Analysis Level of Animal Welfare Knowledge in Medan City Slaughterhouse

M. Ramadhan, E. Mirwandhono*, A. Sadeli, Hasnudi and N. Ginting

Animal Production Program Study, Faculty of Agriculture, University of North Sumatra, Padang Bulan, Medan 20155, Indonesia
* Correspondent author: r.edhy@usu.ac.id

Abstract. Slaughterhouses has a very important role in the chain system for the availability of meat procurement. This research aims to analyze the level of knowledge of animal welfare and implementing it in Medan City Slaughter House. This research was conducted at the Medan City Slaughterhouse located on Jalan Rumah Potong Hewan, Mabar Hilir Village, Medan Deli Subdistrict, Medan City, North Sumatra in August 2021. The method used in this research is a qualitative descriptive research method. The results showed that the level of knowledge was already in the category of very good. The group of slaughterer respondents had the highest percentage of answer scores at 100% followed by animal controllers at 95.36% and cattle traders at 88.62%. The application of animal welfare aspects in the process of slaughtering cattle in Medan City Slaughterhouse is already in the category of very good with the percentage of conformity rate based on the regulations and provisions of Meat and Livestock Australia ranging from 80% to 100%.

1. Introduction

Animal welfare can be defined as all matters relating to the physical and mental state of animals according to the size and natural behavior of the animals that need to be implemented and enforced to protect animals from any improper treatment by people to animals that will be used by humans [1], so that treating livestock badly and properly (not for the welfare of livestock) can cause slaughtered meat to become *haram*/forbidden. Such treatment is like slaughtering livestock using a knife that is not sharp, torturing livestock to be slaughtered such as dropping livestock roughly, pulling cattle to the slaughterhouse by force, or by stunning the cattle to be slaughtered. Stunning livestock to be slaughtered can cause the heart to beat weakly so that the blood that comes out of the body is not optimal and the meat produced will be not halal.

Based on the news circulating in the community, the Managing Director of the Medan City Slaughterhouse issued an opinion that 80% of the meat circulating in the city of Medan is not necessarily halal and hygienic. For this reason, it is necessary to review further aspects of animal

welfare which will have an impact on the halal aspect of the meat that will be produced by the Medan City Slaughterhouse, North Sumatra.

Slaughterhouse has a very important role in the chain system for the availability of meat procurement. Along with the soaring demand for meat by consumers, some Slaughterhouses lack attention and focus on how to slaughter livestock properly and in accordance with health, animal welfare and religious aspects.Animal welfare is a very important aspect to support human resources in terms of meat procurement [2].

Animal welfare aspects of livestock to be slaughtered are very important to note, because handling animals before and during the slaughter process has the potential to violate animal welfare aspects and cause a decrease in the quality of the product resulting from the slaughter. By neglecting animal welfare actions on livestock to be slaughtered can cause stress, fear and pain. Such conditions often occur during the transportation process, the slaughter process, drinking supplies and also poor feed supplies [3].

One of the events that are not in line with animal welfare is that several processes in the Slaughterhouse have been forgotten or neglected, where one example is that the livestock that will be slaughtered are rarely to be rested first and after the livestock arrives immediately slaughter is carried out which of course violates the provisions of animal welfare which is currently an important issue [4]. The effects of fatigue which will cause stress to livestock before slaughter will have a negative impact on the quality of the meat that will be produced.

The treatment carried out by employees at the Slaughterhouse is still not paying attention to the standards of animal welfare aspects that have been set. The existence of acts of violence or torture against livestock before being slaughtered at the Slaughterhouse. This is a problem that occurs at the Slaughterhouse that must be considered and immediately followed up by the relevant parties [5]. Lack of employee knowledge about animal welfare and also supervision of the implementation of animal welfare aspects can be caused by this [6].

