to regulate their body heat (Heraini et al., 2019).

Table 1. Result of measurement for behavior of dairy cows

Indicator of Measurement	Mean	Percentage (%)	Category
Duration of the cattle to lie down (hours/day)	2.97	59.46	Less
Tempo of breathing	3.41	68.11	Sufficient
Cough/ Respiratory Disorders	4.03	80.54	Good
Agonistic Behavior	3.84	76.76	Sufficient
Area for Exercise	1.38	27.57	The Least
Temperature and humidity of the cowshed	2.89	57.84	Less
Sunlight gets into the cowshed (stall)	3.24	64.86	Sufficient
Artificial lighting sources	3.49	69.73	Sufficient
Mean of Total Scores	3.16	63.13	Sufficient

Agonistic behavior (clashing with horns) is an aggressive characteristic. Aggressive interaction may occur naturally due to the establishment process on order of rank in a group. In its implementation, dairy cows in East Java is in sufficient category, whereas the cattle are seldom to show agonistic behavior and it may occurs once in a while, and when it happened they would be set an aside immediately. Naturally, cattle will compete for foods, water, and place to take a rest. If the cowshed design was not conformed to the cattle needs, it would become the significant cause of social stress and aggressive behavior (Mainar et al., 2019). Aggressiveness may occur due to specific conditions, such as: the cattle is separated from their herds, feeling insecure that lead to aggressive reaction against human existence (Neindre, et. al, 1995).

In general, health of the dairy cows is affected by accessibility of the dairy cows to move their bodies (*exercise*). On indicator of access measurement to do exercise, it belongs to the least category due to no specific area for the cattle locomotion, so that the cattle are still tied in a place (tie-stall). It is risky to physical health and reproductive health of the dairy cows. Along with research by Gustafson (1993) suggested that dairy cows would never do

exercise for a couple of weeks are more risky to have reproductive disorders, mastitis, and leg disorders than cows, which do *exercise*. It strict opportunity for the breeders to get *exercise*, so that it requires maintenance to cut the cow hoof routinely (Moran, 2005).

Morbidity level category

Based on table about morbidity level, it showed that result of lameness measurement is in sufficient category (69.73%). It relates to type of floor (pedestal) used for dairy cows locomotion in the cowshed. It is known that type of floor may affect dairy cows’ welfare by disturbing their locomotion that causes nail disease and lameness. Lameness is the main problem for the breeders because it has negative impact on dairy cow welfare and dairy production, and of course, it will impact on their income (Anonymous, 2014). Concrete flooring is not good for dairy cows because it is too hard and inappropriate for cow locomotion (Rushen & De Passillé, 2006), therefore it requires rubber base to reduce lameness or any risk of lameness on the dairy cows (Eicher, 2018). Some hoof diseases correlate to wet flooring (Wells et al., 1999) and hoof diseases generally correlate to management of flooring maintenance (Anonymous, 2009).

Table 2. Result of measurement for morbidity level on dairy cows

Indicator of Measurement	Mean	Percentage (%)	Category
Lameness	3.49	69.73	Sufficient
Injury	4.65	92.97	Good
Mastitis and Leg Disease	3.78	75.68	Sufficient
Body Condition Score	3.32	66.49	Sufficient
Pedestal to lie down	4.35	87.3	Good
Mean of Total Scores	3.918	78.36	Sufficient

Morbidity level in breeding may be affected by material used for flooring or pedestal to lie down. Based on result of the measurement, it showed that majority of the dairy cow breeders in East Java have used rubber base as pedestal with appropriate size that conform to size of the cow, so that it belongs to good category. Application of rubber pedestal may increase comfort to the dairy cows and reduce problems that relate to leg and knee diseases (Moran, 2005). Besides that, rubber pedestal may minimize mastitis in comparison with bamboo- or wood-based pedestals (Azis et al., 2013)

Results of survey suggested that mastitis and leg disease belong to sufficient category. As it was found in the field, the dairy cow that suffers mastitis but it has been well treated, so that the cows' leg and udder look clean. Mastitis is a part of problems that relate to dairy production, dairy quality, and food security. From animal welfare's point of view, mastitis is local infection that causes great suffer upon the dairy cows. Mastitis may create systemic disease that causes fever, dehydration, depression, and even death (Anonymous, 2009). Result of the research (Azis et al., 2013) reported that the more massive surface of the pedestal, it

would facilitate the cleanliness process and minimize the risk of mastitis. It is known that rubber base has 90% coefficient of determination against mastitis in comparison with wood 85% and bamboo 46%. Results of survey in table above show that Body Condition Score (BCS) is categorized sufficient (66.49%), majority of respondents suggested that their dairy cows belong to BCS 3. Body condition score has medium score and fat body symbolizes that the feeds have well fulfilled, so that it would optimize activity of the reproductive hormonal system effectively (Sagiman, 2015).

