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# MISSISSIPPI A. & M. COLLEGE

Agricultural Extension Department

E. R. LLOYD, Director.

AGRICULTURAL COLLEGE, MISSISSIPPI.

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BULLETIN No. 2.

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## Dairy Barn Construction



EXTERIOR VIEW OF DAIRY BARN IN MISSISSIPPI  
CAPACITY 26 COWS, COST \$685.00

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## INTRODUCTION

Although dairying has made a wonderful growth in Mississippi the last few years, the industry is still in its infancy. It is, therefore, highly important that a good, substantial foundation be established upon which to build in future years. Every building erected on a farm should be for a definite purpose and so planned as best to meet the needs of that purpose. In the past the average farmer in Mississippi has put little time and thought into the question of proper housing and care of his farm animals, especially of the family cow. The mild open winters have instilled the idea that the storage of feed for winter feeding and the provision of shelter are not absolute essentials in this State. But with the growth of the dairy industry the farmers are fast realizing the fact that for an animal to be a profitable producer she must be well fed during the entire year and must be kept comfortable. These conditions can be maintained only when provision is made for storage of hay and grain and when the cows are sheltered from the winter winds and rains.

The consuming public is rapidly becoming educated to the point where it will demand that the dairy products be produced under sanitary conditions. Standards are being constantly raised, making it necessary for barns to be built so that they can be kept clean. Almost weekly, in travels over the State, one finds some farmer who has gone to the expense of erecting a dairy barn or milking shed that does not embody any of the real essentials of sanitation. Such a barn consists usually of only a roof and rough, windowless, unsanitary sides and is in such shape that it would be impossible to remodel it so as to include the essentials of sanitation, convenience and comfort.

It is not the purpose of this circular to try to cover the whole field of barn construction but rather to give some of the fundamental principles which should be embodied in every dairy barn, together with floor plans and other designs which will be of service to the dairyman in planning a barn for himself. The general type of a barn that would be desirable under conditions existing on one farm or in one community may not be advisable in another, but the essential requirements for ventilation, air space per cow, and light, and for the best floor arrangement are more or less the same throughout the State.

### ESSENTIALS IN BARN CONSTRUCTION.

**Ventilation.**—A plentiful supply of pure, fresh air is very essential in a dairy barn, both for the health of the cows and for the purity of their products. Tightly constructed barns that make it necessary to install some system of ventilation are rarely needed in this State. We do, however, need the doors and windows so placed and arranged that there will be a constant change of air without a direct draft on the cows. Ceiled barns should be equipped with flues which open flush with the ceiling, and are carried through the roof to a point three to four feet above the ridge. The flues assist in removing the warm air, thus keeping the barn cooler in summer. This ventilating flue may be made of wood or galvanized iron.

**Air Space.**—The interior of the barn should contain at least 500 cubic feet of air space per cow. This would make it necessary for the average height of the ceiling in a barn containing two rows of stalls to be approximately 9 feet. The air space per cow can be calculated by computing the cubical contents of the barn and dividing the result by the number of cows.

**Light.**—The direct sunlight is considered to be a valuable germicide. A dark, damp, filthy place is a good breeding place for disease germs and other germs of a detrimental nature. In order to keep a barn sweet and sanitary it is very important to have it well supplied with windows. A well-lighted barn is also much easier to keep clean. The windows should provide approximately 4 square feet of unobstructed lighting area per cow.\* In some instances, for the sake of economy, it may be necessary to leave the glass sash out, but in all cases the openings should be provided with some form of shutter which in winter may be open during the day and partly closed at night.

**Floor.**—The floor in the barn should be well constructed. The three common materials used for barn floors are clay, wood and concrete. A floor constructed of any one of these materials, if properly made and well cared for, is fairly easy to keep clean and sanitary. A clay or wooden floor, however, can be recommended only when the plans for future business are not definitely formed and when the necessary capital for a better floor is not available.

