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Qualitative and Quantitative Characteristics Analysis in Texel Crossed , Dorper and Fat Tailed Sheep

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ABSTRACT: The aims of present study was to evaluate the qualitative and quantitative characteristics of imported sheep such as Texel crossed and Dorper sheep, compared with local sheep (Fat Tail Sheep/FTS) in almost the same region, namely Pujon and Karangkates. This research was a field research with case study methods and research materials as many as 39 for Texel crossed sheep, 19 for Dorper sheep and 37 for FTS. The age of the sheep ranges from 1.5 to 3 years (some have their first calf). Qualitative data were analyzed by Population Genetics Analysis and quantitative data were analyzed by One-Way Design Anova using Minitab software version 13. The results showed that: (1) Qualitative traits in Texel crossed , Dorper and FTS sheep showed that some traits underwent fixation where one of the traits was fixed. One allele in Texel crossed and Dorper sheep has disappeared and no longer exist in its origin place such as horned and hornless traits, white body color and black head, erect ears, while in FTS sheep it is still polymorphic, especially in the hornless and drooping ears in FTS. The white color on the FTS seems to have been fixed, because the dominant gene frequency/ p = 1 and the recessive gene frequency/ q = 0. (2) The quantitative traits such as body weight, in which the body weights of the Texel crossed , Dorper and FTS breed were different in the study, and the Dorper sheep the highest body weights, while the body weights of Texel crossed and FTS sheep were almost the same. Dorper sheep had the highest head index, and Texel crossed sheep and FTS sheep had the same head index. It was concluded that Texel crossed and Dorper sheep had many fixed qualitative characteristics such as horns, erect and drooping ears, white body color and black head in FTS sheep were quite polymorphic in horns and erect and drooping ears. The best growth of Dorper sheep because Dorper sheep was originated from a crossing between Dorset and Black Persian sheep.

Keywords: Texel crossed sheep; Dorper sheep; Fat Tailed Sheep; Population Genetics; Heterosis

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INTRODUCTION

Indonesia is known as a country with high biodiversity. There are many nations of both animal and plant species, as well as many nations within the same species. This high biodiversity is caused by the high rainfall and the variety of plant species. Within the diverse population there are also groupings of native, local and imported livestock, for cattle, goats and sheep. Imported sheep that have arrived in Indonesia, such as Dorper and Texel crossed sheep. Texel crossed sheep is a type of native sheep from the Netherlands. It actually comes from the island of Texel crossed , the largest island on Wadden Island off the north coast of the Netherlands. The origin of the original breed is unknown, but it is thought to be the result of crossing several breeds of British sheep.

Texel crossed sheep is a very muscular breed of lamb, and produces lean meat (Anonymous, 2021). Dorper sheep bred in South Africa, were first bred as a combination of Blackhead Persian and Dorset Horn. Is a sheep meat, wool and milk. Dorper sheep are unique in that they are raised for goat meat (not just lamb). Because they have a long breeding season, herders with little experience can often breed several times each year. This makes the Dorper breed one of the most economical in terms of meat production. Dorper sheep can give birth up to 3 times every 2 years, with an interval of about 8 months. Dorpers are known for their fertility and good nurturing instincts.

With quite adaptive traits, Texel crossed and Dorper sheep are very suitable to be developed in areas in Indonesia with various types of distinctive ecosystems, some are hilly, have cool temperatures and some are dry and hot. Dorper is very suitable to be kept in the Pujon area, Malang Regency, which has cool air. As relatively new imported livestock, it is necessary to conduct an assessment of Texel crossed and Dorper sheep regarding their suitability with local environmental conditions. Observations on qualitative and quantitative characters need to be done to analyze their adaptability, especially quantitative characters. On the other hand, qualitative characteristics are also important to see to what extent the authenticity of these sheep breeds is by comparing them with their original characteristics. In West Java, Garut sheep are crossed with Dorper sheep to produce sheep that can produce lean meat. The results of crosses with local sheep showed satisfactory results, especially because of the high body weight gain. Thus, it is necessary to investigate the phenotypic variation of qualitative and quantitative characters in Texel crossed and Dorper sheep in the Pujon area, which is known for its areas with sufficient feed availability and cool air temperatures.

At the research location, there are also fat tail sheep (FTS) which are kept together with Dorper and Texel crossed sheep. With relatively similar environmental conditions, a comparison of qualitative and quantitative characters was carried out to evaluate the adaptability of the three breeds of sheep. FTS sheep as local sheep also need to be measured and evaluated considering there is a great opportunity for crosses between the three breeds of sheep. This is because crossbreeding has been widely practiced by the community considering that both the Texel crossed and Dorper breeds are sheep with good meat producers. FTS crossbreeding will obtain a heterosis effect on livestock. Heterosis or Hybrid Vigor is a condition in which children in the first generation (F1) from crosses have advantages over the average of both parents (Maylinda, 2010)

MATERIALS AND METHODS

Research was done at Pandesari village, Pujon subsdistrict, District of Malang.

