Identification of Qualitative and Quantitative Characteristics of Bali Pigs in Gerokgak District, Buleleng Regency

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Abstract. A study was conducted to identify the qualitative and quantitative characteristics of the Bali Pig. This research was conducted in Gerokgak District, Buleleng Regency from February 2021 - July 2021. Balinese pigs cannot be separated from customs, social and culture because Balinese pigs are very important for the Balinese people for materials and religious ceremonial activities such as for "caru balik sumpah " which requires " babi butuan " (uncastrated male Balinese pigs) and Balinese pigs. Also widely used for other traditional activities and social activities. The highest population of Balinese pigs is in Buleleng Regency with 86,519 heads (55.51%) of the total population in Bali. In addition to the decline in population, Balinese pigs also experienced a decrease in their qualitative and quantitative characteristics which was probably due to the upgrading program of Balinese pigs with Suddle Back pigs. Therefore, this study aims to determine the qualitative and quantitative characteristics of Balinese pigs with a survey method targeting male and female Bali pigs aged over 10-18 months (finisher phase) each as samples. The data obtained in the study were tabulated and then analyzed descriptively. Descriptive analysis was used to see the mean and Standard Deviation (SD) according to [15]. From the results of the study, it was shown that Bali pigs in Gerokgak District from the identification of qualitative and quantitative characteristics can be classified as local native Balinese pigs, with the results obtained qualitative characteristics dominant in females and males, including: 100% black coat color, shape back arched 56.67% and 16.67%, stomach does not touch the ground 76.67% and 83.33%, coarse hair on shoulders and neck 83.33% and 90%, head/snout with long oval shape 73.33% and 76.67%, 50% and 66.67% pointed ears, no white stripes were found on all four legs 100%. Body dimensions of female and male bali pigs at the study site were uniform. This is thought to be due to the influence of the environment and maintenance management applied relatively the same to small holder farms in Gerokgak District.

Keywords: Bali Pig, Qualitative Characteristics, Quantitative Characteristics

1 Introduction

Bali pig is one of the meat-producing livestock commodities that has great potential to be developed because it has beneficial properties and abilities, but its presence on the island of Bali

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is very small and is only found in certain areas such as in Buleleng, Karangasem and Klungkung regencies. The maintenance of Balinese pigs cannot be separated from the customs, social and culture that exist on the island of Bali.

Balinese pigs in Bali which have customary, social and cultural status which are very important for the Balinese people for ceremonial activities and ritual materials such as gayah, sate tungguh, penyeneng bangun urip, kakuwung, jepit babi and for Caru Balik Sumpah and so on are needed "butuan pigs". ” (Uncastrated male Bali pig) which is currently difficult to obtain. In addition to meeting the needs for religious ceremonies, Balinese pork is also used in various social activities.

Balinese pigs are very suitable to be kept on a small scale by housewives in Bali as a piggy bank or “tatakan banyu” because with only modest feeding and the use of kitchen waste (banyu and so on) Balinese pigs have been able to provide weight gain. Based on the potential and social status of Balinese pigs, it seems that Bali pigs need to be maintained and developed because as a source of germplasm, the population of which is based on data for the last 3 years (2017-2019) there has been a very significant decline.

Bali Province Livestock Data Information (2019) shows the population of Bali pigs in Bali Province in the last 3 years from 2017-2019 there was a decline of 27.51% where in 2017 (215,000 head), 2018 (207,000 head) and 2019 (155.856 tails). Likewise, in Buleleng Regency, which is the area with the largest population of Balinese pigs, namely 86,519 heads (55.51%) of the total population of Bali pigs in Bali (Buleleng Agriculture and Livestock Service Data 2019). This population decreased by 26.09% compared to the Bali pig population in Buleleng in 2017 (117,058 heads) while in 2018 (112,957 heads). This decrease occurred because the productivity of Balinese pigs from Daily Body Weight Growth was lower and the number of children born was less than that of imported pigs (landrace), so from an economic aspect it was considered less profitable.

