PERFORMANCE OF LOCAL SHEEP PRODUCTION IN GUCIALIT VILLAGE, LUMAJANG REGENCY BASED ON AGE AND SEX

PENAMPILAN PRODUKSI DOMBA LOKAL DI DESA GUCIALIT, KABUPATEN LUMAJANG BERDASARKAN UMUR DAN JENIS KELAMIN

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ABSTRACT

This study was motivated by the importance of understanding the production performance of local sheep in Indonesia, particularly in Gucialit Village, Lumajang Regency, considering its significant role in meat production. This study aimed to examine the effect of age and sex on the production performance of local sheep, which includes body weight, chest girth, body length, and shoulder height. An observational method with a quantitative approach was employed. Local sheep were grouped based on sex (male and female) and age (<1 year, 1-1.5 years, and 1.5-2 years), followed by measurements of the aforementioned variables. Data were analyzed descriptively and statistically using a Completely Randomized Design (CRD). The results showed that age had a very significant effect (P<0.01) on all sheep production performance variables. As the age of the sheep increased, body weight, chest girth, body length, and shoulder height increased significantly. Sex differences also showed a significant effect on production performance. Male sheep had greater body weight, chest girth, body length, and shoulder height compared to female sheep within the same age group.

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ABSTRAK

Penelitian ini dilatarbelakangi oleh pentingnya mengetahui penampilan produksi domba lokal di Indonesia, khususnya di Desa Gucialit, Kabupaten Lumajang, mengingat peran pentingnya dalam penyediaan daging. Penelitian ini bertujuan untuk mengkaji pengaruh umur dan jenis kelamin terhadap penampilan produksi domba lokal, yang meliputi bobot badan, lingkar dada, panjang badan, dan tinggi pundak. Metode penelitian yang digunakan adalah observasional dengan pendekatan kuantitatif. Domba lokal dikelompokkan berdasarkan jenis kelamin (jantan dan betina) dan umur (<1 tahun, 1-1,5 tahun, dan 1,5-2 tahun), kemudian dilakukan pengukuran terhadap variabel-variabel tersebut. Data dianalisis secara deskriptif dan statistik menggunakan Rancangan Acak Lengkap (RAL). Hasil penelitian menunjukkan bahwa umur memberikan pengaruh yang sangat nyata (P<0,01) terhadap seluruh variabel penampilan produksi domba. Semakin tua umur domba, bobot badan, lingkar dada, panjang badan, dan tinggi pundak meningkat secara signifikan. Perbedaan jenis kelamin juga menunjukkan pengaruh yang nyata terhadap penampilan produksi. Domba jantan memiliki bobot badan, lingkar dada, panjang badan, dan tinggi pundak yang lebih besar dibandingkan domba betina pada kelompok umur yang sama.

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INTRODUCTION

Sheep is one of the meat-producing livestock commodities which plays an important role in meeting the animal protein needs of the Indonesian people. Population development and public awareness of the importance of animal protein have driven an increase in demand for lamb. Most of the large sheep farms in Indonesia are people's farms carried out traditionally (As'ad, 2024). This type of sheep is found in almost every region on the island of Java. In 2022, the three provinces with the largest sheep populations will be West Java (8,468,224 heads), Central Java (2,288,826 heads), and East Java (1,430,947 heads) (Director General of Animal Husbandry and Animal Health, 2024). West Java is also the province with the highest lamb meat production (33.49 thousand tons), followed by East Java (6.62 thousand tons) and Central Java (6.38 thousand tons) (Director General of Animal Husbandry and Animal Health, 2024).

One area in East Java that has the potential to develop local sheep farming is Lumajang Regency. Sheep are widely cultivated in Lumajang Regency, especially in Gucialit District, because of its favorable geographical conditions (Zain, 2024). Gucialit District is an area at high altitude located southwest of Lumajang Regency, just below the mountain to the east of the Mount Semeru area which

is still active, and an area that has cold temperatures so it can be used as an opportunity and potential for a meat producing area, especially sheep. This area has great potential in the fields of agriculture and animal husbandry which can later support the economy of the surrounding community. Many people in Gucialit District, especially Gucialit Village, work as farmers and livestock breeders. The types of sheep that are widely developed in Gucialit District are Fat Tail Sheep (DEG) and Thin Tail Sheep (DET). These two types of sheep are thought to originate from different regions. DEG is thought to originate from dry and hot areas such as East Java and Nusa Tenggara, while DET originates from relatively wet areas such as West Java (Williamson and Payne, 1993).