Mortality and culling

Based on result of calculation, it shows that mortality level of dairy cows in East Java belongs to sufficient category (79.46%). The breeders stated that during maintenance, mortality level of the adult dairy cow was 8%, pre-weaning was 5%, post-weaning was 5%. Of course, the mortality level increased in comparison with mortality level in 2017, 3.97% (Anonymous, 2018). In general, mortality is caused by reproductive disorders (dystocia, failed conception), mastitis, low dairy production, and lameness.

Table 3. Result of measurement for mortality level and culling

Indicator of Measurement	Mean	Percentage (%)	Category
Mortality Level	3.97	79.46	Sufficient
Mean of Total Scores	3.97	79.4	Sufficient

Based on literature study by Thomsen & Houe, 2006 quoted result of study by Faye and Perochon, it showed that mortality level in the first week post calving was 4x higher than in the subsequent weeks. In this study,

Menzies *et al.* concluded that 45% death of the dairy cows in a month post calving. Furthermore, Stevenson and Lean suggested that danger of death for the first 15 days of lactation was 4x higher than in the next

period. Thomsen, *et al.* found that 30-45 days (depend on race and parity) upon the cow's death within the first 30 days of lactation. Also, they concluded that distribution of death in the first 30 days of lactation was uneven with the highest mortality for a couple of days post-delivery. **The change of weight, body condition, and dairy production category**

Result of survey reported that frequency of feeding belongs to sufficient category (63.73%). The breeders feed the dairy cows 2x a day, in the morning and in the afternoon, with forage fodder 10% out of the cattle weight and 1-2% concentrate out of the weight. So that frequency of the feeding should be increased in order to

increase dairy production (Utami et al., 2014). Besides frequency of the feeding, result of measurement for drinking water supply still belongs to sufficient category; drinking water is well given by ad libitum system, fairly clean, and uncontaminated.

The need of drinking water for dairy cows that are lactating closely related to dairy production, so that unlimited supply of water is required whereas 87% composition of milk is water (Ward & Mckague, 2007). The need of water for dairy cows in tropical area at least require 60 to 70 liter per day and extra 4 to 5 liter water for dairy production (Moran, 2005). Of course, less supply of drinking water will directly affect on dairy production (Anonymous, 2017).

Table 4. The change of weight, body condition, and dairy production

Indicator of Measurement	Mean	Percentage (%)	Category
Frequency of Feeding	3.19	63.78	Sufficient
Cleanliness of the crib (feeder)	3.7	74.05	Sufficient
Drinking Water Supply	3.76	75.14	Sufficient
Mean of Total Scores	3.55	71	Sufficient

Besides the need for drinking water, cleanliness of the crib (feeder) is important. The table above shows that cleanliness of the crib (feeder) belongs to sufficient category (74.05%), in which the crib (feeder) could be cleaned and maintained. Height of the crib in the inside part is 30 cm, which is not higher than height of the cow's knee, and the outside part is 70 cm. it is not only facilitating in cleaning process, but also useful to produce saliva.

It is known that lower position of the cow's head when it feeds, would be able to increase saliva production, 17%, in comparison with position of the head straight with the body (Albright, 1993). Quality of the fresh water is very important because it may affect volume of water consumed by the dairy cows. Bad smell or unpleasant taste, for instance, may be repelled by the cattle. Contaminated

drinking utensils as a result of dust, spilled feed and the cow dung may cause mucus. So that it creates bad smell (Ward & Mckague, 2007).

In harmony with Ward & Mckague, (Kononoff et al., 2017) in their journal reported that low quality of drinking water may affect the feed intact, health, and productivity of the cattle. At last, it may endanger public health due to cattle may become the microorganism reservoir that is harmful to human, such as *E. coli*, *Yersinia enterocolitica*, and *Campylobacter jejuni*.

