

Faecal Egg Count, Floor Microbial Load And Ammonia Emission Level In Stall Fed Goat Sheds

P. Godlin Blessy

N. Kumaravelu

Department of Livestock Production and Management,
Madras Veterinary College, Chennai

Abstract: A trial was conducted to assess the effect of housing on faecal egg count, floor microbial load and ammonia emission level in stall fed goat sheds. Twenty four weaned Tellicherry kids comprising of both sexes were randomly distributed into three different stall fed housing systems viz., conventional housing of pen with concrete floor and run with mud floor (T_1), goat housing of elevated wooden slatted floor pen and run with mud floor (T_2) and housing made up of elevated polyurethane slatted floor pen and run with mud floor (T_3) at University Research Farm, Madhavaram. The kids were fed with roughage and concentrate. The data on faecal egg count, floor microbial load and ammonia emission level in stall fed goat sheds were collected as per standard procedures and analysed. It was found that the Egg per gram (EPG) count of kids in T_1 group was significantly higher than T_2 and T_3 on the day of deworming and at 21st, 60th and 90th day of post deworming. The floor microbial load at the end of the trial were significantly higher in T_1 than T_2 and T_3 groups. Ammonia level in the pen at 8.00 a.m. was significantly higher in T_1 than T_2 and T_3 groups during first, second, third, fifth and thirteenth fortnights and at 2.00 p.m. it was significantly higher in T_1 than T_2 and T_3 groups during second, third and fourth fortnights. The ammonia level in the run showed no significant difference between the groups at 8.00 a.m. and 2.00 p.m.

Keywords: Egg per gram, ammonia emission, microbial load.

I. INTRODUCTION

Goats constitute an important species of livestock in India and contribute greatly to food, rural employment and gross domestic product. They are multi-purpose animals, producing meat, milk, skin and hair. However, these animals are prone to various parasitic infections, microbial infections and ammonia emissions from the shed due to poor hygiene. Losses due to such infection result in poor growth and production. Production and health of animal depend on environment in which they live. Comfortable environment for farm livestock ensures optimal productivity, health and behavioural needs. An environment in which stressors are minimized will maximize production in farm animals. The aim of the present study was to investigate the faecal egg count, floor microbial load and ammonia emission level in stall fed goat sheds.

II. METHODOLOGY

The experiment was carried out at TANUVAS University Research Farm, Madhavaram milk colony, Chennai-51. The experiment was conducted from September 2013 to February 2014. Three stall fed goat housing systems seen in Tamil Nadu among commercial goat farmers viz., conventional housing of pen with concrete floor and run with mud floor (T_1), goat housing of elevated wooden slatted floor pen and run with mud floor (T_2) and housing made up of elevated polyurethane slatted floor pen and run with mud floor (T_3) formed the experimental housing designs. The kids were provided with a floor space of 10 sq.ft per animal. The pens had feeding and watering troughs. Twenty four weaned Tellicherry kids comprising of both sexes were taken for the study and eight kids (four male and four female kids were allotted for each

housing systems under study). The kids were weaned at the age of 60 days (average body weight 9.39 ± 0.23 kg) and were dewormed and dipped before start of the experiment. The kids were vaccinated against Enterotoxaemia at two months of age.

FAECAL EGG COUNT

Dung samples were collected prior to deworming and subsequently on 3rd, 7th, 14th, 21st, 60th and 90th day of post deworming with Fenbendazole (16 mg/ml) plus Praziquantel (5 mg/ml) at the rate of one ml per 3 kg bodyweight in three different groups. Eggs per gram (EPG) were counted for the samples collected on different days using New Triple-Chambered McMaster counting slide.

MICROBIAL COUNT

One sq.ft distance drag swabs from five different places on the floor of three types of goat pens under study were taken. Each drag swab was moistened with saline before taking sample and standard plate count test was done to estimate the viable microorganisms. In view of a wide range of bacterial population, their number can be counted only by making appropriate dilutions. An aliquot of 1ml of the diluted samples was poured in sterilized plates and mixed with 10-15 ml of liquefied sterilized agar medium. After solidification of agar, the plates were incubated in inverted position at 37 °C for 24 hours. After incubation, bacterial cells grow into distinct and isolated colonies were counted with the help of colony counter.