Even though it has great potential, local sheep productivity in Gucialit Village is still relatively low. This is a serious concern for breeders and related parties, considering that local sheep have high economic value and can contribute significantly to improving community welfare. This low productivity is thought to be caused by several factors, including the farmer's lack of knowledge regarding good maintenance management. Many farmers still rely on traditional methods of caring for their sheep, without understanding the importance of modern rearing practices that can improve livestock health and productivity. Apart from that, inadequate feeding is also one of the main causes. Many farmers in Gucialit Village are not fully aware of the importance of balanced nutrition for the growth and development of sheep. Quality feed that meets the nutritional needs of sheep greatly influences production results, such as body weight and meat quality. Without adequate feed, sheep cannot grow well, which ultimately results in low productivity.

Traditional breeding systems also contribute to this problem. Many breeders do not apply good breeding techniques, so that the genetic quality of local sheep does not develop optimally. Good breeding is very important to produce offspring that have resistance to disease, fast growth, and good meat quality. Without innovation in the breeding system, the potential for local sheep to compete in the market will decrease. The low productivity of local sheep is the main problem in the development of sheep farming in Gucialit Village. If not addressed immediately, this can hamper local economic growth and reduce livestock farmers' income. Therefore, there needs to be a collaborative effort between the government, research institutions and the community to increase breeders' knowledge of good husbandry practices, provide access to quality feed, and introduce modern breeding techniques. Through an integrated and sustainable approach, it is hoped that local sheep productivity in Gucialit Village can increase, thereby providing greater benefits for the local community and regional economy.

One effort to increase the productivity of local sheep in Gucialit Village is by characterization. Characterization is a series of activities to identify livestock characteristics, both qualitative and quantitative, so that their genetic potential can be known. Characterization can be done by understanding the quantitative characteristics of sheep, such as body weight, chest circumference, body length and shoulder height. These quantitative traits can be measured directly and used as indicators of sheep production performance. This research focused on assessing the performance of local sheep production in Gucialit Village based on age and sex. The age of the sheep affects the growth and development of the livestock, thus having an impact on its production performance (Praja, et al., 2020). As sheep age, their body weight, chest circumference, body length and shoulder height increase (Hernaman, et al., 2022). Apart from age, gender also influences the performance of sheep production. Male sheep generally have a larger body weight and body size compared to female sheep of the same age (Wijaya, et al., 2016).

This research aims to determine the performance of local sheep production in Gucialit Village, Lumajang Regency based on age and gender. It is hoped that the results of this research can provide information regarding the performance of local sheep production in Gucialit Village and the factors that influence it. This information can be used by farmers to increase the productivity of local sheep through improving maintenance, feeding and breeding systems. Apart from that, it is hoped that the results of this research can contribute to the development of local sheep farming in Indonesia.

MATERIALS AND METHODS

This research was conducted in Gucialit Village, Gucialit District, Lumajang Regency, East Java. This location was chosen because of the consideration that Gucialit Village has the potential for developing local sheep livestock which is characterized by a diverse population. Based on statistical data, the sheep population in Lumajang Regency in 2022 will reach 59,134 heads, with the population in Gucialit District reaching 11,769 heads (Central Statistics Agency, 2021).

This research uses an observational method with a quantitative approach. The research subjects were local sheep raised by farmers in Gucialit Village. A total of 54 male sheep and 69 female sheep were selected as research samples. Sample selection was carried out using purposive sampling with the criteria of sheep being healthy, without defects and not pregnant, and grouped based on age. This age grouping is based on the age of permanent teeth (Permanent Incisors - PI) with modifications (Praja, et al., 2020; Hernaman, et al., 2022):

PI0: Sheep less than 1 year old (< 1 year) or weaned until 8 months old, PI1: Sheep aged 1 - 1.5 years and PI2: Sheep aged 1.5 - 2 years

The age of a sheep can be estimated by looking at the growth and development of its teeth (Solaiman, 2010). The easiest way to find out the age of a sheep is to look at the livestock record or card and based on the incisors (Tmaneak, Beyleto, & Nurwati, 2016). The variables observed in this study include several physical parameters that are important for understanding the growth and development of livestock animals. Body weight is one of the key variables measured using livestock scales in kilograms (kg). Measuring body weight is very important because it can provide an idea of the health and physical condition of the animal. In many cases, ideal body weight is directly related to animal productivity, both in terms of growth and milk or meat production. In addition, chest circumference is measured using a tape measure around the chest just behind the shoulder blades in centimeters (cm). Chest circumference is an indicator often used to determine an animal's lung capacity, which influences respiratory efficiency and, in turn, the animal's overall performance.

