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VALUE of NECK BOARD and BRISKET BOARD in FREE-STALL HOUSING for DAIRY CATTLE

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Value of Neck Board and Brisket Board in Free-stall Housing for Dairy Cattle

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INTRODUCTION

INDIVIDUAL FREE-STALL HOUSING of dairy cattle was apparently used for the first time in 1960 *(3)*. Since then there has been widespread adoption of this method of housing dairy animals *(1, 2, 3, 4, 5, 6)*. Reasons for the adoption of the system in preference to loose housing and stanchion barn housing, as indicated by most researchers are: Cows stay cleaner; a 50-75 per cent saving in bedding is realized; less labor needed in cleaning cows and cleaning stalls; less injury and disease of udders; and timid cows have less competition with bossy animals.

Although free-stall housing is gaining acceptance throughout the United States very little research has been done to determine the most suitable design. Schmisseur and co-workers at Purdue (7) did some studies to compare the free-stall arrangement with loose housing. They observed that cows prefer larger stalls if given a choice. Animals housed in free stalls are more individualistic in such behavior patterns as eating habits and this is an advantage for timid cows. 'Free-stall cows' rested less than 'loose-housing animals' (10.7 hr. per day to 12.3 hr.), and cows given a choice between the two housing types had to be trained to use free stalls. Schmisseur reported a British study in which it was concluded that cows tend to choose stalls nearest the door but have no individual stall preferences.

Most recommendations on stall design by writers cited above suggested the following basic dimensions: Stall space per cow – 30 square feet; width and length, small cows – 40 x 84 inches, large cows – 48 x 96 inches; partition height – 48 inches; curb height – 8 inches; alley width – 8-10 feet; neck board – 48-66 inches from curb; and brisket board (only one recommendation) – 66 inches from curb.

* On leave.

No research results are available on the relative merits of a neck board (NB) and a brisket board (BB), nor on the most desirable location of these boards. Experience has indicated that these boards tend to keep stalls cleaner. Since there is widespread interest in free-stall housing for dairy cows in Alabama, and since there is very little information available on stall arrangements, studies on freestall housing were conducted at the Gulf Coast and Black Belt Substations in 1969.

The objectives of the research were to determine the relative merits of neck boards (NB) and brisket boards (BB) in free stalls for dairy cows and to study the location of NB and BB in the free stall for optimum results.

EXPERIMENTAL PROCEDURE

At the Gulf Coast Substation there were two free stall barns. One had 29 stalls and housed the same number of dairy cows day and night. The other had 45 stalls and 45 animals. Five treatments (1-5) were used in the smaller barn and all seven

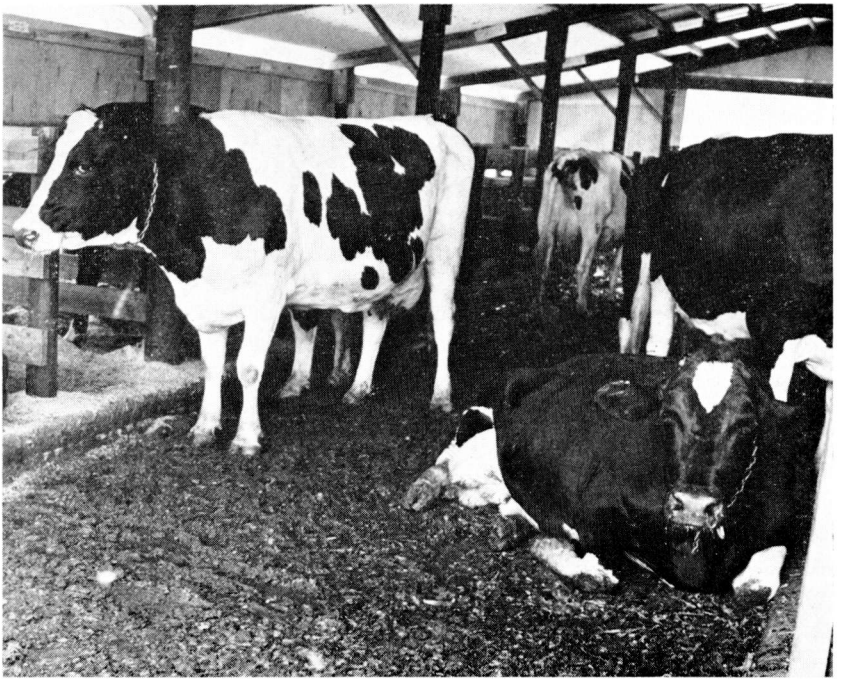

FIG. 1. A few cows must be trained to use free stalls. One animal in this barn preferred to rest in the contaminated alleyway.

