OBSERVATIONS OF DAIRY COW HABITS AND CERTAIN PHYSIOLOGICAL ACTIVITIES IN LOOSE HOUSING DURING THE WINTER

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THESIS

This is to certify that the

thesis entitled

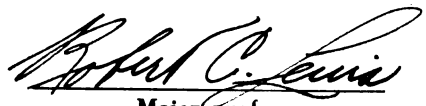
Observations of Dairy Cow Habits and Certain Physiological Activities in Loose Housing During the Winter

presented by

John Daniel Johnson

has been accepted towards fulfillment of the requirements for

M.S. degree in Dairy



Major professor

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OBSERVATIONS OF DAIRY COW HABITS AND CERTAIN PHYSIOLOGICAL ACTIVITIES IN LOOSE HOUSING DURING THE WINTER

By

John D. Johnson

A THESIS

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

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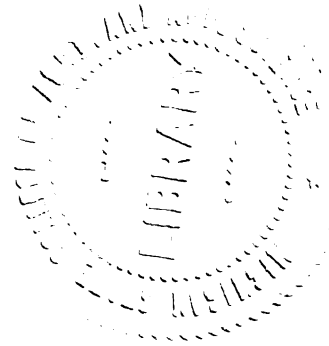

ACKNOWLEDGMENTS

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The fine cooperation of E. S. Smiley, Dairy Herdsman, and Robert Slee, Brown Swiss herdsman, while the writer was working with the herd, was also greatly appreciated.

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INTRODUCTION

A steadily increasing farmer interest in the loose housing of dairy cattle has been noted in recent years. Economical production of a high quality product has directed dairy farm changes towards labor saving methods, low priced remodeling or construction programs, and cattle comfort and health improvement. All are aimed at the most profitable production per cow and per man hour expended.

Research workers have in general reported favorably during the past half century on cow health, comfort, and production in pen barns. However, dairymen have been slow to accept loose housing and outside feeding as they have noted their cows suffering from cold when turned out of standard barns for even a short while in severe weather. Also, during the past fifty years labor was not a serious problem and new barns were built to house the herd in a way that would compare favorably with others in the neighborhood.

The change from one extreme, the closed, often poorly ventilated barn, to the open shed with outdoor feeding areas, almost immediately raises the question of an effect on cow health, feed requirements, and habits.

The objectives of this investigation were:

1. To study the effect of winter weather conditions on the roughage eating, loitering, and resting habits of dairy cows in a loose housing barn with outside self-feeding hay- and silage-feeding areas.

2. To study the effect of winter weather conditions on the pulse rate, respiration rate, and body temperature of dairy cows in a loose housing barn with outside hay- and silage-feeding areas as compared with cows in a standard tie stall barn.

REVIEW OF LITERATURE

Loose Housing of Dairy Cattle

Loose housing of dairy cattle was first studied as a research project in the United States in 1905 in Illinois. W. J. Fraser (9) reported on the results of questionaires to 18 dairymen on their success with pen-type dairy barns. All reported satisfaction with this type of dairy cattle housing and the author, in summarizing, reports that pen barns make it easier to provide fresh air, the cattle were more vigorous and healthy and had better appetites than when kept in a stall. He also reported that the exercise and movement of the cattle reduced suffering from severe cold even though the pen was colder than the stable.

Early pen-barn research reported from Pennsylvania in 1913 by H. P. Davis (6). A four year experiment (1910-1913) was completed with two herds of cattle, one in a regular stable and the other in an open pen. Environmental temperature reduced milk production in both herds with the outside group decreasing the most. However, after the cold spell, this group recovered quicker and increased more than the inside herd. One season the outside herd was not placed in the open pen early in the fall and as a result were not acclimated. That year they showed a greater decrease in production than those housed in the stable.

At about this same time Buckley and Lamson (3) of the Maryland Agricultural Experiment Station reported on a three year experiment with closed versus open stabling of dairy cows. Their study of winter temperature effects indicated that the importance of low temperatures had

been greatly overestimated by dairymen. A severe cold spell of -26°F. outside temperature on January 28, 1912 showed comparable variations in milk flow in the two groups studied. The open pen temperature was -14°F. and the closed pen temperature dropped to 11°F.

The open shed for dairy cattle was also compared with the closed barn as early as 1914 by the United States Department of Agriculture, as reported by Woodward (22). The open shed barn in this study included areas for loafing, resting, and eating of roughage. The south side of two barns used was open. The second barn had double doors on the other three sides which were kept open during the summer. Two herds were used and alternated each year between the open and the closed barn. Of 21 cows, 14 produced more milk in the open shed and 6 produced more in the closed barn. Feed cost per 100 pounds of milk was slightly higher in the open barn despite their higher production. Cow health and contentment was estimated to be the same in the two barns, although there appeared to be differences between cows. In this study ventilation was not a factor, as both barns were satisfactorily ventilated.

In 1935, Dice (8) reported similar production by comparable cows with relatively equal feed consumption in open shed and standard dairy barn housing. Inside temperatures averaged 48.2°F. in the standard barn and 28.2°F. in the open shed.

Research and the actual use of open shed housing and outside feed areas continued to make slow progress. A popular article by Fraser (10) in 1939 discussed general characteristics of loose housing, including the general layout, feeding racks, ventilation, and bedding from reports

of dairymen using pen barns. On ventilation, this writer suggested that doors be opened in moderate weather and the windows be opened slightly all year. This was reported tried at the University of Illinois where windows were left open 2 or 3 inches all winter. Cows under these conditions always moved to the side of the barn from which the wind was blowing, indicating they wanted more fresh air.

Ventilation was also noted as a serious problem in the closed barn by United States Department of Agriculture workers (16) in 1945. Closed barns were still recommended for cold areas, although outside feed racks and open south walls were recommended for areas where winter weather was not too severe. "Cold areas" or "not too severe winter weather" were not further explained. Department workers (12) were also studying relative milk production of cows in pens and stanchions. This report in 1947 showed 18 percent more milk and 17 percent more butterfat produced by cows in pens over cows in stanchions when both received grain at the rate of 1 pound to every 3 pounds of milk. An increase of 7 percent more milk and 6 percent more butterfat from cows in the pens was noted when the grain ration was limited to 1 pound of grain per 4 pounds of milk produced. Cows in the pens had free access to hay and silage and ate more in total. Cows moved from pens to stanchions had serious lameness and sore feet for the first three months.

Outdoor feeding research was reported in 1948 by Smith and co-workers (18) who found that farmers reported success with loose housing in the state of Washington even in winter weather. Cows preferred to eat at outside feed racks even in zero weather. Outdoor feed racks were

recommended if placed in areas sheltered from prevailing winds. Open-shed lounging areas should be free of crossdrafts.

North Dakota studies by Dice (7) compared warm and cold housing of two similar groups of dairy cattle during the winter months of October, November, December 1926 and January 1927. Temperatures ranged from -22°F. to 36°F. for the open shed group and seldom under 50°F. in the stanchion barn. The feeding program was the same for both groups except that those in the open pen had free access to hay from an outdoor feeder. The open shed group gained more weight, produced more milk, and ate more hay. From this and other studies between 1927 and 1942, Dice concluded that cows in the dry climate of North Dakota can stand considerable exposure to cold temperatures. Adequate rations, shelter from wind, snow or rain, and dry bedding provide conditions for comparable production with cows in a stanchion barn at 50°F. or above. Dice also concluded that cows on full feed apparently produce more heat than needed to maintain body temperatures without using additional nutrients for body heat and the apparent need for heat in the barn was to meet the conditions desired by the operator rather than the cows.

A ten year loose housing research project in Wisconsin by Witzel, Heizer, and co-workers (21) used steel barns and included comparison studies of a warm stanchion barn, an insulated warm loose housing barn (3 years), and a cold loose housing barn. The insulated loose housing barn gave unsatisfactory results due to wet bedding and high humidity. However, when this barn was operated with open doors and windows as a cold loose housing barn, it was satisfactory, as was the uninsulated

loose housing barn which was operated with doors open. Herds in both types of housing, loose and stanchion, produced equally well. The cold loose housing herds used 3 to 6 percent more roughage and also gained more weight. In this project, recorded temperatures averaged 52°F. in the stanchion barn, 50.9°F. in the warm loose housing barn (3 years), 36.1°F in the cold loose housing barn and 30.5°F. outside temperature. Below zero temperatures were usually noted each winter in the cold loose housing barn with a low of -23°F. recorded in the winter of 1950-51. Temperature and milk production had no apparent relationship in either barn.

Jefferson and Weaver (14) report that pen barn research started in Michigan in 1928. In 1945 these workers reported 139 pen barns known to be in use in Michigan. All records to this date were on closed pens with inside hay and silage feed racks. Outside exercise yards were used only in moderate weather.

In 1950 Brown, Cargill, and Bookhout (2) reported on studies made with farmer herds in Michigan. On environmental temperature requirements of the dairy cow, they reported that cold housing is practical and economical when cows are properly acclimated, if an adequate ration and a dry bedded area out of crossdrafts is provided. They also report that more roughage and less grain will be used by cows in open barns due to sharpened appetites with more efficient production as the result. Year around self-feeding of hay from outside feed racks or a separate hay storage barn is here recommended for the first time in Michigan. Once a day outside feeding of silage was also recommended. Cargill (4)

further reported in 1952 on outdoor self-feeding of hay and silage to reduce labor requirements.

Environmental Effects on Cow Habits and Body Metabolism

More recently, research workers have reported on factors affecting the body metabolism of dairy cows. Thomas and Moore (20) reported in 1951 that heart rate is affected by age, feed intake, period of gestation, and estrus, with the resulting rate in direct proportion to the total metabolism of the cow.

Thomas (19) had reported earlier, 1949, that heart rate averages 65 beats per minute at 70-90 days before calving; 72 at 30-50 days and 92 at 0-10 days before calving.

Brody and co-workers (1) reported in 1951 that hunger acts as a body temperature regulating mechanism and that feed consumption increases as environmental temperatures decrease with the least change in the small and low producing cows.

Stress conditions on dairy cattle were studied by Graf (11) and included the effects of low ambient temperatures, exercise, dehorning, adrenaline injections, parturition, and intermittent electrical stimulus. A slight increase in rectal temperature was noted when animals were exposed to one hour -16°F. ambient temperature.

A very extensive work on environmental physiology with controlled experiments on dairy cattle by Kibler and Brody (15) included a study of decreasing temperature from 50° to 5°F. with the following conclusions regarding temperature, heart rate, respiration rate, and milk production:

1. No significant change in rectal temperature.
2. A greater decrease in milk production in the Jersey than in the Holstein cows, which was presumably associated with increasing diversion of feed for maintenance of normal body temperature.
3. A progressive decrease in respiration rate to minimal value of 10 to 15 per minute at $5^{\circ}F$.
4. An increase in pulse rate of approximately 8 percent.

MATERIALS AND METHODS

The Brown Swiss herd of sixteen cows and four bred heifers housed in the steel loose housing barn, which is a part of the Dairy Cattle Housing Research Project at Michigan State College, was selected for this study. Ralston (17) reported that this herd was originally moved to this barn November 15, 1951. Thus they had become adjusted to loose housing conditions when this study was started November, 1952, shortly after the herd had been taken off pasture. One cow was removed from the herd at the end of the third month, so 20 head are included in the first half of the study and 19 head for the last half. Six head of Holsteins in the main barn were also included in this study for tie stall barn observations on pulse rate, body temperature, and respiration rate. Herd numbers, birth dates, and date of last calving are shown in Table I.

The loose housing program included two barns. One provided straw storage, lounge area, calf and maternity pens, milking parlor, and milk room. The lounge area opened on the south to a paved barn yard. The other building on the west of the paved yard provided hay storage for the entire herd and shelter and straw storage for young stock.

The feeding program did not have to be changed for this study as hay was self-fed from moveable racks along one side of the hay storage barn. Silage was also available from an experimental self-feeding silo located in the paved yard area.

Activity and cardiorespiratory data were obtained by observations and measurements on individual cows. To facilitate easy identification

TABLE I

EXPERIMENTAL ANIMALS

Identifcation No.	Herd No.	Date of birth	Date of last calving
	Holsteins in tie stall barn		
1.	460	6/27/44	5/31/52
2.	490	2/2/46	7/9/51
3.	517	11/19/47	3/29/52
4.	523	3/9/48	1/29/52
5.	540	2/22/50	5/27/52
6.	542	6/4/50	9/12/52
	Brown Swiss in loose housing barn		
1.	322	1/25/41	11/19/52
2.	335	3/3/43	4/23/52
3.	300	4/11/47	12/25/51
4.	367	9/22/47	10/30/51
5.	377	4/25/49	11/23/51
6.	384	4/3/50	7/11/52
7.	383	2/27/50	8/25/52
8.	371	11/3/48	11/14/51
9.	309	3/13/48	12/23/51
10.	390	12/29/50	----
11.	372	11/3/48	8/20/51
12.	379	11/7/49	5/4/52
13.	387	7/3/50	9/26/52
14.	389	9/10/50	----
15.	385	5/12/50	9/28/52
16.	365	8/14/47	1/11/52
17.	380	11/12/49	10/19/52
18.	382	2/27/50	----
19.	350	8/23/45	3/27/52
20.	392	7/21/51	----

for both day and night observations with the least possible disturbance of the cattle, large numbers were clipped on both sides of each animal with electric clippers and painted with a nonlead white paint. The paint lasted only a few weeks but was not replaced due to the fact that the clipped numbers were plainly visible throughout the experimental period.

Individual cow activity observations were made as a twenty-four hour watch once per month for a total of six days. A flashlight was used to check the identification of cows during the night hours to avoid the use of barn lights and any unnecessary disturbance of the cows. Individual cow activity was noted every ten minutes during the observation period. Data included time spent: (1) loitering in the paved yard area, (2) loitering in the lounge area, (3) eating silage, (4) eating hay, (5) resting in the lounge area, (6) Resting in the yard, and (7) time in the milking parlor. It was originally planned to include time drinking water, but a ten minute interval did not lend itself well to this type of observation.

The first twenty-four hour study was completed over two weekends in two six hour periods and one twelve hour period. The remaining five observation periods were completed as uninterrupted twenty-four hour observation. The following dates were used:

1. November 1, 6-12 P.M.; November 3, 12-6 P.M.; November 8, 12-12 A.M.
2. November 28, 8 P.M.-12 Midnight; November 29, 12:01-8 A.M.
3. December 30, 5 P.M.-12 Midnight; December 31, 12:01 A.M.- 5 P.M.

4. January 23, 3 P.M.-12 Midnight; January 24, 12:01 A.M.-3 P.M.

5. February 27, 4 P.M.-12 Midnight; February 28, 12:01 A.M.-4 P.M.

6. March 28, 8 A.M.-12 Midnight; March 29, 12:01 A.M.-8 A.M.

Respiration, body temperature, and pulse rate data were secured at weekly intervals starting November 11, 1952 and concluding March 25, 1953. Data are not included for the last weeks of December and January due to Unavoidable disruptions in December and Farmers' Week activities in January. All data were collected between 2:00 and 4:00 P.M.

A stop watch was used to check pulse rate and respiration. Generally two or more 15 second periods were checked, then averaged and multiplied by four to find the rate per minute. Respiration was checked by observation when standing and resting. Pulse rates were secured from the coccygeal artery in the tail. A few checks were made with a stethescope over the heart. Rectal temperatures were secured and recorded. These data were obtained by tying two or three animals at a time with rope halters as near as possible to where they were standing or resting at the time. Fortunately this herd was very quiet, not easily excited and accustomed to halters so the activity in securing these observations caused very little extra disturbance.

Weather data including precipitation, snowfall, snow on the ground, wind, resting area temperature, and paved-yard outside temperature were secured from the 1952-53 Progress Report on Dairy Housing Research Project No. 89 (5), and records of the local United States Weather Bureau. These data were secured each week for the same day and time of day as the pulse rate, body temperature, and respiration rate.

RESULTS AND DISCUSSION

Cow Habits and Activities

Freedom of movement from resting to feeding and sheltered to open areas made it possible to study cow activities throughout the day and night to determine cow habit patterns. Six twenty-four hour observation periods approximately four weeks apart from early November to late March were used to study changes in activities as affected by low temperatures, rain, snow, and wind. A very open and mild winter reduced the effectiveness of this study, although a low of -7°F. was recorded in the outside paved area January 6, and several periods of sleet and ice not recorded in the twenty-four hour studies showed very little effect on cow activity except to increase the lounge area loitering time.

Collected data on cow activities are shown for individual cows at ten minute intervals for twenty-four hour observation periods in Tables V, VI, VII, VIII, IX, and X in the Appendix.

Loitering in the yard.

Figures 1, 2, 3, 4, 5, and 6 show cow minutes per hour loitering in the paved yard area for each twenty-four hour observation period. These figures show two major periods each day when time was spent standing and loitering outside. The first was 7-12 A.M. and the second 12-4 P.M. Both were closely related to daytime hay-and silage-eating periods. A study of individual cow activity data in Tables V to X shows that during these hours most of the cows would alternate at eating hay or silage and loitering in the yard.

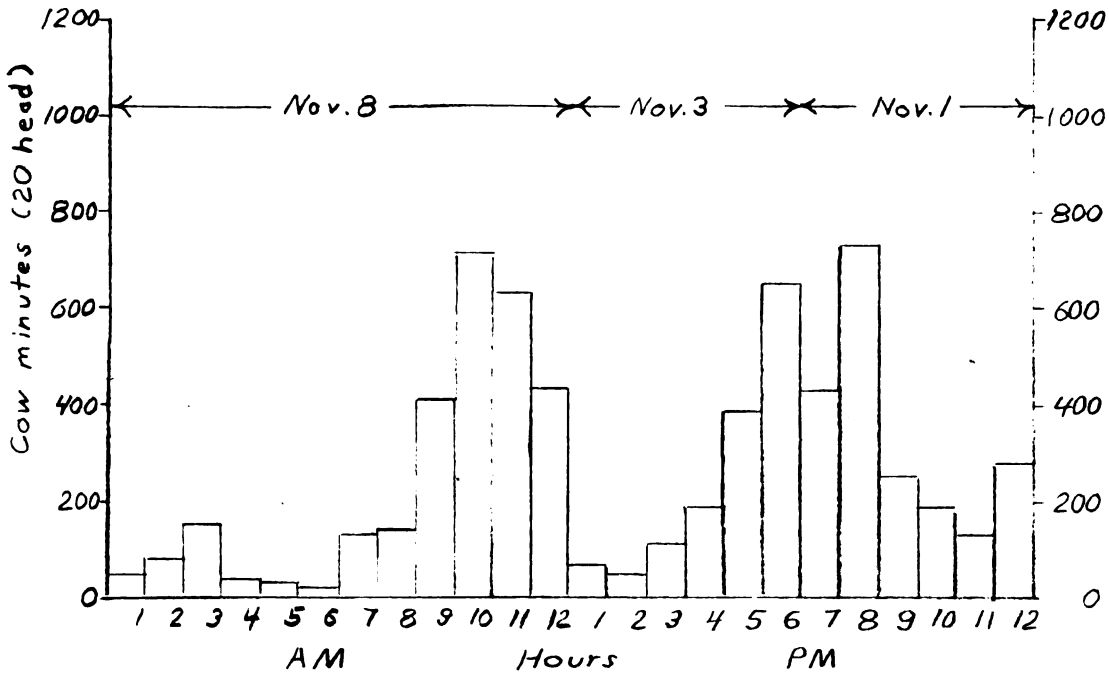

Figure 1. Cow minutes per hour loitering in the yard (Nov. 1, 3, 8).

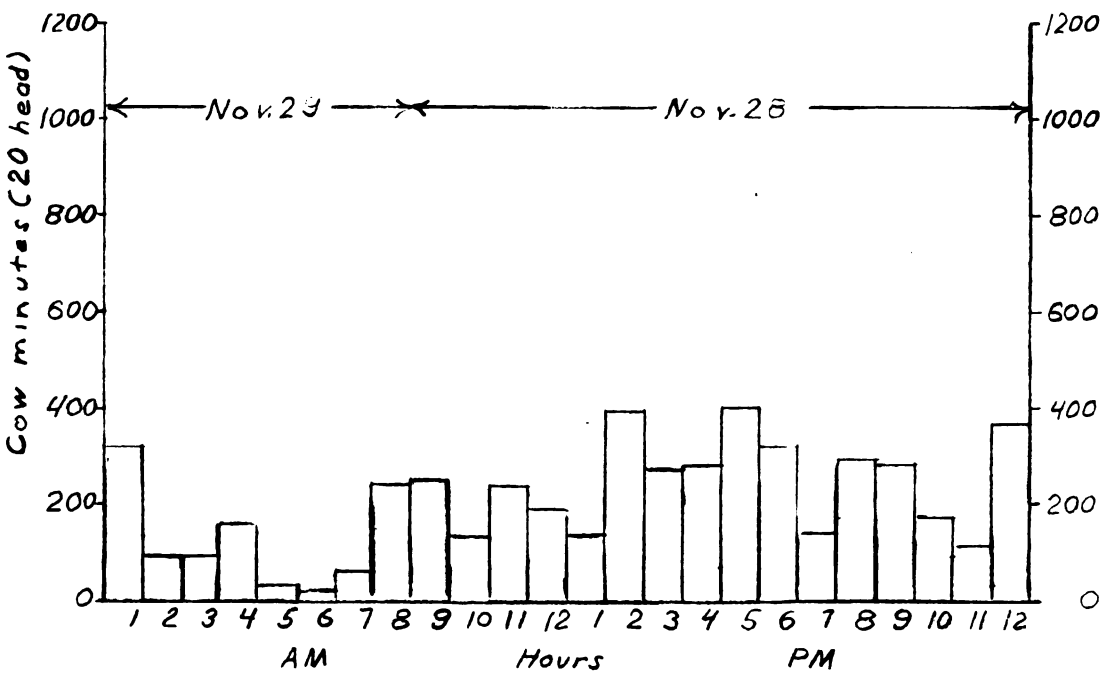

Figure 2. Cow minutes per hour loitering in the yard (Nov. 28, 29).