Variables were observed in this research were (1) Qualitative characteristics such as the existence of horn, wool color, erect ear or drooping ear, and (2) quantitative characteristics such as body weight, linear body measurements that such as chest girth, body height, body length. Data collected directly in the field by measurements on body weight, chest girth, body height and body length using data collection in the field using body scales. a ruler and measuring tape.

Data Analysis

1. Qualitative data were analyzed using Population Genetics-based calculations, namely calculating the gene frequency of horned/non-horned traits and wool color. The formula used was to calculate the frequency of the dominant gene for the single locus, where p is the frequency of the dominant gene and q is the frequency of the recessive gene. Then the diversity is evaluated with the following formula:

$PIC_i = 1 - \Sigma p2_{ij}$ where PICi is the amount of diversity/polymorphism at the i-th locus (horned/horned locus and black/nonblack wool locus), p_{ij} is the frequency at the j-th allele and the i-locus (Maylinda, 2011), To test whether the population is in a state of equilibrium with Hardy Weinberg, the Chi Square Test is carried out, if the chi square test is significantly different, it means that the population is in an unbalanced state according to Hardy Weinberg's Law.

2. Quantitative data were analyzed using One Way Anova to compare body weight data in FTS, Texel crossed and Dorper breeds with the assumption that the sheep were kept in relatively the same environment. Statistical analysis was carried out with the help of Minitab software version 13. The mathematical model of data analysis used was as follows:

Yij = + ai + eij where Yij is the observed value in the i-th nation and the j-th individual and ai is the effect of the i-th sheep breed and eij is the error in the i-th and j-th individual observations.

RESULT AND DISCUSSION

General condition of research location.

The research was conducted in two locations, namely in Pujon (Texel crossed and Dorper sheep) and Karangkates (Fat Tailed Sheep/FTS). Environment conditions of the locations are almost the same. Pujon subdistrict is a part of Malang district. This subdistrict consisted of 10 villages. The 10 villages in this sub-district are Bendosari, Madirdo, Ngabab, Ngroto, Pandesari, Pujon Kidul, Pujon Lor, Sukomulyo, Tawangsari, and Wiyurejo. Administratively, Pujon subdistrict is surrounded by other sub-districts in Malang district. To the north, Pujon Village is directly adjacent to Mojokerto Regency. While in the east, this sub-district is directly adjacent to Batu City. To the south, Pujon District is bordered by Wonosari subdistrict and Blitar District. In the west, this sub-district is also bordered by Ngantang subdistrict. Based on the official website, Pujon District has an area of 13,075.144 Ha. This district is located at an altitude of 1,100 meters above sea level. The air temperature in this sub-district ranges from 18 degrees to 20 degrees Centigrade. Meanwhile, the average rainfall reaches 21,400 mm per year. Pujon subdistrict still has a natural environment that is still maintained and is a tourist destination. The famous tourist attractions include the Coban Rondo Tourism Wana and Dewi Sri Baths. In addition, there were tourist attractions that are no less interesting even though they were not known to the public, namely Watu Gilang Religious Tourism in Ngabab Village, Madiredo Lake, Semedi

Lake, Coban Sriti in Madiredo Village Including Darungan Apple Tour in Madiredo Village and Coban Tretes in Bendosari Village. The average daily temperature was around 21º C, humidity is 95% and the wind speed was 3 km per hour.

Climatic conditions in Karangkates indicated by rainfall, where the rainy months occur from October to May which ranges from 179.40 mm to 742.60 mm or 2,531.9 mm per year. Average daily air temperature 26 , humidity 90% and wind speed 3 km/hour (BPS, 2015). Based on the analysis of climatic and geographical conditions, it seems that Pujon and Karangkates are not too much different in temperature and humidity. Only the rainfall was slightly different, where in Pujon the rainfall was higher than Karangkates.

Qualitative characteristics analysis

In livestock, the qualitative traits generally gave the livestock characteristics, including the presence or absence of horns, body and head color, ears erect or drooping. All of these characteristics were also observed in this study in Texel crossed , Dorper and Fat Tailed Sheep (FTS). The analysis carried out was population genetics where the frequency of gene or allele was calculated, Hardy Weinberg balance test using the Chi Square test. From the Chi Square test seems that all the qualtitative traits allele frequency in all sheep breed were not in Hardy Weinberg equilibrium. That's mean that in all breed too many selection activity were done by the farmer to select the horned, erect ear, white body color sheep to have more reproductive activity and having progeny than hornless, droopy ear, colored body sheep (see table 3). The genetic analysis of the population of the sheep at the research site is as follows.