Previous cases related to welfare that did not meet standards could affect international relations between countries such as Australia in 2011 which once stopped exporting cattle to Indonesia unilaterally because the case began with an event that broadcast about acts of torture of cattle from Australia in several Slaughterhouses in Indonesia.

2. Materials and Methods

This research was conducted at the Medan City Slaughterhouse which is located on Jalan Rumah Potong Hewan, Mabar Hilir Village, Medan Deli District, Medan City, North Sumatra. This research was conducted in August 2021.

2.1 Data Collection Technique

The data collection techniques used in this study are primary data and secondary data. The collection of primary data was obtained from the results of direct observations and interviews through questionnaires to study respondents who were people directly involved in the Medan City SlaughterHouse, namely 5 cow traders, 6 slaughterers and 16 animal controllers. Secondary data collection is obtained from a written data found from data in agencies, tracing library studies related to research interests.

2.2 Data Analysis Method

The data analysis method used in this study is descriptive qualitative analysis and assessment based on the Likert scale [7].

3. Results and Discussion

3.1 Characteristics of Executing Activities in Medan City Slaughterhouse

Characteristics of implementing activities in Medan City Slaughterhouse is classified into several aspects, namely age, education level, length of work and animal welfare training. The characteristics of implementing activities at the Medan City Slaughterhouse are people who are directly involved in the activities at the Medan City Slaughterhouse which consist of cattle traders, butchers and animal controllers. Data on the characteristics of implementing activities at the Medan City Slaughterhouse can be seen in Table 1 below.

Table 1. Characteristics of respondents inMedan City Slaughterhouse

Characteristics Respondent	Cow Trader		Slaughterer		Animal Control		Total	
	N	%	N	%	N	%	N	%
Age								
<30	1	20	0	0	2	12.5	3	11.11
30	4	80	6	100	14	87.5	24	88.89
Total	5	100	6	100	16	100	27	100
Education								
Primary School	0	0	0	0	2	12.5	2	7.41
Junior High School	2	40	2	33.33	6	37.5	10	37.04
Senior High School	3	60	4	66.67	5	31.25	12	44.44
Bachelor	0	0	0	0	3	18.75	3	11.11
Total	5	100	6	100	16	100	27	100
Length of work								
<14	4	80	2	33.33	7	43.75	13	48.15
14	1	20	4	66.67	9	56.25	14	51.85

Total	5	100	6	100	16	100	27	100
Training animal welfare							
Once	0	0	5	83.33	3	18.75	8	29.63
Never	5	100	1	16.67	13	81.25	19	70.37
Total	5	100	6	100	16	100	27	100

Description: n = number of respondents for each group of respondents
N = total number of respondents for respondent characteristics

The characteristics of respondents who are directly involved in the Medan City Slaughterhouse are the majority over 30 years old (88.89%), have a high school education level (44.44%), have work experience of more than 14 years (51.85%) and have never attended training on animal welfare aspects (70.37%). The cattle traders involved in activities at the Medan City Slaughterhouse consist of five people, the majority of whom are more than 30 years old (80%), have a high school education level (60%), have less than 14 years of work experience (80%). %), and have never attended and been given training in animal welfare aspects (100%). The butchers who work at the Medan City Slaughterhouse consist of six people, all of whom are more than 30 years old (100%), have a high school education level (66.67%), some work more than 14 years (66.67%), and have attended training on animal welfare aspects (83.33%). There are 16 animal controllers working at the Medan City Slaughterhouse, the majority of whom are more than 30 years old (87.5%), have a junior high school education level (37.5%), have work experience of more than 14 years (56, 25%), and have never attended training on animal welfare aspects (81.25%).

3.2 Knowledge of Animal Welfare Aspects in Medan City Slaughterhouse

Based on the results of observations that have been made, it shows that the level of knowledge regarding aspects of animal welfare from the executor of activities in Medan City Slaughterhouse based on the characteristics and one group of respondents, namely five cattle traders, were included in the very good category.