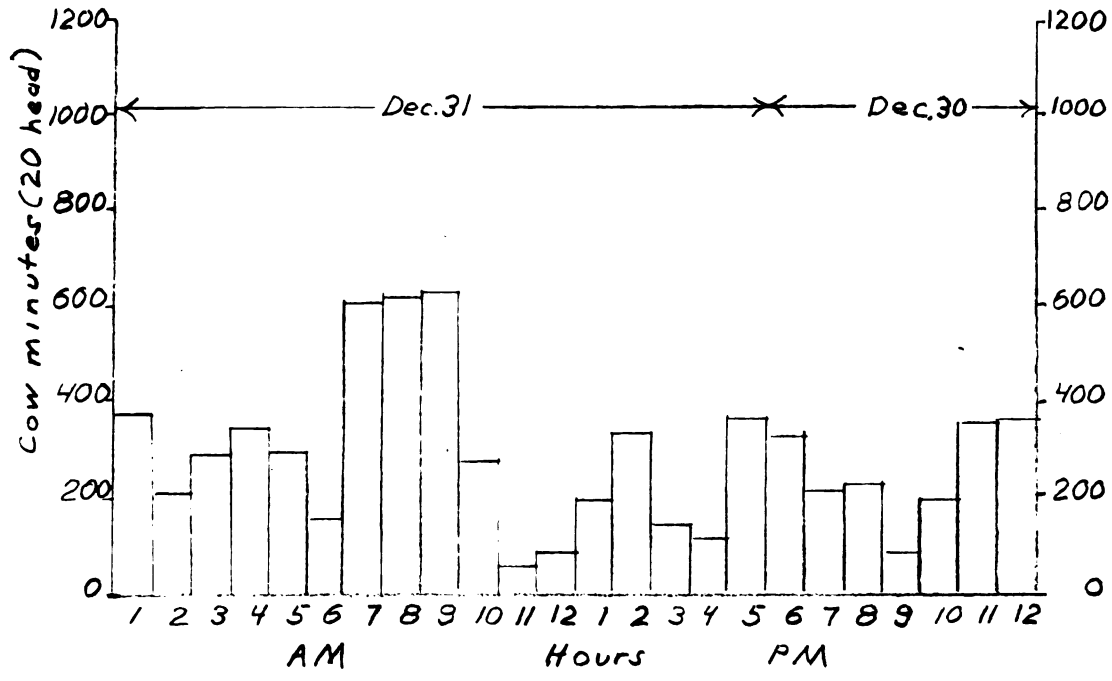

Figure 3. Cow minutes per hour loitering in the yard (Dec. 30, 31).

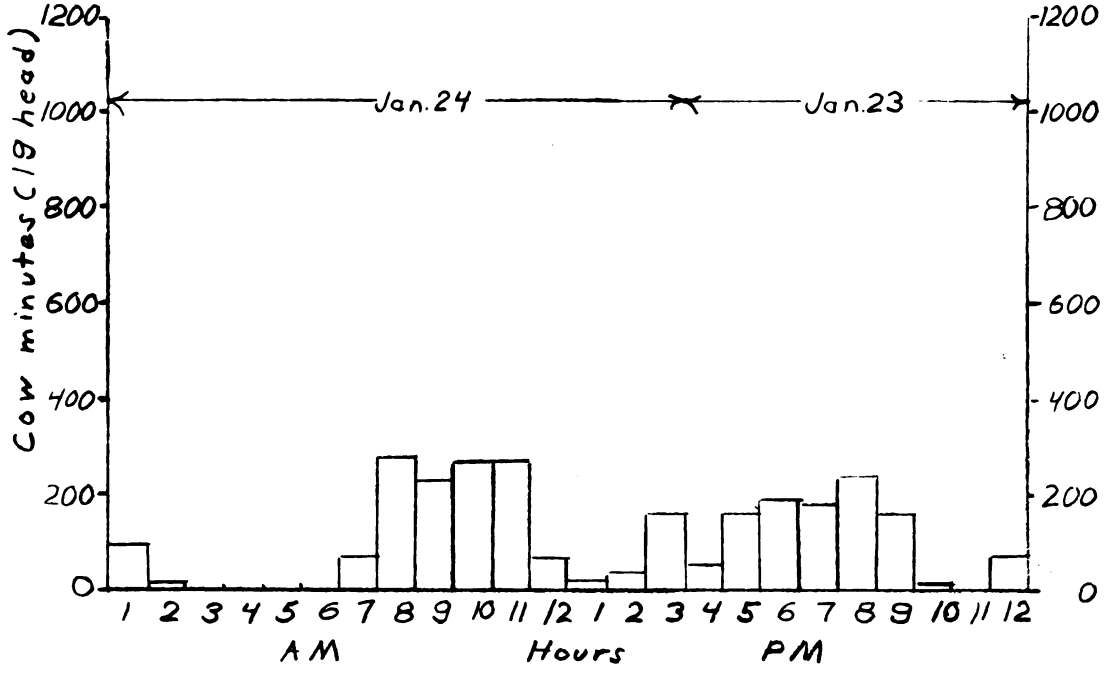

Figure 4. Cow minutes per hour loitering in the yard (Jan. 23, 24).

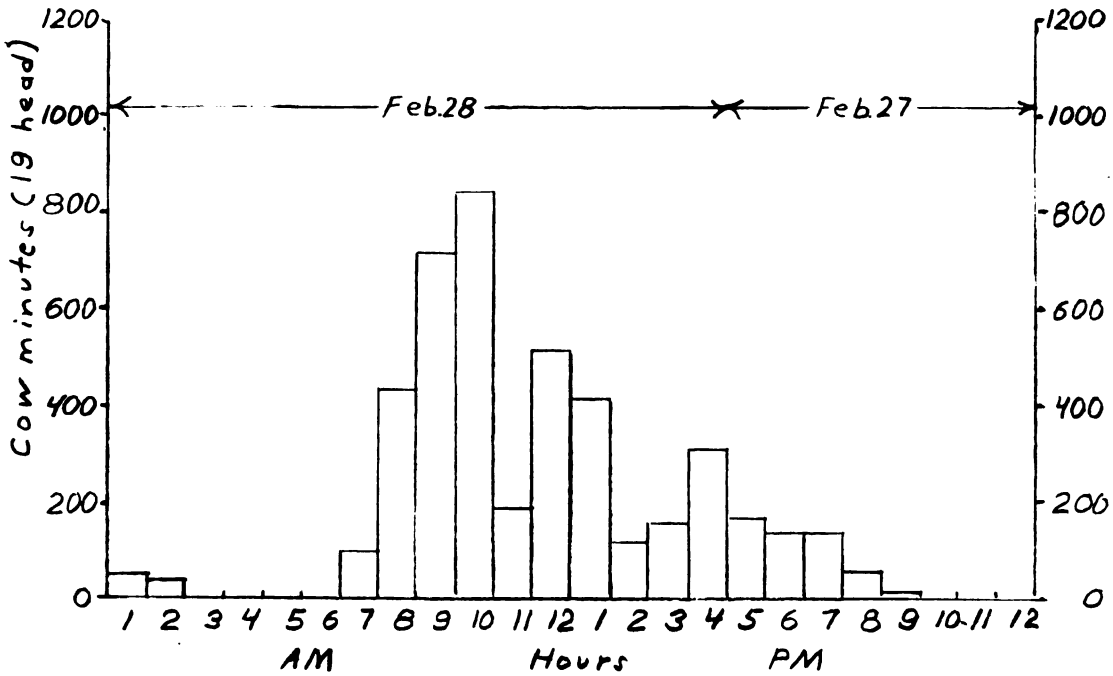

Figure 5. Cow minutes per hour loitering in the yard (Feb. 27, 28).

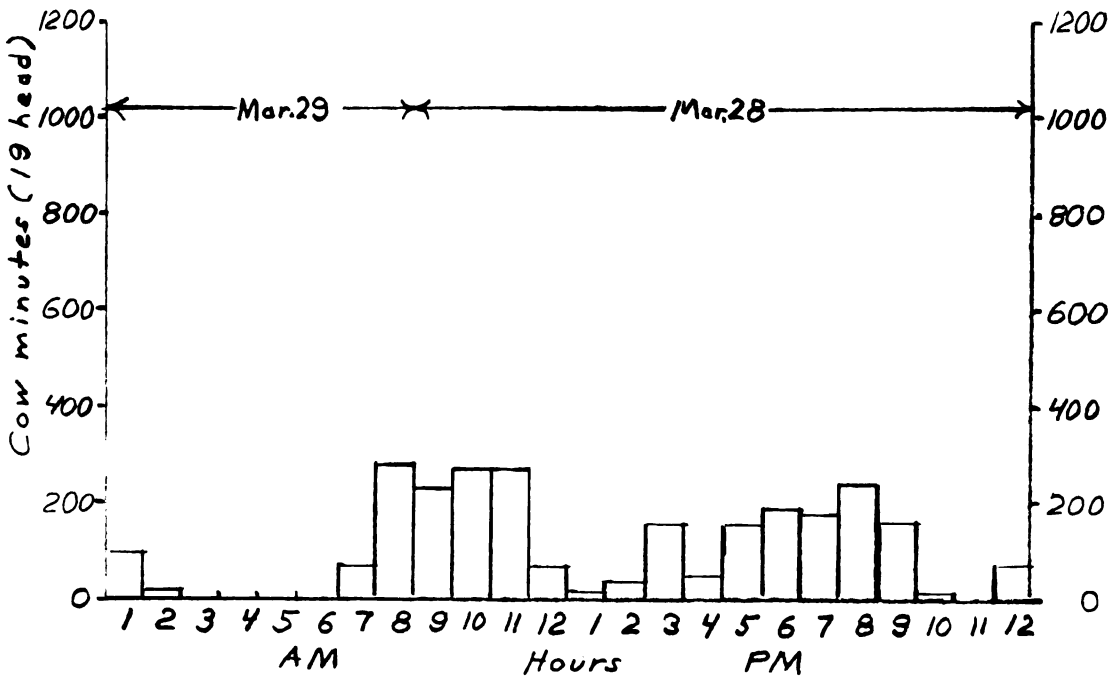

Figure 6. Cow minutes per hour loitering in the yard (Mar. 28, 29).

Yard loitering was chiefly around the silo or hay feeding racks until appetites were satisfied. Loitering would then continue in other areas of the yard for a period of time depending on weather conditions. A comparison of Tables II and III will generally show some type of adverse weather conditions for the periods of least outside loitering.

Outside loitering was at its lowest during the January observation period when the cows spent only 7.3 percent of their time standing in the yard. Snowfall was steady most of the day with a total of 1.5 inches. Yard loitering during March observation period was also low with an average of 9.4 percent of the cow time. Weather conditions were not severe at this time when compared with previous months, although extremely warm dry weather the previous week could have made this near freezing and windy (17 mph average) day uncomfortable for loitering in the yard.

The late November and February observation periods showed that the cows spent 17.2 and 16.0 percent of their time loitering in the yard. The November date had the lower temperature (28°F. maximum, and 22°F. average) as compared to 40°F. maximum, 18°F. minimum, and 30°F. average for the February date. Precipitation was approximately the same on both dates with 0.3 of an inch of snow in November and 0.4 of an inch of snow for the February date. The February period had the highest wind velocity with an average for the day of 20.3 mph and a high of 45 mph. The late November observation day showed an average of 15.5 mph wind velocity and a high of 23 mph.

Early November and late December observation periods showed the greatest outside loitering time with 21.9 and 24.2 percent respectively.

TABLE II

AVERAGE TIME SPENT LOITERING, RESTING, EATING AND IN MILK ROOM FOR SIX TWENTY-FOUR HOUR OBSERVATION PERIODS

Date	Activity							
	Resting in lounge		Eating hay		Eating silage		In milking room	
	Min.	%	Min.	%	Min.	%	Min.	%
Nov. 1,3,8.	553	38.4	42.5	3.0	281	19.5	8.5	0.5
Nov. 28,29.	494	34.3	51	3.5	244	16.9	20.5	1.5
Dec. 30,31.	427	29.7	156	10.8	243	16.9	16.5	1.1
Jan. 23,24.	706	49.0	284	19.7	0*	0	29.0	2.0
Feb. 27,28.	613	42.6	324	22.5	0*	0	31.0	2.2
Mar. 28,29.	611	42.4	305	21.2	0*	0	22.0	1.6

	Loitering in yard		Loitering in lounge		Resting in yard	
	Min.	%	Min.	%	Min.	%
Nov. 1,3,8.	315	21.9	181	12.6	59	4.1
Nov. 28,29.	248	17.2	368	25.6	14.5	1.0
Dec. 30,31.	349	24.2	237	16.5	11.5	0.8
Jan. 23,24.	112	7.8	309	21.5	0	0
Feb. 27,28.	231	16.0	241	16.7	0	0
Mar. 28,29.	136	9.4	366	25.4	0	0

* No silage available after January 10, 1953.

TABLE III

WEATHER DATA FOR DAYS OF COW ACTIVITY OBSERVATIONS

Weather Data	Date					
	Nov. 1,3,8.	Nov. 28,29.	Dec. 30,31.	Jan. 23,24.	Feb. 27,28.	Mar. 28,29.
Temperature (°F.)						
Maximum	68	28	34	36	40	40
Minimum	23	15	27	26	18	33
Average	42	22	30	32	30	37
Precipitation (In.)						
Total	0	0.02	0.02	0.39	0.05	0.01
Snow	0	0.3	0.1	1.5	0.4	T
Snow on ground (In.)	0	1.0	T	1.0	T	0
Wind (mph)						
Average speed	9.5	15.5	11.1	14.2	20.3	17.9
Fastest speed	26	23.0	17.0	29.0	45.0	35.0
Direction	SW	SWW	NE	N	WNW	NW

This November period had the highest temperatures (68°F. maximum, 28°F. minimum and 42°F. average) and the least precipitation (none recorded), and the slowest average wind velocity (9.5 mph.). December was also relatively mild with a high of 34°F., a low of 27°F., and an average of 30°F. Precipitation was also low (0.1 of an inch of snow) and wind velocity was only slightly higher than November with an average of 11.1 mph and a high of 17 mph.

Loitering in the lounge.

Figures 7, 8, 9, 10, 11, and 12 show cow minutes per hour loitering in the lounge for each twenty-four hour observation period. A study of these figures show high periods just before and at milking time. The cows seemed to anticipate the milking time by going into the lounge and those to be milked were confined inside just before milking started. Inside loitering during other periods of the day varied with outside weather conditions as shown by Tables II and III.

Loitering in the lounge increased proportionately each month as the outside loitering decreased. The total loitering time ranged from 421 to 616 minutes per day with an average of 516.6 cow minutes, or 8.6 hours per day.

Resting in the yard.

Figures 13, 14, and 15 show that outside resting or lying down was limited to short intervals during the observation periods of early November, late November, and December. No outside resting was noted during the other three months. It is quite evident that the paved area became

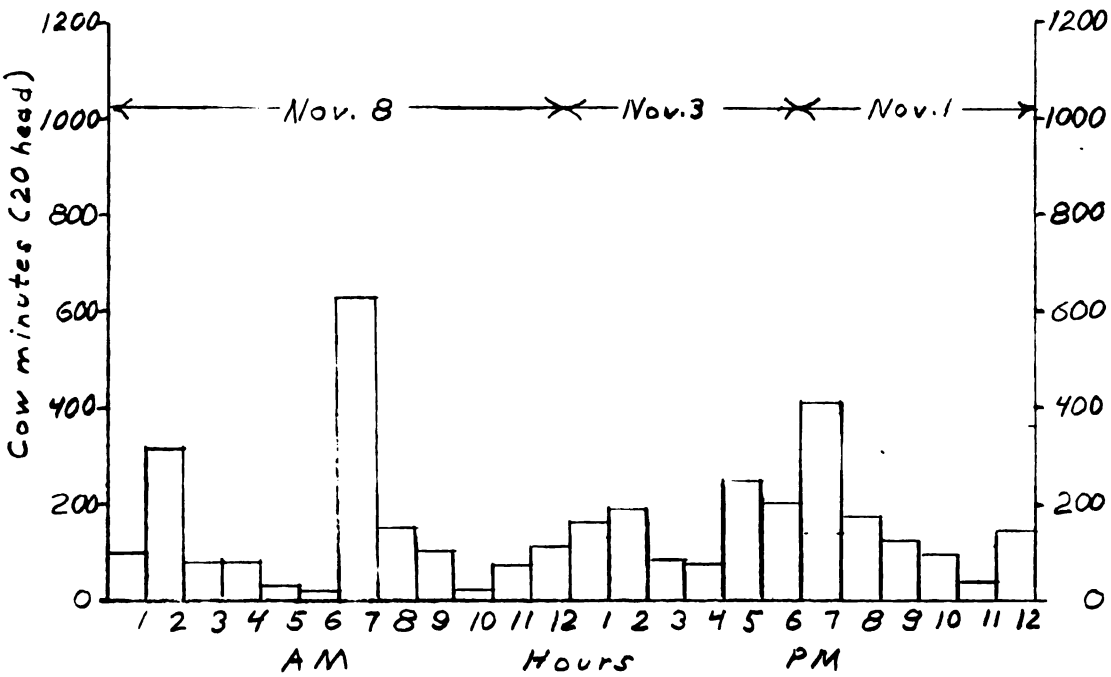

Figure 7. Cow minutes per hour loitering in the lounge (Nov. 1, 3, 8).

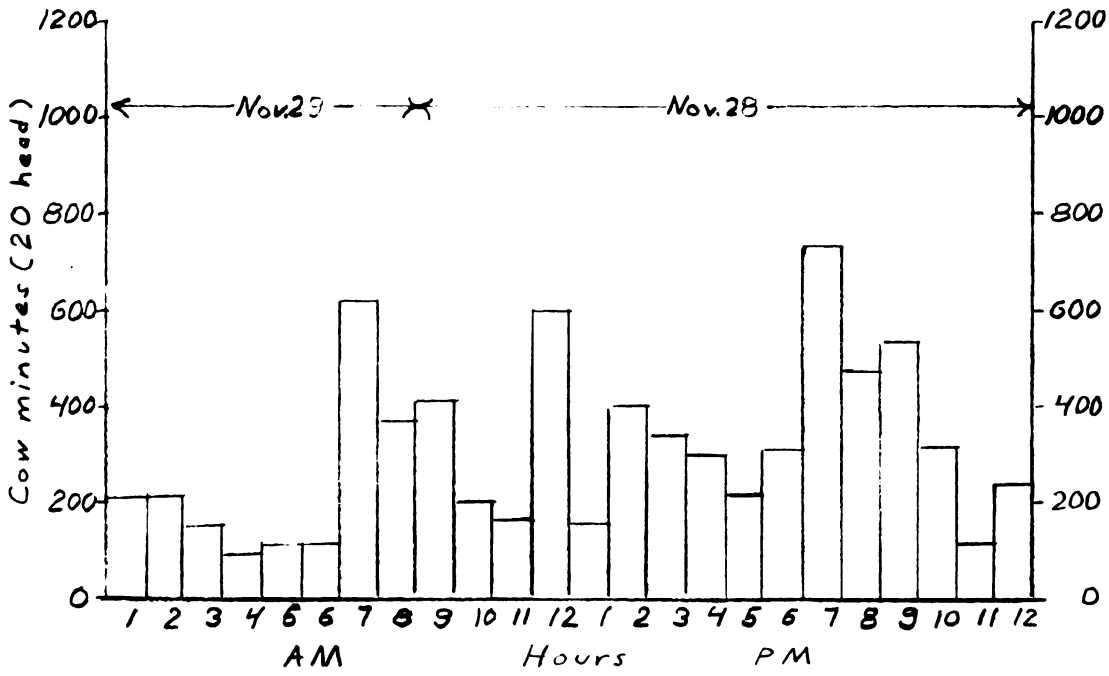

Figure 8. Cow minutes per hour loitering in the lounge (Nov. 28, 29).