Texel crossed sheep vs dorper sheep vs fat tail sheep (fts)

The result of data analysing for qualitative traits Texel crossed sheep, Dorper sheep and FTS has been showed at Table 3.

Table 3. Result of equation of allele frequency, Chi Square analysis for Hardy Weinber equlibrium analysis.

Breed of sheep	N	Dominant allele frequency (p)	Recessive allele frequency (q)	PIC (%)	Chi Square Test result
Texel crossed : Horned/ hornless	43	0	1	1	Cannot be analyzed, hornless traits are fixed (lost from the population in their place of origin)
White body color	43	0.49	0.51	0.2499	Hingly significant (P< 0.01)
Erect/ droopy ear	43	1	0	0	Cannot be analyzed, erest ear traits were fixed (droopy ear lost from the population in their place of origin)
Dorper : Horned/ hornless	19	0.32	0.68	0.2176	Highly significant (P<0.01)
White body color	19	0.54	0.46	0.2484	Highly significant (P<0.01)
Erect/ droopy ear	19	1	0	0	Cannot be analyzed erect ear traits are fixed (droopy ear lost from the population in their place of origin)
FTS ; Horned/ hornless	37	0.23	0.77	0.161	Significant (P < 0.05)
White body color	37	1	0	0	Cannot be analyzed , the white body has been fixed, the non white color has disappeared from the population
Erect/ droopy ear	37	0.43	0.57	0.2451	Highly significant (P<0.01)

Quantitative characteristics analysis

Body weight

For quantitative traits analyzed here are body weight and head indexes (ratio between the width and length of head). Here are the comparison of, the body weight of Texel crossed , Dorper and FTS sheep. as shown in Table 4.

Table 4. Results of data analysis with One-Way Anova body weight of Texel crossed , Dorper and sheep

FTS

Breed of sheep	N	Body weight mean ± SD (kg)	CV (%)
Texel crossed	37	26.78 ± 6.25 [a]	23.33
Dorper	16	52.56 ± 12.80 [b]	24.35
FTS	37	28.72 ± 7.70 [b]	26.81

Note: different superscripts in the same column showed highly significant differences (P<0.01), SD = standard of deviation, CV = coefficient of variation, FTS = Fat Tail Sheep

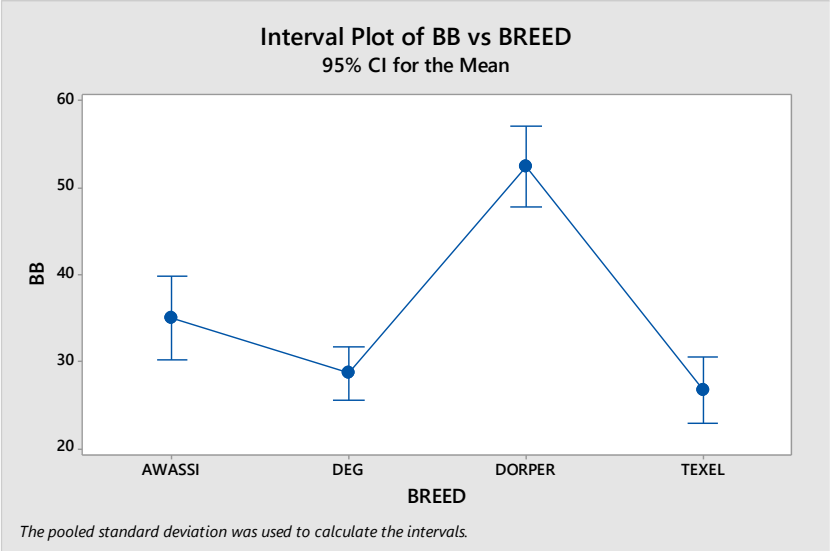

Figure 1. Body weight comparison of Texel crossed , Dorper and FTS sheep in reseacrh location

Head Index

In the calculation of the Head Index, which was obtained by calculating the ratio between the width and length of the cattle's head (Pradana, 2015). Likewise described by Karimi, Onar, Pazvant, Hadipour and Mazaheri (2011) can also be used to study the closeness of livestock breeds. The calculation results can be seen in Table 5.