The maximum value is obtained from the highest answer score and then multiplied by the number of respondents then multiplied by the number of questionnaire questions, so that $5 \times 5 \times 13 = 325$. The calculation of the percentage level of knowledge based on the cattle trader respondent group is as follows:

Score = (sum × ST score) + (sum × T score) + (sum × CT score) + (sum × KT score) +
(sum × TT score)

Score = $(36 \times 5) + (21 \times 4) + (8 \times 3) + (0 \times 2) + (0 \times 1)$

Score = 288

Meanwhile, the percentage of knowledge level based on the cattle trader respondent group is as follows:

47

Score Percentage $= \dfrac{Total\ Score}{Maximum\ Value} \times 100\%$

Score Percentage $= \dfrac{288}{325} \times 100\%$

Percentage Score $= 88.62\%$

The total score from the knowledge level data of the cattle trader respondent group consisting of five respondents had a percentage score of 288 (88.62%) of the maximum value of 325 (100%). Based on the criteria for assessing the level of knowledge on aspects of animal welfare according with the research by Sugiyono (2018), the percentage score is included in the very good category. This shows that the respondent group of cattle traders has a very good level of knowledge about aspects of animal welfare in IndonesiaMedan City Slaughterhouse but cattle traders who are involved in activities in Medan City Slaughterhouse have never attended training on animal welfare aspects [8].

Based on the results of observations that have been made, it shows that,the level of knowledge about aspects of animal welfare from the implementers of activities at the Medan City Slaughterhouse based on the respondent group, namely six butchers, was included in the very good category.

The maximum value is obtained from the highest answer score then multiplied by the number of respondents then multiplied by the number of questionnaire questions, so that $5 \times 6 \times 20 = 600$. The calculation of the percentage level of knowledge based on the respondent group of slaughterers is as follows:

Score $=$ (sum $\times$ ST score) + (sum $\times$ T score) + (sum $\times$ CT score)+ (sum $\times$ KT score) + (sum $\times$ TT score)

Score $=$ $(120 \times 5) + (0 \times 4) + (0 \times 3) + (0 \times 2) + (0 \times 1)$

Score $=$ 600

Meanwhile, the percentage of knowledge level based on the respondent group of slaughterers is as follows:

Score Percentage $= \dfrac{Total\ Score}{Maximum\ Value} \times 100\%$

Score Percentage $= \dfrac{600}{600} \times 100\%$

Percentage Score $= 100\%$

The total score from the knowledge level data of the slaughtering interpreter respondent group consisting of six respondents had a percentage score of 600 (100%) from the maximum value of 600 (100%). Based on the criteria for assessing the level of knowledge on aspects of animal welfare according with the research by Sugiyono (2018), the percentage score is included in the very good category. This indicates that the respondent group of butchers has a very good level of knowledge about aspects of animal welfare in the countryMedan City Slaughterhouse and

almost all butchers who work in Medan City Slaughterhouse have attended training on aspects of animal welfare [8].

Based on the results of observations that have been made, it shows that, the level of knowledge about aspects of animal welfare from the implementers of activities at the Medan City Slaughterhouse based on the respondent group of 16 animal controllers is in the very good category.

The maximum value is obtained from the highest answer score and then multiplied by the number of respondents then multiplied by the number of questionnaire questions, so that $5 \times 16 \times 14 = 1120$. The calculation of the percentage level of knowledge based on the animal control respondent group is as follows:

Score = (sum × ST score) + (sum × T score) + (sum × CT score)+ (sum × KT score) +
           (sum × TT score)

Score = $(172 \times 5) + (52 \times 4) + (0 \times 3) + (0 \times 2) + (0 \times 1)$

Score = 1068

Meanwhile, the percentage of knowledge level based on the animal control respondent group is as follows:

Score Percentage $= \dfrac{Total\ Score}{Maximum\ Value} \times 100\%$

Score Percentage $= \dfrac{1068}{1120} \times 100\%$

Percentage Score = 95.36%

The total score from the data on the level of knowledge of the animal control respondent group consisting of 16 respondents had a percentage score of 1068 (95.36%) from the maximum value of 1120 (100%). Based on the criteria for assessing the level of knowledge on aspects of animal welfare according with the research by Sugiyono (2018), the percentage score is included in the very good category. This shows that the animal control respondent group has a very good level of knowledge about aspects of animal welfare in IndonesiaMedan City Slaughterhouse and some of the animal controllers who work in Medan City Slaughterhouse have attended training on aspects of animal welfare [8].

