Effect of Floor Space Allowance Under Katcha Housing on Growth Performance of Post-Weaning Osmanabadi Kids in Mumbai

Rameswar Panda*, Prerna P. Ghorpade, Sahadeo S. Chopade, Mahammad Bashir A. Siddiqui and Arjun H. Kodape

Department of Livestock Production and Management, Bombay Veterinary College, Aarey, Goregaon (E) Mumbai, INDIA

*Corresponding author: R Panda; Email: rameswar.panda8@gmail.com

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ABSTRACT

This experiment was conducted to find out the effect of different floor space allowance on the growth performance of Osmanabadi kids. Eighteen Osmanabadi kids between the age group of 3-4 months and body weight of 7-8 kg were randomly selected irrespective of sex. The selected kids were divided and kept into three different groups with different floor space comprising of 6 kids in each group. Group T_0 (0.8m² floor space/kid), Group T_1 (0.7m²/kid) and Group T_2 (0.6m²/kid). The feeding and other management practices for all the three groups were similar. The body weight of kids at 3 and 6 months of age was 6.75, 6.86, 6.82 and 12.69, 12.44, 11.98 kg respectively in Group T_0, T_1 and T_2. The average daily gain and average weekly gain in body weight were 70.77 ± 1.62, 66.05 ± 1.80, 61.50 ± 3.95 gm/day and 495.39 ± 11.39, 465.26 ± 11.00, 430.00 ± 14.64 gm/wk in Group T_0, T_1 and T_2 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 Osmanabadi kids. It was concluded that provision of floor space is positively correlated with the growth performance of kids.

Keywords: Floor space, growth performance, katcha housing, Osmanabadi kids

Goat (*Capra hircus*) was the earliest ruminant domesticated around 9000 to 7000 B.C. India possesses the largest goat population (135.17 million) which rank second in the world and contributes about 26.54% of the total livestock population of India (19th livestock census, 2012). Amongst the goat breeds of India, Osmanabadi goat breed is a native of Marathwada region of Maharashtra, but it is reared, bred and well adapted throughout India. In housing management, particularly floor management is an important aspect of goat husbandry, which provides both comfort and cleanliness with minimal risk of injury. It is also well known fact that floor space plays limitations which have negative consequences on the welfare and production of animals, as well as on performance. The floor space requirement for the weaned kids (3-6 months old) as per BIS (Bureau of Indian Standard, 1985) is 0.8m². Space is generally defined as the average area offered per animal and it is considered a defining feature of all animal production systems due to its economic implications (Petherick and Phillips, 2009). Provision of large enclosures for animal housing implies larger land requirements, higher construction and maintenance costs, and possibly manpower requirements. Therefore, commercial animal production systems usually limit, to some degree floor space. The total goat population in India in urban areas is 6,092 thousand and in rural areas is 1,29,081 thousand (19th Livestock Census, 2012). There is an abrupt decrease by 16.66% in goat rearing compared to 2007 mostly in urban areas due to increased human population and lack of land availability. Providing adequate space in rural area is no problem but there are limitations while rearing goats in providing adequate space in urban areas. In today’s date the cost of land is at highest price in urban areas. To reduce the cost of land it is essential to reduce the total area/space provided without hampering the welfare and performance of goats. The performance of the animal is also influenced by environmental factors like temperature and humidity in region. Rearing the goats in these climatic conditions...
in complete confinement with reduced floor space is
difficult for the goat farmers. Therefore, to overcome this
situation, studying the growth performance of goats on
different floor space area is an important aspect. In view
of the constraints in rearing of goats in urban area due to
unavailability of adequate space and high cost of land, the
present research work was planned.

MATERIALS AND METHODS
The research was carried out in the Instructional
Livestock Farm Complex of Bombay Veterinary College
at Maharashtra Animal and Fishery Sciences University,
India.

Selection of experimental animals
Total 18 healthy Osmanabadi kids of either sex between
the age group of 3-4 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 kids that were taken for the experiment was
of nearly same. The average body weight of the kids 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
As far as the tropical country like India is concerned,
thatched type of roof is preferred in terms of housing. The
roof was of single slope type and the height at the ridge
was 3.2 m. In this katcha system of housing, the floor was
made up of mud and normal soil. There was no artificial
layering over the floor. The wall is built with bamboo
and other wood type material. Ventilation as one of the
important aspect of housing was also facilitated in this
housing system. The wall, 1 m height from the floor was
entirely made up of bamboo and the rest of the part was
designed with the wire net. So the above attempt was a
showcase for the wise provision of ventilation. 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. The
entire husbandry practices were followed under intensive
management of complete stall fed Osmanabadi kids. There
was no provision for open space.

