



## Effect of Floor Space Allowance on Growth Performance of Magara Lamb Under *Katcha* Housing System

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### ABSTRACT

The present study was carried out to assess the effect of floor space allowance on performance and behaviour of weaned lambs. Eighteen weaned Magra lambs (Male) the age group of 3-7 months body weight 7-8 kg were randomly divided into three different groups and viz., T<sub>0.8</sub>, T<sub>0.6</sub> and T<sub>1</sub>. The selected lambs were kept into three different groups with different floor space comprising of 6 lambs in each group. Group T<sub>0</sub> (0.8 m<sup>2</sup> floor space/ lamb), Group T<sub>1</sub> (0.6 m<sup>2</sup>/ lamb) and Group T<sub>2</sub> (1 m<sup>2</sup>/ lamb). The feeding and other management practices for all the three groups were similar. The body weight of lambs at 3 and 6 months of age was 13.53, 13.57, 13.75 and 19.09, 18.65, 19.79 kg respectively in Group T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>. The average daily gain and average weekly gain in body weight were 66.22 ± 1.106, 60.44 ± 1.755 and 71.85 ± 0.82 gm/day and 463.47b ± 48.33, 423.05a ± 38.30 and 502.92c ± 42.23 gm/wk in Group T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> respectively. There was significant effect of floor space on average daily gain (P<0.01), average weekly gain (P<0.01) and also on average monthly gain (P<0.05) of Magra lambs. It was concluded that provision of floor space is positively correlated with the growth performance of lambs.

### HIGHLIGHTS

- There was positive significant correlation found between growth rate and morphometric traits in lambs housed in groups with different floor space.
- Provision of floor space was positively correlated with the growth performance of lambs.

**Keywords:** Floor space, growth performance, *katcha* housing, Magra lambs

Housing is essential to animal husbandry and its significance increases as the system changes from extensive to intensive. Raising the animals in intensive production has an impact on the behaviour and productivity of the animals. It is well known that group feeding encourages social interaction, which leads to an increase in feed intake, a more even growth rate, and improved social behaviour in comparison to individually fed animals, feed and water intake, as well as hostile behaviour rise as the number of animals in the pens rises (Van *et al.*, 2007). The accessible floor space to animals affects their feeding, lying, and standing behaviour (Centoducati *et al.*, 2015). It was also observed that inadequate space availability often leads to the development of abnormal behaviour which

can not only be detrimental to oneself but also to other animals in groups (Mason *et al.*, 2007). Therefore, present study was conducted to access the effect of provision of different floor space allowances on social behaviour of Magra lambs.

### MATERIALS AND METHODS

The study was carried at Livestock Research Station,

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### Selection of experimental animals

Total 18 healthy Magra lambs (Male) between the age group of 3-6 months (after weaning) were selected randomly from the same herd of the farm. Selection was based on the physical appearance and to some extent the mortality record data from the respective dams. So the size of the Lambs that were taken for the experiment was of nearly same. The average body weight of the Lambs was between 6-7 kg. They were identified with ear tagging with individual identity number. Before entering to the herd of the experiment, they had undergone for deworming and vaccination.

### About *Katcha* Housing System

The house was made up with mud floor and thatched type of roof. The wall of house is built with bamboo and other wood type material and naturally ventilated. The pens were cleaned daily in the morning and a layer of sawdust was added in the solid resting area to ensure a dry surface. The *katcha* housing system was being prioritized in this experiment so as to equate the type of housing system being practised in India by maximum of small and marginal farmers due to its cost effectiveness with regard to farming.

### Feeding and Management

The roughage like locally available green fodder in chaffed condition was given at the rate of 350 gm twice daily between 8-9 AM in morning and 3-4 PM in evening. Also depending upon the yield, sometime lucerne (250 gm) was also fed. 150 g concentrate daily in the morning and evening also given to the lambs. The amount was gradually increased in relation to the age and body weight. For watering purpose, a round waterer was placed in one corner with slight elevation from the floor. These waterer and feeder were cleaned and washed once on every alternate day.