3.3 Slaughter Process Facilities at Medan City Slaughterhouse

The facilities in the process of slaughtering cattle at the Medan City Slaughterhouse which were observed consisted of facilities in the animal reception area, animal shelter, animal herding process, the process of restraining the animal before slaughtering the animal and the process of slaughtering the animal. Data on the application of animal welfare aspects at the Medan City

Slaughterhouse in detail can be seen in Table 2 where the application of animal welfare aspects at the Medan City Slaughterhouse is adjusted to the Meat and Livestock Australia regulations and provisions.

Table 2. Application of animal welfare aspects at the Medan City Slaughterhouse

Facilities at Slaughterhouses	Application of Animal Welfare Aspects		Percentage of Conformity	Rating Category
	In accordance	It is not in accordance with		
Animal Reception	11	0	100%	Very Good
Animal Shelter	4	1	80%	Good
Herdsman	10	2	83.33%	Very Good
Restraining Box	10	1	90.91%	Very Good
Animal Slaughterhouse	9	0	100%	Very Good
Total	44	4	91.67%	Very Good

Description :

In accordance	= has complied with standard operating procedures aspects animal welfare
It is not in accordance with	= has not met the standard operating procedures aspects animal welfare

Based on observations, the application of animal welfare aspects at the Medan City Slaughterhouse to the facilities owned by the majority is in the very good category. The results of the percentage level of conformity of the slaughtering process facilities at the Medan City Slaughterhouse can be seen in Table 6. The application of welfare aspects at the Medan City Slaughterhouse which has the highest percentage of conformity levels is found in the animal reception and slaughtering facilities, which is 100 %, while the lowest is found in animal shelter facilities, which is 80%.

3.4 Application of Animal Welfare Aspects in Animal Reception

Based on the results of observations made, the application of animal welfare aspects at the animal reception area at the Medan City Slaughterhouse has a 100% conformity percentage result with a very good value. The level of suitability of the application of animal welfare aspects at the animal reception area can be seen from the process of unloading livestock which is in accordance with standard operating procedures for animal welfare. Animals are equipped with certificates of origin, livestock health certificates and cattle travel documents before entering the Slaughterhouse area and the means of transportation or trucks used are in accordance with the type and size of the animal.This is in accordance with the research by Standar Nasional Indonesia (2018) which states that the process acceptance of animals at the Slaughterhouse includes inspection of documents consisting of conformity of document contents and completeness of documents as well as for transporting animals the tools used must also be in accordance with the type and size of the animal [9].

50

Things that must be considered in the transportation of livestock are the type of transportation used must be in accordance with the type and size of the animal, the method of loading and unloading the animal at the receiving point is carried out properly, the length of the journey and the availability of feed and drink during transportation. The wrong transport and unloading process can cause fear, stress and pain to livestock. This is in accordance with the research by Mandala*et al*., (2016)which states that by neglecting animal welfare actions on livestock to be slaughtered can cause stress, fear and also pain. Such conditions often occur during the transportation process, the slaughter process, drinking supplies and also poor feed supplies [3].