Therefore, the government through the Bali Provincial Livestock Service has implemented a Bali pig upgrading program. The program was carried out by crossing a Balinese pig with a Saddle Back pig. This program is able to increase livestock productivity, improve the quality of cross-bred pork and the performance of cross-bred pigs has also changed. Since the implementation of the upgrading program, crossbred pigs have spread throughout Bali, including in Buleleng Regency. As a result, there has been a decline in the population of Balinese pigs and a decline in their genetic quality, so it is currently very difficult to get the original types of Balinese pigs

Observing the declining development/population of Balinese pigs and the difficulty of finding native Balinese pigs and the role of Balinese pigs which are very much needed as a tool in religious ceremonies as well as the very difficult of obtaining genuine types of Balinese pigs due to the upgrading program carried out by the government, a study is needed to identify the nature of the pigs. qualitative and quantitative Bali pigs with a case study in Gerokgak District, Buleleng Regency which is the area with the largest population of Balinese pigs in Bali Province.

2 Research Methods

This research was conducted in the Gerokgak District, Buleleng Regency, Bali Province, which is 120 km from the provincial capital. The research was carried out starting from February-July 2021 starting from a survey, data collection, tabulation, and data analysis and reporting. The research objects used in this study were adult male and female Bali pigs kept on

smallholder farms in the Gerokgak District, Buleleng Regency. Bali pigs are more than 10-18 months old (finisher period) with a sampling of 30 males and 30 females.

The tools used in this study were a questionnaire (a list of questions), a 200 kg scale, a measuring stick and a measuring tape. The research method used in this study is a survey method. The determination of the sample of the research location was carried out by simple purposive sampling [13], while to determine the livestock used as the sample, it was carried out using the simple random sampling method. The collected data is then processed analytically descriptively so that the frequency and percentage are obtained

Observation of Research Results

1. Qualitative characteristics variables
    a. Coat color is done by looking at the physical characteristics that appear and the dominant coat color in each Bali pig.
    b. The back shape is done by observing the back shape of each Bali pig. The results of observations of the shape of the back in general will find 2 forms, namely curved and flat.
    c. The presence or absence of white stripes on all four legs.
    d. The presence or absence of coarse hair on its back.
    e. The muzzle is short or long
    f. Ear shape, done by observing the shape of the ear is pointed or not
2. Quantitative characteristics variables
    a. Body length is a straight-line distance from the edge of the bone to the tapir bone lump. Measurements were made using a measuring stick with units of cm.
    b. Height, is done by measuring the distance from the highest shoulder to the ground which is measured using a measuring stick in cm.
    c. Chest circumference, is an observation by measuring the chest cavity through the shoulder joint using a measuring tape unit in cm.
    d. Body weight is done by weighing before the pigs are fed with feed consumption using a scale with a capacity of 200 kg.

The data collected is then tabulated and then analyzed descriptively. Descriptive analysis is used to see the mean and Standard Deviation (SD) according to [15].

3 Results and Discussion

Geographical Conditions

Gerokgak District is one of the sub-districts in Buleleng district, Bali province. This district is about 35 km from Singaraja to the west. The center of government is in Gerokgak Village. This sub-district is the westernmost sub-district in Buleleng Regency with an area of 356.57 km2. Gerokgak District consists of 14 villages, namely: Banyupoh, Celukan Bawang, Gerokgak, Musi, Patas, Pejarakan, Pemuteran, Pengulon, Penyabangan, Sanggalangit, Suber Klampok, Sumber Kima, Tinga-Tinga, and Tukad Sumaga.

Its borders are in the north by the Bali Sea, in the east by Seririt District, in the south by Jembrana Regency, and in the west by the Bali Strait. Gerokgak District is located in a lowland area with an altitude of 0-25 meters above sea level. According to data from the Central Bureau of Statistics of Buleleng Regency, the population of Gerokgak District in 2019 was 95,615 people.