Body length is also a variable measured in this study, which is taken from the base of the shoulder blade to the base of the tailbone in centimeters (cm). Body length measurements can provide information about the morphological growth of animals, which is important for genetic assessment and selection of breeds. Shoulder height, which is measured using a measuring stick from the highest shoulder bone to the soles of the feet in centimeters (cm), is also an important parameter that shows the animal's body size. Shoulder height is closely related to the animal's ability to move and adapt in different environments, and can influence competitiveness in rearing.

By measuring these variables, this research aims to obtain comprehensive data regarding the physical condition of the livestock being observed. It is hoped that this data will provide deeper insight into the factors that influence animal growth and health, as well as help farmers make better decisions regarding livestock care and management. By understanding the relationship between body weight, chest circumference, body length and shoulder height, we can identify growth patterns that can be used to improve production efficiency and livestock welfare. The data obtained is tabulated and analyzed descriptively to get a general picture of sheep production performance local in Gucialit Village. Then, the mean and standard deviation were calculated for each age group and gender. Next, the data was analyzed using a Completely Randomized Design (CRD) (Ciptadi, et al., 2019) to determine the effect of age and sex on the performance of local sheep production.

RESULTS AND DISCUSSION

The Effect of Age and Gender on the Performance of Local Sheep Production

This research compares the production performance of male and female sheep in various age groups in Gucialit Village, Lumajang Regency. The results showed that there were significant differences between the production performance of male and female sheep in all age groups. Data on local sheep production performance in Gucialit Village based on age and sex are presented in Table 1.

Table 1 Performance of local sheep production in Gucialit Village based on age and sex.

Umur	Jenis Kelamin	Bobot Badan (kg)	Lingkar Dada (cm)	Panjang Badan (cm)	Tinggi Pundak (cm)
PI0	Jantan	23,25±9,91	67,61±13,87	49,17±8,16	58,72±6,43
	Betina	18,70±1,67	66,61±2,63	48,78±2,21	58,43±2,81
PI1	Jantan	29,44±8,99	77,72±6,82	52,28±5,68	64,11±5,58
	Betina	27,60±4,02	74,57±5,71	53,96±4,24	61,61±3,67
PI2	Jantan	42,81±12,87	87,50±10,53	59,39±5,74	69,83±5,62
	Betina	34,13±5,68	79,52±7,20	55,43±3,74	64,65±3,64

Body weight

Livestock body weight is quantitative data obtained by weighing before the sheep are fed or grazed using a scale in kg units (Nurfaridah, et al., 2013). Body weight plays an important role in good maintenance patterns, apart from determining nutritional needs, the amount of feed given, the number of drug doses, body weight can also be used to determine the selling value of livestock (Niam, et al., 2012). Average body weight of male and female sheep increases with age. This increase indicates growth and development in sheep. The body weight of male sheep was higher than that of female sheep in all age groups. This is in accordance with previous research which shows that male sheep have a faster growth rate than female sheep (Ashari et al., 2015). This difference is thought to be caused by the influence of the testosterone hormone in rams which stimulates bone and muscle growth (Akhsan, 2023). Variability in livestock body weight in a region is influenced by several factors, such as rearing conditions, feed provided, and genetic diversity (Mulliadi and Arifin, 2008). The rearing system, age, genetic factors and the environment where livestock live also play a role in variations in body weight. In addition, the movement of livestock in and out of areas and mating within limited populations can cause negative selection, resulting in offspring with different body weights. In line with the opinion of Pratama, Purbowati, and Lestari (2016), livestock body weight is a crucial metric in determining seed quality. Body weight reflects the level of livestock productivity, making it the main indicator for selecting superior seeds, both for rearing feeders and livestock seeds.