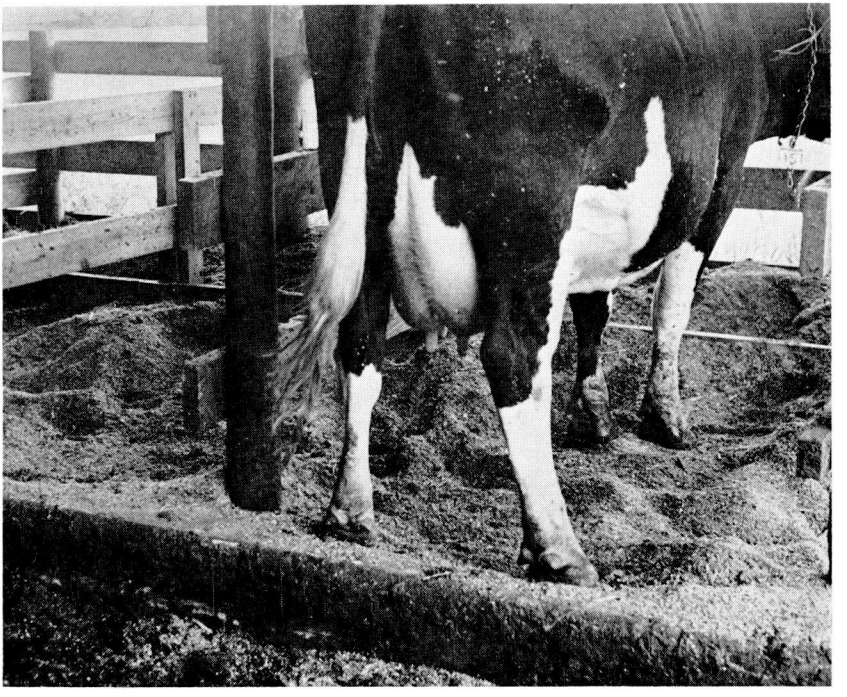

FIG. 2 Cow in free stall. Note cleanliness of cow and condition of the bedding. Brisket board (BB) can be seen at the front of the stall.

treatments (1-7) were used in the larger barn. The treatments were assigned in a random manner. Stall dimensions were 4 x 7½ feet. The neck boards in all cases were poles 2-3 inches in diameter, nailed to the top of stall partitions 40 inches above curb level. The breast boards were made from 2 x 6-inch timbers and were nailed to the bottom partition board 3.5 inches above curb level. Treatments used were: Control (C) — no neck board (NB), no brisket board (BB); NB placed 66 inches from curb and 40 inches above top of bedding level; BB placed 66 inches back of curb and 3.5 inches above curb level; NB 66 inches from curb and BB 66 inches from curb; NB 60 inches from curb and BB 66 inches from curb; NB 60 inches from curb and BB 60 inches from curb; and NB 72 inches from curb and BB 72 inches from curb.

Observations were made 4 days weekly from January 16 to March 20. The number of manure droppings inside each stall were tabulated once daily, about 3:00 p.m. Manure droppings were removed from the stalls daily. Wood shavings were used

as bedding material. The bedding was levelled at weekly intervals and shavings added as needed about once each month.

For a period of 6 weeks a record was made of the identification of cows occupying the stalls to determine whether there was a stall preference associated with individual cows. Also measurements were made of the length of each animal from foremost points of withers to extreme end of tail-head to determine whether cow size might affect stall preference. The cattle were mainly grade Holsteins.

At the Black Belt Substation four free-stall arrangements were studied and nine stalls of each treatment were used. The stalls were assigned to treatments in a random manner and had the same basic dimensions of those in the experiment at the Gulf Coast Substation. Treatments were: Control – no neck board (NB), no brisket board (BB); NB – 60 inches from curb and 39 inches from top level of shavings; BB – 52 inches from curb and 2 inches above bedding level when stalls were filled; and NB and BB — 66 inches from curb.

Cattle in this herd were of mixed breeding, some Jerseys and some grade Holsteins. Animals of Holstein breeding ranged from 1,000 to 1,400 pounds and Jerseys, of course, were smaller. Average cow size was somewhat less than in the Gulf Coast Substation herd.

Wood shavings were used for bedding and levelled each 2-3 days.

A record was made of manure droppings during a total of 18 days starting January 29, 1969. This information was obtained once daily about 8:00 a.m. during the experimental period.