### Experimental design

The Magra lambs were housed in *katcha* floor housing

system under stall feeding with different floor space for 84 days i.e. 12 weeks. The experiment was started in the month of June and ended in September. So the temperature (40-45°C) and humidity (85-92%) alternations were kept under normal range by pushing attempts like putting dry tree leaves and sprinkling water on the roof depending on the situation. The group size was kept constant of six lambs, but the floor space available for each individual varied from 0.8 m<sup>2</sup>, 0.6 m<sup>2</sup> and 1 m<sup>2</sup> meaning that they were housed in 3 different group densities. Accordingly, the pen size was designed.

Gr.T<sub>0</sub>- 0.8 m<sup>2</sup> floor space/lamb (total 6 lambs) standard floor space as per BIS

Gr.T<sub>1</sub>- 0.6 m<sup>2</sup>/lamb (total 6 lambs)

Gr.T<sub>2</sub>- 1 m<sup>2</sup>/lamb (total 6 lambs)

### Statistical analysis

The data were statistical analysed by completely randomized design (Snedecor and Cochran, 2004).

Following observations were recorded in animals throughout the experiments in all the three groups.

## GROWTH PERFORMANCE

### Weekly body weight

Lambs from all the treatment groups weighed weekly by using digital weighing balance and the observations were assessed for calculation of growth rate. The weighing was performed in the morning hour before their feeding. All attention is to given not to impart stress to the animals.

All experimental lambs were weighed on the beginning thereafter at weekly interval up to the end of experiment with the help of digital weighing machine. The observations were recorded for calculation of growth rate.

### Average Daily Weight Gain (ADG)

To evaluate the growth rate of lambs in different treatment groups average daily weight was calculated by the following formula:

$$\text{Average daily gain (gm/day)} = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{No. of days of experiment}}$$

#### Average weekly weight gain (AWG)

Average weekly weight gain was calculated by the following formula:

$$\text{Average weekly weight gain (gm/week)} = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{No. of weeks of experiment}}$$

#### Average monthly weight gain (AMG)

Average monthly weight gain was calculated by the formulae:

$$\text{Average monthly weight gain (gm/month)} = \frac{\text{Final body weight} - \text{Initial body weight}}{\text{No. of months of experiment}}$$

#### Body conformation

To evaluate the lambs morphometrically linear body dimension viz. height at wither, body length, heart girth, punch girth, tail length, length of ear, width of ear were measured by measuring tape (Tudu *et al.* 2015) from the beginning to till the end of experiment at weekly intervals.

## RESULTS AND DISCUSSION

#### Weekly body weight

The body weight of lambs steadily increased as their age increased. The initial body weight of T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> group was 13.53, 13.57, 13.75 kg respectively which was increased to 19.09, 18.65 and 19.79 kg respectively at the end of the experiment (12<sup>th</sup> week). The absolute gain in body weight of groups of lambs was 5.57 ± 0.093, 5.08 ± 0.147 and 6.04 ± 0.069 kg for T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub> respectively.

The absolute gain in body weight of groups of lambs was 5.56, 5.08 and 6.04 kg for T<sub>0</sub>, T<sub>1</sub> & T<sub>2</sub> respectively and differed significantly (P<0.01). It indicated that the body weight of lambs reared on 0.6 m<sup>2</sup> (T<sub>1</sub>) was less than the lambs reared on increased floor space of 0.8 m<sup>2</sup> (T<sub>0</sub>) and 1 m<sup>2</sup> (T<sub>2</sub>). It means that by reducing the floor space per lamb the body weight of lambs was affected. Similar results were reported by Leme (2013) which indicate that animal density influenced changing pattern of feed intake and thereby affected the weight gain in lambs. Mohammed (2014) reported that body weight gain in space allowance of 0.5 m<sup>2</sup> and 1.0 m<sup>2</sup> was lower compared to 1.5 and 2.0 m<sup>2</sup> in Egyptian balady goats. Kumari *et al.* (2013) reported that when animals absolute gain in body weight of 9.94 kg to 10.97 kg in Osmanabadi kid which was higher than the present study. The variation might be due to influence of different housing system. Similar results were also reported by Panda (2016) when kids reared with kept with 0.8 m<sup>2</sup> floor space/kid, 0.7 m<sup>2</sup>/kid and 0.6 m<sup>2</sup>/kid body weight significantly affected by space allowance.

