Growth Performance of Boer Goat Crossbreeds Based On The Number of Kids Born Through Weaning At CV. Raman Farm Sejahtera

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Abstract.
The growth performance of goats from birth to weaning is an indicator of meat goat productivity and can be related to the number of kids in a litter. This study aims to compare the growth performance of Boer goat breeds based on the number of kids born to weaning at CV. Raman Farm Sejahtera. The study used a descriptive quantitative method with a comparative observational approach. The study population was Boer goat breeds that were born and met the research criteria, while the sample size was 15 goats consisting of 5 singletons, 5 twins, and 5 triplets, selected using purposive sampling. The research instruments were calibrated scales, recording devices, and cameras, while data were obtained from reproductive recordings and body weight measurements of BB0, BB1, BB2, and BB3. Data analysis was performed using the mean and standard deviation. The results showed that the highest average body weight was found in singletons, followed by twins and triplets throughout the observation period. In conclusion, there is a tendency for higher growth performance in singletons compared to twins and triplets until weaning age.

Keywords : *Boer Goat, Body Weight, Growth Performance, Litter Size and Weaning.*

I. INTRODUCTION

Goats are a type of ruminant livestock that have great potential to be developed as meat-producing livestock to meet the increasing demand for animal protein. The livestock industry is one of the economic sectors that helps meet food needs through livestock products. Local tropical goats have the advantage of better productivity compared to goats imported from non-tropical regions. Success in the livestock sector largely depends on successful reproduction [1]. This condition is increasingly important because the Indonesian population continues to grow, resulting in increasing demand for various types of food [2]. The use of animal products such as meat and other products in general is also very high in Indonesia [3].

Lampung Province has good potential for development in the livestock business sector, while Central Lampung Regency is one of the areas with great potential in the livestock sector, particularly in the development of goat populations. Increasing livestock production can be achieved by improving the quality of offspring through crossbreeding. Long-term benefits in the form of increased livestock productivity can be more easily achieved through improving environmental factors, especially by providing better nutrition. In addition, improving genetic quality can be done through crossbreeding programs. The implementation of crossbreeding will be more effective if supported by artificial insemination technology as a reproductive biotechnology to increase reproductive efficiency while producing offspring with better genetic quality [4]. In the development of meat goats, Boer goats are known to have good growth capabilities, while crossbreeding with local goats is aimed at obtaining livestock with better growth capabilities and adaptability to tropical environments.

Problems in increasing goat productivity are related to growth performance from birth to weaning. The weaning period is a crucial stage because growth and development occur intensively, while physiological conditions and immune systems are still developing, resulting in suboptimal adaptation to the environment. Fulfillment of nutritional needs during this period is also greatly influenced by the provision of nutrition by the mother. Inappropriate management and maintenance in the early phase can result in stunted growth of the weaners [5]. Growth is also an important indicator in assessing production results because it shows the level of weight gain achieved by livestock over a certain period as a result of increased body cell number and size [6]. Therefore, growth performance from birth to weaning is a crucial part of assessing the productivity of meat goats.

The next problem relates to the number of kids in each litter, which can affect nutrient distribution during pregnancy and after birth. Kid growth is influenced not only by genetics but also by litter size, feed, maintenance management, and the environment. In litters with different numbers of kids, namely singletons, twins, and triplets, differences in nutrient distribution occur both in the womb and after birth through the mother's milk. The greater the number of kids born, the higher the competition for nutrients, potentially reducing birth weight and growth rate of kids. Continuous improvement of goat genetic quality also needs to be carried out to increase productivity and population, one of which is through selection by estimating genetic parameters [7]. In addition, there is a relationship between birth weight and weaning weight that can be used in the livestock selection process [8].