Typology of Farmer and Total Population of Bali Pigs

The very important thing that needs to be considered so that Balinese pig farms can develop well in this area is the condition of the people. There are 40 people who are respondents in this survey. The results are the most, namely 42.5% aged 51-60 years with the highest level of education, namely elementary school graduates as much as 45%. The respondents' occupations are 100% as farmers, so that the agricultural and livestock sectors dominate employment and sources of income for residents in Gerokgak District. However, the majority of the population in Gerokgak sub-district work side jobs as farmers by raising 2-7 tail pigs around the house. The lack of public knowledge about raising pigs is an inhibiting factor that has not maximized the productivity of pigs in this region.

The total population of bali pigs in Gerokgak District in 2020 is 28,074 tails. This number decreased compared to 2019 as many as 86,519 tails [2]. The largest population of pigs is in Sumber Kima Village, which is 3,308 tails, where almost all residents in this village raise local pigs around their yards.

Management of Bali Pig Livestock

Maintenance management is one of the factors that greatly affect the level of growth and productivity of livestock. In management, pig cages must be in accordance with the needs of livestock so that livestock feel comfortable so that they can grow, develop, and produce optimally according to the wishes of the breeder. In general, how to raise pigs by Balinese pig farmers in Gerokgak District is almost the same, namely: some are caged with various shapes and sizes, and some are kept by tying Balinese pigs under certain trees.

Most of the feed ingredients given to Bali pigs are obtained by looking for or by self-cultivation. Feeding is carried out by the farmers 2 (two) times a day, namely: in the morning around 09.00 local time and in the afternoon at 17.00 local time. Based on the results of the field survey, it is known that the type of feed given to Bali pigs is relatively the same, namely the type of mixed feed consisting of: banana stems, taro leaves, sweet potato leaves, rice bran, polard, in addition there are those who provide kitchen scraps.

Performants of Bali Pig Qualitative Characteristics

Table 1. Performants Data on Qualitative Characteristics of Female Bali Pigs in Gerokgak District

No	Observed Variables	Number (Tails)	Percentage (%)
	Feather color		
1	- Black	30	100
	- Striped	0	0
	Back Shape		
2	- Curved	17	56,67
	- Horizontal	13	43,33
	Stomach		
3	- Touching the Ground	7	23,33
	- Don't Touch the Ground	23	76,67
	Coarse Hair on the Shoulders and Neck		
4	- There is	25	83,33
	- Nothing	5	16,67
	Head / Muzzle Shape		
5	- Short Round	8	26,67
	- Long Oval	22	73,33
6	Ear Shape		
	- Tapered	15	50

	- Not Tapered	15	50
	On His Four Feet		
7	- There are white stripes	0	0
	- No White Stripes	30	100

Table 2. Performants Data on Qualitative Characteristics of Male Bali Pigs in Gerokgak District

No	Observed Variables	Number (Tails)	Percentage (%)
1	Feather color		
	- Black	30	100
	- Striped	0	0
2	Back Shape		
	- Curved	5	16,67
	- Horizontal	25	83,33
3	Stomach		
	- Touching the Ground	5	16,67
	- Don't Touch the Ground	25	83,33
4	Coarse Hair on the Shoulders and Neck		
	- There is	27	90
	- Nothing	3	10
5	Head / Muzzle Shape		
	- Short Round	7	23,33
	- Long Oval	23	76,67
6	Ear Shape		
	- Tapered	20	66,67
	- Not Tapered	10	33,33
7	On His Four Feet		
	- There are white stripes	0	0
	- No White Stripes	30	100

One of the qualitative characteristics used as a criterion in the selection of Bali pigs is coat color. Based on tables 1 and 2. it appears that 100% of male and female bali pigs in Gerokgak sub-district have black fur. This result is the same as the results of [4] study which found 100% black coat color in female local pigs and 67% black color in male local pigs in West Nabire District, Nabire Regency, Papua Province. The results are also in line with the results of [1] research which found that local pigs kept in North Sumatra generally have black fur and sometimes blackish gray.