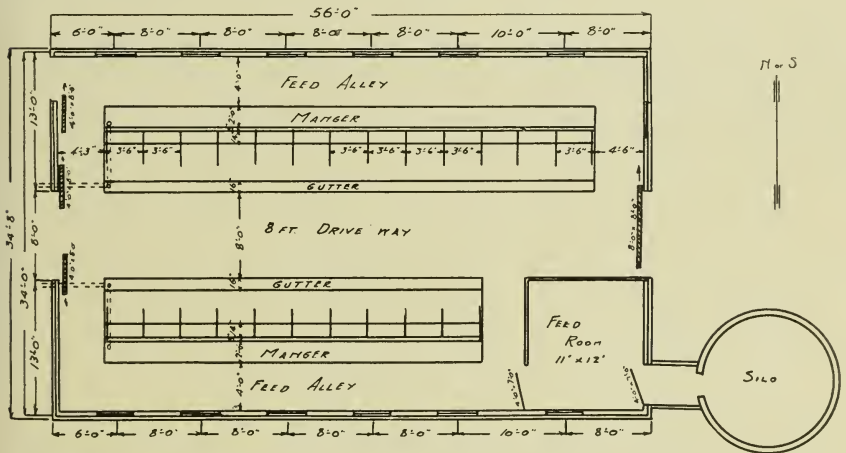


FIGURE 1. Floor plan for 23 cow barn, with feed room and silo attached.

A fairly good clay floor can be made by mixing the clay with lime, wetting the mixture thoroughly and packing it firmly. This floor is easier to keep clean than an ordinary dirt floor but it will wear in places and need frequent repairing.

The wooden floor, when properly constructed, is probably a little easier to keep clean than the clay floor, but it is liable to be somewhat more expensive, depending on the local price of lumber and the grade



of material used. If ordinary sap pine is used, it will have to be replaced every few years. The boards should be laid tightly together to prevent any of the dropping and urine from seeping through the cracks and cause an accumulation of filth and a bad odor in the barn. A floor of very soft, open-grained wood is also objectionable on account of its tendency to absorb large quantities of the liquid manure. Either of the two floors described above, when considered for a period of years, is more expensive than the concrete floor, on account of the necessity of frequent repairing and replacing, and is less desirable from the standpoint of sanitation.

When the concrete floor is properly constructed and of good material it has several advantages over either of the other two types. It is very durable and requires but little expense for maintenance. It saves labor as it is easily kept clean, especially where running water is available. One objection against the concrete floor is the high first cost. As pointed out above, when considered for several years' service, the cost of constant repairing of other types more than equals the extra cost of the concrete. Other objections are that it is hard and cold. Both these difficulties, however, may be overcome by using plenty of bedding. Unless special precaution is taken in laying a concrete floor it is apt to be slippery. The surface should be dressed off with a wooden float but never polished with a steel float or trowel.

The stall equipment should be put in or provisions be made for its installation at the time that the floor is laid. The standard width of the stall is 3 feet, 6 inches. The depth of the stall varies according to the length of the cows. For average Jersey cows it should be 4 feet, 6 inches from the curb to the gutter. For medium-large cows it should be 4 feet, 8 inches, and for very large cows it should be 5 feet. The thickness of the floor throughout the barn, in every case, should be five inches.

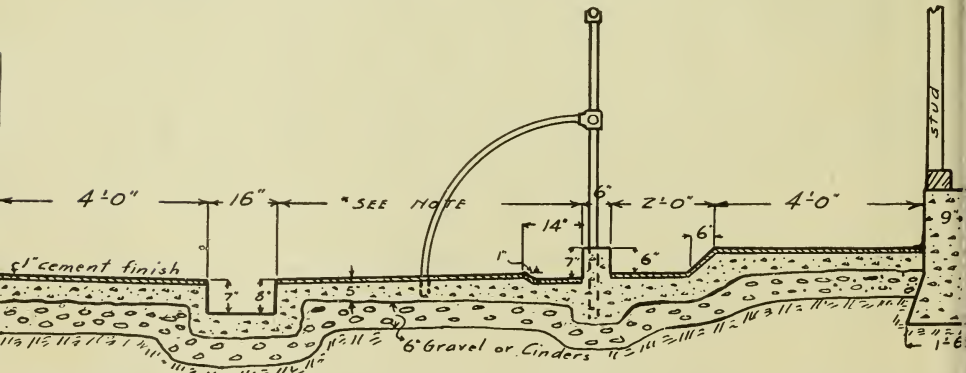


FIGURE 2. Cross section of concrete floor for dairy barn, showing necessary dimensions. (\* For average cows 4 ft. 6 in.; medium large cows 4 ft. 8 in.; very large cows 5 ft.)

The gutter should be made 16 inches wide and 6 inches deep. Its bottom and sides should be plastered with a half-and-half mixture of cement and sand, and troweled as smooth as possible to make it nonporous.