In addition to the number of calves born, feed and the environment are also factors related to goat growth performance. Feed is an important issue that needs to be considered in its provision at all times [9]. Goats and sheep are generally raised by providing green grass and other types of feed. In tropical climates, available green feed generally has a relatively low nutritional quality, so concentrates can be provided as an effort to increase its nutritional content [10]. Feed ingredients must be able to be consumed and digested by livestock without causing negative impacts on health and be able to meet the nutrient needs to support livestock growth, development, and productivity [11]. In addition to feed, the pen environment also plays an important role in supporting livestock health through improving the pen floor, waste drainage channels, waste collection areas, and the provision of clean water channels [12]. Environmental factors contribute significantly to livestock productivity, while heredity or genetic quality also influences production levels [13]. Thus, differences in growth performance based on the number of calves born need to be observed while still considering factors such as feed, maintenance, and the environment.

This study aims to compare the growth performance of Boer goats based on the number of calves born to weaning at CV Raman Farm Sejahtera. This study is important because growth performance from birth to weaning is an indicator of meat goat productivity, while the number of calves in one litter is related to the distribution of nutrition and growth of goat kids. The urgency of this study lies in the need to obtain information on the growth performance of Boer goats based on the number of calves born, namely single, twins, and triplets. The novelty of this study lies in the comparison of the growth performance of Boer goats based on the number of calves born to weaning at CV Raman Farm Sejahtera, by considering factors of feed, maintenance system, cage environment, and health management so that it can provide information on growth performance based on litter size at the research location.

II. METHOD

This study used a descriptive quantitative method with a comparative observational approach. Quantitative research methods are based on the philosophy of positivism and are used to study populations or samples [14]. The study was conducted observationally without providing treatment to the research objects. Observations were made to compare the growth performance of Boer goat offspring based on three birth type categories, namely single births, twins, and triplets at CV. Raman Farm Sejahtera, Seputih Raman District, Central Lampung Regency. The study was conducted from December 1, 2025, to March 30, 2026.

The tools used in this study included scales, books, pens, sacks, panbelts, and cameras, while the materials used were Boer crossbred goats. Research data were obtained through livestock reproduction recording at CV. Raman Farm Sejahtera. The recorded data included the type of birth and the body weight of the calves from birth to weaning. Body weight measurements were carried out at birth or BB0, 1 month of age or BB1, 2 months of age or BB2, and 3 months of age or BB3. Body weight was measured using a scale that had been calibrated in kilograms (kg) and had an accuracy level of 100 grams [15]. The weighing results were then grouped based on the type of birth, namely single birth, twins, and triplets.

The population in this study was all Boer goat crossbreeds born at CV. Raman Farm Sejahtera and met the criteria as research objects. The population consisted of singleton, twin, and triplet goats raised on the same farm. The sample is part of the population that has the same characteristics, traits, and population size [14]. The sample in this study was 15 Boer goat crossbreeds that met the research criteria. The sample consisted of 5 singleton goats, 5 twin goats, and 5 triplets.

The sampling technique used was purposive sampling. This technique was used because the researcher established certain criteria so that the samples obtained were in accordance with the research needs and were able to provide relevant data to answer the problem formulation [14]. The sampling criteria were based on the birth type of Boer goats, namely singletons, twins, and triplets. All samples came from CV. Raman Farm Sejahtera, so the research was conducted on the same farm.

The research procedure began with a preparatory stage, which involved observing the research site at CV. Raman Farm Sejahtera, Seputih Raman District, Central Lampung Regency. The next stage involved preparing research tools and materials and coordinating with the farm staff regarding the recording of livestock reproduction data used in the study. Following the preparation, livestock samples were determined based on research criteria and grouped by birth type: singletons, twins, and triplets.

The next stage is recording calf data based on livestock reproduction records at CV. Raman Farm Sejahtera. Calculations are based on the number of newborns and recorded based on the type of birth. Next, calf weight is measured from birth (BB0), then monthly until weaning, namely at 1 month of age (BB1), 2 months of age (BB2), and 3 months of age (BB3). Body weight measurements are carried out using a calibrated scale with kilogram (kg) units and an accuracy level of 100 grams [15].

Weighing data were then grouped by birth type. Weight data for each observation period were tabulated based on singleton, twin, and triplet birth groups. The data were then processed to obtain the mean and standard deviation (SD) for each group and observation period. The processed data were then interpreted to describe the growth performance of young animals based on birth type and served as the basis for drawing conclusions and developing research recommendations.