Feeding and Management
The roughage like widely available hybrid napier grass in
chaffed condition was given at the rate of 400 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. Concentrate was fed at the rate of 150
gm initially and 250 gm after one and half month after 2
hours of roughage feeding in same manner. For feeding
facilitation, small drum like feeder was being tightly
held along one side of the wall in each pen. 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 three days. Every
effort was put towards achieving dryness in the pen as the
urine and droppings were mixed with the floor soil. To
overcome this, scrubbing of floor with the help of spade in
every 15 days was performed.

Experimental design
The Osmanabadi kids 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 March and ended in June. 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
goats, but the floor space available for each individual
varied from 0.8m², 0.7m² and 0.6m² meaning that they
were housed in 3 different group densities. Accordingly,
the pen size was designed.
Gr.T₀- 0.8m² floor space/kid (total 6 kids) standard floor
space as per BIS
Gr.T₁- 0.7m²/kid (total 6 kids)
Gr.T₂- 0.6m²/kid (total 6 kids)
The designed pen size were 8ft × 6ft, 7ft × 6ft and 6ft ×
6ft for the Gr.T₀, T₁ and T₂ respectively. (1square m =10
square ft)
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Following observations were recorded in animals throughout the experiments in all the three groups.

**Growth Performance**

**Weekly body weight**

Kids 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.

**Average Daily Weight Gain (ADG)**

Average daily weight gain was calculated for knowing the growth rate in different experimental group 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 can be 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 can be calculated by the formulae:

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

**Statistical analysis**

The data were analysed using RBD (Randomised Block Design) as suggested by Snedor and Cochran (1982).

**RESULTS AND DISCUSSION**

**Weekly body weight**

The body weight of kids steadily increased as their age increased. The initial body weight of \(T_0\), \(T_1\) and \(T_2\) group was 6.75, 6.86 and 6.82 kg respectively which was increased to 12.69, 12.44 and 11.98 kg respectively at the end of the experiment (12th week). The absolute gain in body weight of groups of kids was 5.94, 5.58 and 5.16 kg for \(T_0\), \(T_1\) and \(T_2\) respectively.

The weekly body weight of kids recorded under \(T_0\) and \(T_2\) group and in between \(T_1\) and \(T_2\) group differed significantly (P<0.01) whereas no significant difference was found between body weight of kids of \(T_0\) and \(T_1\). It indicated that the body weight of kids reared on 0.6m\(^2\) (\(T_2\)) was less than the kids reared on recommended floor space of 0.8 m\(^2\) (\(T_0\)). It means that by reducing the floor space per kids the body weight of kids was affected.

The body weight ranged between 5.99 ± 0.11 to 6.09 ± 0.10 kg at 3 months age (Kochewad et al., 2009) and 10.57 ± 0.09 kg at the age of 6 months in Osmanabadi kids (Rathod et al., 2011). The present findings are slightly higher than the findings of Kochewad et al. (2009) and Rathod et al. (2011). Kumari et al. (2013) found the absolute gain in body weight of 9.94 kg to 10.97 kg in Osmanabadi kid which was higher than the present study. This might be due to the different types of housing system. Thiruvenkadan et al. (2009) reported higher body weight gain in kids reared on slotted housing system than in kaccha housing with mud floor. Similarly Bhakat and Nagpaul (2005) concluded that raised slotted floor with thatched roof shed is the best suited for crossbred female kids in terms of growth, feed conversion efficiency. Lawar et al. (2004) reported 13.13 kg body weight at six months of age in Sangamneri goats is in agreement with the present result.

Leme et al. (2013) suggested that animal density influenced changing pattern of feed intake and thereby affected the weight gain in lambs. Mohammed (2014) found that body weight gain in space allowance of 0.5 m\(^2\) and 1.0m\(^2\) was lower compared to 1.5 and 2.0 m\(^2\) in Egyptian balady goats. These findings are in agreement with the results of present study.
Average daily body weight gain

The average daily weight gain in Osmanabadi kids of group $T_0$, $T_1$ & $T_2$ was 70.77 ± 1.62, 66.05 ± 1.80 and 61.50 ± 2.09 gm/day respectively and differed significantly (P<0.01). It indicated that the Osmanabadi kids reared on the standard floor space (0.8 m$^2$), the per day weight gain was maximum and as the floor space reduced i.e. 0.7 m$^2$ and 0.6 m$^2$, the weight gain per day was minimum. It means that weight gain of kids is affected by floor space provided for rearing. This might be due to overstocking of kids resulted in reduced feed intake. The average daily weight gain declined at the rate of 16.69, 22.67 and 29.70% from 1st to 12th week.