RESULTS AND DISCUSSION

The combined use of the NB and BB in a free stall resulted in a cleaner stall; i.e., fewer manure droppings than the other stall arrangements. Also, the NB helped prevent small cows from turning around in the stalls. Summary data are shown in Table 1. Analysis of variance showed highly significant differences among the treatments. The two most effective treatments were: BB 60 inches from curb – NB 60 inches from curb and BB 66 inches from curb – NB 60 inches from curb. Also, more effective than the control and those treatments with only NB or BB was the BB 66 inches – NB 66 inches.

It is apparent that the spacings of the NB and BB are quite important. Though fewer data were collected on treatment 7

FIG. 3. This view of the free-stall barn at the Gulf Coast Substation shows the neck boards, which were installed 40 inches above the floor.

TABLE 1. AVERAGE NUMBERS OF MANURE DROPPINGS PER DAY BY COWS IN SEVERAL STALL ARRANGEMENTS, GULF COAST SUBSTATION

Treatment	Manure droppings per stall per day (means)		
	Barn 1	Barn 2	Averages
1. Control	1.53	1.46	1.50
2. NB, 66″ from curb	1.43	1.18	1.31
3. BB, 66″ from curb	1.33	1.29	1.31
4. NB, 66″ — BB, 66″	1.04	0.44	0.74
5. NB, 60″ — BB, 66″	0.37	0.24	0.31
6. NB, 60″ — BB, 60″	----	0.07*	----
7. NB, 72″ — BB, 72″	----	1.25*	----

* Treatments 6 and 7 were used only in Barn 2.

Table 1, the BB 72 inches — NB 72 inches seemed to be no better than the control stall arrangement.

The use of NB as in treatments 4, 5, and 6 causes droppings

to fall in the ally instead of the stall when the cow is standing. Likewise a BB helps prevent manure droppings in the stall when the cow is lying down.

The data showed no evidence of stall preference by individual cows when animals had a choice. Also, there were no significant differences among treatments in average length of cows using the stall, Table 2, although the data indicated there was a slight tendency of larger cows to occupy stalls with no NB or BB, or to make more use of stalls with the greatest distance from curb to NB or BB. Range in body length was 54 inches – 64 inches (fore-withers to tail-head).

TABLE 2. BODY LENGTH OF COWS USING VARIOUS STALL ARRANGEMENTS, GULF COAST SUBSTATION

Treatment	Average body length				
	Barn I		Barn II		Mean of all
	East	West	East	West	
	In.	*In.*	*In.*	*In.*	*In.*
1. Control	60.26	60.70	60.30	51.16	60.10
2. NB, 66″ from curb	60.05	59.89	60.53	61.65	60.53
3. BB, 66″ from curb	60.26	59.50	59.70	59.88	59.83
4. NB, 66″ — BB, 66″	59.84	59.45	59.44	60.37	59.77
5. NB, 60″ — BB, 66″	59.87	59.31	60.36	60.40	59.99
6. NB, 60″ — BB, 60″	----	----	59.35	59.25	59.30
7. NB, 72″ — BB, 72″	----	----	60.55	60.13	60.34

Two of the cows at the Gulf Coast Substation consistently refused to use the free stalls during the experiment. This may have been a result of the lack of extra stalls, although they were consistently the same animals. Most general recommendations call for providing about 5 per cent more stalls than actual number of cows in a barn. During a later period of extremely warm weather there were 6-8 cows that preferred to lie down in the alley which was moist and apparently cooler than the stalls. This problem emphasized the need for effective ventilation and air movement during warm summer periods.

As in the Gulf Coast Substation research, the use of both NB and BB in free stalls proved superior to each separately and to the control in the experiment at the Black Belt Substation. The average numbers of stalls contaminated by manure droppings per day are shown in Table 3.

The values in Table 3 are lower than those shown in Table 1, since in the Black Belt study no effort was made to count individual droppings, as was done in the Gulf Coast experiment.

Thus in many observations the contamination in a given stall resulted from more than single droppings during the day. Also, the Black Belt cows were not confined to the free stalls during the day as were those at the Gulf Coast Substation.

TABLE 3. MANURE CONTAMINATION BY COWS IN SEVERAL STALL ARRANGEMENTS, BLACK BELT SUBSTATION

Treatment	Manure contamination per stall per day (means)
1. Control	0.38
2. NB, 60 inches	0.14
3. BB, 52 inches	0.22
4. NB, 60 inches — BB, 52 inches	0.08