The variables used in this study consist of independent variables and dependent variables. The independent variable (X) is the type of birth of Boer goat crossbreeds, which is grouped into three categories: single birth, twin birth, and triple birth.

The dependent variable (Y) is the growth performance of Boer goat breeds based on the number of calves born to weaning at CV. Raman Farm Sejahtera. Growth performance was measured based on body weight over several observation periods, namely birth weight (BB0), 1-month-old weight (BB1), 2-month-old weight (BB2), and 3-month-old weight (BB3). The study was conducted on Boer goat breeds from the same farm.

The research data were analyzed using descriptive statistics in the form of average values (mean) and standard deviation (SD). Descriptive analysis was used to provide an overview of the growth performance of Boer goat offspring based on birth type. This analysis was used to describe calf growth data for each birth group: singletons, twins, and triplets, but not to test for differences between groups.

Data processing was performed by first grouping the data based on birth type. Weighing data for weight 0, weight 1, weight 2, and weight 3 were separated into singleton, twin, and triplet birth groups. Next, the average value was calculated for each group by summing all the body weights of the calves in one group and then dividing by the number of samples in that group. The average value was used to describe the average body weight of calves in each observation period.

Standard deviation is used to describe how far the variation in body weight of young animals deviates from the average value. The standard deviation is calculated by subtracting the average value from each data point, squaring the result, adding all the squared results, dividing by the number of data points minus one (n-1), and then calculating the square root of the result. The mean and standard deviation values obtained from each group are then used to interpret the growth performance of young animals based on birth type.

The statistical analysis results were then interpreted to explain the growth performance of calves based on birth type. These results were used to draw conclusions about the growth performance of Boer goat breeds from birth to weaning at CV. Raman Farm Sejahtera and to formulate recommendations based on the research findings.

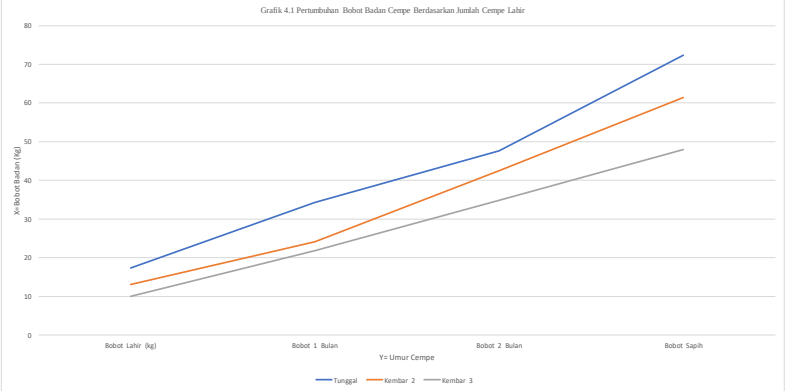
III. RESULTS AND DISCUSSION

Body Weight Growth of Calves Based on the Number of Calves Born

Table 1. Growth of Body Weight of Chicks Based on Number of Chicks

Group	N	Weight Lfinal (kg)	Weight 1 Month	Weight 2 Month	Weight Weaning
Single	5	17,29	4.28	47.64	72.38
Twins 2	5	13,08	17,29	42.53	61.38
Triplets	5	9,98	21,83	34,86	48

Based on the data table above, there is a tendency for differences in the growth patterns of Boer goat offspring in each group of litters born, namely: Single (n=5), twins (n=5), and triplets (n=5). Observations were made from birth weight (BB0) to weaning weight at 3 months of age (BB3). Overall, the descriptive data in the table shows that all groups experienced an increase in birth weight up to 3 months. The single group tended to maintain a higher body weight throughout the observation period, while the triplet group showed a relatively low body weight. Meanwhile, the twin group showed a growth pattern close to the single group, especially at 2 months of age. Birth type refers to the number of offspring born by a doe in a single birth. Based on the number of offspring produced, birth types can be divided into single births, twins, and triplets. Yudi Atabaniy., (2021). The birth of twins in livestock can be influenced by several factors, including disturbances in the quality and quantity of reproductive hormone secretions, such as Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), and estrogen in females. Furthermore, this phenomenon can also occur due to abnormal zygote cell duplication (Davis, 2017).