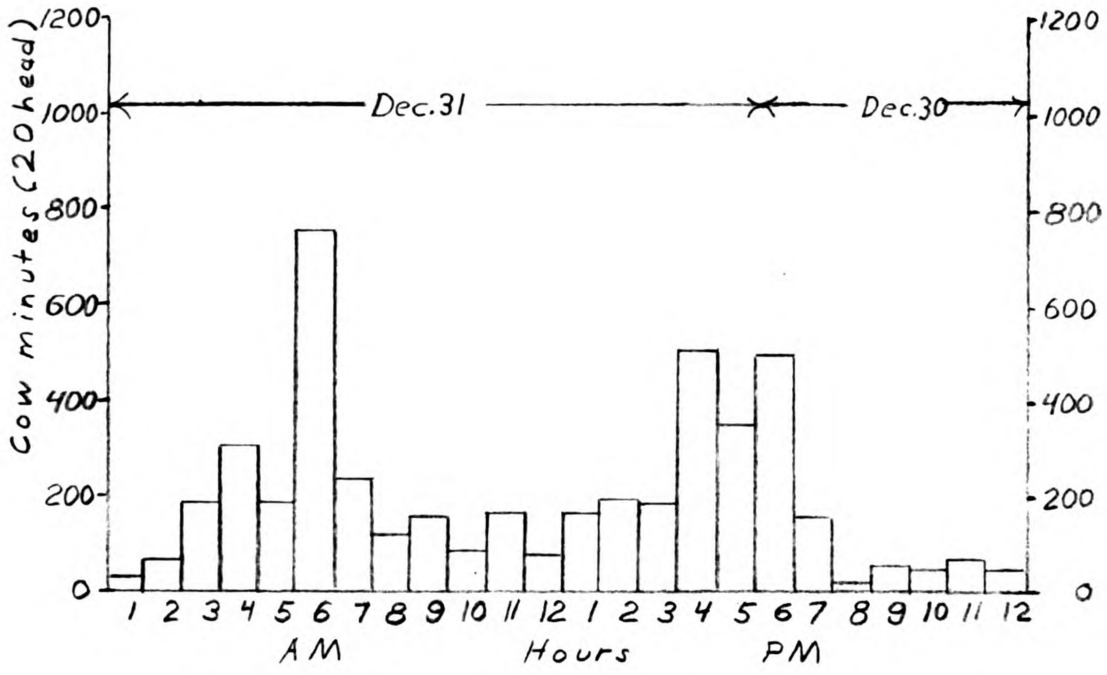

Figure 9. Cow minutes per hour loitering in the lounge (Dec. 30, 31).

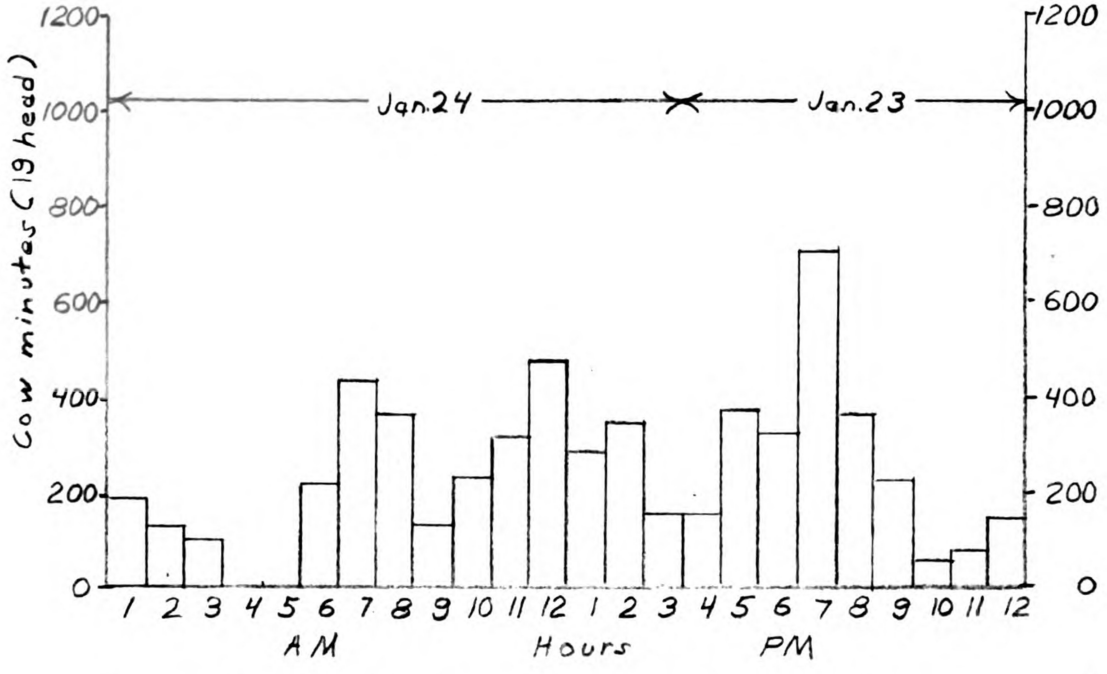

Figure 10. Cow minutes per hour loitering in the lounge (Jan. 23, 24).

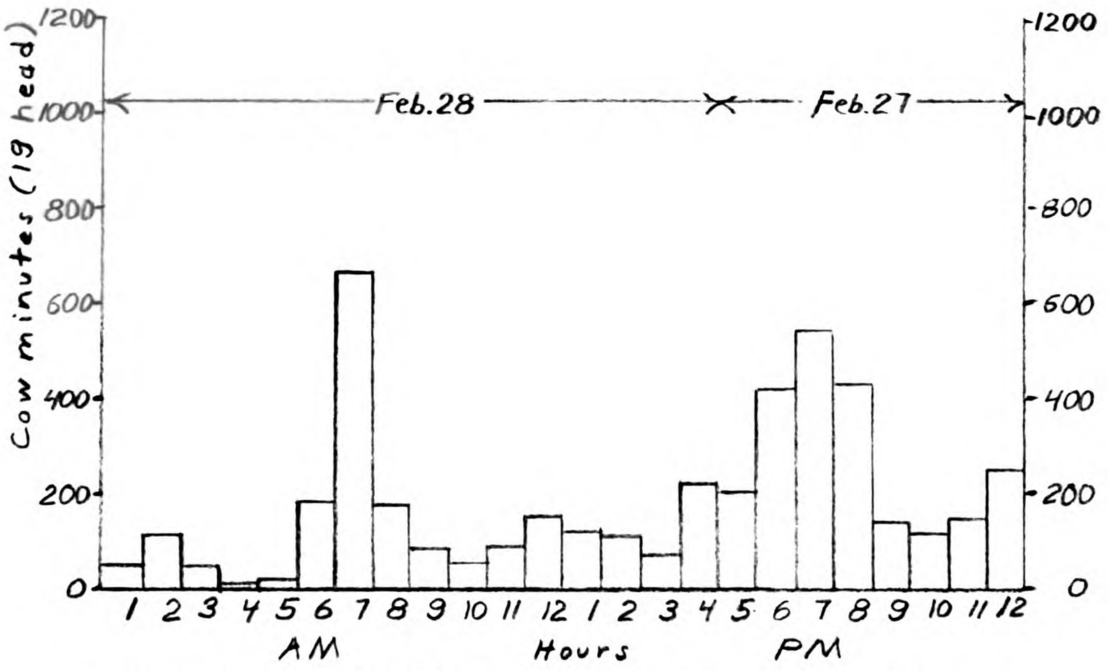

Figure 11. Cow minutes per hour loitering in the lounge (Feb. 27, 28).

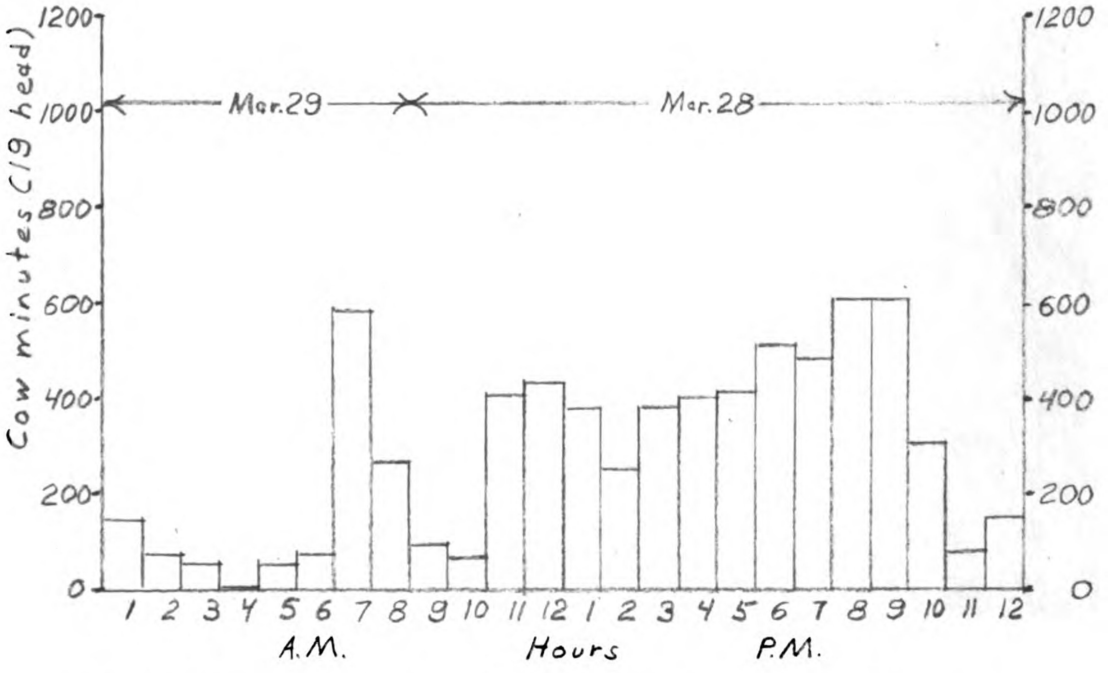

Figure 12. Cow minutes per hour loitering in the lounge (Mar. 28, 29).

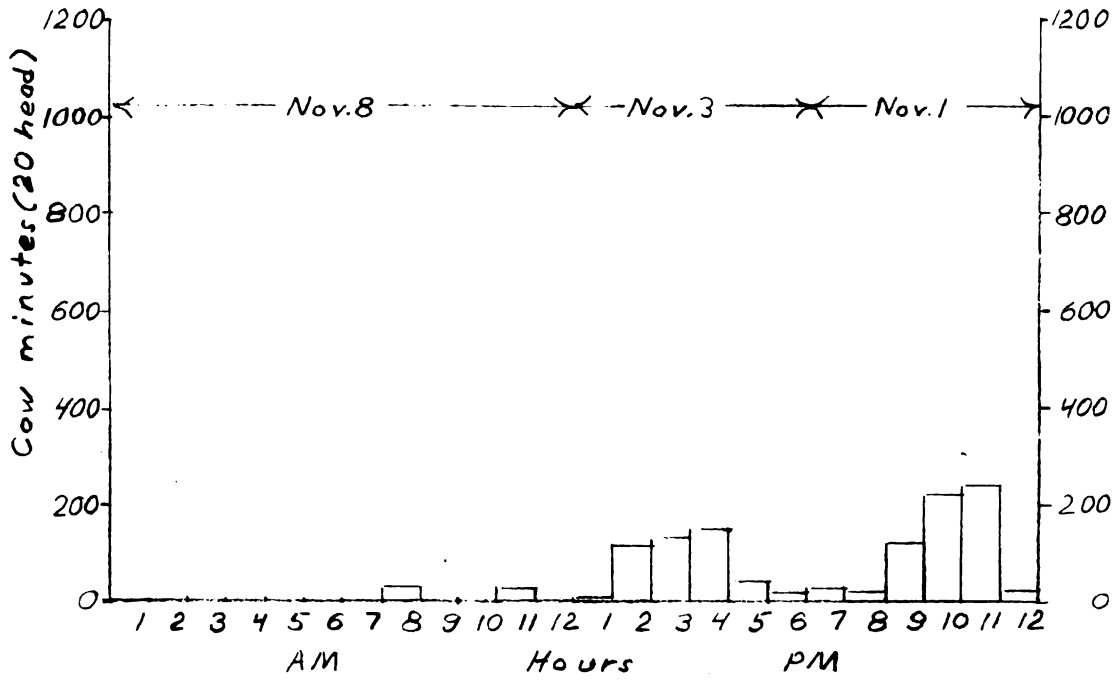

Figure 13. Cow minutes per hour resting in the yard (Nov. 1, 3, 8).

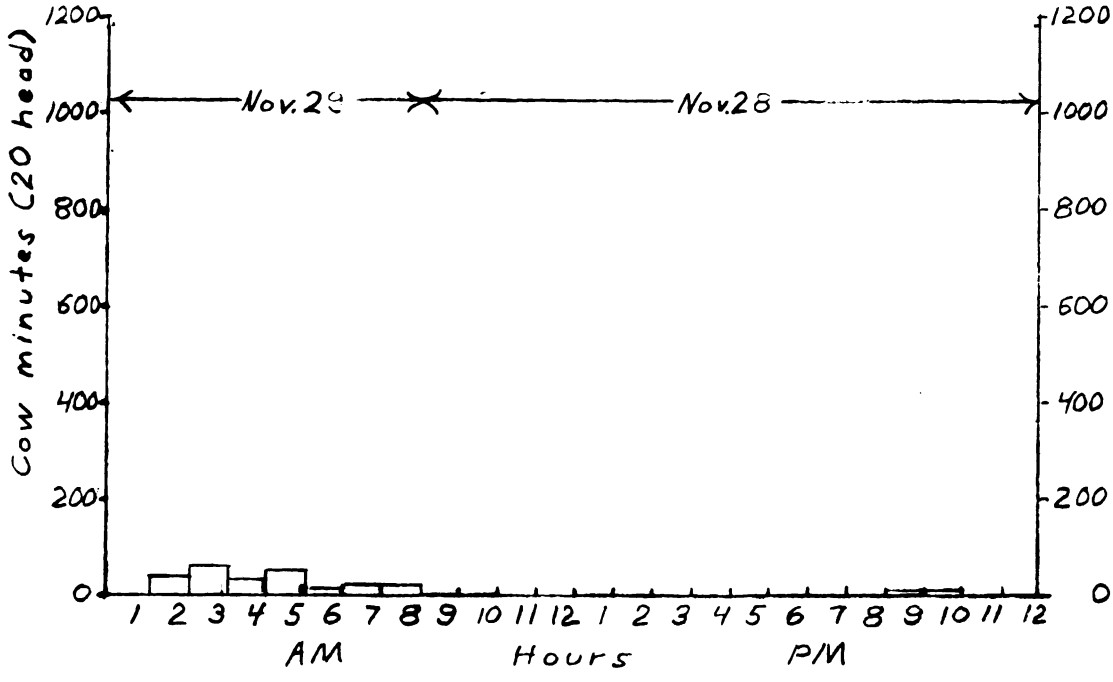

Figure 14. Cow minutes per hour resting in the yard (Nov. 28, 29).

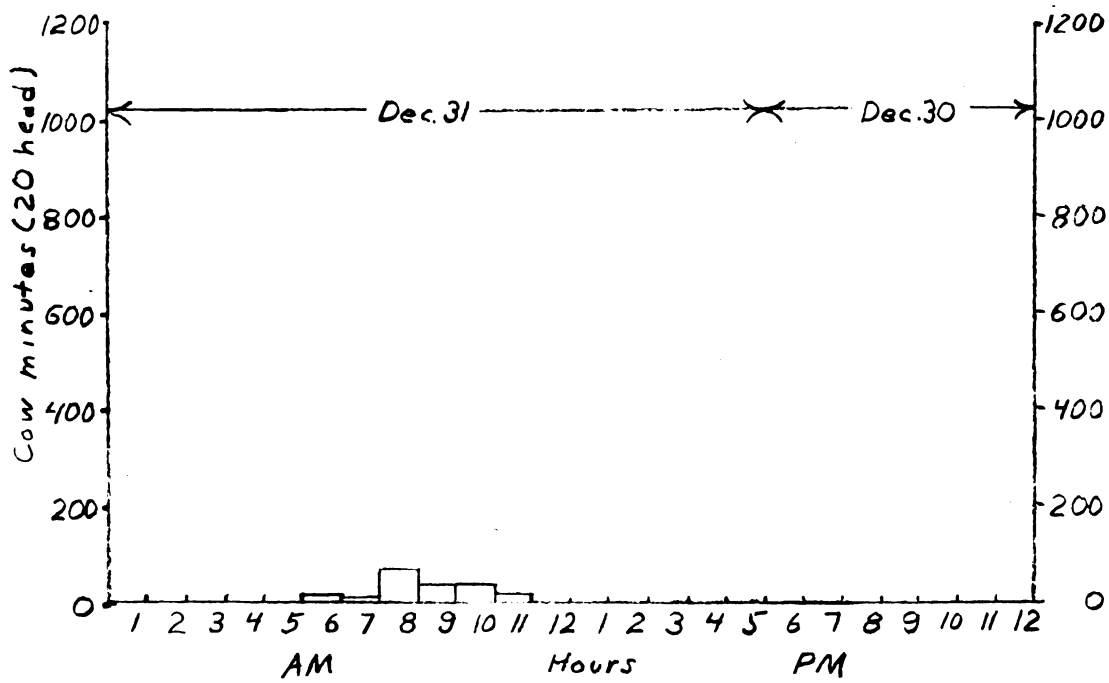

Figure 15. Cow minutes per hour resting in the yard (Dec. 30, 31).

too cold and the limited sunlight of the winter months failed to warm the paved area sufficiently for comfortable resting.

Resting in the lounge.

Figures 16, 17, 18, 19, 20, and 21 show time spent by the herd resting in the lounge per hour for each observation day. Three periods of the day were preferred for resting, 12-5 A.M., 12-4 P.M. and 8-12 P.M. Preference was in the order named.

Total resting time ranged from 433.5 to 700 cow minutes per day with an average of 581.5 minutes or 9.6 hours, which is approximately one hour more than the total loitering time.

The lounge or bedded area offered some moisture problems, although a liberal use of straw provided clean bedding all winter. The entire area was used to about the same extent. Some cows preferred the more quiet corners (generally the youngest or oldest animals), while others preferred the entrance or central area of the lounge.

Eating hay.

Figures 22, 23, 24, 25, 26, and 27 show the cow minutes per hour spent eating hay for each of the monthly observation periods. Table II shows the direct effect the availability of silage had on time spent eating hay. Hay eating time was fairly well spread throughout the day with high periods from 7-12 A.M. and 1-6 P.M. Midnight to 2 A.M. was also quite regularly used by some cows before resting the remainder of the night.

The months with the lowest roughage eating time were late November and January which were the months with the most adverse weather conditions.

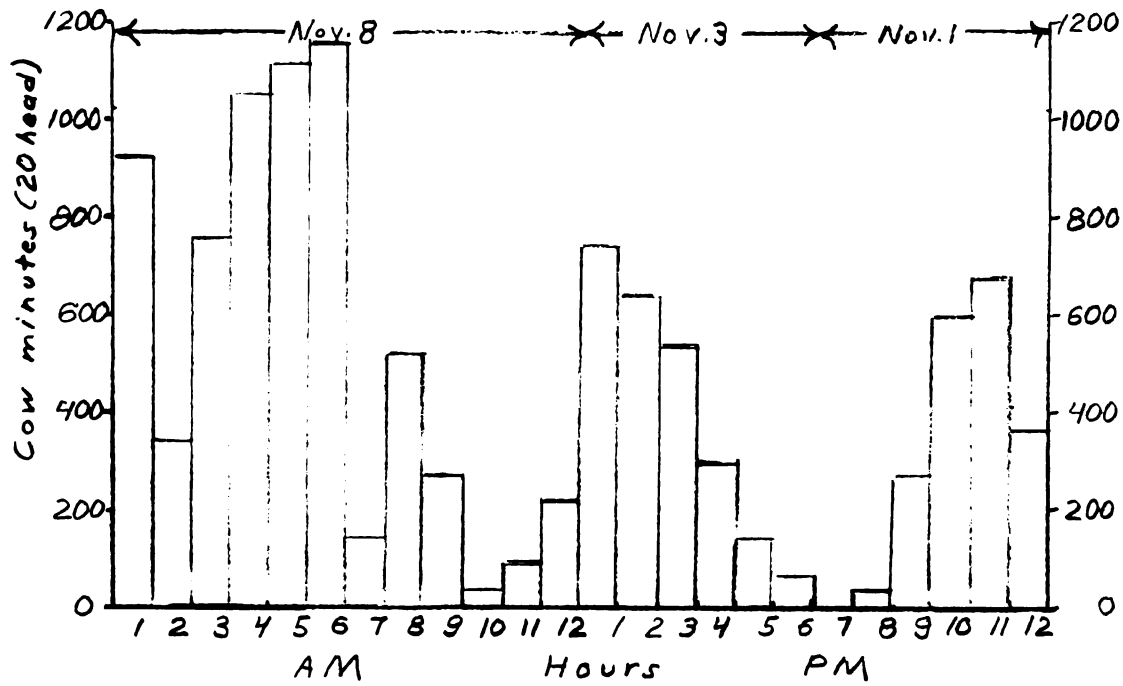

Figure 16. Cow minutes per hour resting in the lounge (Nov. 1, 3, 8).

