

Feasibility Study on Red Brick and Fly Ash Brick Flooring for Dairy Housing

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Abstract— Feasibility Study on Red brick and Fly ash brick flooring for dairy housing has been carried out at Cattle Cross Breeding Project, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra with objectives like Study of various properties of red brick and fly ash bricks. Cost estimation for loose house system using red brick and fly ash bricks and Comparison of flooring of red bricks and fly ash bricks. It is found that Urine absorption for red bricks was found to be 18 % and for cement bricks 6.5 % .Compressive strength for red bricks was found to be 7.91 mPa and for cement bricks was 22.83 mPa. Cost of construction for red bricks was found to be Rs. 1010.28/m² and Cost of construction for fly ash bricks was found to be Rs. 1046.74/m². Red bricks flooring found to be superior than fly ash bricks flooring.

Keywords: Red Brick, Dairy Housing, Fly Ash Brick

I. INTRODUCTION

Livestock production is an important source of livelihood. It is the income source for poor farmers in the Asia and the Specific region. However, livestock productivity in many countries in the region is below their genetic potential, mainly because of inadequate nutrition, poor reproductive management and animal diseases indirectly related to housing flooring. To improve milk production, dairy housings should be first well designed and managed hence for good production and get good quality of milk we have must built the animal house with scientific manner for this purpose we try to make design of brick flooring in loose housing barn and find its cost estimation.

Gooch, C.A. (2007) Shearer, J.K., D.K. Beede, R.A. Bucklin, and D.R. Bray. 1991., studied on health in many cases, concern about welfare is largely about the physical health of the animals and the economic consequences of their health. Lindley J.A. and Whitaker, J.H. (1996) Different functional areas can be identified in animal accommodation facilities including feeding areas, resting areas and cattle traffic routes by selecting Specific floor designs may be selected for the different functional areas

Flooring is the part of dairy barn which mostly effect on the cows health. Good flooring provides a sufficient friction between the cow hooves and floor .we observed that more cows are died due to lameness and infection because of dirtiness. It is decided to carry out Feasibility Study on Red brick and Fly ash brick flooring for dairy housing by constructing a brick flooring using red bricks and fly ash bricks.

II. MATERIALS AND METHODS

For design and construction of brick flooring barn used following materials and method

A. Materials:

- 1) Bricks
- 2) Mortar (P.C.C)

Laboratory Test:

- 1) Urine content and water content in bricks
- 2) Strength of bricks

B. Urine content in bricks

Determination of urine content in the bricks is important while constructing brick flooring. Urine of cow is absorbed by bricks and it is rest in bricks, hence we use good quality bricks i.e. second class bricks. For easily drain out of liquid. More wetness in bricks causes slipperiness and more animals are injured.

The bricks are kept in water for 24 hr. and then took final weight.

C. Formula

$$\text{Urine content} = \frac{(\text{Final weight} - \text{Initial weight}) \times 100}{\text{Initial weight}}$$

III. RESULT AND DISCUSSION

Sr. No.	Bricks	Initial Weight (gm)	Final Weight (gm) After 24 hrs	% Urine content	Average of urine content
1	A	2327	2724	17.5%	18.4%
2	B	2430	2915	19.3%	
3	C	2385	2824	18.4%	

Table 1: Urine content for red bricks

Sr. No.	Bricks	Initial Weight (gm)	Final Weight (gm) After 24 hrs	% Urine content	Average of urine content
1	A	3845	4115	7.02%	6.49%
2	B	3705	3935	6.20%	
3	C	3830	4070	6.26%	

Table 2: Urine content for fly ash bricks

Sr. No.	Bricks	Initial Weight (gm)	Final Weight (gm) After 24 hrs	% Urine content	Average of urine content
1	A	2356	2700	14.6%	16.7%
2	B	2200	2627	19.4%	
3	C	1936	2250	16.2%	
4	D	2100	2450	16.6%	

Table 3: Moisture content for red bricks

Sr. No.	Bricks	Initial Weight (gm)	Final Weight (gm) After 24 hrs	% Urine content	Average of urine content
1	A	3600	3785	5.13%	4.31%
2	B	3677	3754	2.09%	
3	C	3645	3900	6.99%	
4	D	3827	3943	3.03%	

Table 4: Moisture content for fly ash bricks

From table no. 1 average of urine content for red bricks found to be 18.4%

From table no. 2 average of urine content for fly ash bricks found to be 6.49%.

From table no. 3 average of moisture content for red bricks found to be 16.7%.

From table no. 4 average of moisture content for fly ash bricks found to be 4.31%.

A. Strength of Bricks

It is the ability of bricks which sustain against impact of pressure or force acted upon it.

For strength we use the Strength compression machine in which the load on bricks is regularly acted by handle.

Choose the good quality bricks which are not easily broken when live load (animal) applied on it in barn.