Based on Graph 1, the weight gain of Boer goat crossbred calves in all birth groups increased from birth to weaning. This indicates that calves grow continuously during the pre-weaning period, indicated by increasing weight with age.

The singleton-born group exhibited the highest body weights across nearly all observational ages. The singleton-born group's body weight increased from 17.29 kg at birth to 34.28 kg at 1 month, 47.64 kg at 2 months, and reached 72.38 kg at weaning. This increase indicates that singleton-born calves exhibited good growth performance throughout the observation period.

The twin group also experienced an increase in body weight, from 13.08 kg at birth to 24.1 kg at 1 month, 42.53 kg at 2 months, and 61.38 kg at weaning. Meanwhile, the triplet group had the lowest body weight at each observation age. This group's body weight increased from 9.98 kg at birth to 21.83 kg at 1 month, 34.86 kg at 2 months, and 4.8 kg at weaning. Despite the increase in body weight, their growth was still below that of the singlet and twin groups.

Overall, the graph shows that all groups experienced an increasing growth pattern from birth to weaning. Fur ther more, there was a tendency for singletons to have higher body weights than twins, although at 2 months of age, the twin group showed slightly higher body weights. These results illustrate differences in growth patterns between groups based on the number of twins born.

Weight gain

There is a table of data on body weight gain (PBB) of goats from the age groups 0 to 1 month, 1 to 2 months, and 2 to 3 months, total body weight gain during the period 0–3 months, and daily body weight gain (PBBH). Based on the results of observations of 15 goats, the average PBB aged 0–1 months was obtained

at2.65kg, 1–2 months old2.98kg, and 2–3 months of age3.68kg. The average weight gain during the maintenance period reached 9.28 kg, while the average daily body weight gain (DGB) was 0.10 kg/head/day.

These results indicate that body weight gain tends to increase with age. Increased growth at 2–3 months of age indicates that the goats are in an optimal growth phase, enabling them to utilize feed nutrients more efficiently to support tissue growth. Inadequate nutrition will result in a decrease in the number of offspring produced.

Statistical Analysis Results

Statistical analysis was carried out to determine the type of birth on the weight of the calf at birth (BB0), 1 month of age (BB1), 2 months of age (BB2), and 3 months of age (BB3).

The analysis stage begins with descriptive analysis using the mean and standard deviation to provide an overview of the data characteristics in each treatment group.

1. Mean and Standard Deviation Analysis

Descriptive analysis was conducted to describe the mean and standard deviation of calf weight based on birth type, namely: single, twins, and triplets, from birth to 3 months of age (weaning). The mean shows the trend in body weight for each group, while the standard deviation describes the level of data variability within each group. The results of the mean and standard deviation calculations are presented in the table below.

Table 2. Results of Calculation of Average and Standard Deviation

TiBirth	BB0 (Kg)	BB1 (Kg)	BB2 (Kg)	BB3 (Kg)
Single (n=5)	3.45 ± 0.14	6.85 ± 0.20	9.52± 0.29	14.4 ± 0.29
Twins (n=5)	2.61 ± 0.18	4.82 ± 0.11	8.50± 0.17	12.2 ± 0.26
Triplets (n=5)	1.99 ± 0.10	4.36 ± 0.10	6.97± 0.25	9.60±0.17

Description:

The average order at each age is: Single > Twins 2 > Triplets

Based on the table, it is known that the average mean body weight of chicks at each observation age shows a consistent pattern, namely: single-born chicks have the highest body weight, followed by twin-born chicks, and triplets have the lowest body weight. At birth, the body weight of single-born chicks is 3.45 ± 0.14 kg, higher than twin-born chicks of 2.61 ± 0.18 kg and triplets of 1.99 ± 0.15 kg. The results of the study show that the more children born in one birth, the lower the birth weight of chicks tends to be.

At the age of 1 month (BB1), the average body weight of single-born chicks increased to 6.85 ± 0.20 kg, while twin-born chicks reached 4.82 ± 0.11 kg, and triplets 4.36 ± 0.10 kg. The same pattern is still visible, namely: the highest body weight is possessed by single-born chicks, followed by twins, and triplets.

