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## RESEARCH ARTICLE

# THE LOCAL COMMUNITY PERCEPTION TOWARDS PIG FARMING IN KUPANG CITY, EAST NUSA TENGGARA, INDONESIA

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### ABSTRACT

East Nusa Tenggara Province is the region with the highest number of pig population compared to other provinces in Indonesia. Kupang City is one of the areas which contributes pig population in East Nusa Tenggara. However, the development is still not maximized. One of the obstacles is the perception of people around the location feel disturbed by the existence of the pig business, such as the smell, sound, waste handling, and socio-cultural structure of the community. Therefore, a research had been conducted for two months, starting from June-July 2017 in Kupang City. Data were collected through questionnaire interviews to 41 samples using *convenience sample* method. In general, the result of community perception research towards pig farm, based on odor / aroma, noise, waste management, and social culture aspects, is quite disturbed or quite agree. There should be socializations for and behavioral changes of local farmers. A poor management will decrease the productivity and create issues in environmental sustainability and health of local communities.

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## INTRODUCTION

Pigs have opportunity to be developed as one of animal protein sources in Indonesia because they have comparative and competitive advantages, including: (1) pigs are *omnivorous monogastric* animals thus they are able to change all foodstuffs including human food consumption remnants and agricultural side products, factories, and so forth into meat and fat; (2) pigs are classified as *peridi* or *prolific animals*, which are capable of breeding 6-12 heads per birth that can be harvested twice a year; (3) pigs have higher percentage of carcass with (65-80%) while cattle (50-60%), sheep / goats (45-55%) and buffaloes (38%) with the highest composition of fatpigs' energy value is higher while it has lower moisture content; (4) pigs are easy to adapt to the maintenance environment which can reduce the cost pig farming livestock and (6) pigs can produce fertilizer for plants as well as energy sources for humans. Indonesian Central Bureau of Statistics 2016 reports that one of the highest populated provinces is East Nusa Tenggara (1,844,900 pigs), followed by North Sumatra (1,159,000 pigs), Bali (825,700 pigs), Papua (722,800 pigs), and Sulawesi South (670,000 pigs). Local pigs in East Nusa Tenggara are generally maintained extensively and semi-intensively and are nurtured simultaneously by almost every family because they play a significant role in the socio-cultural life of the people (Johns *et al.*, 2010; Wea and Koni, 2012).

Local pigs in this city have the potential to be developed as one of the livestock to fulfill the protein in pork consumption areas because NTT local pig production is quite good of which 3-4 years local pigs' weight, with limited feed and poor environment management, could reach 24,5-31,6kg/head (Johns *et al.*, 2010; Anjani *et al.*, 2014). However, the development of pig farms in NTT is still constrained by the perception of people who have not fully supported the development of pig farms due to some local inconvenience regarding to the smells, sounds, ways of waste handling and socio-cultural structures of local communities. It will also be possible to inhibit the strategic plan policy of the Directorate General of Animal Husbandry and Animal Health to increase the pig population by 1.15% per year (DG PKH 2013). Therefore, one of the most influential factors on the development of pig farms is the public perception. The perception of local community towards pig farming is an evaluation process of someone on the object given by the community of certain area through several indicators such as odor(smell), noise, waste management and socio-culture. Realizing that there is lack of available data on Kupang city local community perception towards pig farms business, it is considerably necessary to conduct a research entitled Public Perception of Pig Farming in Kupang City". The purpose of this research is to know the public perception of pig farm business in Kupang City.

## METHODS

This research had been conducted for two months, started from June to July 2018 in Kupang City. Data were collected using a series of questions arranged in a list of statements and questionnaire questions. The sample was chosen using available / convenience sampling method, which is a collection of samples that have been directly available and can be directly used for research. Based on this sampling technique, the total sample population is 41 people consisting of: community leaders, religious figures, youth leaders, and citizen residing to pig farms in Kupang City who raise pigs extensively and semi-intensively. Data analysis technique used in this research is quantitative descriptive based on grouping, simplification, and data presentation such as using frequency distribution and measurement table by using Likert scale. Likert scale is used to measure attitudes, opinions and perceptions of a person or group of social events or phenomena. The use of the Likert scale relates the variables to be measured as measurable indicators, as in Table 1.