The manger should be 18 inches wide at the bottom, 24 at the top, and 6 inches deep. It should be separated from the floor of the stall by a 6 x 6 inch concrete curb. A feed alley 4 feet wide should be provided between the manger and the wall to give ample room to pass in front of the cows when feeding. The manger should never be placed closely against the wall. The bottom of the manger should be one inch above level with the floor of the stall, and should be polished with a steel float. For convenience in sweeping into the manger whatever feed may have been pushed out by the cow, the floor of the feed alley should be on a level with the top of the manger. A two-inch gas pipe may be imbedded in the concrete from one end of the manger to the gutter, to drain out the water used for washing the mangers.

Any of the floors described should be equipped with concrete gutters. Gutters may be made from boards if for temporary use, but they are difficult to keep clean and the sides frequently collapse from outside pressure, especially if used with the clay floor. In some instances, in which clay floors have been used concrete gutters have been put in with satisfactory results, extending the concrete 12 to 18 inches up under the hind feet of the cow, and the same distance on the side next to the walkway.

The interior of the barn should be annually whitewashed or painted. This will help preserve the walls, improve the appearance of the barn, and make it more sanitary.

Whitewash used by the Government is prepared as follows: Take one-half bushel of unslaked lime, slake it with boiling water, cover during the process, to keep in the steam; strain the liquid through a fine sieve or strainer and add a peck of salt previously dissolved by soaking in warm water, three pounds of ground rice boiled to a thin paste and one pound of clean glue, previously dissolved by soaking in cold water, and then hang it over a slow fire in a small pot hung in a larger one filled with water. Add five gallons of hot water to the mixture; stir well and let it stand a few days covered from dirt. It should be applied hot, for which purpose it can be kept in a kettle or portable furnace. The east end of the White House at Washington is embellished by this brilliant whitewash. It is used by the Government to whitewash lighthouses. A pint of this mixture, properly applied, will cover one square yard and will be almost as serviceable as paint for wood, brick or stone and is much cheaper than the cheapest paint. It is cheaper and better to apply the wash with a good brass spray pump. It will keep down flies and vermin in stalls as well as preserve the wood.

## EQUIPMENT.

The equipment and arrangement should be so planned as to contribute to the comfort of the cows, to the sanitation of the barn, and to the convenience in the care and handling of the stock. The cows are fed and milked twice daily and a minute or two saved in each operation will amount to a great saving of time in a number of years.

Probably there is no better way of fastening the cow in her stall than by some form of swinging stanchion either steel or wooden. In making a selection it is well to keep in mind that the steel stanchion is the more durable and easier to keep clean but more expensive to install.

Wooden equipment can be made sanitary and convenient and can be constructed for a very small cost. Complete stalls and stanchions have been built in Mississippi barns at a cost of less than 40 cents per cow. Special material should be cut for making this equipment. The following is a bill of material for one stall complete:

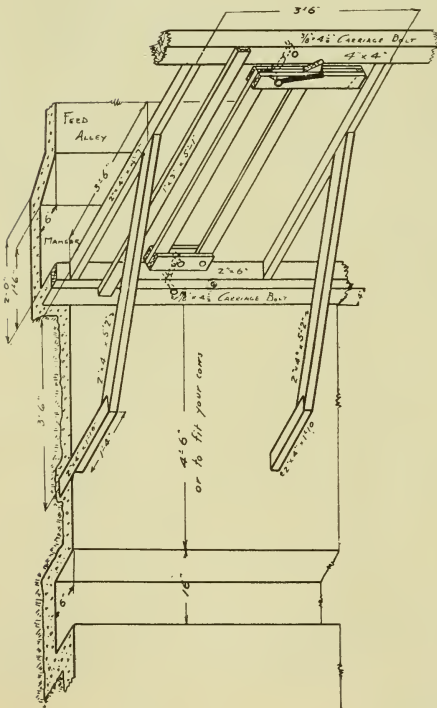


FIGURE 3. Wood stall and stanchion with concrete floor.