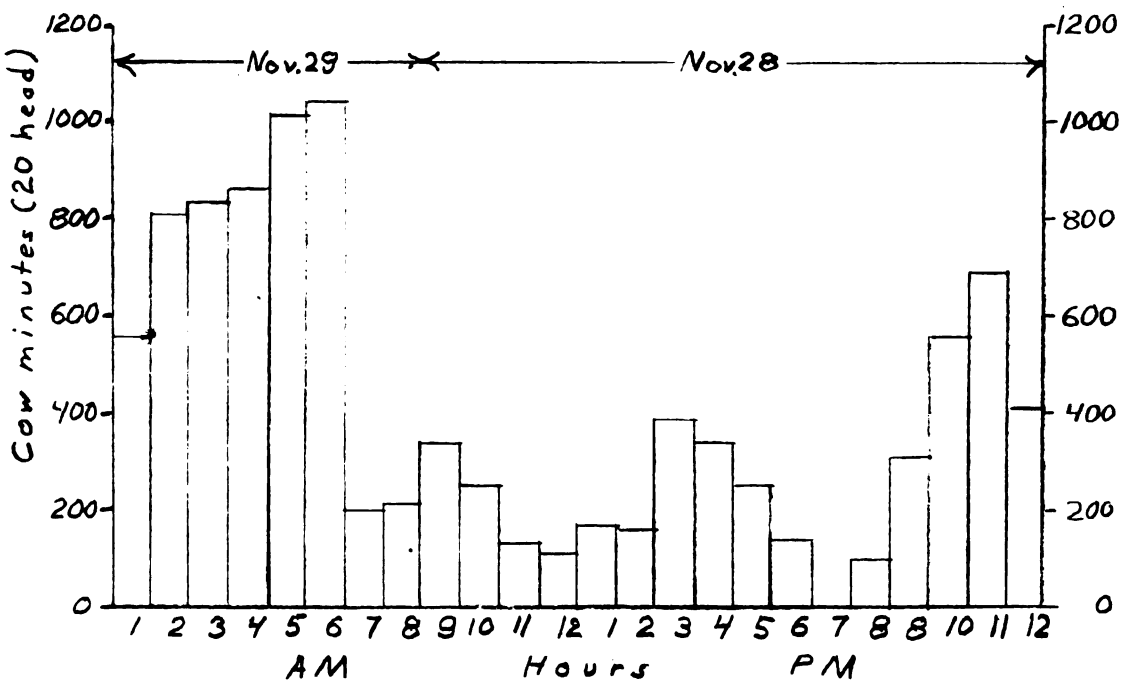

Figure 17. Cow minutes per hour resting in the lounge (Nov. 28, 29).

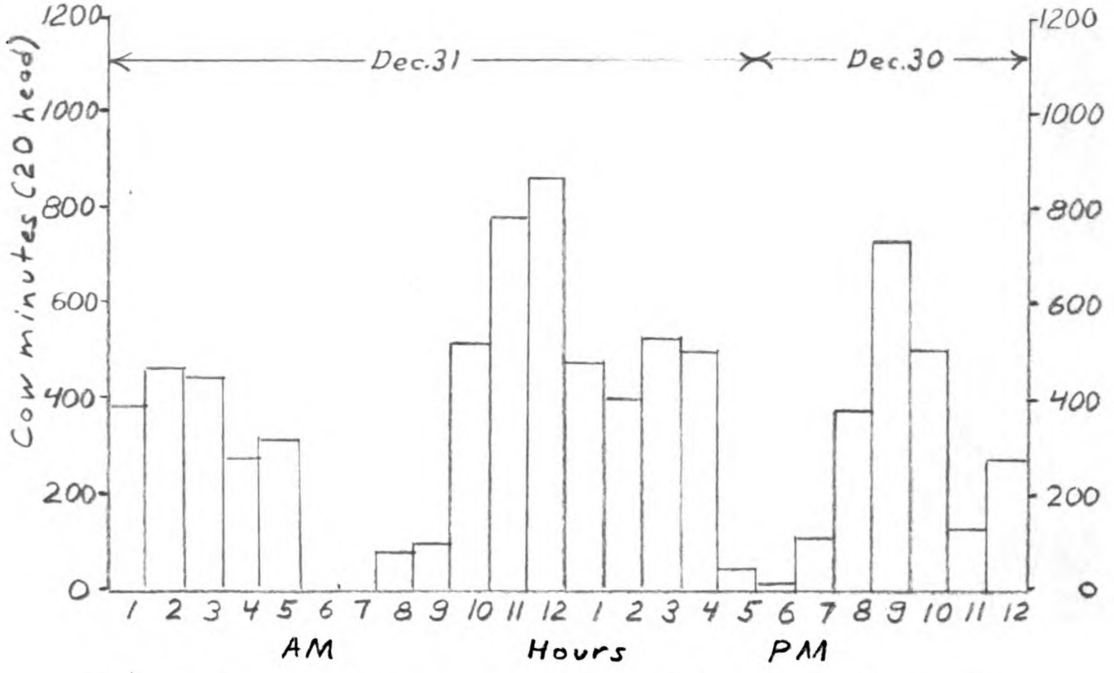

Figure 18. Cow minutes per hour resting in the lounge (Dec. 30, 31).

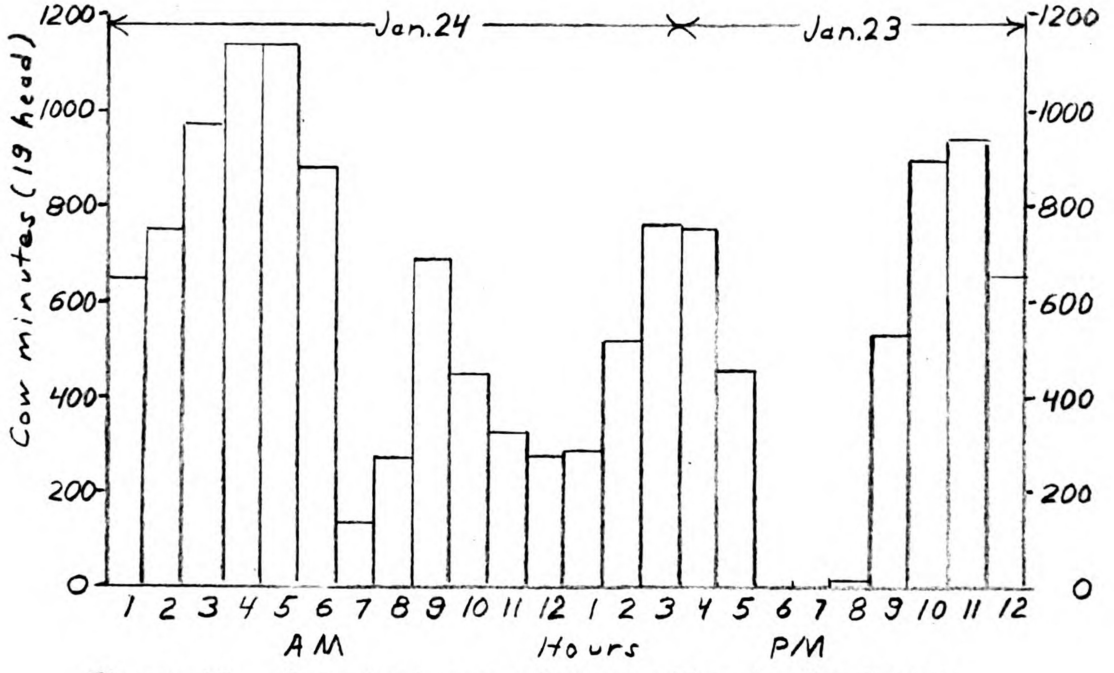

Figure 19. Cow minutes per hour resting in the lounge (Jan. 23, 24).

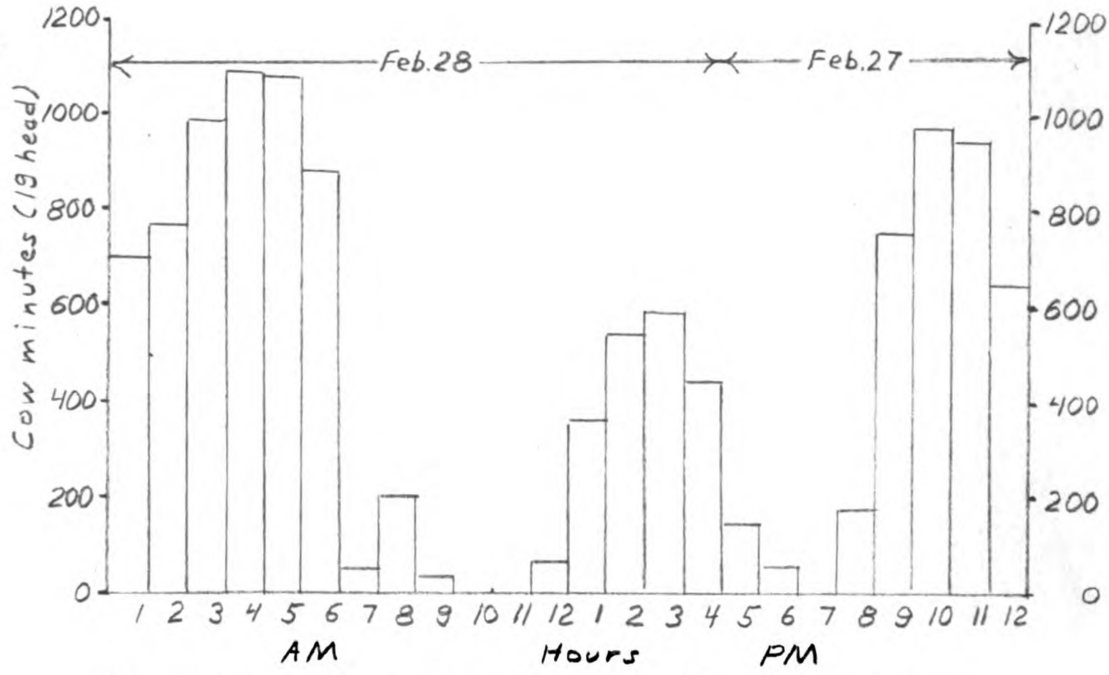

Figure 20. Cow minutes per hour resting in the lounge (Feb. 27, 28).

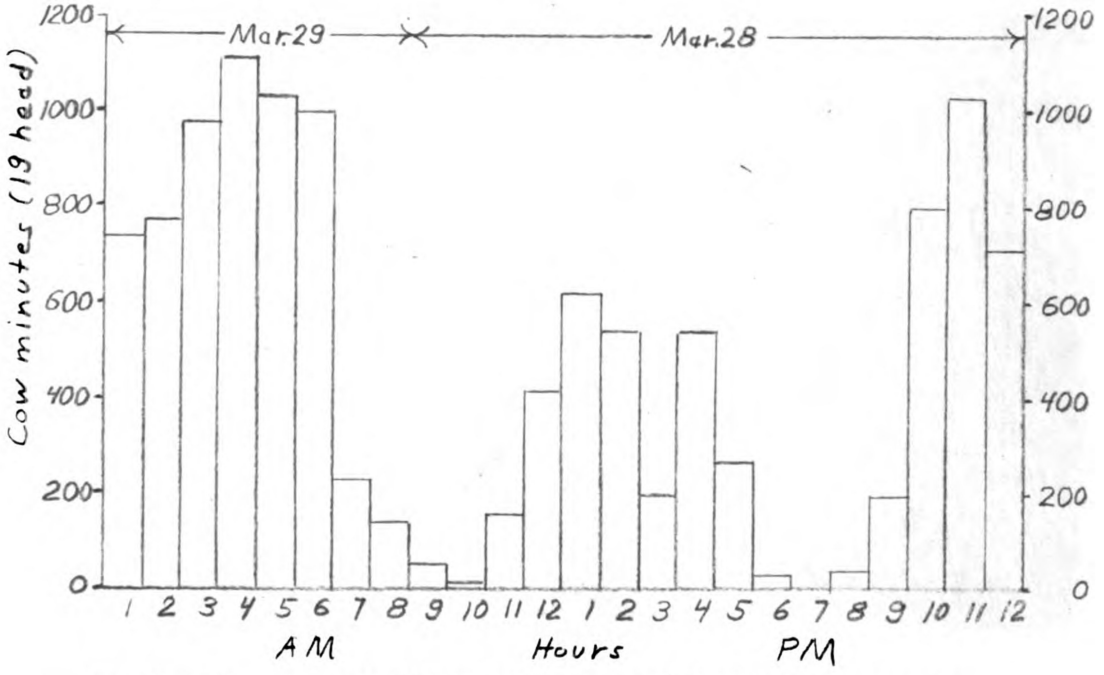

Figure 21. Cow minutes per hour resting in the lounge (March 28, 29).

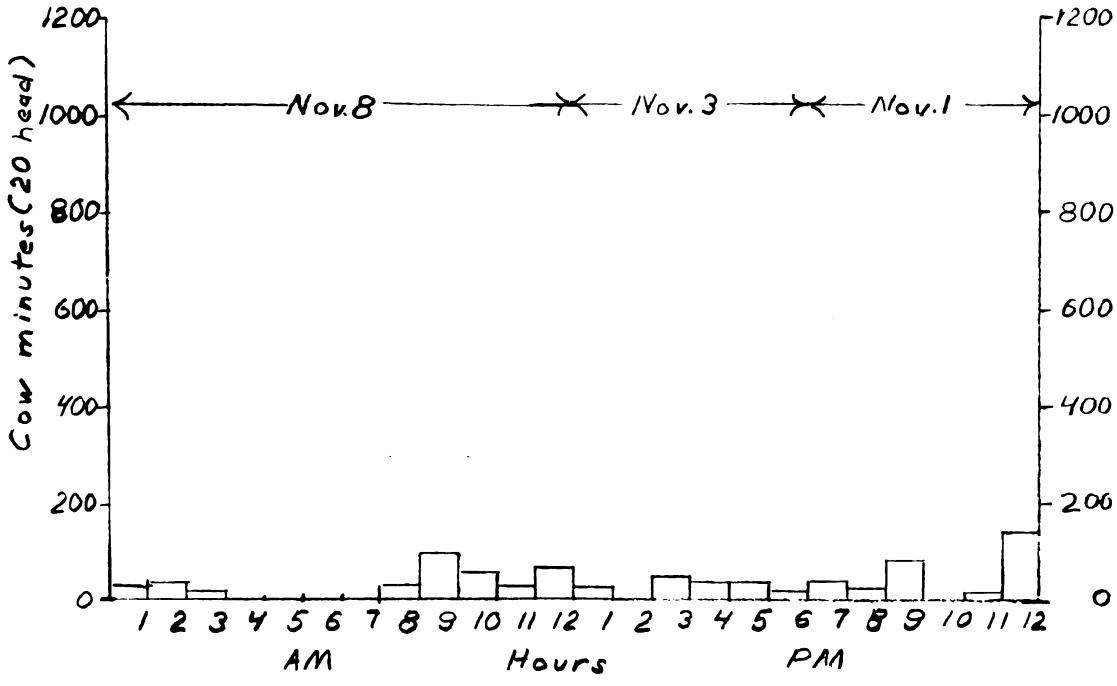

Figure 22. Cow minutes per hour eating hay (Nov. 1, 3, 8).

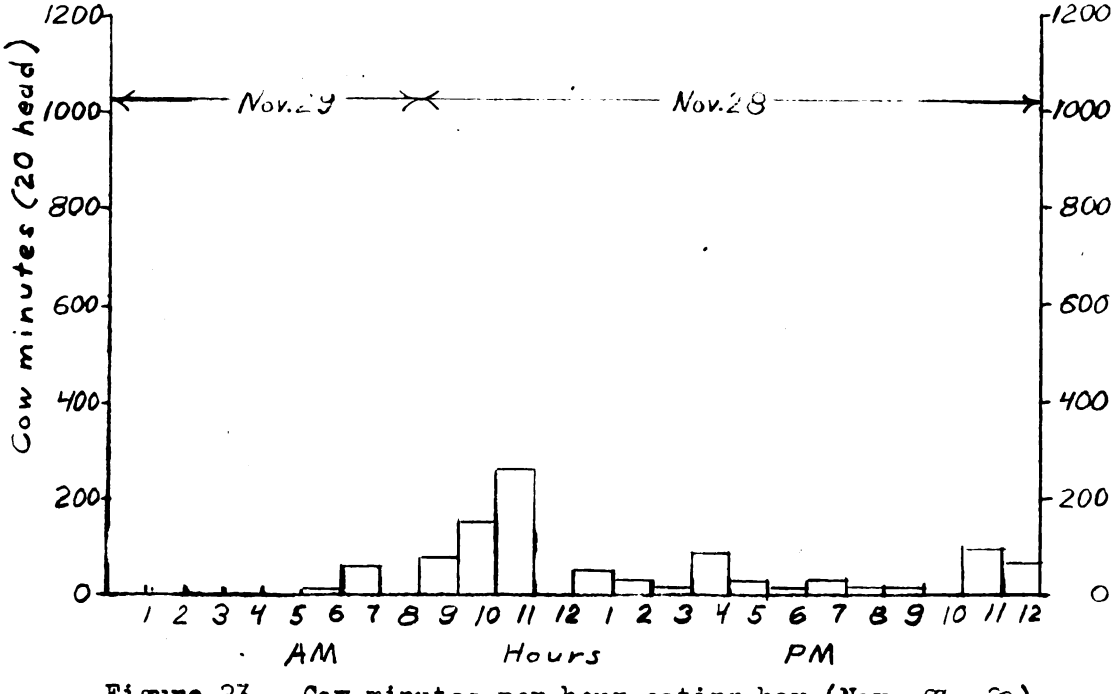

Figure 23. Cow minutes per hour eating hay (Nov. 28, 29).

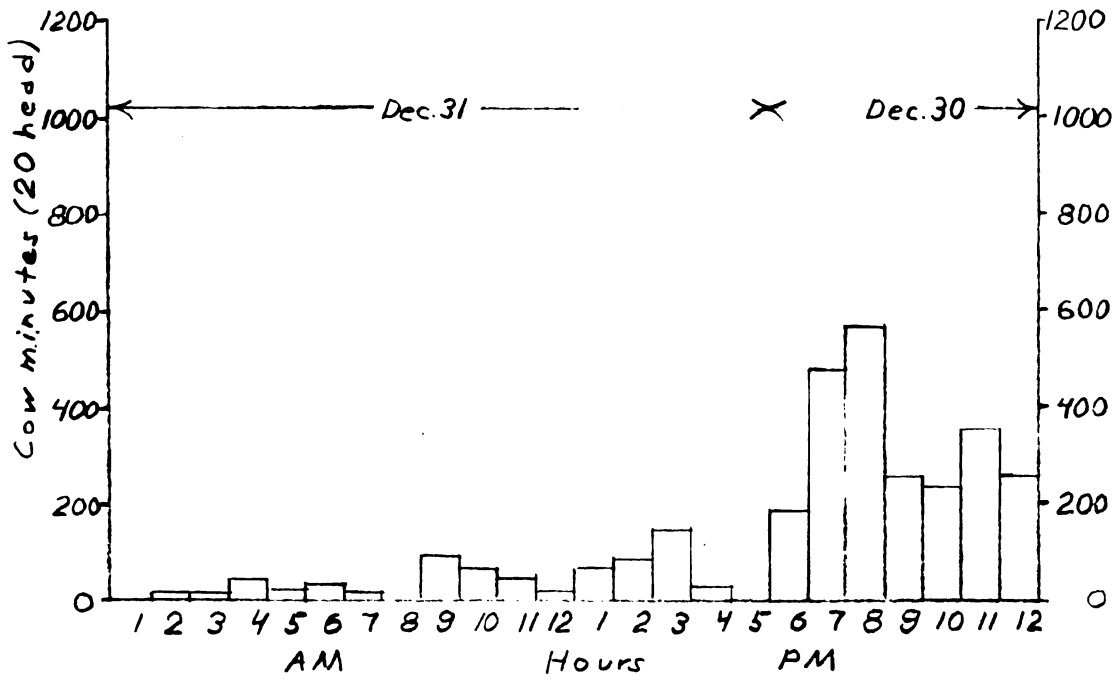

Figure 24. Cow minutes per hour eating hay (Dec. 30, 31).