The process of unloading livestock is carried out immediately after the truck arrives at the Slaughterhouse (Figure 1). In the unloading process at the reception, the cattle are allowed to unload by themselves without harsh treatment (Figure 2). The process of unloading livestock does not use stairs because the height of the truck door for removing livestock is the same as the place for receiving livestock to the shelter (Figure 3). The animal reception area at the Medan City Slaughterhouse has a floor made of concrete with a slightly bumpy surface like a ladder to prevent animals from slipping (Figure 4).The condition of the animal reception floor is very important because it can cause injury to livestock. This is in accordance with the research by Grandin and Knowles (2011) which states that slippery floors cause high cases of falling livestock to be slaughtered when they are unloaded from the vehicle or to the slaughterhouse [10].

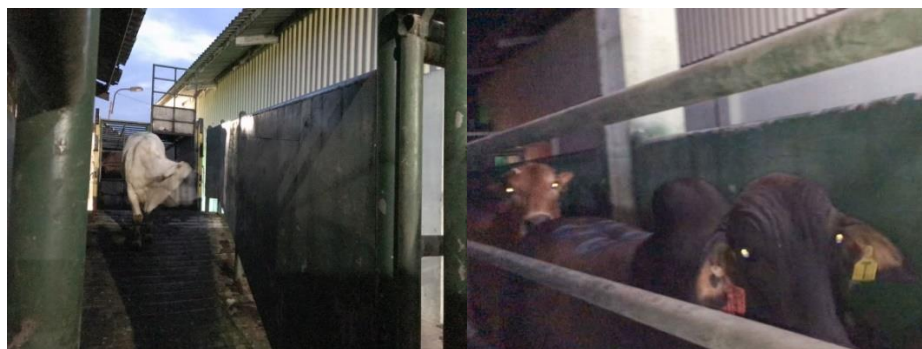Figure 1. Preparation of cattle unloading from the truck

Figure 2. Livestock unloading

3.5 Application of Animal Welfare Aspects in Animal Shelters

Based on the results of observations made, the application of aspects of animal welfare in animal shelters at the Medan City Slaughterhouse has a percentage level of conformity of 80% with a good value and has complied with standard operating procedures for animal welfare. The level of suitability of the application of animal welfare aspects in animal shelters can be seen from animal shelters that already have a roof that functions as a shelter for animals from the scorching heat of hot weather and cold rainy weather (Figure 5). The area of the animal shelter is sufficient according to the size of the animal, where the animal can move freely (animals can go forward, backward, lie down and stand freely). Animal shelters are also provided with adequate drinking water while the animals are resting and are safe from sharp objects that can injure livestock. This is in accordance with the research by OIE (2015) which states that the application of animal welfare aspects in shelters includes cages that have a roof that serves for sheltering animals, the size of the cage is quite large and animals are grouped according to their sex [11].

Figure 3. Condition of livestock holding cages

As for those that are not in accordance with standard animal welfare procedures, namely animals in the holding cages are still not grouped according to their gender. This can cause animals to fight while in the holding cage. Another drawback can be seen in the problem of cleanliness of some cages. The pedestal or floor still looks dirty and muddy due to the feces and urine of the livestock itself and the process of filling the drinking water reservoir which is full, dirty and uncontrolled.

Livestock to be slaughtered at the Medan City Slaughterhouse have not been rested for at least 12 hours. This is in accordance with the research by Susanto (2011) which states that one of the events that have not been in line with animal welfare, namely that several processes at the Slaughterhouse have been forgotten or neglected, where one example is that the cattle that will be slaughtered are rarely to be rested first and after the cattle arrive slaughter is immediately carried out which of course violates the provisions of animal welfare which is currently an important issue [4].

3.6 Application of Animal Welfare Aspects at Animal Herd

Based on the results of direct observations, the application of animal welfare aspects in animal herding areas has a very good value with the results of the percentage of conformity of 83.33%. The level of suitability for the application of animal welfare aspects in herding areas can be seen from the condition of the animals that are not jostling during the herding process (Figure 6). The number of requests for slaughter means the strategy for herding animals used is in accordance with the character of the species, both individually and in groups. The gangway facility used at the Medan City Slaughterhouse has a floor that does not look slippery, does not have holes and there are no puddles of water during the herding process. The guardrail has a width and height that is in accordance with the size of the animal, so that the animal does not allow turning around during herding. The lighting in the gangway is fairly even and the changes are not contrasting or not visible from light to dark. This is in accordance with the research by Grandin and Knowles (2011) which states that the gangway facilities used must also be considered, namely the floor used is not perforated, not waterlogged and must not be slippery, the guardrail used must be made of materials that are not easily corroded with the appropriate height and width. with the type and size of the animal [10].