At the age of 2 months (BB2), the average body weight of single-born chicks was 9.52 ± 0.12 kg, higher than twin births of 8.50 ± 0.17 kg, and triplet births of 6.97 ± 0.25 kg, this study shows that differences in body weight between birth types are still visible up to the age of two months.

Furthermore, at the age of 3 months or weaning age (BB3), the average body weight of single-born chicks reached 14.47 ± 0.29 kg, while twins were 12.2 ± 0.26 kg, and triplets were 9.60 ± 0.17 kg. The results of this study indicate that single-born chicks have better body weight growth than twins or triplets until weaning age.

From single births, twins, and triplets up to 3 months of age as a whole, the standard deviation value in each group is relatively small compared to the average value. This condition indicates that the body weight of each group of calves is quite uniform, so that the results of the descriptive analysis have a good level of representation of the population and sample. Then, the order of average body weight at all observation ages remains consistent, namely: single birth > twin birth 2 > triple birth. The results of this descriptive analysis provide an initial picture that the type of birth is suspected to influence the body weight of calves from birth to 3 months of age or weaning age.

2. Body Weight Tendency Differs in Each Group

Based on the results of the Mean ± SD, each group has a tendency in body weight, because the number of chicks born affects the availability of nutrition from the womb to the breastfeeding period.

A. Newborn group

Differences in birth weight trends are thought to be related to the number of fetuses carried by the mother during pregnancy. In singleton births, all the nutrients and uterine space are utilized by one fetus, resulting in optimal fetal growth and higher birth weights. Conversely, in twin and triplet births, maternal nutrients and uterine space must be shared among more than one fetus. As a result, each fetus receives relatively fewer resources, resulting in lower birth weights.

B. Group BB 1 (Single Birth)

Group B1 had the highest average body weight at each age observed. This is likely because the mother carried only one fetus, allowing all the nutrients received during pregnancy to be utilized by that single calf. After birth, the single calf also received its mother's milk without having to share it with siblings. This condition resulted in more optimal growth, resulting in faster weight gain compared to the other groups.

C. Group B2 (Twin Birth 2)

Group B2 showed a lower average body weight than B1, but higher than B3. This is likely because during gestation, the two fetuses must share uterine space and nutrients from the mother. After birth, the two calves also share the mother's milk production. However, the small number of calves still allows each calves to receive sufficient nutrition for proper growth.

D. Group B3 (Triplets)

Group B3 had the lowest average body weight across all observation ages. This is likely because the three fetuses had to share space and nutrients during development in the womb. After birth, the three fetuses also had to share their mother's milk, reducing the amount of nutrients each individual received. As a result, weight gain was slower than in the singleton or twin groups.

Discussion of Research Results on Goat Crossbreed Growth Performance

Boer Based on Number of Calfs to Weaning

Based on the results of descriptive analysis using mean and standard deviation values, it is known that the type of birth affects the growth performance of Boer goat off spring from birth to weaning age. The single birth group had the highest average body weight across all observation ages, namely birth weight of 3.45 ± 0.14 kg, 1-month-old weight of 6.85 ± 0.20 kg, 2-month-old weight of 9.52 ± 0.12 kg, and weaning weight of 14.47 ± 0.29 kg. The twin group had lower average weights of 2.61 ± 0.18 kg, 4.82 ± 0.11 kg, 8.50 ± 0.17 kg, and 12.27 ± 0.26 kg, respectively, while the triplet group showed the lowest values of 1.99 ± 0.15 kg, 4.36 ± 0.10 kg, 6.97 ± 0.25 kg, and 9.60 ± 0.17 kg. These data show a consistent order of growth performance, namely singleton births > twins > triplets. This difference is caused by the number of fetuses during gestation. In a singleton birth, all the nutrients from the mother are utilized by one fetus so that development takes place more optimally. Conversely, in twins and especially triplets, nutrients and space in the uterus must be shared by more than one fetus, resulting in lower birth weights. After birth, this condition continues because the mother's milk production must also be divided among several calves, so the growth rate until weaning is lower.