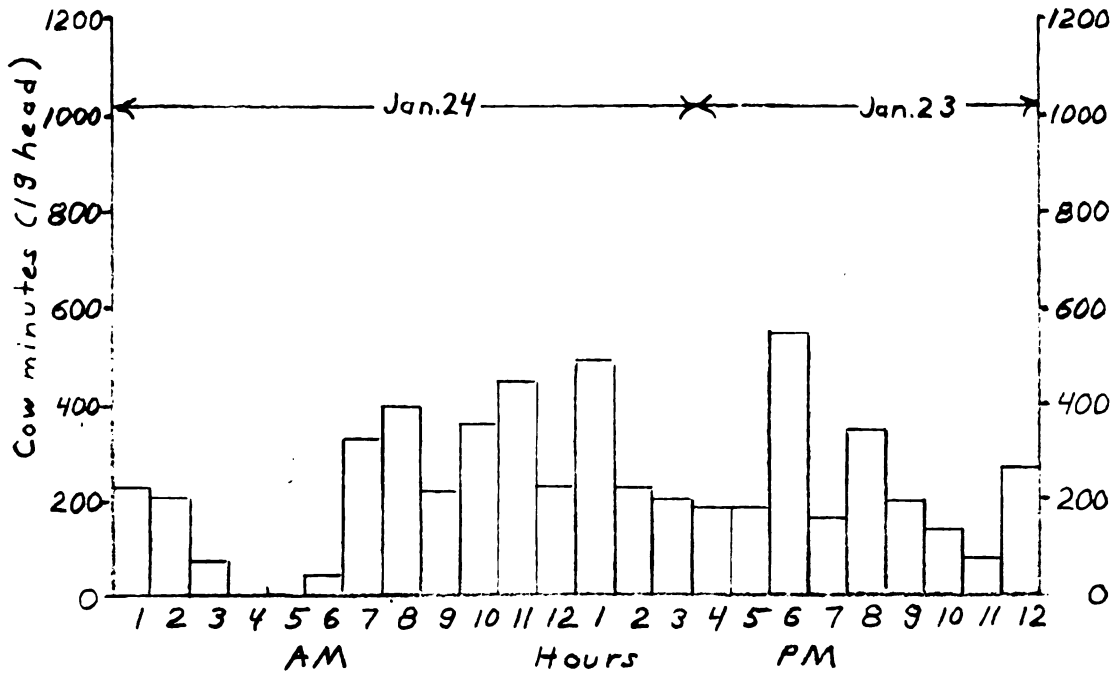

Figure 25. Cow minutes per hour eating hay (Jan. 23, 24).

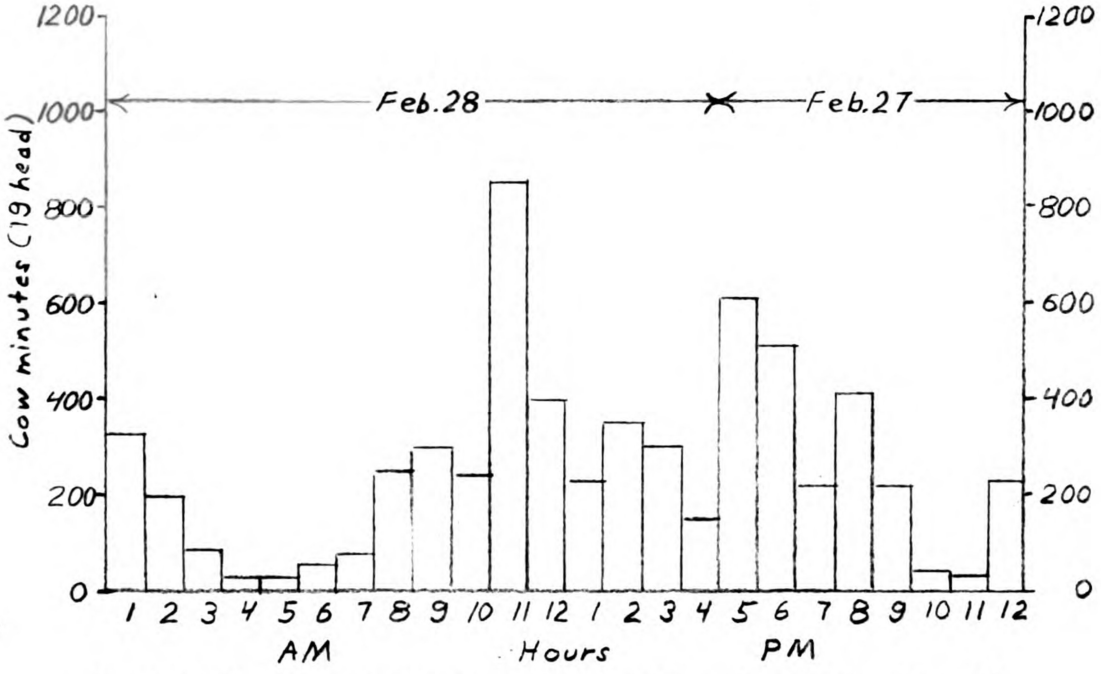

Figure 26. Cow minutes per hour eating hay (Feb. 27, 28).

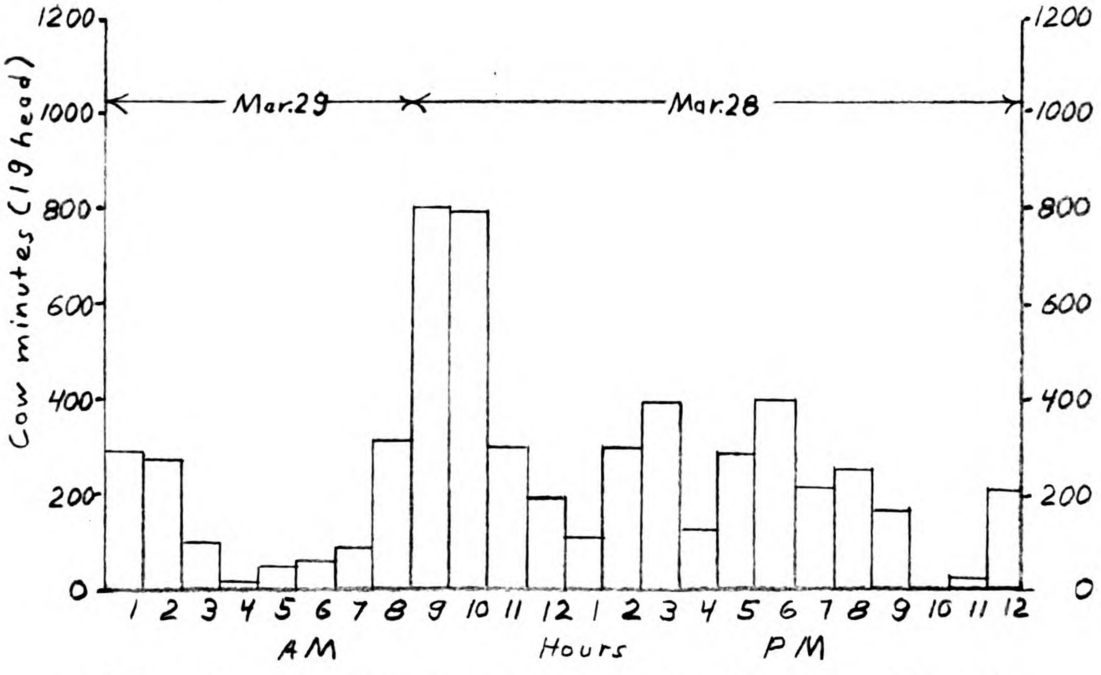

Figure 27. Cow minutes per hour eating hay (Mar. 28, 29).

Total roughage eating time ranged from 295 to 399 minutes per cow when silage was available and 284-324 minutes when only hay was available or an average of 339 minutes eating both hay and silage and 304 minutes per day when only hay was available. Harshberger (13) found that dairy cows require seven to sixteen minutes to eat one pound of hay with the faster rates for larger cows. If we use ten minutes per pound and the 304 minutes average per cow we estimate that thirty pounds of hay was consumed per day per cow.

Eating silage.

Time spent eating silage when available took most of the roughage eating time as shown in Table II. Figures 28, 29, and 30 show cow minutes per hour spent by the herd eating silage for the three observation periods with silage available. Eating periods preferred were 7-12 A.M. and 1-6 P.M., although some silage was eaten practically every hour of each observation period. The cows averaged 256.0 minutes eating silage per twenty-four hour period.

The study by Harshberger (13) showed that dairy cows averaged 1.75 to 2.75 minutes to eat one pound of silage. An indication as to the amount of silage consumed in this case can be estimated by using 2.5 minutes per pound since the silage was not always loose. By dividing the average of 256.0 minutes we may estimate that 100.0 pounds of silage were consumed per day per cow. A total of 125 tons was available during the three months of November, December, and January. The use of 100.0 pounds of silage daily per cow would use 90 tons for the three months. The remaining 35 tons included wastage and silage for young stock.

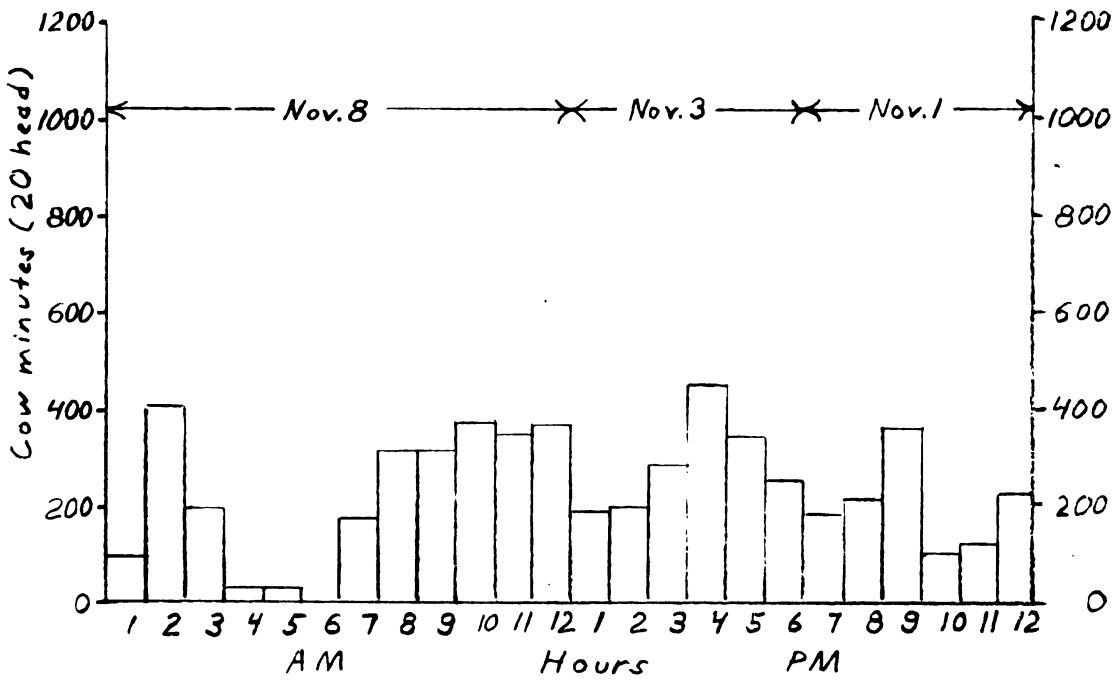

Figure 28. Cow minutes per hour eating silage (Nov. 1, 3, 8).

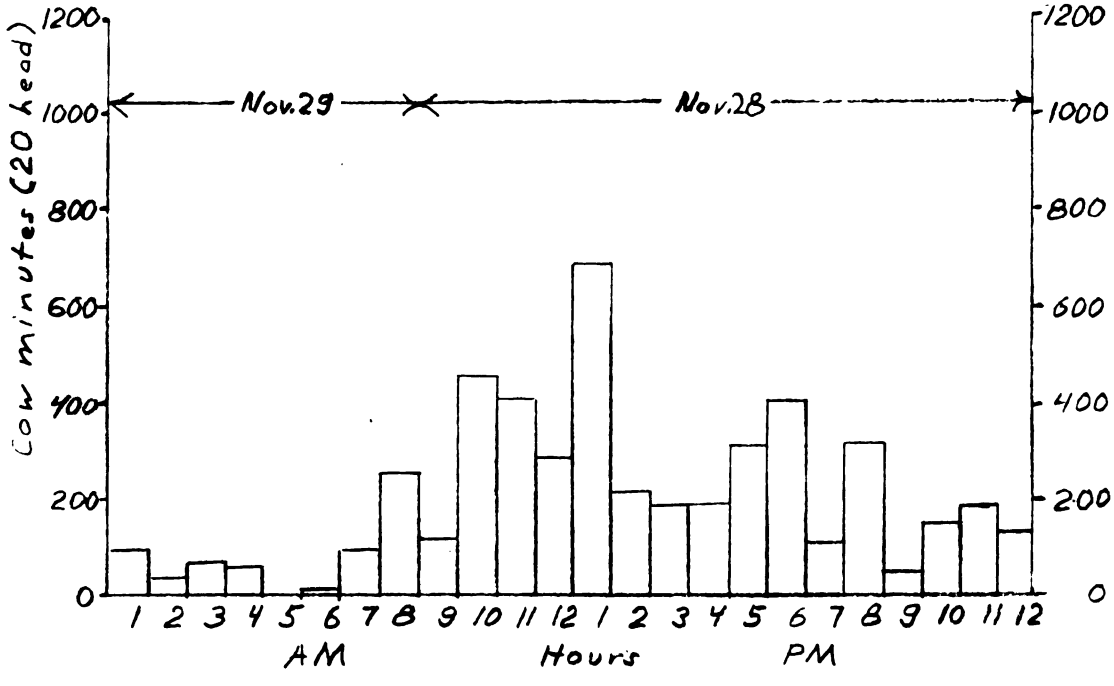

Figure 29. Cow minutes per hour eating silage (Nov. 28, 29).

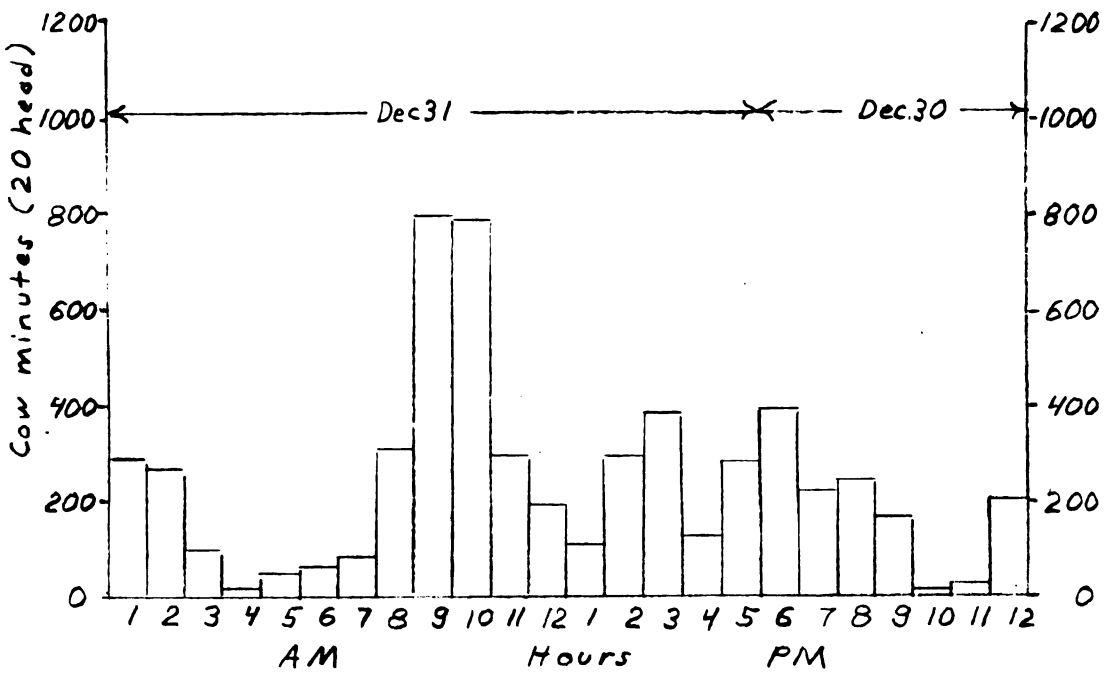

Figure 30. Cow minutes per hour eating silage (Dec. 30, 31).

As mentioned earlier, silage was definitely preferred when available and time-spent-eating increased, as soon as silage was not available as is shown in Figures 24 and 30. On December 30, the silage was nearly all cleaned away at 5 P.M. and a new supply didn't break loose until 12 midnight. The cows spent some time at the silo but due to the lack of silage the hay feeding time immediately increased and stayed up until 12 A.M., December 31, when time spent eating silage increased although it was after midnight.

These data of individual cow activity in a loose housing barn show that the animals spent 9.6 hours resting (mostly in the lounge), 8.6 hours loitering (fairly evenly divided inside and outside), and 5.1 hours eating roughage (mostly silage when available, otherwise hay) each day. The remaining 0.7 of an hour was spent in the milking parlor.

Physiological Activity Study

Weekly data collected for eighteen weeks during November and December, 1952 and January, February, and March 1953 is shown in Tables XI, XII, and XIII (in the Appendix) for individual cows in the Brown Swiss herd at the loose housing barns and for six Holsteins in the main barn in tie stalls. These data are summarized and averaged by herds as shown in Table IV which also includes a summary of weekly weather conditions.

Pulse rate.

The cows in the loose housing barn on November 11 had a fairly high pulse rate of 71 beats per minute and averaged above 70 beats a minute through December 11, when a high of 74.5 was reached. The next week,

December 18, the pulse rate dropped to 67 and to 63.3 on January 14. A low of 52 beats per minute was reached January 21 and was followed by rates of 54 to 57 during subsequent weeks.

The high average pulse rate of November and early December occurred during the early cold periods of late fall which served as the acclimatizing period. The slightly colder weather in December and January failed to hold the pulse rate up, as after these cows were acclimatized, their pulse rates dropped to the sixties for six weeks and then to the fifties for the remainder of the test period. Variations during this period generally showed a slight increase in pulse rate as temperatures dropped and a slight decrease as the temperature went up.

The average pulse rate of six Holsteins in the tie stall barn was fourteen beats slower (60 beats per minute) than the cows in the loose hosing barn at the start of the observation period. This rate increased to 65.3 on December 26 and then dropped to 58 on January 7 after the temperature dropped to -7°F. on the morning of January 6. From this low, the average pulse rate increased to 66 beats per minute and was maintained at this rate through the remainder of the experimental period. Only the severe cold of January 6 and 7 had any affect on the pulse rate of this herd. The low rate at the beginning of the period probably resulted from the warmer temperatures of inside housing as compared to the lower temperatures in the loose housing barn where the lounge area temperatures averaged only 5.5°F. higher than the outside paved yard area.

Respiration rate.

The respiration rate of cows in the loose housing barn at the start of this experimental period, November 11, was 25 breaths per minute. It

decreased gradually to a rate of 16.1 per minute on January 7. Warmer weather the next week increased respirations to 19.6 per minute from which another gradual decrease to 14.7 was noted on March 4. By March 25, the average respiration rate for the herd had increased to 15.9 per minute.

The cows in the tie stall barn had a respiration rate of 25.3 on November 11. An increase to 30 was noted by December 4 and then a gradual decrease to 21 on January 7 and another increase to 24 to 27 through January and early February. The low for the herd was reached on February 25 at 19.3 respirations per minute from which point the rate increased to 26.7 on March 25.

These data show the effect of cold weather in causing a steady decrease in rate of respiration for cows under loose housing conditions, while cows in the stall barn held at a consistently higher rate with major decreases only under severe changes of outside temperatures.

Body temperature.

Body temperature variations as shown in Table XIII (in the Appendix) and the summary with weekly averages in Table IV indicate normal temperature ranges for both loose housing and stall barn conditions.

Under loose housing, the rectal temperatures averaged 100.8°F., while in the stall barn the temperatures averaged 101.1°F. to 101.7°F. Greater differences were noted between cows within a herd than between herds.