AMMONIA ESTIMATION

The ammonia level inside the experimental goat stalls were detected at weekly intervals by using Multi Gas Monitor (Drager X-am 7000). Ammonia level was identified at three locations inside the pen and run in all the three stalls above the floor at the animal feet level (3 cm above the floor level) and at animal head level (60 cm above the floor level) using the probe of the instrument. In addition, ammonia was detected below the slatted floor in the elevated stalls. The procedure was carried out at 8.00 a.m. and 2.00 p.m. on data collection days.

The data collected in different housings were subjected to standard statistical procedure.

III. RESULTS AND DISCUSSION

FAECAL EGG COUNT

From the table 1, it was noted that pretreatment EPG in T₁ was significantly ($P < 0.05$) higher than the T₂ and T₃ but post treatment EPG has declined considerably in all treatment group due to the effect of dewormer used (Fenbendazole + Praziquantel). However on 21st day of deworming, the EPG started raising significantly ($P < 0.05$) in T₁ groups compared to other two groups. The EPG in, T₂ group was not significantly elevated compared to T₃ on 21st day. At the end of two months, highly significant EPG level in T₁ group was

observed when compared to other two groups. At the end of the trial period (3 months) EPG level continued to increase in T₁ groups and moderately in T₂ groups but in T₃ groups the animals remained negative for any endoparasites. This clearly indicated that in T₁ groups the animals were repeatedly exposed to eggs and significant reinfection was noticed. The results of the study clearly indicate that T₁ resulted in reinfection in short intervals (3 months time).

From the study, it was observed that the faecal egg count was significantly higher in T₁ (Cement concrete floor) than T₂ (Elevated wooden slatted floor) and T₃ (Elevated polyurethane slatted floor). This was akin to the reports of Pearce (1999) who observed that the slatted floors for weaned pigs were associated with lower prevalence of endoparasites or conversely, housing weaners on solid floors with manual dung removal significantly increased the chances of endoparasites being present. In contrary, Thiruvankadan *et al.* (2008) reported that the EPG count made at different days of deworming was not significantly different between slatted floor and mud floor housing systems. Costa and Vieira (1987) also reported that slatted floor did not reduce the worm burden in regions where annual rainfall was less than 800 mm. Khare *et al.* (2008) reported that the egg count of does kept on wooden slatted bedding material was numerically lower but statistically non significant during rainy season. The non significant effect of anthelmintic treatment on parasite prevalence in T₂ and T₃ observed in the present study agreed with results of several previous studies (Mercy *et al.*, 1989; Roesporff and Jorsal, 1990) and might be due to inappropriate timing of anthelmintic administration with regard to parasite epidemiology. During winter, the availability of parasitic stages are naturally minimum due to hypobiosis. So further studies can be carried out whether other seasons like south west monsoon and north east monsoon could influence the worm burden in animals housed under different housing system studied. Khare *et al.* (2008) also reported that in summer season the egg count of does was significantly higher in wooden slatted than the cement concrete, sand and soil. The faecal egg count reported was at low level (less than 500 EPG) even though there was significant difference between the groups.

Treatment Groups	Initial EPG	Post treatment EPG					
		3 rd day	7 th day	14 th day	21 st day	60 th day	90 th day
Cement concrete Pen and Run with mud floor (T ₁)	350.00 ^a ± 75.59	37.50 ± 26.31	37.50 ± 26.31	75.00 ± 41.19	100.00 ^b ± 37.80	280.00 ^b ± 48.99	420.00 ^b ± 96.95
Elevated wooden slatted floor Pen and Run with mud floor (T ₂)	137.50 ^a ± 46.05	0.00 ± 0.00	25.00 ± 16.37	25.00 ± 16.37	50.00 ^a ± 18.90	60.00 ^a ± 24.49	140.00 ^a ± 97.98
Elevated polyurethane slatted floor Pen and Run with mud floor (T ₃)	137.50 ^a ± 49.78	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ^a ± 0.00	0.00 ^a ± 0.00	0.00 ^a ± 0.00
F value	4.378*	2.032 ^{NS}	1.139 ^{NS}	2.227 ^{NS}	4.200*	21.733**	7.221**