The results of the present research are closely associated with the findings of Krishna and Prasad (1985) who found the average daily gain of 46.0 ± 1.76 to 61.35 ± 3.95 gm/day in goats of more than 3 months of age. The results are closely associated with the findings of Mohammed (2014) who reported the decreasing of ADG with decreasing the floor space allowance in Goats. Overstocking of goats is closely associated with lower nutritional status and negative body weight gain (Mellado et al. 2003). Daily live weight gain per head decreased linearly with increasing stocking rates (Wang et al., 2011).  

Average weekly gain in body weight

As the age of kids advances, the weekly weight gain of kids of all groups showed declining trend. Similar to daily weight gain, the Osmanabadi kids of group $T_0$ showed the highest (495.39 ± 11.39 gm) weekly body weight gain than other groups. Slight reduction in floor space from 0.8 m$^2$ ($T_0$) to 0.7 m$^2$ ($T_1$) showed reduction in weekly weight to the tune of 6.08 %. When again floor space reduced by 0.1 m$^2$ from 0.7 m$^2$ to 0.6 m$^2$, the weekly body weight gain reduced by 7.57 %. This again indicated that when floor space reduced by 0.2m$^2$ from BIS floor space requirement, the weekly body weight gain reduced by 13.99 %. The differences in gain in weekly body weight of Osmanabadi kids of various groups were highly significant (P<0.01). It indicated that the floor space definitely affected the weekly weight gain of Osmanabadi kids. Nasim et al. (1981) reported that the average weekly gain ranged between 0.22 to 0.48 kg for different goats. This finding is also in close agreement with present study.

Average monthly gain in body weight

The maximum monthly body weight gain (1981.54 ± 90.24 gm) was seen in kids ($T_0$) reared on standard floor space (0.8 m$^2$). As the floor space reduced to 0.7 m$^2$ ($T_1$) and 0.6 m$^2$ ($T_2$), the monthly weight gain also reduced to lower values i.e. 1861.06 ± 66.23 g and 1722.00 ± 114.48 g respectively. The reducing trend in monthly gain has been observed in all kids. The monthly body weight gain (gm) of Osmanabadi kids reared under 0.8 and 0.7 m$^2$/kid was at par but the monthly body weight gain (g) of kids reared on 0.6 m$^2$ differed significantly (P<0.05).

Table 1: Effect of floor space on body weight of Osmanabadi kids

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group $T_0$ (0.8m$^2$/kid)</th>
<th>Group $T_1$ (0.7m$^2$/kid)</th>
<th>Group $T_2$ (0.6m$^2$/kid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial body weight, kg</td>
<td>6.75 ± 0.57</td>
<td>6.86 ± 0.55</td>
<td>6.82 ± 0.51</td>
</tr>
<tr>
<td>Final body weight, kg</td>
<td>12.69 ± 0.15</td>
<td>12.44 ± 0.11</td>
<td>11.98 ± 0.17</td>
</tr>
<tr>
<td>Body weight gain, kg</td>
<td>5.94 ± 0.41*</td>
<td>5.58 ± 0.44*</td>
<td>5.16 ± 0.46b</td>
</tr>
<tr>
<td>Average daily gain, g/day</td>
<td>70.77 ± 1.62*</td>
<td>66.05 ± 1.80b</td>
<td>61.50 ± 2.09c</td>
</tr>
<tr>
<td>Average weekly gain, g/wk</td>
<td>495.39 ± 11.39a</td>
<td>465.26 ± 11.00b</td>
<td>430.00 ± 14.64c</td>
</tr>
<tr>
<td>Average monthly gain, g/month</td>
<td>1981.54 ± 90.24a</td>
<td>1861.06 ± 66.23a</td>
<td>1722.00 ± 114.48b</td>
</tr>
</tbody>
</table>

abc Means in the same row with different superscripts are significantly different at (P < 0.05).
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The results indicated that the monthly gain in body weight of kids was not affected due to slight reduction of floor space.

CONCLUSION
There was significant effect of floor space on growth performance of Osmanabadi kids. Thus, from the above findings it can be concluded that there was direct effect of floor space on growth performance of Osmanabadi kids. Hence, the floor space provided per kid was 0.8m² found to be ideal as far as the good marketing and welfare of the animals are concerned.

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REFERENCES