Besides being influenced by birth type, weight gain is also influenced by feed quality, husbandry management, the health of the animals, and the ability of the sows to produce milk. Although the twin group had lower body weights, all groups continued to increase in weight from birth to weaning. This demonstrates that the intensive husbandry system at CV. Raman Farm Sejahtera has been able to support optimal calf growth.

The relatively small standard deviation values across all groups indicate low body weight variation among individuals. Therefore, the research data can be said to be sufficiently homogeneous that the average values obtained adequately reflect the actual condition of each group.

Comparison of Research Results with Previous Research

The findings of this study are consistent with the results of research conducted by [16] regarding the production performance of crossbred Boer goats in the pre-weaning phase. The study reported an average birth weight of 2.72 ± 0.62 kg, a weaning weight of 12.30 ± 1.60 kg, and a daily weight gain of 106.2 g/head/day. The researchers concluded that pre-weaning performance is influenced by genetic factors and husbandry management.

When compared with this study, the single-born group had a higher birth weight (3.45 kg) and weaning weight (14.47 kg) than the results of the study [16]. This difference is thought to be because this study used single-born calves which received more optimal nutrition during pregnancy and the breastfeeding period.

This research is also in line with research [17] regarding the performance of Boerawa goats based on birth type. The study showed that birth type influences weaning weight and body weight gain, where single-born goats have better production performance than goats born with twins or triplets.

The results of this study strengthen these findings because the order of growth performance obtained also shows the same pattern, namely singletons > twins > triplets.

Furthermore, research [18] reported that Boerlok F1 goats had relatively uniform body weights between males and females at the weaning phase, indicating that good husbandry management was able to produce uniform growth performance. This research also obtained small standard deviation values across all groups, indicating that body weight variation between individuals was low and growth was relatively uniform within each group.

Overall, the results of this study are consistent with several recent studies that suggest that birth type is a major factor influencing calf growth performance from birth to weaning. The greater the number of calves in a litter, the greater the competition for nutrients during gestation and lactation, resulting in lower body weights.

Research Limitations

This study has several limitations that need to be considered when interpreting the results. The relatively limited sample size of 15 goats means that the results reflect the population conditions at the study site and are not representative of the general population of Boer goats. Furthermore, the study used only one site, CV. Raman Farm Sejahtera, so comparisons cannot be made between environmental factors, husbandry systems, and management practices at other farms.

IV. CONCLUSION

This study shows that the type of birth is related to the growth performance of Boer goat offspring from birth to weaning at CV. Raman Farm Sejahtera. Based on descriptive analysis, the single-birth group had the highest average body weight throughout the observation period, namely 3.45 ± 0.14 kg at birth, 6.85 ± 0.20 kg at 1 month of age, 9.52 ± 0.12 kg at 2 months of age, and 14.47 ± 0.29 kg at 3 months of age. The twin group showed average body weights of 2.61 ± 0.18 kg, 4.82 ± 0.11 kg, 8.50 ± 0.17 kg, and 12.27 ± 0.26 kg, while the triplet group had the lowest values, namely 1.99 ± 0.15 kg, 4.36 ± 0.10 kg, 6.97 ± 0.25 kg, and 9.60 ± 0.17 kg. Thus, there is a consistent trend in growth performance, namely single births > twins > triplets. The relatively small standard deviation value indicates that the variation in body weight between individuals in each group is relatively low. Practically, these results can be informative for farm managers in monitoring the growth of calves based on birth type and paying attention to nutritional adequacy, maintenance, and environmental conditions during the pre-weaning period.

This study has limitations in the form of a relatively limited sample size of 15 goats, and was conducted at only one research location, so the results cannot be generalized to the entire Boer goat cross population. Furthermore, the study used descriptive statistical analysis, so the results obtained illustrate trends in growth performance, but did not test the significance of differences between birth types. Future research is recommended to use a larger sample size, involve several farm locations, and consider factors such as feed, milk production, sex, health condition, and husbandry management in a more measurable manner. Further research can also use inferential statistical analysis to examine differences in growth performance between birth types in more depth. The results of this study can be used as initial information in managing goats and evaluating growth performance based on the number of kids in a single birth.

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