TABLE IV

SUMMARY OF WEEKLY OBSERVATIONS OF WEATHER CONDITIONS, PULSE RATE, RESPIRATION RATE AND BODY TEMPERATURE

Data Recorded	Date								
	Nov. 11	Nov. 19	Nov. 26	Dec. 4	Dec. 11	Dec. 18	Dec. 26	Jan. 7	Jan. 14
Weather									
Temperature (°F.)									
Paved yard	38°	43°	30°	33°	28°	32°	26°	19°	37°
Lounge area	*	*	35°	41°	36°	38°	33°	26°	44°
Precipitation (In.)	0	0.15	0	0.29	0.01	0	T	0	0.03
Snowfall (In.)	0	0	0.1	T	0.3	0	T	T	0
Snow on ground (In.)	0	0	0	2.0	T	T	T	1.0	1.0
Wind velocity (mph)	15.1	6.7	8.5	1.7	5.8	4.3	6.1	14.0	10.0
Cow response									
Stall barn									
Pulse rate (per min.)	65.0	64.7	62.7	59.3	60.0	62.0	65.3	58.0	61.3
Body temperature (°F.)	101.5°	101.5°	101.3°	101.1°	101.6°	101.4°	101.7°	101.3°	101.4°
Respiration rate (per min.)	25.3	22.7	27.3	30.0	28.7	28.7	24.7	21.0	27.0
Loose housing barn									
Pulse rate (per min.)	71.0	70.0	71.0	72.6	74.2	67.0	66.4	64.0	63.3
Body temperature (°F.)	101.6°	101.4°	101.1°	101.3	101.4°	101.2°	101.3°	101.1°	101.2°
Respiration rate (per min.)	25.0	23.6	20.3	20.9	19.5	21.2	18.6	16.1	19.6

* Not available.

TABLE IV (CONTINUED)

Data Recorded	Date								
	Jan. 21	Feb. 4	Feb. 11	Feb. 18	Feb. 25	Mar. 4	Mar. 11	Mar. 18	Mar. 25
Weather									
Temperature (°F.)									
Paved yard	34°	32°	31°	40°	39°	*	35°	50°	52°
Lounge area	42°	38°	35°	43°	42°	*	40°	54°	54°
Precipitation (In.)	0	T	0.06	T	T	0.09	T	0.25	T
Snowfall (In.)	0	T	0.1	T	0	1.5	0	1.5	T
Snow on ground (In.)	T	T	T	0	0	T	0	T	T
Wind velocity (mph)	5.6	8.9	18.8	14.2	10.1	21.3	13.3	13.5	9.3
Cow response									
Stall barn									
Pulse rate (per min.)	63.3	66.0	66.7	67.3	66.0	65.3	66.7	68.0	65.3
Body temperature (°F.)	101.6°	101.4°	101.2°	101.2°	101.5°	101.3°	101.4°	101.6°	101.5°
Respiration rate (per min.)	25.3	24.0	26.0	22.0	19.3	21.3	24.3	25.0	26.7
Loose housing barn									
Pulse rate (per min.)	52.0	54.9	55.4	54.9	54.3	55.4	55.6	52.6	57.3
Body temperature (°F.)	101.2°	101.0°	100.9°	101.1°	100.8°	101.0°	101.1°	100.8°	100.8°
Respiration rate (per min.)	18.2	17.8	16.0	15.1	15.3	14.7	15.9	15.4	15.9

* Not available.

SUMMARY

This study showed that individual cow activities varied with changing winter weather conditions even though the 1952-53 winter season was relatively open and mild.

Loitering time inside and outside varied the most with a range of 112 to 349 minutes daily per cow outside loitering time and a range of 181 to 368 minutes daily per cow inside or lounge area loitering. Precipitation--mostly as snow, and wind caused the greatest increase in lounge loitering time.

Resting time in the paved yard area was very limited with 59 minutes per cow per day in early November, 14.5 in late November, 11.5 in late December and no outside resting recorded for January, February and March. A definite preference was shown for the warm bedded area of the lounge. Inside or lounge area resting showed a tendency to increase along with inside loitering in more severe weather when the outside loitering time decreased.

Hay- and silage-eating time showed a range of 295 to 399 minutes per cow during the first three observation periods when both hay and silage were available. The high was a relatively mild day and the low was a blustery day with a low of 15°F. and 0.3 of an inch of snowfall. Silage was not available during the last three months and hay-eating time ranged from 284 to 324 minutes per cow per day.

This study of roughage-eating time showed a definite preference by the cows for silage since approximately three-fourths of the total roughage-eating time was spent eating silage. This herd averaged 256.0

minutes per cow per day eating silage and 83 minutes eating hay when both were available. Hay eating time averaged 304 minutes per cow daily when only hay was available.

Weekly observations of pulse rate of cows in the loose housing barn showed a relatively high rate of 71 to 74 beats per minute in November as the cows were becoming acclimated. This was followed by a gradual decrease through December, January, and February to a low of 52.6 beats on March 18. Slight pulse rate decreases were noted as environmental temperatures increased and pulse rate increased as environmental temperatures decreased. During this same period of time, cows in the stall barn who started with a lower pulse rate (65 per minute) continued throughout the period with only temporary decreases during periods of lower outside temperature.

The average respiration rate of the herd in the loose housing barn showed a gradual decrease from 25 to 14.7 per minute with the lowest periods during the most severe weather conditions. During this same period the respiration rate of cows in the stall barn ranged from 30 to 19.3 per minute with higher rates in mild weather than in cold weather.

The average body temperature showed a greater difference between cows within a herd than between the loose housing and stall barn herds of this study.

APPENDIX

TABLE V

INDIVIDUAL COW ACTIVITY DATA
(12:00 to 6:00 P. M. Nov. 3, 6:00 to 12:00 P. M. Nov. 1 and 12:00 to 12:00 A. M. Nov. 8, 1952)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6:00	2*	2	1	2	1	2	3	8	2	1	2	2	2	1	2	1	2	3	2	4
6:10	2	2	1	2	1	2	3	1	2	1	2	8	8	1	2	1	2	3	2	3
6:20	2	2	1	8	1	8	1	3	2	4	2	8	3	4	8	1	8	3	2	1
6:30	2	8	1	8	4	1	1	3	2	1	2	3	2	5	2	1	2	1	8	1
6:40	1	2	1	3	1	3	3	3	1	1	2	2	1	5	2	2	3	1	2	2
6:50	1	2	1	1	1	1	3	3	1	1	1	2	1	5	3	1	1	1	1	2
7:00	1	1	1	1	1	1	3	1	1	1	1	1	1	5	3	1	1	1	1	2
7:10	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7:20	2	1	1	1	1	3	1	1	1	1	1	1	2	1	1	1	1	1	1	1
7:30	1	2	1	1	4	3	2	2	3	3	1	3	2	1	3	1	1	1	3	1
7:40	1	2	1	1	4	3	2	2	3	3	1	3	1	1	3	5	3	1	3	1
7:50	2	2	1	1	5	3	2	2	1	2	1	3	1	1	3	5	3	1	3	2
8:00	2	3	5	3	6	3	1	4	1	2	4	3	3	1	3	3	1	1	1	2
8:10	2	3	5	3	6	6	1	4	2	2	4	4	3	3	3	3	1	1	3	5
8:20	2	3	5	3	1	6	3	1	2	2	4	4	3	3	1	3	1	1	3	5
8:30	2	3	5	3	1	6	3	1	2	5	4	4	6	1	1	3	5	1	3	5
8:40	1	3	5	3	5	6	3	5	1	5	6	1	6	1	5	3	5	3	6	5
8:50	1	3	5	3	5	6	5	5	1	5	6	1	6	2	5	3	5	3	6	5
9:00	1	1	5	3	5	6	5	5	1	5	6	1	6	2	5	3	5	3	6	5
9:10	3	1	5	1	5	6	5	5	5	5	6	6	6	5	2	5	5	5	1	5
9:20	3	1	5	1	5	6	5	5	5	5	6	6	6	5	2	5	5	5	1	5
9:30	3	2	5	1	5	6	5	5	5	5	6	6	6	5	2	5	5	5	1	5
9:40	3	2	5	2	5	3	5	5	5	5	1	6	6	5	5	5	5	5	1	5
9:50	3	2	5	2	5	3	5	5	5	5	1	6	6	5	5	5	5	5	1	5
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10:50	1	4	5	5	5	5	5	1	5	1	1	3	6	5	5	5	3	5	4	5
11:00	5	4	5	5	2	2	5	1	5	1	1	3	6	5	5	5	3	5	4	5
11:10	5	4	3	5	1	2	2	1	5	1	5	3	1	5	5	5	3	5	4	5
11:20	5	2	3	5	1	5	2	1	5	5	5	3	1	4	1	3	3	1	4	5
11:30	5	2	3	5	1	5	2	1	5	5	1	1	1	4	1	3	1	1	3	6
11:40	5	2	3	5	4	5	3	5	5	5	1	2	1	3	4	3	1	4	3	2
11:50	2	2	3	5	4	5	3	5	5	5	1	2	1	3	4	3	1	4	1	2
12:00	3	5	3	5	5	1	5	5	5	5	2	4	5	5	5	5	5	2	3	2
12:10	3	5	3	5	5	1	5	5	5	5	2	4	5	5	5	5	5	2	3	2
12:20	3	5	3	5	5	1	5	5	5	5	2	4	5	5	5	5	5	2	3	2

TABLE V (Continued

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
12:30	3	5	3	5	5	1	5	2	5	5	5	1	5	5	5	5	5	2	3	5
12:40	3	5	3	5	5	3	5	2	5	5	5	1	5	2	5	5	5	5	2	5
12:50	1	5	3	2	5	3	5	2	5	5	5	6	5	2	5	5	5	5	3	5
1:00	1	5	3	2	5	3	5	2	5	5	5	6	3	2	5	5	5	5	6	5
1:10	5	5	3	2	5	3	5	2	5	5	5	6	3	5	1	5	5	5	6	5
1:20	5	5	3	2	5	3	5	5	2	5	5	6	3	5	1	5	5	5	6	5
1:30	5	5	2	3	5	3	5	5	2	5	5	6	3	5	2	5	5	5	6	5
1:40	5	2	2	3	5	3	1	3	3	5	5	6	3	5	2	2	5	3	6	5
1:50	5	2	2	3	5	3	1	3	3	2	5	6	5	5	2	2	5	3	6	5
2:00	5	2	6	3	2	3	3	3	3	2	5	6	5	5	2	2	5	3	6	5
2:10	5	5	6	3	2	4	3	3	4	5	5	6	5	5	5	5	5	3	5	5
2:20	5	5	6	3	5	4	3	3	1	5	5	6	5	5	5	5	5	3	5	5
2:30	5	5	6	3	5	4	3	3	1	5	1	5	4	4	3	5	5	3	5	3
2:40	5	5	6	3	5	3	3	1	1	5	1	6	5	3	3	5	5	3	5	4
2:50	5	5	6	3	5	3	3	1	1	5	1	6	5	3	3	5	5	3	5	2
3:00	5	5	6	3	5	3	3	1	1	4	3	6	5	3	3	5	5	1	5	5
3:10	2	5	6	4	5	4	3	1	1	1	3	6	4	3	3	3	5	2	5	5
3:20	1	5	6	1	1	1	5	3	1	6	3	6	5	3	3	3	5	2	5	5
3:30	2	3	5	1	1	1	5	3	3	6	3	6	5	3	3	3	1	3	1	5
3:40	2	3	6	2	1	1	5	4	3	6	3	6	5	3	3	3	1	3	3	5
3:50	2	1	6	5	3	6	5	3	3	3	1	1	5	5	1	3	2	3	3	2
4:00	2	1	6	5	3	6	5	3	3	3	1	1	5	5	1	3	2	3	3	2
4:10	2	1	6	5	3	6	5	3	3	3	1	1	5	5	1	3	2	3	3	2
4:20	2	3	3	5	3	3	2	1	1	1	4	1	5	2	4	3	2	2	3	2
4:30	2	3	3	5	3	3	2	1	1	1	4	3	2	1	4	1	1	2	1	2
4:40	2	3	3	5	1	3	2	1	1	1	1	3	3	1	1	1	1	1	3	2
4:50	2	3	2	5	1	2	2	1	1	3	6	3	3	1	5	1	1	1	3	5
5:00	2	3	2	5	1	2	2	1	1	3	6	3	3	1	5	1	1	1	1	5
5:10	2	3	2	5	1	2	2	1	1	3	6	3	3	1	5	3	1	1	1	5
5:20	2	3	2	5	1	2	2	1	1	3	6	3	3	1	5	3	1	1	1	5
5:30	2	2	2	1	1	3	4	1	1	1	3	3	3	1	1	1	3	1	1	2
5:40	1	2	2	1	1	1	1	1	1	3	1	1	2	3	1	1	1	1	1	2
5:50	1	1	1	3	1	1	1	3	3	1	3	1	2	3	1	1	1	1	1	3
6:00	1	2	2	2	1	2	2	2	1	3	2	2	2	2	2	2	2	3	2	1
6:10	2	2	8	2	1	2	8	8	1	3	2	2	2	2	2	8	2	3	2	1
6:20	2	2	7	2	1	2	2	1	3	3	2	2	2	2	2	2	8	3	8	5
6:30	5	2	1	2	5	2	2	1	3	3	2	8	8	2	2	5	2	3	2	5
6:40	2	2	2	8	5	8	5	3	3	3	5	1	2	2	2	2	2	3	2	5
6:50	2	8	2	2	5	2	5	3	3	3	5	1	2	5	2	2	2	3	2	5
7:00	2	2	5	2	6	3	5	3	3	3	5	4	2	5	3	5	5	3	5	5
7:10	2	2	5	2	6	3	5	3	1	3	5	4	2	5	3	5	5	3	5	5
7:20	5	2	5	5	6	3	5	3	1	1	5	5	2	5	3	5	5	3	5	5
7:30	5	2	5	5	1	3	5	3	4	3	5	5	2	5	3	5	5	3	5	1

TABLE V (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
7:40	5	2	5	5	1	3	5	3	1	3	5	5	2	5	3	5	5	3	5	1
7:50	5	1	5	5	3	3	3	3	1	3	1	5	2	1	3	2	3	5	1	1
8:00	5	1	5	5	3	3	3	3	1	3	1	5	2	1	3	2	3	5	1	1
8:10	5	3	5	5	3	1	3	1	1	3	4	5	2	1	4	3	3	5	3	3
8:20	5	2	5	5	1	1	1	1	1	3	4	5	2	1	1	3	3	5	3	3
8:30	5	3	3	5	1	1	3	4	1	1	4	2	2	1	5	4	1	3	3	5
8:40	5	3	3	5	1	1	3	4	1	1	1	2	2	1	5	4	1	1	1	5
8:50	5	3	3	5	1	1	3	4	1	1	1	2	2	1	5	4	1	1	1	5
9:00	5	3	3	3	1	1	3	4	1	1	1	2	2	1	5	4	1	1	1	5
9:10	1	1	3	3	1	1	1	3	3	1	3	1	1	4	1	3	3	1	1	1
9:20	1	1	3	3	1	1	1	3	3	1	3	1	3	4	1	3	3	1	1	1
9:30	1	1	3	3	1	1	1	3	3	1	3	1	1	4	1	3	3	1	1	1
9:40	1	1	3	3	1	1	1	3	3	1	3	1	1	4	1	3	3	1	1	1
9:50	1	1	1	1	1	3	3	3	1	1	3	3	1	1	1	1	1	1	1	1
10:00	1	1	1	1	1	1	3	3	1	1	3	1	1	1	1	1	1	1	1	1
10:10	2	1	1	1	3	1	3	1	1	4	1	1	1	1	3	3	1	2	3	3
10:20	2	1	1	1	3	1	3	4	1	4	1	1	5	1	3	3	3	5	3	3
10:30	2	3	3	3	1	1	3	1	1	1	6	3	5	1	3	5	3	5	1	1
10:40	2	3	3	1	1	1	3	1	1	1	6	3	5	1	1	5	3	5	1	1
10:50	2	3	3	1	3	1	3	1	1	1	6	3	2	1	1	5	3	3	1	1
11:00	1	1	1	3	3	2	1	4	3	5	4	3	2	1	1	5	1	3	1	1
11:10	1	1	1	3	3	2	1	4	3	5	1	3	2	1	1	5	1	3	1	1
11:20	3	1	5	3	3	2	2	3	3	5	1	3	2	3	3	5	1	1	1	1
11:30	1	1	5	1	3	2	5	3	3	5	3	3	5	3	3	5	1	1	1	4
11:40	1	1	5	4	3	2	5	3	1	5	1	3	5	3	3	5	3	1	1	1
11:50	4	1	5	4	3	2	5	3	1	5	2	3	5	3	3	5	3	1	1	1
12:00	3	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3
12:10	3	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3
12:20	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1
12:30	1	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1
12:40	2	4	5	5	5	5	5	5	5	2	2	3	5	5	3	5	5	2	2	5
12:50	2	4	5	5	5	5	5	5	5	2	2	3	5	5	3	5	5	2	2	5
1:00	2	5	3	2	2	5	1	2	3	2	2	3	2	3	3	2	2	2	4	2
1:10	2	5	3	2	2	5	1	2	3	2	2	3	2	3	3	2	2	2	4	2
1:20	2	5	3	2	3	5	3	2	3	2	2	3	2	3	3	2	2	2	1	2
1:30	5	5	3	3	3	5	3	5	3	1	3	4	5	3	3	5	3	5	5	5
1:40	5	5	3	3	3	5	3	5	3	1	3	4	5	1	3	5	3	5	5	5
1:50	5	5	3	3	3	5	3	5	5	5	3	1	5	1	3	5	3	5	5	5
2:00	5	5	5	1	1	5	3	5	5	5	3	1	5	3	4	5	4	5	5	5
2:10	5	5	5	3	3	5	3	5	5	5	3	5	5	3	1	5	1	5	2	5
2:20	5	5	5	3	3	5	3	5	5	5	3	5	5	3	1	5	2	5	2	5
2:30	5	5	5	3	3	5	3	5	5	5	3	5	5	3	1	5	2	5	2	5
2:40	5	5	5	3	1	5	1	5	5	5	3	5	5	1	1	5	2	5	5	5

TABLE V (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2:50	5	5	5	5	1	5	2	5	5	2	1	5	5	1	1	5	5	5	5	5
3:00	5	5	5	5	1	5	5	5	5	2	2	5	5	5	1	5	5	5	5	5
3:10	5	5	3	5	2	5	5	5	5	2	5	5	5	5	2	5	5	5	5	5
3:20	5	5	3	5	2	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5
3:30	5	5	1	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:40	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5
3:50	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5
4:00	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	2	5
4:10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	2	5
4:20	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	1	5	5	5	5
4:30	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5
4:40	5	5	5	5	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5
4:50	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5
5:00	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5
5:10	5	5	5	5	5	5	5	5	5	5	5	5	5	1	5	5	5	5	5	5
5:20	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
5:30	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5:40	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5:50	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

* Activity code:

1- Loitering in the yard.
2- Loitering in the lounge.
3- Eating silage.
4- Eating hay.
5- Resting in the lounge.
6- Resting in the yard.
8- In milking room.