#### Average daily body weight gain

Average daily weight gain in Magra lambs of T<sub>0</sub>, T<sub>1</sub> & T<sub>2</sub> Gr. were 66.22 ± 1.106, 60.44 ± 1.755 and 71.85 ± 0.82 gm/day, respectively and differed significantly (P<0.01). It means that weight gain of lambs is affected by floor space provided for rearing. This might be due to overstocking of lambs resulted in reduced feed intake. The results are in agreement with the findings of Mohammed (2014) who reported the decreasing of ADG with decreasing the floor space allowance in Goats. Similarly Wang *et al.* (2011) reported that daily live weight gain per head decreased linearly with increasing stocking rates. Mellado *et al.* (2013) also reported that overstocking of goats is significantly affect the body weight gain. Similar results were found by Thakur *et al.* (2017) in kids on higher space allowance

#### Average weekly gain in body weight

The weekly body weight gain of Magra lambs of group T<sub>2</sub> showed the highest (502.92 ± 42.23) than other groups when floor space increased by 0.2 m<sup>2</sup> from BIS floor space requirement. It is also indicate that weight gain is decreased with reduction in the floor space. Similar results were

reported by Panda *et al.* (2016) in Osmanabadi kids were housed in *katcha* floor housing system under stall feeding with different floor space.

| Parameters                | Group T <sub>0</sub><br>(0.8 m <sup>2</sup> /lamb) | Group T <sub>1</sub><br>(0.6 m <sup>2</sup> /lamb) | Group T <sub>2</sub><br>(0.6 m <sup>2</sup> /lamb) |
|---------------------------|--|--|--|
| Initial body weight, kg   | 13.53  | 13.57  | 13.75  |
| Final body weight, kg     | 19.09  | 18.65  | 19.79  |
| Body weight gain, kg      | 5.57 ± 0.09 <sup>3b</sup>                          | 5.08 ± 0.147 <sup>a</sup>                          | 6.04 ± 0.069 <sup>c</sup>                          |
| Average daily gain, g/day | 66.22 ± 1.106 <sup>b</sup>                         | 60.44 ± 1.755 <sup>a</sup>                         | 71.85 ± 0.82 <sup>c</sup>                          |
| Average weekly gain, g/wk | 463.47 ± 48.33 <sup>b</sup>                        | 423.05 ± 38.30 <sup>a</sup>                        | 502.92 ± 42.23 <sup>c</sup>                        |

**Note:** a, b, c - Means superscripted with different letters within a row differ significantly from each other (P<0.01).

### Body morphometric traits

The results as shown in Table 2 revealed the body length was not significantly differed between T<sub>0</sub>, T<sub>1</sub> and T<sub>2</sub>. The similar results were reported by Kochewad (2009) body length of kids of 3 month of age ranged from 41.03 ± 0.28 cm. Similar findings were reported by Iqbal *et al.* (2013). Mule *et al.* (2014) reported that as age advances, there is gradual increase in height at wither of kids. Heart girth of Magra lambs differ significantly in between T<sub>0</sub> and T<sub>1</sub>. However, there was no significant difference in gain in heart girth between the lambs of T<sub>0</sub> and T<sub>2</sub> and T<sub>1</sub>, T<sub>2</sub>. Kochewad *et al.* (2009) reported the average heart girth of Osmanabadi kids at 3 and 5 months of age as 41.20 ± 0.28 to 41.70 ± 0.25 cm and 45.18 ± 0.37 to 47.20 ± 0.34 cm. The results of the present study are in agreement with their findings. Similar results were also reported by Rathod (2011) indicating that the heart girth of kids of 6 months of age was 51.17 ± 0.36 cm. There was significant effect (P<0.01) of floor space i.e. 0.8 m<sup>2</sup> 0.6 m<sup>2</sup> and 1 m<sup>2</sup> on weekly paunch girth of lambs of Gr. T<sub>0</sub>, T<sub>1</sub>, and T<sub>2</sub>. The similar results of the present investigation agree with the findings of Alex *et al.* (2008) who reported that the average paunch girth of Malabar goats at the age of 3 month was 43.67 ± 0.80 to 52.36 ± 0.29 cm and 56.16 ± 2.01 to 63.07 ± 0.42 at 6 months of age. Ajao *et al.* (2014) reported that a positive correlation found between body

