SUPPORTING PAPERS
ISBN 979-97243-9-2

SOME FACTORS AFFECTING THE WEIGHT GAIN OF GRAZING SHEEP IN PALU VALLEY'S RANGELANDS

K. Kasim, A. L. Amar, and M. H. Husain

Tadulako University Palu 94118 Central Sulawesi, Indonesia

ABSTRACT

This study, lasted for 12 weeks, was conducted at 7 villages in Palu, 4 of which were located in sub-district of East Palu while the other 3 were in that of South Palu. The objective of the study was to examine factors that contributed to the live weight changes of sheep grazing on the rangelands of those villages. The sheep to be involved in this study were initially screened from all the sheep owners found in the villages having at least 20 sheep per owner. Randomization was then performed in such a way to form 15 farmer groups with a total animal number of 300 (20 sheep per group) which were proportionally distributed in all villages. The 20 animals per group were divided into 2 sub groups (10 animals each) to receive either one of the following two treatments: supplementation with rice-bran (250 g/animal/d) or control (no supplementation). All the animals were treated for possible worm infestation (2 piperazine capsules/animal) before beginning the study. The rice-bran supplement was offered to the animals daily in the morning before they were allowed to graze normally. Intake of the supplement was recorded daily while changes of the animals' body weight were measured weekly. An analysis of variance was applied to test effects of perceived contributing factors (animal genotype, animal sex, study site and rice-bran supplement) on body weight changes of the animals. At the end of the study, there were only 292 animals available for analysis; 8 animals were dead or sold by their owners. Results showed that the body weight gain of the sheep was significantly ($P<0.05$) affected by all the factors considered, except for the effect of animal genotype. However, these 4 factors shared only 24.0% contribution in affecting the animal weight gain (genotype 0.12%, sex 4.68%, rice-bran fed 7.12%, and village 11.99%). Body weight gain of the local fat-tailed sheep did not differ ($P>0.05$) to that of the crossed fat-tailed x merbas breed indicating a need to reconsider the cross breeding program on this indigenous local breed.

Keywords: genotype, sex, rice-bran, village

INTRODUCTION

In Central Sulawesi, about 99 percent of the total sheep population is concentrated in areas around Palu Valley, and 51 percent of this is found in two sub districts belonging to Palu Municipality, i.e. East and South Palu. The population is composed of the indigenous Donggala fat tailed sheep and its crossing with the Merbas (Merino x Gibas) breed. Rams of the latter breed was introduced by government in 1986 to the area with an intention to increase the overall performance of the local breed.

SUPPORTING PAPERS
ISBN 979-97243-9-2

The general sheep production system applied by owners in this region is extensive in nature in which the sheep are allowed to graze on communal grazing fields during the day, from 09.00 to 17.00h, before the animals are returned to their confinements near the owners' households. Feed supplements are rarely provided to the animals and they thus depend solely on nutrients available on grazing fields. The levels of animal production are generally low because of low nutrients availability on the fields. This is partly due to the low rainfall rates in the area which Amar and Tarsono (2003) recorded in 1999, for example, that there were only two wet months in that year with a total rainfall of 644 mm. Thus, Duma (2001) reported that the daily live weight gain of the local breed and its crossing were 47.8 and 43.1 g, respectively. Higher daily live weight gain for the two breeds was reported by Amar *et al.* (2005), i.e. 65.1 g without feed supplement or 82.8 g when the animals were supplemented with rice bran. Information on the growth of the local breed under various controlled dietary conditions may be found in other reports (Djafar, 1991; Rosyid, 1992).

In grazing-based animal production system, some techniques may be done to increase the quantity and quality of feeds available to the animals. These include provision of feed supplements (Winter *et al.,* 1990; Coates, 1994), increasing forage production through fertilization (Rayment and Helyar, 1980; Coates, 1994), increasing the grazing space through forest and woodland clearances (Gillard *et al.*, 1989; Cook and Ratcliff, 1992), and introduction of quality forages and legumes (Winter *et al.,* 1989; Shelton 1990). Each of these techniques possesses its respective advantages and disadvantages and its application will depend on the current conditions of the grazing lands.