NS – Not significant, * Significant ($P < 0.05$), **Significant ($P < 0.01$)

Means bearing different superscript in the same column differ significantly

Table 1: The mean \pm S.E and analysis of variance of therapeutic effect of dewormer in Tellicherry kids under different stall fed housing systems

MICROBIAL LOAD IN THE FLOOR

The total microbial load in the floor was shown in the Table 2. Result revealed that the total microbial load in the floor differ significantly at 0th, 90th and 180th day of sample collection. In this study gradual increase in total microbial load was observed on 90th and 180th day. Similar observations was reported by Pritchard *et al.* (1981) in calf shed and Yasotha (2002) in sheep pen. From the table it is evident that the microbial load in conventional goat house with concrete floor was higher than elevated wooden and polyurethane slatted floors. The reason may be due to presence of fodder left overs and direct contact of floor with dung and urine. Similarly higher microbial load was observed in conventional floor in poultry house by Madelin and Wathes (1989) and in sheep pen by Yasotha (2000).

Treatment Groups	0 th day	90 th day	180 th day
Cement concrete Pen and Run with mud floor (T ₁)	4.40x10 ^{3b}	6.27x10 ^{5b}	1.96x10 ^{6b}
Elevated wooden slatted floor Pen and Run with mud floor (T ₂)	1.97x10 ^{3a}	1.07x10 ^{4a}	5.47x10 ^{4a}
Elevated polyurethane slatted floor Pen and Run with mud floor (T ₃)	1.33x10 ^{3a}	5.88x10 ^{3a}	1.07x10 ^{4a}
F value	4.17*	4.31*	11.69**

* Significant $P < 0.05$, ** Significant $(P < 0.01)$

Means bearing different superscript in the same column differ significantly

Table 2: The mean \pm S.E and analysis of variance of microbial load under different stall fed housing systems

AMMONIA EMISSION

The ammonia level (ppm) at 8.00 a.m. inside the pen before cleaning in different stall fed housing systems ranged between 1.80 \pm 1.20 and 3.50 \pm 0.50 in T₁; 0.00 \pm 0.00 and 2.60 \pm 0.00 above the wooden slatted floor, 1.80 \pm 0.50 and 3.00 \pm 0.00 below the slatted floor in T₂; and 0.00 \pm 0.00 and 2.65 \pm 0.35 above slatted floor, 1.80 \pm 0.50 and 3.00 \pm 1.00 below the slatted floor in T₃; respectively. The ammonia level at 8.00 a.m. in the run ranged between 1.15 \pm 0.15 and 2.60 \pm 0.00 in T₁; 1.30 \pm 0.00 and 3.00 \pm 0.00 in T₂ and 1.50 \pm 0.50 and 2.80 \pm 0.20 in in T₃. The ammonia level (ppm) at 2.00 p.m. in pens of different stall fed housing system were ranged between 1.30 \pm 0.00 and 3.50 \pm 0.50 in T₁; 0.00 \pm 0.00 and 2.50 \pm 0.50 above the slatted floor, 1.95 \pm 0.65 and 3.00 \pm 0.00 below the slatted floor in T₂; and 0.00 \pm 0.00 and 2.65 \pm 0.35 above the slatted floor, 1.95 \pm 0.65 and 3.00 \pm 0.00 below the slatted floor in T₃. At 2.00 p.m. the ammonia level in the run ranged between 1.65 \pm 0.35 and 3.15 \pm 0.15 in T₁; 1.95 \pm