Table 5. Average Head Index of the sheep breeds studied at the research location

Breed of sheep	Head index ± SD	CV (%)
Texel crossed	0.6273 ± 0.07 [a]	11.16
Dorper	0.8372 ± 0.12 [b]	14.33
FTS	0.5947 ± 0.06 [b]	10.09

Note: different superscripts in the same column showed highly significant differences (P<0.01), SD = standard of deviation, CV = coefficient of variation, FTS = Fat Tail Sheep

In this case, the Dorper sheep head index shown the highest, as possessed by exotic sheep. Figure 2 shows a significant difference between Dorper sheep compared to FTS and Texel crossed , this is presumably due to the age difference because Texel crossed sheep range in age from 1 - 3 years while Dorper sheep range from 2 - 4 years, while the FTS age range is almost the same as Dorper sheep. The head index of the Dorper sheep in this study was much higher than that of the Mehraban sheep from Iran (52.78%). While the FTS Head Index is almost the same as the Mehraban Sheep Head Index as found by Karimi, Onar, Vazvant, Hadipour and Mazaheri (2011).

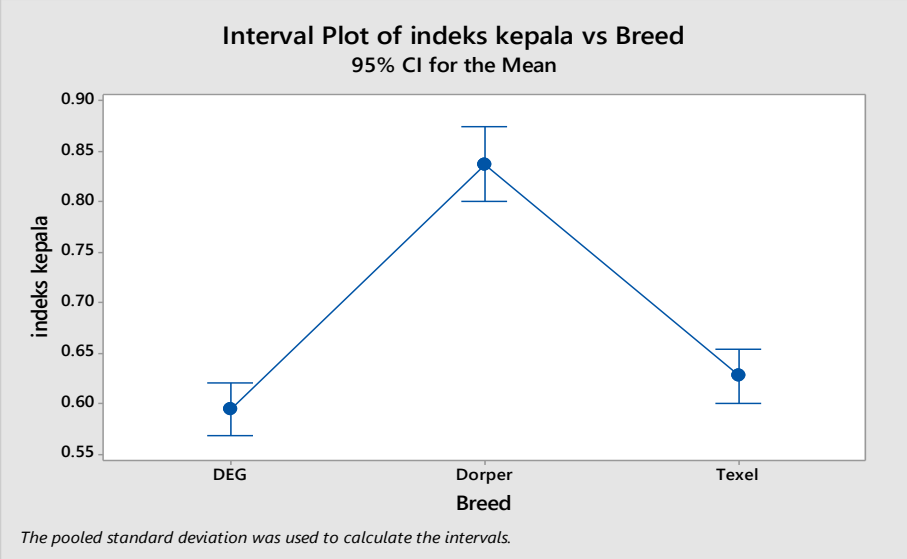

Figure 2. Texel crossed , Dorper and FTS Sheep Head Index Comparison in Locations

CONCLUSIONS

It was concluded that:

1. Texel crossed and Dorper sheep have qualitative characteristics that have been largely fixed and alternative alleles have been lost in their original populations such as horns, erect and drooping ears, white body color and black head, while FTS sheep are quite polymorphic in horn and horn traits and ears erect and drooping.

2. The growth of Texel crossed and FTS sheep was the same at the study site, and Dorper sheep were the best because of the heterosis effect of the cross, because the Dorper sheep was a cross between Dorset and Black Persian sheep. The head index of Dorper sheep in this study was the highest, while Texel crossed and FTS sheep had the same head index.

3. Dorper sheep head index is highest compared to FTS and Texel crossed sheep. This includes a fairly high head index.

REFERENCES

Anonymous, 2007. Better sheep ideal for lamb market. Farmers Weekly - Farming & Anonymous. 2021. Texel crossed Sheep Society. https://Texel crossed .uk/

Anonymous. 2016. Permentan 47-2016 tentang Pedoman Penyusunan Program Penyuluhan Pertanian.

Karimi, I, V. Onar, G. Pazvant, M. Hadipour and Y. Mazaheri. 2011.Cranial Morphometric and Morphologic Characteristicsof Mehraban Sheep in Western Iran. Global Veterania 6 (2) : 111-117.

Maylinda, S. 2010. Pengantar Pemuliaan Ternak. UB Press. ISBN 978-979-8074-39-4

Maylinda, S. 2011. Genetic polymorphism of growth hormone locus and its association with bodyweight in Grati dairy cows. International Journal for Biotechnology and Molecular Biology Research Vol. 2(7), pp. 117-120.

Pradana, API, W. Busono dan S. Maylinda, 2015. Characteristics of Madura Cows in Different Altitudes at Pamekasan. J. Ternak Tropika Vol. 16, No.2: 64-72.