Despite that the dietary factor plays a significant role in determining animal production in any husbandry system, other factors are also important. This study was intended to explore contributing effects of factors such as animal genotype, sex, grazing site and a feed supplement on the live weight changes of sheep under grazing-based sheep production system applied by farmers in Palu Valley.

MATERIALS AND METHODS

Sites and duration of the study

This study, lasted for 12 weeks, was undertaken at seven villages (grazing areas); four of which (Lasoani, Poboya, Talise, and Tondo) were located in the Sub District of East Palu while the other three (Kawatuna, Petobo, and Tana Modindi) were in that of South Palu. These villages were selected as study sites on the basis that it was where the sheep were found in high populations.

Animals

Animals to be involved in the study were first randomly selected from the sheep population in the seven villages. These animals had been grazing for about 1 year and belonged, as shown phenotypically, to either the local pure breed or its crossbred. At each site, groups of 20 animals were formed randomly without considering sex, genotype, and age or body weight of the animals which resulted in a total of 205 groups. Next, the group number was reduced to 15 groups (300 sheep) and these were

SUPPORTING PAPERS
ISBN 979-97243-9-2

proportionally distributed in the seven villages. The final groups distribution was: 1 group in Lasoani, 4 in Poboya, 2 in Talise, 1 in Tondo, 4 in Kawatuna, 1 in Petobo and 2 in Tanah Modindi.

Each of the 15 groups was then randomly divided into 2 subgroups, each with 10 animals to receive one of the two experimental treatments: without feed supplement or supplemented with rice bran prior to grazing time. There were only 292 animals available for data collection because the remaining animals were dead, lost or sold by their owners. During the experiment, the animals were allowed to remain and graze together with their original herd.

Research procedure

The study consisted of three steps. First, preparatory step in which animals were numbered, grouped randomly as explained above and given 'piperazine' (2 capsules per animal) to treat possible worm infestation. Second, animals receiving the rice bran supplement were accustomed to it for one week, and third, data were collected for eight weeks.

The rice bran was offered to the supplemented animals in the morning at about 08.00h before the animals and their counterparts (unsupplemented animals) allowed to graze as usual. These animals were usually released by their owners to graze at 10.00h and returned to their confinements at about 17.00h. The rice bran dry matter contained (%) 7.75 crude protein, 3.88 crude fats, 26.88 crude fibres, 44.36 nitrogen free extracts and 17.13 ashes. It was offered individually at a rate of 250 mg per animal per day after mixing it with a small amount of salt solution. Refusal of the supplement was recorded.

Body weight changes of the animals were recorded weekly at about 07.00h in the morning prior to offering the rice bran supplement. Body weight gain was calculated as the difference between initial body weight at the beginning of data collection and the final weight at the end of this period and expressed as gram per animal per day.

Data analysis

Since the animal body weight changes would have not only been affected by the rice bran supplement but also by the animal genotype, sex and grazing site, a one-way analysis of variance was applied to test effect of each of the factors on the animal body weight gain. A multi variant analysis (analysis of covariance) was also applied to test the combined effect of these factors on body weight gain.

RESULTS AND DISCUSSION

Means of the animal body weight gain during the study as affected by animal sex, genotype, rice bran supplement and study sites are presented in Table 1. Animals receiving the rice bran significantly gained higher body weight (P=0.000) than those not receiving the supplement and this was consistent for both the local and crossbred sheep. The body weight gains of rams were also always significantly higher (P=0.004) than those of dams irrespective of the presence of supplement. The effect of breed on body weight changes, however, was insignificant (P>0.05), i.e. the weight gained by the local breed remained similar to that of crossbreed.

SUPPORTING PAPERS
ISBN 979-97243-9-2

Table 1. The effects of sex, genotype, rice-bran and sites on daily body weight gain (g/day/animal) of sheep

Affecting factors	Body weight gain*
Sex:	
Male	82.11 a
Female	70.02 b
Genotype:	
Local breed	71.34 a
Crossbreed	75.32 a
Supplement:	
No supplement	66.07 b
Supplemented with 250 g rice-bran/animal/d	82.84 a
Village:	
Kawatuna	86.83 a
Petobo	84.37 a
Lasoani	79.79 ab
Tanamodindi	73.50 bc
Poboya	67.86 c
Tondo	67.68 c
Talise	55.27 d

*Different letters following means denote significant differences

Table 2 shows the levels of contributing effect of each factor and its significance on the body weight changes of the animals.