The most significant increase in production occurred in rams from the PI1 to PI2 age group. This shows that rams reach peak growth at adulthood (1.5 - 2 years) (As'ad, 2024). Meanwhile, in female sheep, the most significant increase in production occurred from PI0 to PI1. This shows that female sheep in Gucialit Village reach peak growth at a young age (1 - 1.5 years) (Zain, 2024). Apart from that, the body weight of sheep also increases with age. This increase in body weight occurs due to the growth and development of the sheep's body tissue (Nurmi, 2016). These results are in line with research by Praja et al. (2020) which shows that the average weaning weight and body weight gain of Garut sheep increases with age.

Growth in sheep is divided into 2 phases, namely the fast growth phase and the slow growth phase. The rapid growth phase occurs from birth until puberty, indicated by a significant increase in body weight. The slow growth phase occurs after reaching body maturity, with a lower growth rate. Apart from age, there are other factors that can influence sheep body weight, including gender, genetics, maintenance management, health and feed levels. Genetic factors can limit the growth potential and body size of sheep. Environmental conditions such as climate, feed availability, disease prevention, and livestock management also play a role in sheep growth (McDonald et al., 2002).

Chest Circumference

Chest circumference is an indicator that can be used to determine the increase in livestock body weight and body size. Chest circumference (LD) is a body measurement that is most closely related to body weight. The average difference in chest circumference in female goats between PI0 and PI1 is 10.11 cm, while the average difference between PI1 and PI2 is 9.78 cm. The growth of chest circumference is the development of the muscles attached to the ribs (Permatasari, Kurnianto, and Purbowati, 2013). The chest circumference of male sheep was greater than that of female sheep in all age groups. Chest circumference is an indicator of rumen capacity and rib cage growth (Wijaya et al., 2016). The average difference in chest circumference between PI0 and PI1 is 10.11 cm, while the average difference between PI1 and PI2 is 9.78 cm. The growth of chest circumference is the development of the muscles attached to the ribs (Permatasari, Kurnianto, and Purbowati, 2013).

Trisnawanto, Adiwinarti, and Dilaga (2012) showed that for sheep in the age group of around 12 months to 36 months (PI1 and PI2), chest circumference growth was relatively similar in the PI1 and PI2 groups. The relatively similar growth in the PI1 and PI2 groups (12 months to 36 months of age) may be due to the fact that the lambs have gone through the breeding period necessary for growth. According to Komariah et al., (2015). Increasing livestock weight causes livestock to become larger, and muscle development in the chest area causes a larger chest circumference. Research conducted by Malewa and Salmin (2008) supports the findings regarding the effect of age on sheep chest circumference. They stated that chest circumference selection is an indicator of livestock growth speed. This means that sheep with a larger chest circumference tend to have faster growth, including in aspects of shoulder height and frame size. Furthermore, Basbeth et al., (2015) explained that the size of the sheep's chest circumference is also influenced by bone growth. Research by Atmaja et al., (2012) showed that ewes that gave birth to more than two children (twins) were found to have a larger chest circumference compared to ewes that gave birth to a single or two twins. This shows a positive correlation between chest circumference and birth type in female sheep. Based on previous research conducted by Sutopo et al (2022), there is a relationship between chest circumference and body weight, this relationship is the strongest compared to upper neck circumference and lower neck circumference in DEG crossbred sheep with Merino sheep. Supported by research on other ruminants that chest circumference is the best choice for predicting body weight (Mubarak, et al. 2024). Paputungan, et al (2013) added that livestock body weight is closely related to chest circumference.

Body Length

Body length is divided into two terms, namely absolute body length and relative body length. Absolute body length is the distance between the lateral tip of the shoulder bone (Tuberculum humeralis lateralis) to the tip of the sitting bone (Tuberculum ischiadium) of a livestock. Relative body length is a projection (flat line) rather than absolute body length (Akhsan, 2023). The measurements taken in this study were absolute body length. The body length of male sheep is greater than that of female sheep in all age groups. Body length indicates the size of the sheep's body frame (Handiwirawan et al., 2004). The average difference in body length between PI0 and PI1 is 3.11 cm, while the average difference between PI1 and PI2 is 7.11 cm. During growth, bones will grow continuously at a relatively slow growth rate, while muscle growth is relatively fast, so that the ratio of muscle to bone increases during growth (Pratama, Purbowati, and Lestari 2016). Soeparno (2005) added that every increase in body size will be followed by an increase in other body sizes. Tristananto et al., (2012) stated that sheep's bodies will grow longer with age. Body length indicates spinal growth. Maolana et al., (2022) stated that body length is one of the most important components that contributes greatly to livestock performance. The diversity of sheep body length in a region can be influenced by many factors, such as rearing systems, age, genetics and the environment, influencing the length of livestock in one region. According to Sutopo, Nurgiartiningsih, and Ciptadi (2022), there are two factors that influence differences in livestock development, namely internal factors, namely genetics, age and species, and external factors, namely feed and the environment.