Figure 4. The process of herding livestock through the gangway to the slaughterhouse

As for what is not in accordance with standard operating procedures for animal welfare aspects in animal herding areas, on the gangway there is still animal control activity and there are still some animal controllers whose position is not outside the gangway, but right behind the cattle on the gangway and makes noise that can disturb livestock and cause livestock to become stressed and rush to walk during the herding process to the slaughterhouse. Action forcing livestock can disturb livestock and cause livestock to become stressed. This is in accordance with the research by Meat and Livestock Australia (2012) which states that forcing livestock, using electric shocks and hitting livestock during herding are actions that should be avoided because they can cause livestock fear and stress [12].

3.7 Application of Animal Welfare Aspects in Restraining Boxes Before Slaughtering Animals

Based on the results of direct observations, the application of aspects of animal welfare in the restraining box before slaughtering animals at the Medan City Slaughterhouse resulted in the percentage level of conformity of 90.91% with a very good value. There are two ways of slaughtering animals at the Medan City Slaughterhouse, namely by slaughtering directly using a restraining box (Figure 7) and stunning (Figure 8) but the way of slaughtering animals that are often used in Medan City Slaughterhouses is cutting directly using restraining box. This is in accordance with the research by Bhaskara *et al.*, (2015) which states that there are two ways of implementing the method of slaughtering animals that are applicable in Indonesia, namely with the stunning process and without the stunning process [13]. The level of suitability of the application of animal welfare aspects in the restraining box before slaughtering the animal can be seen from the process of entering the animal into the restraining box. The restraining box entrance is easy to operate and the cattle are allowed to enter the restraining box themselves (Figure 9). Animals are not allowed to wait long when they are put into the restraining box for the slaughter process (Figure 10).

Figure 5. Restraining box facilities Figure 6. Stunning cage facilities

Figure 7. Livestock allowed to enter in alone Figure 8. Livestock are ready to be slaugh

The thing that is not in accordance with standard operating procedures for animal welfare aspects in the restraining box before slaughtering the animal is that the restraining box facility used is not equipped with a chin restraint device. This can cause the slaughtering process to take a long time because the animal's head is not properly restrained. Neck brace and chin brace are

standard operational tools of the restraining box that are used to facilitate the slaughtering process [10].

3.8 Application of Animal Welfare Aspects in Animal Slaughterhouse

Based on the results of direct observations, the application of animal welfare aspects at the animal slaughterhouse in Medan City Slaughterhouse has a 100% conformity percentage with a very good value. The level of suitability of the application of animal welfare aspects in animal slaughterhouses can be seen from the slaughtering process which is carried out quickly after the animal is knocked down or stunned (Figure 11). The knife used in the slaughter process is in accordance with the size of the type of animal and is also sharp. Animals that are still alive are not allowed to see their friends directly at the time of slaughter during the slaughtering process.

Figure 9. The process of slaughtering livestock

At the time of slaughter, the location of the incision is in accordance with standard operating procedures for animal welfare aspects, namely under the Adam's apple or just below the esophagus and the slaughter is carried out a maximum of three incisions with back and forth movements without lifting the knife. This is in accordance with the research by Standar Nasional Indonesia (2018) which states that the slaughter performed must be ensured to have cut off three channels (trachea, esophagus and common carotid artery) with one incision or a maximum of three incisions with back and forth movements without even lifting the knife [9].