Table 2. The contributing effect of the four factors to the body weight gain of the sheep

Affecting factors	Contribution level (%)	P value
Sex	4.68	0.004
Genotype	0.12	0.495
Rice-bran	7.12	0.000
Villages	11.99	0.000
Total of the 4 factors	23.81	

Duma (2001) also found that there was no difference in body weight gain between the two breeds after weaning despite that the birth weight and the weight changes before weaning of the crossbred was higher than those of the local one.

It is clear that the effects of all the factors on the body weight changes of animals were significant, except for the animal genotype which contributed the least among other factors to the body weight changes and thus was insignificant. It is also obvious that there were some other factors not considered in this study which affected the body weight gain of the sheep since the total contribution of the considered factors was only about 24.0 %. These may include factors such as animal birth weight, weaning weight, initial body weight at the commencement of the study and age including animal owner factor. The results above may indicate that the crossbreeding program designed in the past to increase the performance of local breed has not achieved its goal. The program, therefore, needs to be reconsidered.

SUPPORTING PAPERS
ISBN 979-97243-9-2

REFERENCES

Amar, A.L. dan Tarsono, 2003. Jenis-Jenis Legum Introduksi yang Persisten pada Lahan Kering Penggembalaan ternak di Lembah Palu, Sulawesi Tengah. Makalah Seminar Nasional AINI-IV dan Universitas Diponegoro di Semarang, 23 Oktober 2003.

Amar, A.L., R. Tantu dan M. Hamsun, 2005. Upaya perbaikan produktivitas ternak domba rakyat yang dipelihara pada penggembalaan lahan lering di Lembah Palu. *Jurnal Ilmu-Ilmu Pertanian - Agroland*, 12/4: 396-401.

Coates, D.B., 1994. Effect of phosphorus as fertilizer or supplement on pasture and cattle productivity in the semi-arid tropics of north Queensland. *Tropical Grasslands*, 28: 90-108.

Cook, S.J. and D. Ratcliff, 1992. Effect of tree clearing and seedbeds on the establishment, growth and population dynamics of siratro, green panic and signal grass oversown into a speargrass pasture in south-east Queensland. *Tropical Grasslands*, 26: 171-180.

Djafar, R., 1991. Pengaruh Tingkat Pemberian Tepung Biji Kapuk (*Ceiba petandra* G.) dalam Konsentrat Terhadap Pertambahan Bobot Badan Domba Ekor Gemuk Jantan yang Mendapatkan Jerami Jagung (*Zea mays*) Secara *ad-libitum*. Fakultas Pertanian, Universitas Tadulako, Palu. pp41

Duma, Y., 2001. Performan pertumbuhan domba-ekor-gemuk Palu dan hasil silangannya dengan domba Merbas pada padang penggembalaan Lembah Palu. *Jurnal Ilmu-Ilmu Pertanian - Agroland*, 8/1: 105-109.

Gillard, P., J. Williams and R. Monypenny, 1989. Clearing trees from Australia's semi-arid tropics: production, economic and long term hydrological responses. *Agricultural Science*, 2: 34-39.

Rayment, G.E. and K.R. Helyar, 1980. Estimation of maintenance fertilizer needs. *Tropical Grasslands*, 14: 210-217.

Rosyid, A., 1992. Pengaruh Tingkat Pemberian Dedak Jagung-Urea Terhadap Pertambahan Bobot Badan Domba Ekor Gemuk Jantan yang Diberi Hijauan Jagung (*Zea mays*) *ad-libitum*. Fakultas Pertanian, Universitas Tadulako, Palu. pp59

Shelton, H.M., 1990. Using legumes to sustain pasture systems. *Agricultural Science*, 3: 34-40.

Winter, W.H., J.J. Mott and R.W. McLean, 1989. Evaluation of management options for increasing the productivity of tropical savanna pastures, 2. Legume species. *Australian Journal of Experimental Agriculture*, 29: 613-622