0.65 and 3.00 \pm 0.00 in T₂; and 2.00 \pm 0.00 and 2.80 \pm 0.20 in T₃. After cleaning the shed in the morning no ammonia level was detected both inside the pen and runs in all the three types of stall fed goat housing systems studied. It was evident that ammonia level differed above the floor between groups during first, second, third and thirteenth fortnight at 8.00 a.m. inside the pens and during second, third and fourth fortnights at 2.00 p.m. between different pens. After cleaning the shed, no ammonia emission was detected in pen and run of all the three types of goat shed. The excreta deposited in animal houses result in significant gaseous emissions. Ammonia emissions induced by the hydrolysis of urea present in urine depend on parameters such as air velocity over manure surface, rate of urea hydrolysis, p^H of excreta and air temperature (Pereira *et al.*, 2011). In the present study, the ammonia level were numerically higher even though statistically not differed in T₁ than T₂ and T₃. Pereira *et al.* (2011) also reported that ammonia emissions were significantly greater in the solid floor than the slatted floor. In the present study, ammonia level in the morning were numerically higher than afternoon (2.00 p.m.) which coincides with the findings of Popescu *et al.* (2011) in dairy cattle barns. Jiahong *et al.* (2013) in their study observed that ammonia level significantly differed between different types of goat sheds.

IV. CONCLUSION

From the study it may be concluded that considering the cost of investment of slatted floor, the animals can be reared in cement concrete floor with management practices like proper disposal of dung, bedding materials, cleaning the shed two or three times a day and devising suitable deworming calendars based on parasite epidemiology in stall fed goat sheds comprising of a pen and run pattern.

REFERENCES

- [1] Costa, C.A.F and L.D.S.Vieira. (1987). The influence of raised slatted floor corrals on the incidence of intestinal nematodes in goats. *Cabra & Bodes*, 3, 10.
- [2] Jiahong, C., Guo Xiaofei, Huang Yafeng, Luo Zhongyue, Luo Jianchuan, Ling Yinghui and Zhang Zijun. (2013). Comparative analysis of air environment in three kinds of goat houses in summer in Southern China. *Journal of Anhui Agricultural university*, 40(5), 710-715.
- [3] Khare, P., D.V.Singh and S.K.Singh. (2008). Effect of bedding material on parasitic profile of Barbari goats and manure enrichment of litter under semi-intensive system of rearing. *Indian J. Anim. Res*, 42(2), 100-103.
- [4] Madelin, T.M. and C.M.Wathes. (1989). Air hygiene in a broiler house: Comparison of deep litter with raised netting floors. *Br. Poultry Sci*, 30, 23-37.
- [5] Mercy, A.R., G.de Chaneet and Y.Emms. (1989). Survey of internal parasites in Western Australian pig herds. *Austral. Vet. J*, 66, 6-9.
- [6] Pearce, G.P. (1999). Interactions between dietary fibre, endo-parasites and *Lawsonia intracellularis* bacteria in grower-finisher pigs. *Vet. Parasitol*, 87, 51-61.

- [7] Pereira, J., David Fanguero, Tom H. Misselbrook, David R. Chadwick, Joao Coutinho and Henrique Trindade. (2011). Ammonia and greenhouse gas emissions from slatted and solid floors in dairy cattle houses: A scale model study. *Biosystems Eng*, 109, 148-157.
- [8] Popescu, S., Cristin Borda, Cristina Iuliana El Mahdy, Eva Andrea Diugan, Carmen Dana Sandru, Marina Spinu and Razvan Stefan. (2011). Survey on ammonia concentrations in dairy cattle tie-stall barns. *Anim. Sci. Biotechnol*, 44 (1), 504-509.
- [9] Pritchard, D. G., C. A. Carpenter, S. P. Morzaria, J.W.Harkness, M.S.Richards and J.I.Brewer. (1981). Effect of air filtration on respiratory disease in intensively housed veal calves. *Vet. Rec*, 109, 5-9.
- [10] Roepstorff, A and S.E.Jorsal. (1990). Relationship of the prevalence of swine helminths to management practices and anthelmintic treatment in Danish sow herds. *Vet. Parasitol*, 36, 245-257.
- [11] Thiruvankadan, A.K., K.Karunanithi, R.Narendra Babu and K.Arunachalam. (2008). Comparative performance of Mecheri lambs under different management systems. *Ind. J. Small Ruminant*. 14(1), 84-88.
- [12] Yasotha, A, S. Arunachalam, T. Sivakumar and V.Ramesh. (2002). Influences of air pollution levels in sheep pens on the performance of Madras Red lambs. *Indian J. Anim.Sci.*, 72(10), 933-935.

IJIRAS