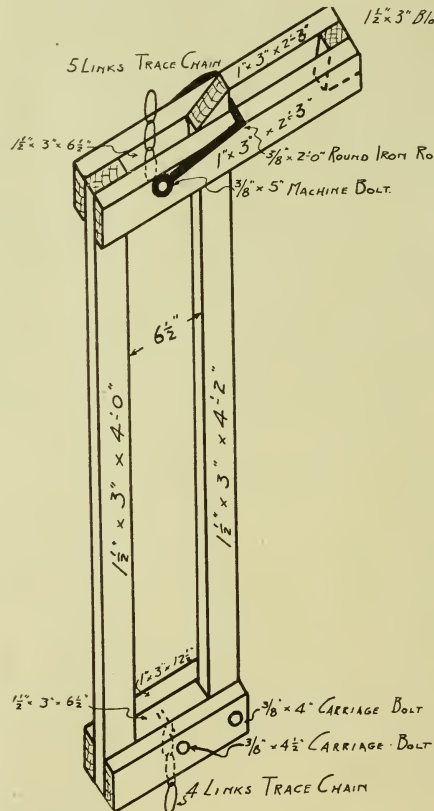


FIGURE 4. Homemade wooden stanchion.





**BARN FACTS AND SUGGESTIONS.**

1. For two rows of stalls the barn should be either 34 or 36 feet wide. If it is desired that the stalls shall be arranged for the cows to face the center alley, with a six-foot feed alley between the mangers, the barn should be 34 feet wide. If an eight-foot feed alley is desired, the barn should be 36 feet wide. If the stalls are arranged for the cows to face the outside walls, with an eight-foot driveway in the center, the barn should be 34 feet wide.

For one row of stalls the barn should be 17 feet wide.

2. Provide not less than 500 cubic feet of air space per cow.

3. The barn should be well ventilated.

4. The minimum amount of glass should be 4 square feet per cow. Plenty of light will help keep the barn sanitary.

5. The floor should be hard so that it can be easily kept clean.

6. Concrete floors should have the top surface dressed off with a wooden float. A steel float should never be used for this purpose.

7. The manger should be 18 inches wide at the bottom, 24 inches wide at the top and at least 6 inches deep.

8. Never put stationary divisions in the manger.

9. The manger should not be placed closely against the wall. For convenience in feeding, leave a four-foot passageway at each end of the stable, and in front of the mangers.

10. The stalls should be 3 feet, 6 inches wide and deep enough to accommodate the cows. This requires 4 feet, 6 inches for small cows, 4 feet, 8 inches for medium-sized cows and 5 feet, for large Holsteins.

11. Make the gutters 16 inches wide and 6 inches deep.

12. Provide the gutters with pipes for draining out the water from the barn after scrubbing the floor.

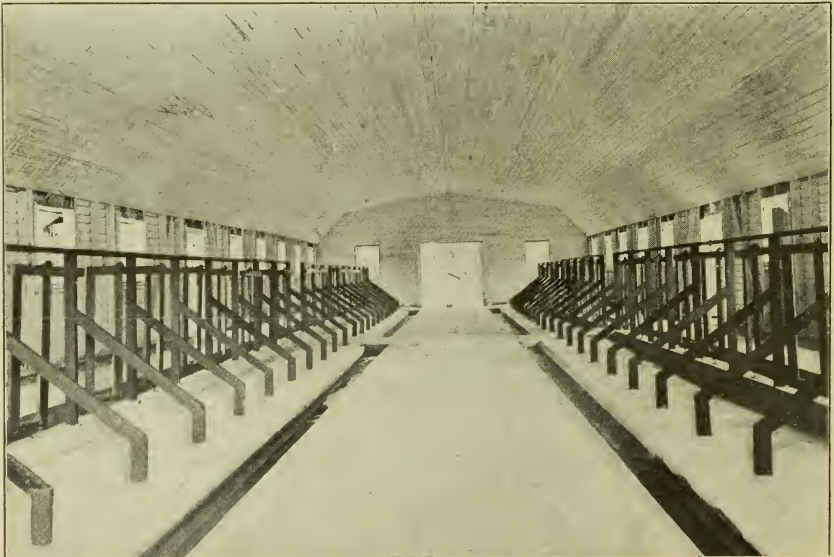
13. Use some type of swinging stanchion.

14. Make the ceiling of the barn so that it can be kept free from dust and cobwebs.

15. The ceiling in the cow stable in a two-story barn should be dust proof.

16. Whitewash the inside of the barn every year.

17. Paint the outside of the barn as often as is necessary. Paint preserves the wood and improves the appearance.



INTERIOR VIEW OF DAIRY BARN IN MISSISSIPPI, SHOWING WOOD EQUIPMENT WITH CONCRETE FLOOR. CAPACITY 40 COWS, COST \$1025.00