Production efficiency category

Result of survey showed that dystocia in East Java belongs to sufficient category (78,92%), in which dystocia was found more than twice. It was due to traditional care pattern, in which the dairy cows are tie-stall without exercise as well as access to the meadow.

Table 5. Result of measurement on production efficiency

Indicator of Measurement	Mean	Percentage (%)	Category
Dystocia Level	3.95	78.92	Sufficient
Mean of Total Scores	3.95	79	Sufficient

It is supported by suggestion by Bendixen, et al. in (Gustafson, 1993) found significant increase of risk against the occurrence of retention placenta, mastitis, and ketosis on lactating dairy cows that have dystocia during partus. This study also presents result of the research by Rowlands et al. who suggested significant correlation between dystocia and retention placenta, endometritis, hypocalcaemia, and hypomagnesaemia, as well as between endometritis and ketosis.

Physical appearance category

Result of survey showed that physical appearance belongs to sufficient category. On indicator that shows the ectoparasite, the score belongs to good category. It means

that management in handling ectoparasite is good. As ectoparasites may cause pruritus, pain and decreased welfare depend on type of the ectoparasite (Winckler, 2004).

It is known that hair condition belongs to sufficient category (74,59%) in which hair condition of the dairy cow is normal, fall out a little, soft, shiny, and rather grimy. Cleanliness of the body belongs to sufficient category (74,59%). It is due to the cattle look clean, but grime, feces, and mud are attached on several parts of the cattle’s body, so that cleanliness of the cattle must be concerned. Cleanliness of the dairy cows is very important to maintain quality of the hygienic dairy production; therefore, it becomes an indicator of animal welfare measurement.

Table 6. Result of measurement on physical appearance

Indicator of Measurement	Percentage		Category
	Mean	e (%)	
Ectoparasites	4.57	91.35	Good
Hair Condition	3.73	74.59	Sufficient
Body Cleanliness	3.73	74.59	Sufficient
Mucks from 3 conduits (eyes, nose, and reproductive organs)	3.08	61.03	Sufficient
Mean of Total Scores	3.78	75.55	Sufficient

Keeping the cleanliness of the dairy cows is essential to maintain quality of the dairy production and to minimize any potency of disease infection. According to (Anna & Costa, 2011) who suggested that clean dairy cows have low SCLS (*somatic cell linear scores*).

Response of handling category

Based on the table above, it shows that condition of the dairy cows when they were milked belongs to sufficient category (67.03%), in which they did not show aggressive behaviors, for instance, kicking, restless, and over bellow when they were milked. Condition of the milked cows may

be worsened if they feel uncomfortable during milking process in standing position and it may cause the dairy cows to be stressed. Stress factor during milking process include the place to stand on, unsuitable sanitation process, improper microclimate, and bad condition of the flooring may cause stress to the dairy cows. So that the dairy cows are reluctant to be milked, they may kick the bucket of the collected milk and defecate during the milking process (Broucek et al., 2017)

It is known that flooring condition in East Java belongs to sufficient category (78.38%), in which the slope of the floor

construction is 2-5 degrees, not slippery and rough, but dry a little longer and hold up the incline by using pedestal such as rubber carpet/mattress. It is a safety factor in response of the cattle handling. Safety and security must be concerned to support animal welfare, so that it should pay more attention on cleanliness of the floor and the construction. Sukmawati & Kaharudin

(2010) suggested that floor of the cowshed (stall) must be durable, not rough, not slippery, easily cleaned, and robust to support the load on it. Besides that, difference of the floor height, the front part and the back part of the floor, should not more than 5 cm for each 1 meter length of the floor, or the slope should not be more than 5%.