weight and paunch girth. The absolute gain in tail length of various groups of lambs was 1.03, 99 and 1.12 cm for T<sub>0</sub>, T<sub>1</sub> & T<sub>2</sub> respectively and differed significantly (P<0.01). Similar findings were reported by Tudu *et al.* (2015) he found positive correlation found between the body weight and tail length of goats.

There was significant difference in weekly ear length of Magra lambs of T<sub>0</sub> and T<sub>1</sub> groups but not significant difference was found in weekly ear length of Magra lambs of T<sub>0</sub>, T<sub>2</sub> and T<sub>1</sub>, T<sub>2</sub>. Similar findings were reported by Alam (2006) he found 5.30, 5.75, 5.90 cm ear width in goats of 6, 9 and 12 months of age, respectively. The differences in gain in weekly ear width were significant (P<0.01) in between T<sub>0</sub>, T<sub>2</sub> and T<sub>1</sub>, T<sub>2</sub> groups but the differences in gain in weekly ear width were not significant in between the lambs of T<sub>0</sub>, T<sub>1</sub>. Similar findings were reported by Rahman *et al.* (2008) he found the ear width of the goats was 4.12 ± 0.14, 5.30 ± 0.09 cm at the age of 3 and 6 month, respectively.

**Table 1:** Body morphometric traits parameters under various treatments

| Parameters         | Body morphometric traits                           |  |  |
|--------------------|--|--|--|
|                    | Group T <sub>0</sub><br>(0.8 m <sup>2</sup> /lamb) | Group T <sub>1</sub><br>(0.8 m <sup>2</sup> /lamb) | Group T <sub>2</sub><br>(0.6 m <sup>2</sup> /lamb) |
| Body length        | 5.56 ± 0.375                                       | 5.43 ± 0.463                                       | 6.19 ± 0.451                                       |
| Height at wither   | 7.39 ± 0.38  | 7.17 ± 0.16  | 7.75 ± 0.38  |
| Heart girth        | 4.13 <sup>b</sup> ± 0.095                          | 3.67 <sup>ab</sup> ± 0.176                         | 4.21 <sup>b</sup> ± 0.121                          |
| Paunch girth       | 8.53 <sup>b</sup> ± 0.08                           | 8.27 <sup>a</sup> ± 0.05                           | 9.02 <sup>c</sup> ± 0.06                           |
| Tail length        | 1.03 ± 0.016 <sup>b</sup>                          | 0.99 ± 0.006 <sup>a</sup>                          | 1.12 ± 0.013 <sup>c</sup>                          |
| Ear length & width | 0.61 ± 0.023 <sup>b</sup>                          | 0.61 ± 0.035 <sup>b</sup>                          | 0.48 ± 0.055 <sup>a</sup>                          |

**Note:** a, b, c - Means superscripted with different letters within a row differ significantly from each other (P<0.01).

### CONCLUSION

There was significant effect of floor space on growth performance of Magra lambs. There was also positive significant correlation between growth rate and morphometric traits in lambs housed in groups with different floor space. Thus, from the above findings it can

be concluded that there was direct effect of floor space on growth performance of Magra lambs. Hence, the floor space provided per lamb was 1 m<sup>2</sup> found to be more comfortable. Furthermore there was no much difference in lambs housed in 0.8 m<sup>2</sup> space per lamb can be adopted where there was shortage of land especially in urban cities. However, the lambs housed in 0.6 m<sup>2</sup> space had detrimental effect on growth performance.

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