TABLE VI

INDIVIDUAL COW ACTIVITY DATA
(8:00 A. M. Nov. 28 to 8:00 A. M. Nov. 29, 1952)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8:00	5*	5	5	5	1	2	5	3	5	2	3	2	2	2	1	4	1	2	1	2
8:10	5	5	5	5	1	2	5	3	5	2	3	2	2	2	4	4	3	2	1	2
8:20	5	5	5	5	1	2	5	1	5	2	3	2	2	2	4	4	3	2	1	2
8:30	5	5	5	5	1	2	5	1	5	2	3	2	2	2	1	4	1	2	1	2
8:40	2	2	5	2	1	5	5	3	5	2	4	5	2	2	1	3	1	2	1	2
8:50	2	2	3	1	1	5	5	1	5	2	1	5	4	2	3	1	1	2	1	5
9:00	2	2	3	3	3	5	5	4	5	2	1	5	1	2	3	3	3	2	2	5
9:10	2	2	3	3	3	5	5	1	5	2	1	5	1	2	3	3	3	2	2	5
9:20	2	3	1	3	3	3	5	1	5	4	1	3	3	2	3	3	3	5	2	5
9:30	2	3	1	3	3	3	3	3	3	3	3	3	1	5	3	3	3	5	2	5
9:40	2	3	1	3	1	3	3	3	3	3	3	5	1	5	3	3	3	5	3	5
9:50	2	4	4	4	4	4	4	4	4	3	4	5	4	5	4	3	3	5	1	5
10:00	2	3	4	4	4	4	4	4	4	3	4	4	4	5	3	4	3	5	1	5
10:10	2	3	4	4	3	3	1	3	3	3	4	3	4	5	3	1	2	5	1	1
10:20	4	2	3	4	3	3	2	3	4	3	4	3	4	5	4	4	2	5	3	3
10:30	4	2	3	1	3	3	2	3	1	1	1	3	4	5	3	1	2	5	3	3
10:40	4	1	5	2	1	3	3	3	1	1	1	1	1	2	3	1	2	5	3	3
10:50	4	1	5	2	2	3	3	3	3	1	1	1	1	2	3	1	5	2	3	3
11:00	3	1	5	2	5	1	3	2	3	2	3	3	3	3	1	1	5	2	3	1
11:10	3	1	5	2	5	1	3	2	3	2	3	3	3	3	1	1	5	2	1	1
11:20	3	1	2	2	5	1	3	2	3	2	2	3	3	3	1	1	5	2	1	1
11:30	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	2	2	2
11:40	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	5	2	2	2
11:50	2	3	3	3	2	3	3	3	3	2	2	3	2	2	2	3	5	2	2	2
12:00	2	2	2	2	2	2	2	2	2	2	2	2	2	1	3	3	5	2	2	2
12:10	4	3	3	3	3	3	3	3	3	5	1	3	3	1	3	3	5	2	3	5
12:20	4	3	3	3	3	3	3	3	3	5	1	3	3	3	3	1	5	2	3	5
12:30	4	3	1	3	3	3	3	3	3	5	3	3	4	3	3	5	5	2	3	5
12:40	2	3	1	3	3	3	3	3	3	5	3	3	4	3	3	5	2	5	3	5
12:50	2	3	3	3	3	3	1	1	3	5	1	1	1	3	3	1	2	5	3	3
1:00	2	2	3	3	1	1	1	1	2	5	1	1	2	1	3	1	2	5	1	2
1:10	2	2	3	3	1	1	1	1	2	5	1	1	2	1	3	1	2	5	3	3
1:20	2	2	3	3	1	1	5	1	1	5	2	1	2	1	1	1	2	5	2	3
1:30	2	2	3	4	1	1	5	1	1	2	2	1	2	2	1	2	5	5	2	3
1:40	2	2	3	1	1	3	5	1	1	2	2	3	2	2	3	2	5	5	2	4
1:50	2	2	3	1	1	3	5	1	1	2	2	3	2	2	3	2	5	5	2	4
2:00	2	2	3	1	1	3	5	1	1	2	2	3	2	2	3	2	5	2	2	4
2:10	2	2	1	2	3	3	5	3	1	5	2	1	2	2	3	5	5	2	1	1
2:20	2	2	2	2	3	1	5	3	2	5	5	1	1	5	1	5	2	2	3	2
2:30	2	2	5	5	3	1	5	3	2	5	5	1	1	5	1	5	2	2	3	5
2:40	2	2	5	5	3	1	5	3	2	5	5	1	1	5	1	5	2	5	3	5

TABLE VI (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2:50	5	5	5	5	1	1	5	3	2	5	5	1	1	5	1	5	1	5	3	5
3:00	5	5	5	2	2	1	2	1	2	5	5	1	1	5	1	5	3	5	1	5
3:10	5	5	5	2	2	1	2	3	2	5	5	1	1	5	1	5	3	5	1	5
3:20	2	1	2	2	5	4	4	3	2	1	5	1	1	2	4	2	3	5	1	5
3:30	2	3	2	2	5	4	4	3	2	3	5	1	1	1	4	2	3	5	2	2
3:40	2	3	1	5	5	4	4	3	2	3	5	3	1	1	4	2	3	2	5	2
3:50	2	1	3	5	5	1	1	3	2	3	5	3	1	1	1	2	3	2	5	5
4:00	2	1	3	5	5	1	1	1	2	3	5	3	1	1	1	2	3	2	5	5
4:10	2	1	3	4	4	1	1	1	2	3	5	3	1	1	1	2	3	2	5	5
4:20	1	1	3	3	5	1	1	1	2	3	5	3	1	1	1	2	3	2	5	5
4:30	3	2	1	3	5	1	1	1	1	3	3	1	2	4	3	5	1	5	5	5
4:40	3	2	2	3	3	1	1	1	1	3	3	1	2	4	3	5	1	5	2	5
4:50	3	2	2	3	3	3	1	1	1	3	3	1	2	4	3	5	1	5	2	5
5:00	3	2	2	3	3	3	1	1	1	3	3	1	2	4	3	5	1	5	2	5
5:10	3	2	2	3	3	3	1	1	1	3	3	1	2	3	3	5	1	5	2	5
5:20	3	2	2	3	3	3	1	1	1	3	3	1	2	3	3	2	3	5	2	4
5:30	2	3	1	3	1	1	5	2	1	1	1	3	1	3	2	2	3	2	2	4
5:40	2	3	1	3	1	1	5	5	2	1	1	3	3	1	2	5	3	2	2	1
5:50	2	2	2	3	1	1	5	5	2	1	1	3	3	1	2	5	3	2	2	1
6:00	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
6:10	2	2	2	2	2	2	8	8	2	1	1	2	2	1	2	2	8	2	8	1
6:20	2	2	8	8	2	2	2	2	2	1	3	2	2	3	2	2	3	2	2	4
6:30	2	8	2	2	2	8	2	2	2	1	3	8	2	3	8	2	3	2	2	4
6:40	8	8	1	2	8	2	2	2	2	1	3	2	2	3	8	8	3	2	2	4
6:50	8	2	1	2	8	2	2	3	2	1	1	3	8	1	2	8	2	2	2	1
7:00	2	1	1	2	1	2	2	3	2	1	1	3	8	1	1	3	2	2	2	1
7:10	4	1	2	2	1	3	5	3	2	1	1	3	2	2	1	3	2	2	5	1
7:20	4	2	2	2	1	3	5	3	2	1	1	3	2	2	3	3	2	2	5	3
7:30	2	2	3	2	1	3	5	3	2	1	1	3	2	2	3	3	2	2	5	3
7:40	2	2	3	2	1	2	3	3	2	1	1	2	2	2	1	2	3	5	5	3
7:50	1	2	3	2	1	2	3	3	2	1	1	2	2	2	1	2	3	5	5	3
8:00	2	2	1	2	2	2	3	2	1	1	2	2	2	1	1	2	2	2	5	2
8:10	2	2	1	5	2	5	3	2	1	1	2	2	2	1	1	5	2	5	5	2
8:20	2	2	1	5	2	5	3	5	4	1	2	2	2	1	1	5	2	2	5	1
8:30	2	2	1	5	2	5	3	5	4	1	2	2	2	1	2	5	2	5	5	1
8:40	2	2	1	5	2	3	2	5	2	1	2	5	2	1	2	5	2	5	5	1
8:50	2	5	6	5	2	1	2	5	2	1	5	5	2	1	5	5	2	5	1	1
9:00	2	5	6	5	2	3	2	5	2	1	5	5	2	1	5	5	2	5	3	1
9:10	2	5	5	5	2	3	2	5	2	1	5	5	2	1	5	5	2	5	3	1
9:20	2	5	5	5	1	1	2	5	2	1	5	5	2	2	5	5	3	5	3	2
9:30	2	2	5	3	1	1	2	5	2	2	5	5	3	2	5	5	3	5	5	2
9:40	2	2	5	3	1	1	2	5	2	2	5	5	3	2	5	5	3	5	5	5
9:50	3	5	5	3	1	1	5	5	3	5	5	5	5	1	5	1	5	5	5	5

TABLE VI (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
10:00	3	5	4	3	1	4	5	5	3	5	5	5	5	1	5	1	5	5	5	5
10:10	3	5	4	3	1	4	5	5	3	5	5	5	5	1	5	1	5	5	5	5
10:20	3	5	4	3	1	4	5	5	3	5	5	5	5	2	5	1	5	5	5	5
10:30	3	5	4	5	3	1	5	5	5	2	5	5	5	5	5	1	5	2	5	5
10:40	4	5	3	5	3	1	5	2	5	1	2	5	2	5	5	1	5	1	5	5
10:50	4	5	3	5	3	2	5	2	5	4	2	5	2	5	5	2	5	3	5	5
11:00	4	5	3	5	3	2	5	2	5	4	2	5	2	5	5	2	5	3	5	5
11:10	4	5	3	5	3	2	5	2	5	4	2	5	2	5	5	2	5	3	5	5
11:20	2	5	2	5	1	1	5	3	2	1	1	2	1	5	2	5	5	1	2	2
11:30	2	3	2	5	1	4	5	3	1	1	1	1	1	1	1	5	5	5	1	1
11:40	2	3	2	5	1	4	5	3	1	1	1	1	1	1	1	5	5	5	1	1
11:50	2	3	2	5	1	4	5	3	1	1	1	1	1	1	1	5	5	5	1	1
12:00	5	1	2	5	2	1	5	3	1	1	1	1	1	1	1	5	5	5	1	1
12:10	5	2	1	5	5	2	5	1	2	2	1	3	2	1	1	2	2	5	2	5
12:20	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
12:30	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
12:40	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
12:50	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
1:00	5	2	1	5	5	5	5	1	5	5	2	3	5	5	1	2	3	5	5	5
1:10	5	2	2	5	5	5	2	2	5	5	2	1	5	5	1	5	1	5	5	5
1:20	5	5	2	5	5	2	2	2	5	5	5	1	5	5	6	5	1	5	5	5
1:30	5	5	5	5	5	2	1	2	2	5	5	5	5	5	6	5	2	5	5	5
1:40	5	5	5	5	5	2	3	2	2	5	5	5	5	5	6	5	5	5	5	5
1:50	5	5	5	5	5	2	3	2	2	5	5	5	5	5	6	5	5	5	5	5
2:00	5	5	5	5	5	2	3	2	2	5	5	5	5	5	6	5	5	5	5	5
2:10	5	5	5	5	5	3	3	2	5	2	5	5	5	5	6	5	5	5	5	5
2:20	5	2	5	2	5	3	2	1	5	2	5	5	5	5	6	5	5	5	5	5
2:30	5	2	5	1	5	3	2	1	5	2	5	5	5	5	6	5	5	5	5	5
2:40	5	2	5	1	5	3	2	1	5	1	5	5	5	5	6	5	5	5	5	5
2:50	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	2	5	5	5
3:00	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	2	5	5	5
3:10	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	2	5	5	5
3:20	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	5	5	5	5
3:30	5	5	5	5	5	1	5	1	5	1	2	5	5	5	3	5	5	5	5	5
3:40	2	5	5	5	5	1	5	2	5	1	2	5	5	5	3	5	5	5	5	5
3:50	2	5	5	5	5	1	5	2	5	1	2	5	5	5	3	5	5	5	5	5
4:00	2	5	5	5	1	1	5	5	5	2	2	5	5	5	1	5	5	5	5	5
4:10	2	5	5	5	6	2	5	5	5	5	2	5	5	2	5	5	5	5	5	5
4:20	5	5	5	5	6	5	5	5	5	5	2	5	5	2	5	5	5	5	5	5
4:30	5	5	5	5	6	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
4:40	5	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:50	5	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5

TABLE VI (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
10:00	3	5	4	3	1	4	5	5	3	5	5	5	5	1	5	1	5	5	5	5
10:10	3	5	4	3	1	4	5	5	3	5	5	5	5	1	5	1	5	5	5	5
10:20	3	5	4	3	1	4	5	5	3	5	5	5	5	2	5	1	5	5	5	5
10:30	3	5	4	5	3	1	5	5	5	2	5	5	5	5	5	1	5	2	5	5
10:40	4	5	3	5	3	1	5	2	5	1	2	5	2	5	5	1	5	1	5	5
10:50	4	5	3	5	3	2	5	2	5	4	2	5	2	5	5	2	5	3	5	5
11:00	4	5	3	5	3	2	5	2	5	4	2	5	2	5	5	2	5	3	5	5
11:10	4	5	3	5	3	2	5	2	5	4	2	5	2	5	5	2	5	3	5	5
11:20	2	5	2	5	1	1	5	3	2	1	1	2	1	5	2	5	5	1	2	2
11:30	2	3	2	5	1	4	5	3	1	1	1	1	1	1	1	5	5	5	1	1
11:40	2	3	2	5	1	4	5	3	1	1	1	1	1	1	1	5	5	5	1	1
11:50	2	3	2	5	1	4	5	3	1	1	1	1	1	1	1	5	5	5	1	1
12:00	5	1	2	5	2	1	5	3	1	1	1	1	1	1	1	5	5	5	1	1
12:10	5	2	1	5	5	2	5	1	2	2	1	3	2	1	1	2	2	5	2	5
12:20	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
12:30	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
12:40	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
12:50	5	2	1	5	5	5	5	1	5	2	1	3	5	5	1	2	3	5	5	5
1:00	5	2	1	5	5	5	5	1	5	5	2	3	5	5	1	2	3	5	5	5
1:10	5	2	2	5	5	5	2	2	5	5	2	1	5	5	1	5	1	5	5	5
1:20	5	5	2	5	5	2	2	2	5	5	5	1	5	5	6	5	1	5	5	5
1:30	5	5	5	5	5	2	1	2	2	5	5	5	5	5	6	5	2	5	5	5
1:40	5	5	5	5	5	2	3	2	2	5	5	5	5	5	6	5	5	5	5	5
1:50	5	5	5	5	5	2	3	2	2	5	5	5	5	5	6	5	5	5	5	5
2:00	5	5	5	5	5	2	3	2	2	5	5	5	5	5	6	5	5	5	5	5
2:10	5	5	5	5	5	3	3	2	5	2	5	5	5	5	6	5	5	5	5	5
2:20	5	2	5	2	5	3	2	1	5	2	5	5	5	5	6	5	5	5	5	5
2:30	5	2	5	1	5	3	2	1	5	2	5	5	5	5	6	5	5	5	5	5
2:40	5	2	5	1	5	3	2	1	5	1	5	5	5	5	6	5	5	5	5	5
2:50	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	2	5	5	5
3:00	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	2	5	5	5
3:10	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	2	5	5	5
3:20	5	5	5	3	5	1	5	1	5	1	5	5	5	5	6	5	5	5	5	5
3:30	5	5	5	5	5	1	5	1	5	1	2	5	5	5	3	5	5	5	5	5
3:40	2	5	5	5	5	1	5	2	5	1	2	5	5	5	3	5	5	5	5	5
3:50	2	5	5	5	5	1	5	2	5	1	2	5	5	5	3	5	5	5	5	5
4:00	2	5	5	5	1	1	5	5	5	2	2	5	5	5	1	5	5	5	5	5
4:10	2	5	5	5	6	2	5	5	5	5	2	5	5	2	5	5	5	5	5	5
4:20	5	5	5	5	6	5	5	5	5	5	2	5	5	2	5	5	5	5	5	5
4:30	5	5	5	5	6	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
4:40	5	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:50	5	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5

TABLE VI (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5:00	5	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5
5:10	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5
5:20	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5
5:30	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5
5:40	2	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	2	5	5	5
5:50	5	5	5	1	2	1	5	5	5	5	5	5	5	3	5	5	5	5	5	4
6:00	5	5	5	1	1	1	5	5	5	5	5	5	5	3	5	5	5	5	5	4
6:10	2	2	2	2	2	2	2	2	2	2	4	2	2	3	2	2	2	2	2	4
6:20	2	2	2	2	2	2	8	2	2	2	4	2	8	3	2	2	8	2	8	4
6:30	2	2	2	2	2	2	8	2	2	2	4	2	8	3	2	2	8	2	8	1
6:40	2	2	2	8	2	2	3	8	2	5	1	2	3	2	2	5	3	2	2	1
6:50	2	5	8	8	2	2	3	8	2	5	1	8	3	2	2	5	3	2	2	6
7:00	2	2	8	2	5	8	3	1	2	5	1	8	1	5	8	2	3	2	2	6
7:10	8	8	3	2	5	8	3	1	2	5	1	1	3	5	8	8	3	2	2	6
7:20	2	2	3	2	2	1	5	1	2	2	1	3	1	5	3	8	1	2	5	3
7:30	2	2	3	2	3	1	5	1	2	2	1	3	5	5	3	3	1	2	5	3
7:40	2	2	1	2	3	1	5	1	2	2	1	3	5	5	3	3	1	2	5	3
7:50	2	2	1	2	3	1	5	1	2	2	1	3	5	5	3	3	1	2	5	3

* Activity code:

1- Loitering in the yard.
2- Loitering in the lounge.
3- Eating silage.
4- Eating hay.
5- Resting in the lounge.
6- Resting in the yard.
8- In milking room.

TABLE VII

INDIVIDUAL COW ACTIVITY DATA
(5:00 P. M. Dec. 30 to 5:00 P. M. Dec. 31, 1952)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5:00	1*	1	4	4	2	1	1	1	4	1	4	1	1	4	1	1	2	1	2	1
5:10	1	1	1	1	1	2	1	2	4	1	4	1	1	1	2	2	2	1	2	1
5:20	2	2	2	2	2	2	2	1	1	1	1	2	2	1	2	2	2	2	2	4
5:30	2	2	8	2	2	2	2	1	1	1	1	2	2	2	2	8	8	2	8	4
5:40	2	2	4	2	8	2	8	4	4	4	3	2	2	2	2	5	8	2	8	4
5:50	2	2	4	2	8	2	8	4	4	4	3	2	8	8	2	5	1	2	4	3
6:00	2	2	4	8	3	2	3	2	4	1	3	8	8	8	2	5	1	2	4	4
6:10	2	8	1	8	3	8	1	1	4	1	1	8	3	3	2	5	1	2	4	4
6:20	8	8	4	1	4	1	4	2	4	1	4	4	4	3	8	4	4	8	4	5
6:30	4	4	3	4	1	4	1	5	4	1	4	4	4	4	1	4	5	1	4	5
6:40	4	4	3	4	5	4	2	5	4	1	1	4	4	1	2	4	5	4	4	2
6:50	4	4	3	4	5	4	2	5	4	1	1	4	4	1	2	4	5	4	4	2
7:00	5	4	4	4	5	5	4	5	5	1	5	4	5	3	4	4	1	4	4	1
7:10	5	4	4	4	5	5	4	5	5	1	5	4	5	3	4	4	1	4	4	1
7:20	5	4	4	4	5	5	4	5	5	1	5	4	5	3	4	4	1	4	4	1
7:30	5	4	4	4	5	5	4	5	5	4	5	4	5	1	4	4	1	4	4	1
7:40	5	4	4	4	5	5	4	5	5	1	5	4	5	4	4	1	1	4	4	1
7:50	5	1	4	2	5	5	1	2	5	4	5	4	1	4	4	1	1	4	4	1
8:00	5	5	2	5	5	5	5	1	2	4	5	4	1	4	4	1	1	4	5	1
8:10	5	5	2	5	5	5	5	1	2	4	5	4	3	4	4	5	1	4	5	2
8:20	5	5	5	5	5	5	5	2	5	4	5	1	3	4	4	5	4	1	5	5
8:30	5	5	5	5	5	5	5	5	5	4	5	5	3	4	4	5	4	5	5	5
8:40	5	5	5	5	5	5	5	5	5	4	5	5	3	4	4	5	4	5	5	5
8:50	5	5	5	5	5	5	5	5	5	4	5	5	3	4	4	5	4	5	5	5
9:00	5	5	5	5	5	5	5	5	5	4	5	5	3	4	6	5	3	5	5	5
9:10	5	5	5	5	5	5	5	5	5	4	5	5	3	4	6	5	3	5	5	5
9:20	5	5	5	5	2	5	1	1	5	4	5	5	3	4	6	5	3	5	1	5
9:30	5	5	5	5	1	2	4	4	5	4	5	1	3	4	4	1	3	5	1	2
9:40	2	1	5	5	1	4	4	4	2	1	1	3	4	4	4	3	3	1	3	1
9:50	1	4	4	5	4	4	3	4	1	1	1	3	4	1	1	3	4	3	3	1
10:00	4	4	4	5	4	4	3	4	3	3	3	1	3	3	4	2	1	3	3	3
10:10	4	4	4	2	4	4	1	3	3	1	3	1	4	5	1	3	4	3	3	3
10:20	4	4	4	2	4	4	1	1	1	1	3	1	4	5	2	1	1	3	3	1
10:30	4	4	4	2	4	4	1	1	1	1	3	1	4	5	2	1	1	3	3	1
10:40	4	4	1	5	3	3	1	1	1	1	3	4	4	5	5	1	1	1	1	4
10:50	4	4	2	5	3	3	1	1	1	5	3	4	4	5	5	1	5	5	1	4
11:00	4	4	2	5	3	3	1	1	1	5	3	4	4	5	5	1	5	5	1	4
11:10	4	4	2	5	3	3	1	1	1	5	3	4	4	5	5	1	5	5	1	4
11:20	4	4	1	1	3	3	1	1	1	5	3	4	4	5	5	1	5	5	1	4
11:30	1	4	3	3	4	3	3	3	1	5	4	4	4	5	5	1	1	5	1	4
11:40	1	4	3	3	4	1	3	3	1	5	4	4	1	5	5	4	3	5	1	1