**Table 1. Variables and indicators of variable measurement research**

Variable	Sub Variable	Indicator
Society perception	Odor / smell (smell)	- Smelly
		- Very stinging
	Noise (sound)	- Not easy to lose
		- Snoring
Waste management	- Continuous sound	
	- Loud noise	
Social culture	Waste management	- Stacked / left in a sewage pond
		- Cage cleanliness
	Social culture	- Community approval
		- Environmental adaptation
		- Economic value

Each answer is linked to an attitude statement categorized as follows:

- Strongly disturbed / strongly agree (5)
- Disturbed / agree (4)
- Quite disturbed / quite agree (3)
- Not disturbed / disagree (2)
- Stronglynot disturbed / strongly disagree (1)

The measurement of each indicator of the study is done using the basic assumptions of class interval and class range as follows:

### Odor (Smell)

$$\begin{aligned} \text{Maximum value} &= \text{Highest score} \times \text{number of samples} \times \text{number of questions} \\ &= 5 \times 41 \times 3 = 615 \\ \text{Minimum value} &= \text{Lowest score} \times \text{number of samples} \times \text{number of questions} \\ &= 1 \times 41 \times 3 = 123 \\ \text{Range of class} &= \frac{\text{Maximum value} - \text{Minimum value}}{\text{Total score}} \\ &= \frac{615-123}{5} = 98,4 \end{aligned}$$

With these values, it can be categorized as follows:

Strongly disturbed	: 517-615
Disturbed	: 418.5 - 516.9
Quite disturbed	: 320-418.4
Not disturbed	: 221,5-319.9
Totally undisturbed	: 123-221 , 4

### Noise (sound)

$$\begin{aligned} \text{Maximum score} &= \text{Highest score} \times \text{number of samples} \times \text{number of questions} \\ &= 5 \times 41 \times 3 = 615 \\ \text{Minimum value} &= \text{Lowest score} \times \text{number of samples} \times \text{number of questions} \\ &= 1 \times 41 \times 3 = 123 \\ \text{Range of class} &= \frac{\text{Maximum value} - \text{Minimum value}}{\text{Total score}} \\ &= \frac{615-123}{5} = 98,4 \end{aligned}$$

With these values, it can be categorized as follows:

Strongly disturbed	: 517-615
Disturbed	: 418.5 - 516.9
Quite disturbed	: 320-418.4
Not disturbed	: 221,5-319.9
Totally undisturbed	: 123-221 , 4

### Waste Management

$$\begin{aligned} \text{Maximum value} &= \text{Highest score} \times \text{number of samples} \times \text{number of questions} \\ &= 5 \times 41 \times 2 = 410 \\ \text{Minimum value} &= \text{Lowest score} \times \text{number of samples} \times \text{number of questions} \\ &= 1 \times 41 \times 2 = 82 \\ \text{Range of class} &= \frac{\text{Maximum value} - \text{Minimum value}}{\text{Total score}} \\ &= \frac{410-82}{5} = 65,5 \end{aligned}$$

With these values, the following categories can be created:

Strongly disturbed	: 517-615
Disturbed	: 418.5 - 516.9
Quite disturbed	: 320-418.4
Not disturbed	: 221,5-319.9
Totally undisturbed	: 123-221 , 4

### Social Culture

$$\begin{aligned} \text{Maximum score} &= \text{Highest score} \times \text{number of samples} \times \text{number of questions} \\ &= 5 \times 41 \times 3 = 615 \\ \text{Minimum value} &= \text{Lowest score} \times \text{number of samples} \times \text{number of questions} \\ &= 1 \times 41 \times 3 = 123 \\ \text{Range of class} &= \frac{\text{Maximum value} - \text{Minimum value}}{\text{Total score}} \\ &= \frac{615-123}{5} = 98,4 \end{aligned}$$

With these values, it can be categorized as follows;

Strongly agree	: 517-615
Agree	: 418.5 - 516.9
Quite agree	: 320-418,4
Disagree	: 221,5-319,9
Strongly disagree	: 123-221 , 4

### Overall perception value

$$\begin{aligned} \text{Value Maximum score} &= \text{Highest score} \times \text{number of samples} \times \text{number of questions} \\ &= 5 \times 41 \times (3 + 3 + 2 + 3) = 2255 \\ \text{Minimum value} &= \text{Lowest score} \times \text{number of samples} \times \text{number of questions} \\ &= 1 \times 41 \times (3 + 3 + 2 + 3) = 451 \\ \text{Range of class} &= \frac{\text{Maximum value} - \text{Minimum value}}{\text{Total score}} \\ &= \frac{2255 - 451}{5} = 360,8 \end{aligned}$$

With these values can be made as follows:

Strongly disturbed/ strongly agree	: 1894,6-2255
Disturbed / agree	: 1533,7-1894,5
Quite disturbed/ quite agree	: 1172,8-1533,6
Not disturbed/ disagree	: 811,9-1172,7
Totally undisturbed/ strongly disagree	: 451-811,8

## RESULTS

### Community perceptions of the smell of pig farms:

Community perceptions of the pig farm smell in Kupang City are presented in Table 2, where the data indicates that pig farming in Kupang City has caused discomfort for local communities surround the pig farms. It can be seen from 92.68% of the community around the pig farm business agreed to categorize this business as quite disturbing to very disturbing due to the odor or aroma caused by pig farms. Furthermore, 85.37% of the community around the pig farm business felt disturbed or uncomfortable with the odor from the pig business because the aroma is quite stinging to the very stinging. Then, with the number of 95.13% of the community around the pig farming business stated that the stinging smell is not easily lost, causing the discomfort of residents in the category of quite disturbing to very disturbing.