The black fur color obtained in this study has a higher percentage than the results of the study of [5] who got 76.67% black in male local pigs and 73.33% black in female local pigs in Sianjur MulaMula District, Samosir Regency, North Sumatra Province. The frequency of female Bali pigs with curved backs was 17 (56.67%) while the flat-backed pigs were 13 (43.33%). Observation of male bali pigs found 25 tails (83.33%) with curved backs and 5 tails (16.67%) with flat backs.

This result is consistent with the [5] report which states that local pigs in North Sumatra generally have a curved back shape and sometimes a flat one. The existence of variations in the shape of the back in Balinese pigs is thought to have occurred in marriage with local local pigs, giving rise to a different back shape.

Based on Tables 1 and 2. It was also found that 23 female Bali pigs (76.67%), only 7 heads (23.33%) touched the ground. There were 25 male bali pigs (83.33%) whose stomach did not touch the ground and only 5 (16.67%) that touched the ground. The majority of female Bali Pigs have coarse hair on the shoulders and neck as many as 25 (83.33%) and the remaining 5 (16.67%) do not have coarse hair on the shoulders and neck. Similarly, the majority of male Bali Pigs have coarse hair on the shoulders and neck, 27 (90%), only 3 (10%) do not have coarse hair on the shoulders and neck.

This result is also in line with the results of research by [4] and [3]. Coarse hairs visible on the shoulders and neck indicate that the bali pigs in Gerokgak District are still classified as native Balinese pigs developed from wild pigs in ancient times. The frequency of the head/snout of the female Bali Pig is 73,33% long and 26.67% short round. The frequency of the head/snout of the male Bali pig is 76,67% long and 23.33% short round. This result is also in line with the results of [4] research. The frequency of the female Bali Pig's ears are pointed and not pointed as much as 50% each. The frequency of the ears of male Bali pigs is 66.67% and the ears are not pointed as much as 33.33%. The majority of the head/snout has a long oval shape and pointed ears also indicate that the Balinese pigs kept by the community in Gerokgak District are still classified as Balinese native pigs.

The results of the field research showed that 100% of female and male bali pigs in Gerokgak District did not have white stripes on all four legs. The results obtained are not in line with the research results obtained by [3] who reported that there were 56.67% male local pigs with white stripes on all four legs and 43.33% without white stripes. Furthermore, female local pigs were 73.33% with white stripes on all four legs and 26.67% without white stripes. The high percentage of Balinese pigs that do not have white stripes on all four legs in Gerokgak District shows that the Balinese pigs that are kept by the community are still classified as descendants of the original Balinese pigs that have not been mixed with the genetics of other pig breeds. Thus, it can be said that there has been no crossbreeding between Balinese pigs and other pig breeds in this region.

Balinese Pig Body Dimensions

The results of descriptive statistical analysis which include: the average value and standard deviation of body size of bali pigs are presented in table 3 and 4.

Table 3. Data on Body Dimensions of Female Bali Pigs in Gerokgak District

No.	Variable	Sum (ΣX)	Mean ($\bar{x}$)	Standard Deviation (SD)
1	Body Length (cm)	2242	74,73	14,32
2	Chest size cm)	2573	85,77	13,56
3	Shoulder Height (cm)	1708	56,93	9,33
4	Back Height (cm)	1555	51,83	12,05
5	Hip Height(cm)	1787	59,57	8,69
6	Body Weight (kg)	1863	62,10	10,11

Table 4. Data on Body Dimensions of Male Bali Pigs in Gerokgak District

No.	Variable	Sum (ΣX)	Mean ($\bar{x}$)	Standard Deviation (SD)
1	Body Length (cm)	2171	72,37	7,92
2	Chest size (cm)	2545	84,83	8,74
3	Shoulder Height (cm)	1617	53,90	7,12
4	Back Height (cm)	1483	49,43	7,92