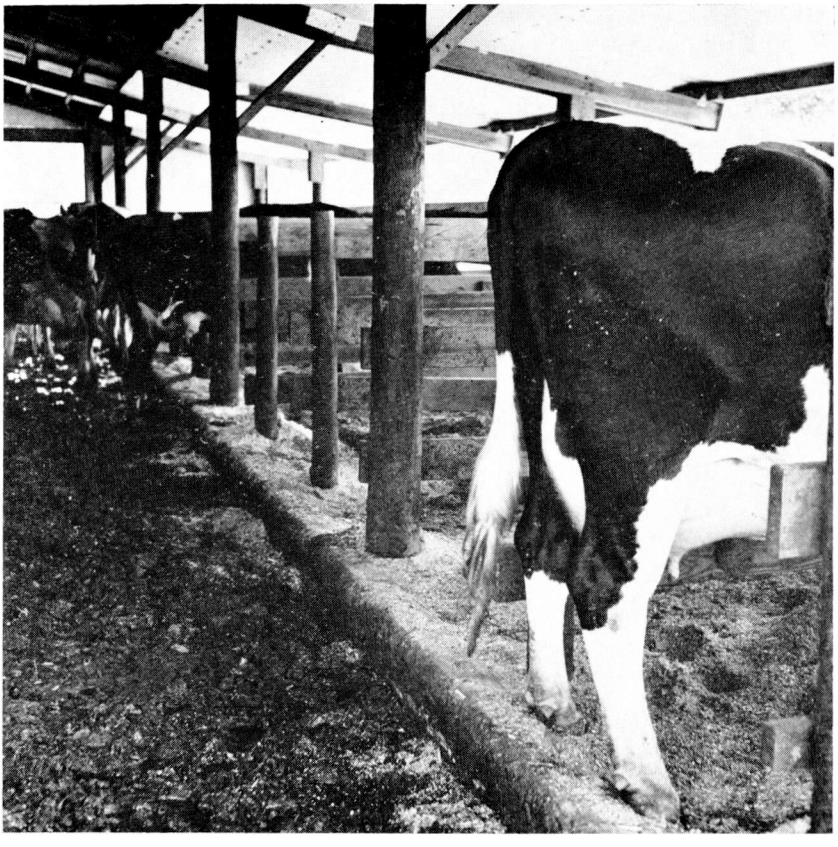

FIG. 4. Clean bedding in the stalls and litter in the alleyway can be seen clearly in this view of the free-stall barn at the Gulf Coast Substation.

SUMMARY

Results of these experiments clearly show that the use of both neck board and brisket board in free stalls helps keep the bedding free from manure contamination and to keep the cows clean, provided the boards are properly spaced.

Optimum spacing of NB and BB depends on cow size, which varies among herds and within herds. However, these studies show that a satisfactory spacing for cows measuring about 60 inches from tail-head to forewithers (grade Holsteins) is NB 60 inches from inside curb and BB 60 inches from inside curb. For larger cows it would be best to have BB 66 inches inside the curb. These spacings resulted in very few droppings in the stalls and cleaner cows, compared with stalls with no NB or BB, or with greater space between curb and NB or BB.

Although there were few Jerseys and Guernseys in these experiments, it appears that a NB spacing of 60 inches from curb and BB spacing 52 inches from curb is satisfactory for animals of the smaller breeds.

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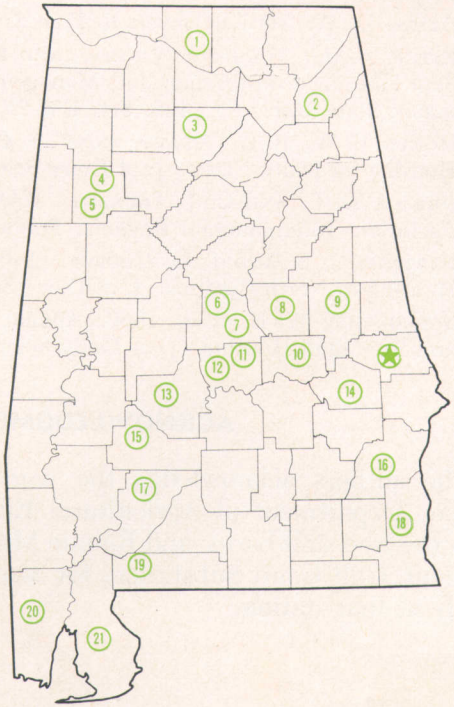

Research Unit Identification

★ Main Agricultural Experiment Station, Auburn.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Thorsby Foundation Seed Stocks Farm, Thorsby.
7. Chilton Area Horticulture Substation, Clanton.
8. Forestry Unit, Coosa County.
9. Piedmont Substation, Camp Hill.
10. Plant Breeding Unit, Tallassee.
11. Forestry Unit, Autauga County.
12. Prattville Experiment Field, Prattville.
13. Black Belt Substation, Marion Junction.
14. Tuskegee Experiment Field, Tuskegee.
15. Lower Coastal Plain Substation, Camden.
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