Item No	Particular	Quantity	Rate (Rs)	Amount (Rs)
1)	Cleaning of Site	L.S	1000	1000
2)	Excavation for foundation in earth. soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50m.beyond the building area stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering(including shoring and strutting) etc. (lift upto 1.50 m)	345.6	143.85 Cum	49714.56
3)	Approved quality of murum filling.	172.8	283.99 Cum	49073.472
4)	Plain cement concrete Providing and laying in-situ ,cement concrete M-15 of trap/granite /quartzite/gneiss metal for foundation and bedding including dewatering , compacting and curing etc.	86.4	3289.74 Cum	284233.53
5)	Providing masonry with conventional/indian standard type red bricks in cement mortar 1:6 in superstructure including striking joints, raking out joints, watering and scaffolding complete.	86.4	5155.07 Cum	445398.04
			Total	829419.60
			Add 5%	41470.98
			Grand Total	870890.58

Table 7: Abstract of estimation for red bricks

Rate per square metre is 1010.28/m² The rate of all particulars is as per DSR-2016-2017.

Item No	Particular	Quantity	Rate from Urine Estimate (Rs)	Amount (Rs)
1)	Cleaning of Site	L.S	1000	1000
2)	Excavation for foundation in earth. soils of all types, sand, gravel and soft murum, including removing the excavated material upto a distance of 50m.beyond the building area stacking and spreading as directed, dewatering, preparing the bed for the foundation and necessary back filling, ramming, watering(including shoring and strutting) etc. (lift upto 1.50 m)	345.6	143.85 Cum	49714.56

B. Formula

Strength = Pressure (load)/Area N/mm² or mPa
Where, Load in N and Area in mm.

Sr. No	Red Bricks	Size	Load (KN)	Strength (mPa)	Average of compressive strength
1	A	10X10X20	150	7.5	7.91
2	B	10X10X20	170	8.5	
3	C	10X10X20	155	7.75	

Table 5: Compressive strength of red bricks

Sr. No	Cement Bricks	Size	Load (KN)	Strength (mPa)	Average of compressive strength
1	A	10X10X20	450	22.5	22.83
2	B	10X10X20	440	22.00	
3	C	10X10X20	480	24.00	

Table 6: Compressive strength of fly ash bricks:

From table no. 5 average of compressive strength for red brick was found to be 7.91 mpa and From table no. 6 average of compressive strength for fly ash brick was found to be 22.83 mpa.

3)	Appoved quality of murum filling.	172.8	283.99 Cum	49073.472
4)	Plain cement concrete Providing and laying in-situ, cement concrete M-15 of trap/granite /quartzite/gneiss metal for foundation and bedding including dewatering, compacting and curing etc.	86.4	3289.74 Cum	284233.53
5)	Providing masonry with conventional/indian standard type fly ash in cement mortar 1:6 in superstructure including striking joints, raking out joints, watering and scaffolding complete.	86.4	5535.85 Cum	478297.44
			Total	861319
			Add 5%	43065.95
			Grand Total	904384.95

Table 8: Abstract of estimation for fly ash bricks

Rate per squire meter is 1046.74/m²

The rate of all particulars is as per DSR-2016-2017.

C. Comparison between Red brick flooring and Fly ash brick flooring

- Brick is best better than fly ash rick paving.
- Sleeperness is less in brick paving than fly ash brick paving due to absorption of water in bricks.
- Brick paving is cooler in summer season due to holding of water.
- Shock absorption or electricity is absorbed more in brick paving.
- Injury is less during fighting in brick paving.
- During setting less injury to the knees in case of brick paving.

IV. CONCLUSIONS

- Urine absorption for red bricks was found to be 18 % and for cement bricks 6.5 %.
- Compressive strength for red bricks was found to be 7.91 mPa and for cement bricks was 22.83 mPa.
- Cost of construction for red bricks was found to be Rs. 1010.28/m² and Cost of construction for fly ash bricks was found to be Rs. 1046.74/m².
- Red bricks flooring found to be superior than fly ash bricks flooring.

REFERENCES

- [1] Chiappini U., Zappavigna P., Rossi P., Ferrari P. (1994). Straw flow litter for dairy cows: experimental tests with different slopes and different quantities of straw. Dairy Systems for the 21st Century, Orlando, Florida, 2-5 February.
- [2] De Belie, N., Lenahan, J. J., Braam, C. R., Svennerstedt B., Richardson M. and Sonck B., (2000) Durability of building materials and components in the agricultural environment, Part III: Concrete structures. J.agric. Engng Res. 76, 3-16.
- [3] EU Commission, 2001: The welfare of cattle kept for beef production. Health & Consumer Protection Directorate-General (Scientific Committee on Animal Health and Animal Welfare). SANCO.C.2/AAH/R22/2000.
- [4] Gooch, C.A. 2007. "Wide-Body Dairy Barns". *Hoard's Dairman*. January 25, 2007.

- [5] Government of Maharashtra public work department, Public work circle Nanded, TRICT schedule rates, 2012-2013, Parbhani-District.
- [6] Hilborn D., Rodenburg J., House H. (1995). Flush systems for manure removal from free stall dairy barns. Ministry of Agriculture Food and Rural Affairs, Factsheet Agdex: 410/743.
- [7] Lindley, J.A. & Whitaker, J.H. 1996. *Agricultural buildings and structures*. Revised edition. American Society of Agricultural & Biological Engineers (ASABE)