**Table 2. Respondents' response towards the odor generated from pig farming bussiness**

No.	Indicator	Score	Frequency (Person)	Total	Percentage (%)
1	Odor ( smell)	5	17	85	41.46
		4	10	40	24.39
		3	11	33	26.83
		2	3	6	7.32
		1	0	0	0
	Total 1		41	164	100
2	Very stinging	5	13	65	31,71
		4	16	64	39.02
		3	6	18	14.63
		2	6	12	14.63
		1	0	0	0
	Total 2		41	159	100
3	Not easy to lose	5	12	60	29.27
		4	15	60	36.59
		3	12	36	29.27
		2	2	4	4.87
		1	0	0	0
	Total 3		41	160	100
	Total 1 + 2 + 3			483	Disturbed

Source: Primary data after being processed (2017)

**Public perception of the sound of pigs:** The data in Table 3 indicates that the noise caused by pig farms is quite disturbing. The vast majority of the population said they were not disturbed by the sounds of pig farms.

**Table 3. Respondents' responses about the sounds of pigs**

No.	Indicator	Score	Frequency (Person)	Total	Percentage (%)
1	Snoring sound	5	0	0	0
		4	10	40	24.39
		3	9	27	21.95
		2	14	28	34.15
		1	8	8	19.51
	Total 1		41	103	100
2	Continuous noises	5	0	0	0
		4	10	40	24.39
		3	11	33	26.83
		2	12	24	29.27
		1	8	8	19.51
	Total 2		41	105	100
3	Loud noises	5	0	0	0
		4	9	36	21.95
		3	11	33	26.83
		2	11	33	26.83
		1	10	10	24.39
	Total 3		41	112	100
	Total 1 + 2 + 3			320	Disturbed

Source: Primary data after being processed (2017)

**Community perception towards pigs farming waste management:** The data in Table 4 shows people living near pig farm sites felt quite disturbed by the pig farm waste. It means that most people feel undisturbed with pig farm waste, whether pig wastes are stacked / left in waste dumps and the lack of pens hygiene.

**Table 4. Respondents' responses towards pigs farming waste management**

No.	Indicator	Score	Frequency (Person)	Total	Percentage (%)
1	Stacked / left in waste dumps	5	2	10	4.88
		4	9	36	21.95
		3	6	18	14.63
		2	12	24	29.27
		1	12	24	29.27
	Total 1		41	112	100
2	Lack of hygiene	5	3	15	7.32
		4	9	36	21.95
		3	7	21	17.07
		2	14	28	34.15
		1	8	8	19.51
	Amount 2		41	108	100
	Total 1 + 2			220	Disturbed

Source: Primary data after being processed (2017)

**Societal socio-cultural perception of pig farming:** The data in Table 5 indicates that people living around pig farming sites feel quite agree to the socio-cultural values prevailing in the area around the livestock business. The community around pig farmings (87.81% of respondents) strongly disagree that pig farming requires community approval. In regard to odor/ smell from pig farming, 85.46% of respondents agreed that they have adapted to it while the other 85.36% of respondents claimed that they have got used to the sound/ noise of the pigs.

**Table 5. Respondents' answers about socio-culture of pig farmings**

No.	Indicator	Score	Frequency (Person)	Total	Percentage (%)
1	Community Approval	5	0	0	0
		4	5	20	11.84
		3	8	24	19.51
		2	14	28	34.15
		1	14	14	34.15
	Total 1		41	86	100
2	Adaptation to the smell of pigs	5	2	10	4.88
		4	10	40	24.39
		3	23	69	56.19
		2	2	4	4.88
		1	4	4	9.66
	Total 2		41	127	100
3	Adaptation to the noise of pigs	5	35	175	85.36
		4	1	4	2.44
		3	2	6	4.88
		2	2	4	4.88
		1	1	1	2.44
	Total 3		41	190	100
	Total 1 + 2 + 3			403	Simply Agree

Source: Primary data after being processed (2017)