Shoulder Height

Shoulder height is an important parameter in assessing the growth and development of livestock, especially sheep. This size is measured from the highest point of the shoulders perpendicularly to the ground when the livestock is standing in the correct posture (Saranjaya et al, 2016). Shoulder height indicates the size of the sheep's body frame (Handiwirawan et al., 2004). This is the main indicator for determining the body frame size of sheep, which in turn can provide an idea of the livestock's potential productivity. Research shows that the shoulder height of rams is generally higher than that of ewes in all age groups, indicating morphological differences between the two sexes. The data obtained shows that the difference in average shoulder height between the PI0 and PI1 groups reached 5.39 cm, while the difference between PI1 and PI2 was 5.72 cm. These figures show that shoulder height growth is not only influenced by genetic factors, but also by environmental conditions and nutrition provided during the growth period. The growth of shoulder height in sheep is closely related to the development of the main bones, namely Os Humerus, Os Ulna, Os Metatarsus, and Os Tarsus. Thus, a deeper understanding of shoulder height growth can help breeders manage and plan more effective rearing programs.

As shoulder height increases, there is also a significant relationship between body size, chest circumference and body weight. This shows that larger body size not only impacts shoulder height, but also other aspects of livestock health and productivity. Further research shows that body height in small ruminants, including sheep, can vary with different breeds and the rearing system applied, whether intensive, semi-intensive or extensive. This variation reflects how genetic and environmental factors interact to determine livestock growth and development.

Thus, it is important for farmers to understand and monitor shoulder height as an indicator of livestock health and productivity. Through this understanding, breeders can take the necessary steps to improve rearing quality and production yields. In conclusion, good management of shoulder height and the factors that influence it can have a positive impact on the overall success of the livestock business.

Factors Influencing the Performance of Local Sheep Production

Apart from age and gender, the performance of local sheep production is also influenced by other factors, such as genetics, feed and the environment. Genetic factors determine the genetic potential of sheep to achieve optimal growth and production (Ciptadi et al., 2019). Feed is a source of nutrients needed by sheep for growth, development and production (Mangisah et al., 2016). The environment includes temperature, humidity, and rearing management which can influence the physiology and productivity of sheep (Zulfahmi et al., 2016).

Local sheep production performance data were analyzed using a Completely Randomized Design (CRD) with two factors, namely age and sex. The results of the analysis showed that age had a very significant influence ($P<0.01$) on all production performance variables, while gender had a significant influence ($P<0.05$) on body weight and chest circumference. The interaction between age and gender has no significant effect on all production performance variables. The results of this research indicate that age is the most influential factor in the performance of local sheep production in Gucialit Village. As sheep age, the growth and development of sheep increases, so that body weight, chest circumference, body length and shoulder height also increase. Gender also influences production performance, where male sheep have better growth than female sheep.

CONCLUSION AND IMPLICATIONS

Based on the results of research that has been carried out, it can be concluded that there are significant differences in production performance between male and female sheep in various age groups in Gucialit Village, Lumajang Regency.

1. Male Sheep: The highest increase in production performance in male sheep occurred in the 1-1.5 year age group.
2. Female Sheep: The highest increase in production performance in female sheep occurred in the <1 year to 1-1.5 year age group

This difference is thought to be caused by several factors, including differences in growth hormones, feed consumption patterns, as well as genetic and environmental factors. To increase sheep productivity in Gucialit Village, it is recommended to select superior livestock breeds and implement good maintenance management. Apart from that, further research regarding the qualitative and phenotypic characteristics of Gucialit sheep is also needed to determine the influence of genetics and the environment on the production performance of Gucialit sheep.

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