5	Hip Height (cm)	1691	56,37	6,52
6	Body Weight (kg)	1965	65,50	7,21

Body dimensions of bali pigs were obtained by measuring directly for each of the observed variables. This is intended to be able to know firsthand how the quantitative characteristics of adult bali pigs are thought to be growing steadily and no longer undergoing many changes. The body dimensions of female and male bali pigs in Gerokgak District are relatively high when compared to the body sizes of local pigs in the Gianyar and Klungkung areas, Bali Province. The average body length of bali pigs obtained is in the same range when compared to local pigs in the Nias and Tobasa areas, namely 84-86 cm and 70-90 cm [10].

It can be concluded that, male bali pigs have a higher body length growth rate compared to females, so that the production ability of male bali pigs is higher [14]. This logically occurs because of the presence of androgen hormones in male livestock which can stimulate bone growth, besides that male livestock consume more feed than female cattle [16].

The average chest circumference of female bali pigs in Gerokgak District is 85.77 ± 13.56 cm and in males the average is 84.83 ± 8.74 cm. This shows that the size of the chest circumference of cattle in the study area is almost uniform with a fairly high chest circumference. The greater the chest circumference, the organs in the chest cavity are also getting bigger such as the lungs and heart [9].

The results of measurements of shoulder height showed that the average shoulder height of female and male bali pigs was 56.93 ± 9.33 cm and 53.90 ± 7.12 cm, respectively. The shoulder height values obtained in this study are in the same range as the shoulder heights of local pigs in Nias Regency, which is 42-65 cm [10]. The results obtained also show that the average shoulder height of bali pigs in Gerokgak District is relatively the same compared to the shoulder height of bali pigs in the Gianyar area, which is 59.58 cm in male pigs and 53.88 cm in female pigs [8]. This situation shows that environmental factors are very influential on the quantitative nature of livestock.

The results of measurements of back height showed that the average back height of female and male bali pigs was 51.83 ± 12.05 cm and 49.43 ± 7.22 cm, respectively. The results obtained are in line with shoulder height that environmental factors also greatly affect the value of this trait. The average hip height of female bali pigs in Gerokgak District is 59.57 ± 8.69 cm and the average is 56.37 ± 6.52 cm for males. These results indicate that the average hip height of cattle in the study area is lower than the results of [4] study which found the average waist height of female and male local pigs in Nabire was 64.53 cm and 90, respectively, 78 cm. The lower hip height obtained in this study indicates that the bali pigs in Gerokgak District are still relatively native. This is indicated by the low body dimensions.

The body weights of female and male bali pigs were 72.57 ± 7.15 kg and 65.50 ± 7.21 kg, respectively. Pigs with larger body size reflect good growth quality compared to other pigs of the same age. The results of measurements of body weight indicate that the body weight of bali pigs in Gerokgak District is higher when compared to the [1] report, that local pigs in the Tobasa and Nias areas have body weights of 50 -70 kg and 20-50 kg, respectively. The low body weight and body size of local pigs in various regions, when compared with body weights and body sizes of national standards for pigs, is thought to be due to the generally lower genetic quality due to uncontrolled breeding of local pigs where inbreeding occurs. This is due to the fact that local livestock rearing is generally carried out extensively.

4 Conclusion

Bali pigs in Gerokgak District from the results of the identification of qualitative and quantitative traits can be classified as native Balinese local pigs, with the results obtained qualitative traits that are dominant in females and males, including: 100% black coat color, curved back shape 56.67 % and 16.67%, the stomach does not touch the ground 76.67% and 83.33%, coarse hair on the shoulders and neck 83.33% and 90%, the head/snout with a long oval shape 73.33% and 76.67% , 50% and 66.67% pointed ears, no white stripes were found on all four legs 100%. Body dimensions of female and male bali pigs at the study site were uniform. This is presumably due to the influence of the environment and maintenance management applied relatively the same to smallholder farms in Gerokgak District.

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