Table 7. Result of measurement on response of handling

Indicator of Measurement	Mean	Percentage (%)	Category
Condition of the dairy cows when they were milked	3.35	67.03	Sufficient
Floor Condition	3.92	78.38	Sufficient
Relationship between Human-Cattle	3.97	79.46	Sufficient
Wall/Partition to protect the cattle	3.65	72.97	Sufficient
Mean of Total Scores	3.72	74.45	Sufficient

Quoting statement by Hinterhofer et al. (2005) and Stefanowska et al. (2002) in journal by Rushen & De Passillé (2006), they suggested that hard floor may increase pressure on the cow's feet, based on result of the study, the dairy cows will be reluctant to lie down on rough surface. In their journal by title *Effects of Roughness and Compressibility of Flooring on Cow Locomotion*, Rushen & De Passillé quoted statement by Jungbluth et al., (2003); van der Tol et al., (2005) that bad condition of the floor may disturb the cattle locomotion and increase the risk of injury (Weeks et al., 2005), as well as affect expression of estrus behavior (Lopez and Shipka, 2003). Dairy cows like to lie down on softer floor (Manninen et al., 2002; Tucker et al., 2003). Recent study shows that dairy cows walk faster, take bigger steps, and seldom slip on rubber pedestal, which is softer, than concrete floor (Jungbluth et al., 2003; Telezhenko and Bergsten, 2005).

Post general procedure category

Result of survey shows that implementation of dehorning procedure belongs to less category (45.41%), in which the breeders in East Java do not apply dehorning procedure. Meanwhile, tail

docking belongs to sufficient category (67.03%), which means that tail docking was not applied but the tail is clean. Dehorning procedure on young dairy cows should be done to: reduce the risk of injury and bruise on the herd, prevent financial loss of cutting the damaged carcass as a result of cattle from the farm during delivery to the slaughterhouse, reduce risk on the milkmaid, minimize the risk of death; disease; produce tame cattle, which are easily to be handled, reduce aggressiveness at the crib, and increase security at the cowshed (stall) for cattle, producer, and laborer (Anderson, 2012).

Tail docking is a procedure that is used to be applied in United States. The livestock breeders propose this procedure to prevent and minimize disease transmission carried by cow, such as *Leptospirosis*, to the worker. Moreover, it is presumably that the procedure will be able to facilitate in milking and make it comfortable for the milkmaids due to short tail would not disturb them. The most important thing, tail docking is considered to be able to increase cleanliness of the cows, as well as health and cleanliness of the udder, so that it will reduce the somatic cells (Botheras, 2006).

Table 8. Result of measurement for complication post general procedure

Indicator of Measurement	Mean	Percentage (%)	Category
Dehorning Procedure	2.27	45.41	Less
Tail Docking Procedure	3.35	67.03	Sufficient
Mean of Total Scores	2.81	56.2	Less

As reported in *Ohio Dairy Industry Resources Center*, an article written by Botheras (2006) with the title *Tail Docking of Dairy Cattle: Is it beneficial or a welfare issue?* It suggested that a number of scientific studies have not found any effect that concern with the implementation of *Tail Docking* procedure on hygienic benefits and sanitation as proposed by *tail docking* procedure. Tucker *et al.* (2001) did not find any difference in *free stall* between the intact tail and the tail docking that concerning with cleanliness, numbers of the somatic cell count, or mastitis. Matthews *et al.* (1995) found the same thing for dairy cows in the meadow that have intact tail in comparison with the tail docking did not show any difference in relation with udder cleanliness, somatic cell count, or mastitis. Eicher *et al.* (2001) also found difference in udder cleanliness or SCC (*Somatic Cell Count*) for tail docking cows and intact tail cows at the tie-stall, but Eicher found that the tail docking cows are clean, particularly the back part of their bodies.

Still in the same article, substantial studies along with numbers of dairy cows at 8 commercial farms that had been observed for 9 months, Schereinier and Ruegg (2002) did not find any difference in SCC or inflammation on udder between the intact tail dairy cows and the tail docking dairy cows. The writers did not find any score difference of udder cleanliness even though the tail docking dairy cows tend to have slightly cleaner feet.

CONCLUSIONS

Implementation of Animal Welfare using *Standard Office International des Epizooties* on dairy cows in East Java is categorized adequate by percentage 70.73%. Among 29 indicators of measurement, 1

indicator belongs to the least category. The category shows an area for exercise with average score is 1.38 (27.57%).

SUGGESTION

Results of survey against Implementation of Animal Welfare using *Standard Office International des Epizooties* on Dairy Cows in East Java should be used as reference for decision-maker or the stakeholders in Dairy Industries. Referring to standard animal welfare, which has been set by OIE in *Terrestrial Health Code 7.11*

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