Based on the results of direct observations, the slaughtering process was in accordance with standard operating procedures for animal welfare aspects where the animal was confirmed to be completely dead by the butcher in which there was no corneal reflex (Figure 12), breath movements (Figure 13) and the animal's flow stopped. on animals (Figure 14) and then carried out further processes such as leg separation, head separation and skinning (Figure 15). This is in accordance with [8] which states that animals can be declared dead completely, if there is no corneal reflex, breath movements and cessation of blood flow in animals.

Figure 10. No corneal reflex Figure 11. No respiratory movement

Figure 12. Cessation of blood flow Figure 13. Process of skinning cattle

4. Conclusion

The level of knowledge from the implementation of activities in Medan City Slaughter House on the aspect of animal welfare as a whole was already in the category of very good. The group of slaughterer respondents had the highest percentage of answer scores at 100% followed by animal controllers at 95.36% and cattle traders at 88.62%. The application of animal welfare aspects in the process of slaughtering cattle in Medan City Slaughterhouse is already in the category of very good with the percentage of conformity rate based on the regulations and provisions of Meat and Livestock Australia ranging from 80% to 100%.

REFERENCE

[1]   Undang-Undang Nomor 41 Tahun 2014 Tentang Perubahan atas Undang-Undang Nomor 18 Tahun 2009 Tentang Peternakan dan Kesehatan Hewan. 2014.

[2]   Gaznur, Z.M., H. Nuraini and R. Priyanto. Evaluation of Halal Slaughter-Man and Human Resource Competency in Slaughterhouse Category II. Jurnal Medika Veterinaria (14)2: 106-110. 2020.

[3]   Mandala, A.Y., I.B.N. Swacita and I.K. Suada. Penilaian Penerapan Animal Welfare Pada Proses Pemotongan Sapi di Rumah Pemotongan Hewan Mambal Kabupaten Badung. Indonesia Medicus Veterinus 5(1): 1-12. 2016.

[4]   Susanto, E. Gambaran Umum Rumah Potong Hewan di Indonesia. Buletin Balai Pengujian Mutu Produk Peternakan. Bogor. 2011.

[5]   Knowles, T.G. Stress physiology of animal during transport:Livestock handling   and transport. Vet Ress Commun. 82(2): 385-407. 2001.

[6]   Nasution, D.A. Hubungan Perilaku Pekerja Terhadap Kesehatan dan Keselamatan Kerja (K3) dengan Timbulnya Dermatomikosis di PD. Rumah Potong Hewan Kota Medan Tahun 2003. Skripsi. Universitas Sumatera Utara. Medan. 2003.

[7]   Likert, R.A. Technique for the measurement of attitudes. Archives of Psychology, 140 pp: 1-55. 1932.

[8]   Sugiyono. Metode Penelitian Kombinasi (Mixed Methods). CV Alfabeta. Bandung. 2018.

[9]   Standar Nasional Indonesia. Nomor 99003 tentang Pemotongan Halal pada Hewan Ruminansia. Badan Standarisasi Nasional. Jakarta. 2018.

[10]   Grandin, T., and Knowles, T.G. Transportation of beef cattle to slaughterhouses and how this relates to animal welfare and carcase bruising in an extensive production system. Animal welfare. 19(3): 281-285. 2011.

[11]   OIE (Office International des Epizooties). The Recomendation for Animal Welfare, Slaughter of Animal. Chapter 7.5. Terrestial Animal Health Code. France. 2015.

[12]   MLA. Meat and Livestock Australia. Prosedur Standar Operasional untuk Kesejahteraan Ternak. North Sydney (AU). Sydney. 2012.

[13]   Bhaskara, Y., Adam, M., Nasution, I., and Lubis, T.M. Tinjauan Aspek Kesejahteraan Hewan Pada Sapi yang dipotong di Rumah Pemotongan Hewan Kotamadya Banda Aceh. Jurnal Medika Veterinaria 9(2): 149-153.2015.