**Table 6. Recapitulation of community perceptions about pig farming in Kupang City**

Variables	Sub variable	Value	Description
Public Perception	1. Odor / aroma	483	Disturbed
	2. Noise/ sounds	320	Quite Disturbed
	3. Waste treatment	220	Quite Disturbed
	4. Social culture	403	Quite Agree
Amount		1426	Disturbed / Quite agree

Source: Primary data after being processed (2017)

**Public perception of pig farming:** The data in Table 6 shows that people's perception towards pig / pig farming smell has score of 483 (disturbed). The public perception of the noise/sounds of pigs has a score of 320 (quite disturbed). Then

the public perception of waste management has a score of 220 (quite disturbed). Furthermore, the public perception of socio-cultural value has a score of 403 (quite agree).

## DISCUSSION

**Community perceptions of the smell of pig farms:** The discomfort of the community around the pig farming business is due to pig farmers in Kupang City do not pay attention to waste handling management aspect. Pig farms in East Nusa Tenggara generally have not been concerned enough about the wastehandling management aspects. The main cause is extensive maintenance. Although pigs are penned, its' waste management is not well utilized. Sajeev *et al.* (2017) states that pigs' waste can be a source of environmental pollution if it is not utilized or managed properly. Pollution of the waste can come from feces, urine, spilled feed, as well as laundry water to bathe pigs (cleaningcages). The presence of *ammonium* and *hydrogen sulfide* found in pig manure can cause disturbance in humans and pigs themselves including air pollution. The impact of ammonia gas on the physiologic of the human bodyarises from the strong smells that can disturb the public's comfort (vomiting, nausea, headache, shallow breathing, coughing, sleeplessness and loss of appetite) living in the area around the cage (Emelda *et al.*, 2013; Takarenguang *et al.*, 2016). Besides the *ammoniagas*, *hydrogen sulfide* gas is also produced from pig farmings waste that smells like rotten eggs. The smell of this gas began to get smelled at a concentration of 0.1 ppm. Persistent exposure by humans at both low and high concentrations for 30 minutes to 1 hour could cause death. This gas is dangerous because at a concentration of  $\geq 30$  ppm, it couldparalyze the sense of smell moreover its presence is somehow not detected (Noren 1977 *op.cit.* Takarenguang *et al.*, 2016).

**Public perception of the sound of pigs:** Kupang City is one area where almost every household has a pig farm which is intensive, extensive or semi-intensive. The community has grown accustomed to pig farming bussiness in that area. The pigs' loud noise only appear in the morning and evening, when the farmers feed themor when the pigs are cut. Moreover, the local community has got used to the pigs' snoring sounds at night, while they consider that pigs' sound in the morning untill evening do not cause any problems because the people are busy doing activities. Johnset *al.* (2010) states that pig farms in NTT are generally in the pens or kept wild around the house, so the noise from pig farms is heard only by people living close to pig farms.

**Community perception towards pigs farming waste management:** Wea (2016) stated the maintainance system is generally done by traditional extensive method with the average pig breeding of 2-3 pigs. With this sich of maintainance system, it causes the pigs dispose their waste anywhere. Based on the climatic classification of Schmid and Ferguson, NTT Province is categorized as a dry tropical region with dry season  $\pm$  6-8 months which has high sunlight intensity. The correlation between the pig-breeding system and the climate of pig farm is that the pigs' waste disposal will quickly get dried with high irradiance intensity and low environmental humidity. This condition will be different if the research is done in the rain season because the dirt will be mixed with water, causing a stinging smell. Pig farming waste poor management is not considered as a disturbance by most people due to this type of bussiness has existed for a long time.

The smell further becomes a common thing and the people get used to it. Livestock waste , if its not utilized properly, can cause problems for the breeders themselves and the environment. All livestock waste is a renewable material or it will not run out as long as the pigs are still there.

**Societal socio-cultural perception of pig farming:** This type of bussiness is a common thing of which the local community have got accustomed to it even the smell still causes some complains. Akuet *al.* (2013) and states that the closer a house to pig farmings, the more likely they are to get affected, however it is also still influenced by the number of pigs.

**Public perception of pig farming:** In general, local community perception of pig farms based on the smell / aroma noise/ sounds, waste management and socio-culture is quite disturbed / quite agree. There should be socializationsfor and behavioral changes of local farmers. A poor management will decrease the productivity and create issues in environmental sustainability and health of local communities.

## Conclusion

The perception of local community towards pig farming is an evaluation process of someone on the object given by the community of certain area through several indicators such as odor(smell), noise, waste management and socio-culture. In general sense, local perception towards the pig farming through those indicators is quite disturbed/ quite agree.

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