TABLE VII (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
11:50	1	1	1	3	1	2	1	3	3	5	1	3	1	5	5	1	3	2	1	2
12:00	2	1	1	1	1	5	1	3	3	5	1	1	5	5	5	1	3	2	1	5
12:10	2	1	1	1	1	5	1	3	3	5	1	1	5	5	5	1	3	1	1	5
12:20	1	1	1	1	1	5	1	3	3	5	1	1	5	5	5	1	1	5	1	5
12:30	5	3	1	3	3	5	3	3	3	5	3	3	5	5	1	1	1	5	3	5
12:40	5	3	1	3	3	5	3	3	3	5	3	3	5	5	1	1	3	5	3	5
12:50	5	3	3	3	3	5	3	3	1	5	3	3	5	5	3	3	3	5	3	5
1:00	5	3	3	1	3	5	3	3	1	5	3	3	5	5	3	3	3	5	3	5
1:10	5	2	3	5	3	5	3	3	1	5	2	3	5	5	3	3	1	5	3	5
1:20	1	5	3	5	3	5	3	3	1	5	2	3	5	5	3	3	1	5	3	5
1:30	3	5	3	3	3	5	1	1	1	5	5	1	5	5	3	3	1	5	3	5
1:40	3	5	3	3	1	5	1	4	4	5	5	1	5	5	3	3	2	5	3	5
1:50	3	5	3	2	1	5	1	1	1	5	5	1	5	5	2	1	5	5	2	5
2:00	3	5	3	2	1	5	1	1	1	5	5	1	5	5	2	1	5	5	2	5
2:10	3	5	3	2	1	5	1	1	1	1	5	1	5	2	5	1	5	5	2	1
2:20	1	5	3	2	1	5	2	1	1	3	5	1	5	1	5	2	5	5	2	3
2:30	1	5	3	2	2	5	1	3	1	3	5	5	5	3	5	1	3	5	2	3
2:40	4	5	3	2	5	5	1	3	2	3	5	5	5	3	5	1	3	5	2	3
2:50	4	5	1	2	5	5	1	3	2	3	5	5	5	3	5	1	3	5	2	3
3:00	4	5	1	1	5	5	1	3	2	3	5	5	5	3	5	1	3	5	2	3
3:10	4	5	1	1	5	5	1	3	2	3	2	2	5	3	2	1	3	5	2	3
3:20	1	2	3	1	1	5	2	4	2	3	2	1	5	3	2	1	3	5	2	1
3:30	1	2	3	1	1	5	2	4	2	1	2	1	5	1	2	2	1	5	2	1
3:40	5	2	3	1	1	5	2	4	2	1	2	1	5	2	2	2	2	5	5	1
3:50	5	1	3	1	3	5	1	1	2	3	2	1	5	2	1	1	5	5	5	3
4:00	5	1	3	1	3	5	1	1	2	3	2	1	5	2	1	1	5	5	5	3
4:10	5	5	3	1	3	5	4	1	1	3	1	3	5	5	1	1	5	5	5	3
4:20	5	5	1	1	3	5	4	3	3	3	3	3	5	5	3	3	5	5	5	1
4:30	1	1	2	1	3	5	4	3	3	1	3	3	5	5	3	3	5	3	5	1
4:40	1	1	5	1	3	5	1	3	3	1	3	1	5	5	3	3	5	3	5	3
4:50	2	2	2	2	2	2	2	1	1	3	1	2	2	2	2	2	2	2	2	3
5:00	2	2	2	2	2	2	2	1	1	1	3	2	2	2	2	2	2	2	2	3
5:10	2	2	2	2	2	2	2	1	1	3	1	2	2	2	2	2	2	2	2	4
5:20	2	2	2	2	2	2	2	1	1	3	1	2	2	2	2	2	2	2	2	4
5:30	2	2	2	2	8	2	8	3	3	3	1	2	8	2	2	2	2	2	8	4
5:40	2	2	2	2	2	2	2	1	3	5	1	8	8	2	2	8	2	2	8	4
5:50	2	2	8	8	1	2	1	1	3	6	1	2	2	8	2	2	8	2	2	1
6:00	2	8	2	8	1	8	1	1	3	6	1	2	1	8	2	1	2	2	1	1
6:10	8	8	1	2	3	8	1	1	1	1	1	1	1	3	8	3	1	8	2	4
6:20	2	2	1	2	3	2	1	1	1	1	1	1	3	3	2	3	1	2	2	4
6:30	2	2	3	1	3	1	1	1	1	1	1	1	3	3	1	3	1	1	2	1
6:40	2	2	3	1	3	1	1	1	1	1	1	1	3	3	1	3	3	1	2	1
6:50	2	2	1	1	1	3	1	1	3	1	1	1	3	1	1	1	3	1	2	1
7:00	2	2	1	1	1	3	1	1	3	1	1	1	1	1	1	1	3	1	2	1

TABLE VII (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
7:10	2	2	1	1	1	3	1	1	3	1	1	1	1	1	1	1	3	1	2	1
7:20	1	2	1	1	3	3	1	1	3	1	1	6	5	1	1	1	3	3	1	1
7:30	1	2	3	3	3	3	1	3	3	1	1	6	5	5	6	1	3	3	1	2
7:40	1	2	3	3	3	1	1	3	1	1	1	6	5	5	6	1	3	3	1	5
7:50	1	2	3	3	3	2	1	3	1	1	1	6	5	5	6	1	1	3	1	5
8:00	1	2	1	3	3	2	1	3	2	1	1	6	5	5	6	1	1	3	1	5
8:10	4	2	1	3	4	1	1	3	1	2	1	6	5	2	6	1	1	2	3	5
8:20	4	1	3	1	1	1	1	1	1	1	1	1	5	1	1	1	1	2	3	5
8:30	4	1	3	1	1	1	2	1	1	1	1	1	5	1	1	1	1	2	3	5
8:40	4	1	4	1	4	1	2	1	1	1	1	1	1	3	3	2	1	2	1	5
8:50	4	1	4	1	4	1	2	1	1	1	3	1	1	3	3	2	1	2	1	5
9:00	4	1	4	1	4	1	2	1	1	1	3	1	1	3	3	2	1	2	1	5
9:10	4	2	1	5	4	1	5	3	1	2	3	2	1	3	4	5	2	5	1	5
9:20	1	1	5	5	4	1	5	3	1	5	5	5	3	3	6	5	2	5	2	3
9:30	5	1	5	5	5	1	5	3	1	5	5	5	3	5	6	5	5	5	5	3
9:40	5	1	5	5	5	1	5	3	1	5	5	5	3	5	6	5	5	5	5	3
9:50	5	1	5	5	5	1	5	3	1	5	5	5	3	5	6	5	5	5	5	3
10:00	5	1	5	5	5	1	2	3	1	5	5	5	3	5	6	5	5	5	5	3
10:10	5	5	5	5	5	4	2	2	1	5	5	5	2	5	6	5	5	2	5	3
10:20	5	5	5	5	5	4	2	5	2	5	5	5	5	5	3	5	5	1	5	1
10:30	5	5	5	5	5	4	2	5	2	5	5	5	5	5	3	5	5	3	5	2
10:40	5	5	5	5	5	4	2	5	2	5	5	5	5	5	3	5	5	3	2	2
10:50	5	5	5	5	5	4	2	5	2	5	5	5	5	5	3	5	5	3	2	2
11:00	5	5	5	3	5	1	2	5	5	5	5	5	5	3	3	5	5	5	5	5
11:10	5	5	5	3	5	1	2	5	5	5	5	5	5	3	3	5	5	5	5	5
11:20	5	5	5	3	5	1	2	5	5	5	5	5	5	3	3	5	5	5	5	5
11:30	5	5	5	3	5	1	2	5	5	5	5	5	5	3	3	5	5	5	5	5
11:40	5	5	5	4	5	1	2	5	5	5	5	5	5	3	3	5	2	5	5	5
11:50	5	5	5	4	5	1	2	5	5	5	5	5	1	2	1	5	1	5	5	5
12:00	5	5	5	4	5	1	2	5	5	5	5	5	1	5	5	5	3	5	5	5
12:10	5	2	1	4	3	1	2	5	5	5	5	5	1	2	5	2	3	5	5	5
12:20	2	3	3	4	3	1	2	3	2	5	5	1	3	1	5	1	3	5	5	5
12:30	2	3	3	1	3	1	2	3	3	5	5	1	3	4	5	3	1	5	5	5
12:40	2	3	3	1	4	1	2	3	3	5	5	1	3	4	5	3	1	5	5	5
12:50	2	3	3	3	1	1	2	3	2	5	5	1	3	4	5	3	3	5	5	5
1:00	2	3	3	3	1	1	2	3	2	5	5	1	3	4	5	4	3	5	5	5
1:10	1	3	3	3	1	1	2	3	5	5	5	1	3	5	5	1	1	1	5	5
1:20	1	3	1	1	1	5	2	3	5	5	5	1	3	5	5	1	1	1	5	5
1:30	4	2	1	1	3	5	2	3	5	5	5	1	3	5	5	1	1	1	5	5
1:40	4	2	1	1	3	5	2	3	5	5	5	1	3	5	5	1	1	1	5	2
1:50	4	2	5	2	3	5	2	1	5	1	2	3	2	5	5	5	1	4	3	1
2:00	4	2	5	2	3	5	2	1	5	3	2	3	2	5	5	5	1	4	3	4
2:10	4	2	5	2	3	5	2	1	5	3	2	3	2	5	5	5	1	4	3	4
2:20	4	2	5	5	3	5	2	1	5	3	5	4	5	5	5	5	3	4	3	4

TABLE VII (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2:30	1	2	5	5	3	5	2	2	5	3	5	4	5	5	5	5	3	1	1	4
2:40	5	2	5	5	1	5	2	5	5	1	5	4	5	5	5	5	3	5	1	4
2:50	5	2	5	5	1	5	2	5	5	1	5	4	5	5	5	5	3	5	1	4
3:00	5	2	5	5	1	5	2	5	5	1	5	4	5	5	5	5	3	5	1	4
3:10	5	2	5	5	1	5	2	5	5	1	5	4	5	5	5	5	3	5	1	1
3:20	5	2	5	5	1	5	2	5	5	1	5	4	5	5	5	5	3	5	1	1
3:30	2	2	5	2	2	2	2	2	2	5	2	2	2	5	5	2	5	2	2	2
3:40	2	2	5	2	2	2	2	2	2	5	2	2	2	5	5	2	5	2	2	2
3:50	2	2	5	2	2	2	2	2	2	5	2	2	2	5	5	2	5	2	2	2
4:00	1	2	3	1	2	3	2	3	1	2	3	3	1	3	2	3	2	5	2	2
4:10	1	2	3	1	2	3	2	3	1	2	3	3	1	3	2	3	2	5	2	2
4:20	1	2	3	1	1	3	2	3	1	2	3	3	1	3	2	3	2	5	2	2
4:30	1	1	3	3	1	3	2	3	3	2	3	3	1	3	2	3	1	5	2	1
4:40	2	2	1	3	3	1	2	1	3	1	3	3	3	1	1	3	1	5	1	1
4:50	2	2	2	1	3	1	2	1	2	1	3	3	3	1	1	1	1	2	1	3

*Activity code:

1- Loitering in the yard.
2- Loitering in the lounge.
3- Eating silage.
4- Eating hay.
5- Resting in the lounge.
6- Resting in the yard.
8- In milking room.

TABLE VIII

INDIVIDUAL COW ACTIVITY DATA
(3:00 P. M. Jan. 23 to 3:00 P. M. Jan. 24, 1953)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3:00	**	2*	5	2	2	5	5	5	2	1	4	5	5	5	5	5	5	4	5	5
3:10		2	5	1	2	5	5	5	2	1	4	5	5	5	5	5	5	4	5	5
3:20		5	5	1	2	5	5	5	5	4	4	5	5	5	5	5	5	4	5	5
3:30		5	5	4	5	5	5	5	5	4	4	5	2	5	5	5	5	4	2	5
3:40		5	5	4	5	2	5	5	5	4	4	5	2	5	5	5	5	4	2	5
3:50		5	5	4	5	2	5	5	5	4	1	5	2	5	5	5	5	4	2	5
4:00		5	5	4	5	2	5	5	5	4	1	5	2	5	5	5	5	4	2	5
4:10		5	5	4	5	2	5	5	5	4	1	5	2	5	5	5	5	4	2	5
4:20		5	5	4	5	2	5	5	5	4	1	5	2	5	2	5	5	4	2	5
4:30		5	2	4	2	2	5	5	5	4	1	5	2	2	2	2	5	4	2	5
4:40		2	1	4	2	2	2	5	5	4	1	2	2	2	1	2	5	4	1	2
4:50		2	1	4	2	2	2	2	2	4	1	2	2	2	1	2	5	4	1	2
5:00		2	1	4	2	2	2	1	2	4	1	2	2	2	1	2	2	4	1	2
5:10		2	4	1	2	4	2	4	2	1	1	2	2	2	4	4	2	4	1	2
5:20		1	4	1	2	4	2	4	2	1	1	1	4	1	4	4	4	4	4	2
5:30		1	4	4	4	4	4	4	2	1	4	1	4	1	4	4	4	4	4	2
5:40		1	4	4	4	4	4	4	2	1	4	1	4	1	4	4	4	4	4	2
5:50		4	4	4	2	2	4	4	2	1	1	1	4	1	4	4	4	2	4	2
6:00		4	4	4	2	2	4	4	2	1	1	4	4	1	4	4	4	2	4	2
6:10		2	2	2	2	2	2	2	2	1	2	2	4	1	2	4	2	2	2	2
6:20		2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	2	2	1
6:30		2	2	2	8	2	2	8	2	1	8	2	8	2	2	1	2	2	2	1
6:40		2	8	2	8	2	8	8	2	4	8	2	8	2	2	1	8	2	2	1
6:50		2	8	2	1	2	8	2	2	4	2	2	2	8	2	2	8	2	2	2
7:00		2	2	2	1	2	1	2	2	4	1	8	2	8	2	2	2	8	1	1
7:10		2	2	2	1	8	1	1	2	4	1	8	2	2	8	1	1	8	4	1
7:20		8	1	1	1	8	1	1	8	4	4	1	2	2	8	1	1	2	4	1
7:30		8	4	4	4	4	2	4	8	1	4	4	2	4	4	2	1	4	1	2
7:40		2	4	4	4	4	2	4	2	4	4	4	2	4	4	2	1	2	1	2
7:50		1	2	4	2	4	5	2	5	4	4	4	2	4	4	5	4	2	2	2
8:00		1	5	4	2	2	5	2	5	4	4	4	2	4	4	5	4	2	2	2
8:10		1	5	4	2	2	5	2	5	4	4	4	2	4	4	5	4	2	2	2
8:20		1	5	1	5	5	4	5	5	4	1	2	5	4	1	5	1	5	5	2
8:30		1	5	1	5	5	1	5	5	1	2	5	5	1	2	5	2	5	5	2
8:40		1	5	1	5	5	1	5	5	1	2	5	5	1	2	5	5	5	5	5
8:50		1	5	4	5	5	2	5	5	4	5	5	5	1	5	5	5	5	5	5
9:00		1	5	4	5	5	2	5	5	4	5	5	5	1	5	5	5	5	5	5
9:10		4	5	1	5	5	2	5	5	4	5	5	5	4	5	5	5	5	5	5
9:20		4	5	1	5	5	2	5	5	4	5	5	5	4	5	5	5	5	5	5
9:30		4	5	2	5	5	2	5	5	4	5	5	5	4	5	5	5	5	5	5
9:40		2	5	5	5	5	5	5	5	1	5	5	5	4	5	5	5	5	5	5

TABLE VIII (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
9:50		5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
10:00		5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
10:10		5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
10:20		5	5	5	5	5	5	5	5	5	5	5	5	4	5	2	5	5	1	5
10:30		5	5	5	5	5	5	5	5	5	5	5	5	1	5	2	2	5	4	5
10:40		5	5	5	5	5	5	5	5	5	1	5	2	2	5	2	1	5	4	5
10:50		5	5	5	5	5	5	5	5	5	1	5	1	5	5	2	4	5	4	5
11:00		5	5	5	5	5	5	5	5	5	1	5	4	5	5	2	4	5	4	5
11:10		5	5	5	2	5	5	5	5	5	1	5	4	5	5	2	4	5	4	5
11:20		5	5	5	1	5	2	5	5	5	1	5	4	5	2	2	4	2	4	5
11:30		5	5	5	4	5	2	5	5	5	1	5	4	5	4	2	4	2	4	5
11:40		5	5	5	4	5	4	5	5	5	1	5	4	5	4	2	4	1	4	5
11:50		5	5	2	4	5	4	5	5	2	2	5	4	5	4	2	4	1	4	5
12:00		5	5	2	4	5	4	5	5	2	2	5	4	5	4	2	2	1	1	5
12:10		5	5	2	4	5	4	5	5	2	5	5	2	5	4	2	5	1	5	5
12:20		5	5	2	4	5	4	5	5	2	5	5	5	5	4	2	5	1	5	5
12:30		5	5	2	4	5	4	5	5	2	5	5	5	5	4	2	5	1	5	5
12:40		5	5	4	4	5	4	5	5	2	5	5	5	5	4	2	5	1	5	5
12:50		5	5	4	4	5	4	5	5	2	5	1	5	5	4	2	5	1	5	4
1:00		5	5	4	4	5	4	5	5	2	5	4	5	5	4	2	5	1	5	4
1:10		5	5	4	4	5	1	5	5	5	5	4	5	5	4	2	5	1	5	4
1:20		5	5	1	2	5	2	5	5	5	5	4	5	5	4	5	5	1	5	4
1:30		5	5	1	5	5	5	5	5	5	5	4	5	5	2	5	5	2	5	4
1:40		5	5	2	5	5	5	5	5	5	5	4	5	5	2	5	5	2	5	4
1:50		5	5	2	5	5	5	5	5	5	5	4	5	5	2	5	5	2	5	4
2:00		5	5	2	5	5	5	5	5	5	5	4	5	5	2	5	5	2	5	4
2:10		5	5	2	5	5	5	5	5	5	5	4	5	5	2	5	5	2	5	4
2:20		5	5	5	5	5	5	5	5	5	5	4	5	5	2	5	5	2	5	4
2:30		5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	2
2:40		5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5
2:50		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:10		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:20		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:30		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:40		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:50		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:10		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:20		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:30		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:40		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:50		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5:00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

TABLE VIII (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5:10		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5:20		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
5:30		5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5
5:40		5	5	2	5	5	2	4	2	4	5	5	5	5	5	2	2	2	2	5
5:50		5	2	2	5	2	2	4	2	4	2	5	2	2	2	2	2	2	2	2
6:00		5	2	2	8	2	8	4	2	4	2	5	8	2	2	2	2	2	8	2
6:10		5	2	2	2	2	8	4	2	4	2	5	2	8	2	2	8	2	8	2
6:20		2	8	2	4	2	4	4	2	4	2	8	4	8	2	5	8	5	2	5
6:30		8	8	2	4	8	4	4	2	4	2	8	4	4	2	5	4	5	2	5
6:40		8	2	2	4	8	4	4	2	4	8	2	4	4	8	5	4	2	2	5
6:50		2	2	4	4	2	4	4	8	4	8	4	4	4	8	5	4	8	2	5
7:00		4	2	4	4	2	4	4	8	4	2	4	4	4	2	5	4	8	2	5
7:10		5	4	4	5	2	5	4	2	4	2	4	4	4	2	5	4	4	5	5
7:20		5	4	2	5	2	5	1	2	1	4	2	2	4	2	5	4	4	5	2
7:30		5	4	2	5	2	5	1	2	1	4	2	2	4	2	5	4	4	5	2
7:40		5	4	2	5	2	5	1	2	1	4	2	2	4	2	5	4	4	5	2
7:50		5	4	2	5	2	5	1	2	1	4	2	2	4	2	5	4	4	5	2
8:00		5	4	2	5	5	5	4	5	4	4	5	5	4	5	5	4	4	5	2
8:10		5	4	2	5	5	5	4	5	4	4	5	5	1	5	5	4	4	5	2
8:20		5	1	2	5	5	5	4	5	4	1	5	5	5	5	5	1	1	5	2
8:30		5	2	2	5	5	5	4	5	4	1	5	5	5	5	5	1	2	5	5
8:40		5	5	2	5	5	5	4	5	4	1	5	5	5	5	5	1	2	5	5
8:50		5	5	2	5	5	5	4	5	4	1	5	5	5	5	5	1	2	5	5
9:00		5	5	2	5	5	5	4	5	4	1	5	5	5	5	1	1	2	4	5
9:10		1	5	1	5	5	1	4	5	4	1	5	5	5	5	4	1	2	4	5
9:20		4	5	4	4	2	4	4	5	4	2	2	2	5	2	4	2	2	4	2
9:30		4	5	4	4	2	4	1	5	2	5	2	2	5	2	4	5	5	4	2
9:40		4	5	4	4	2	4	1	5	5	5	4	2	5	2	4	5	5	4	5
9:50		4	5	4	4	2	4	1	5	5	5	4	2	4	2	4	5	5	4	5
10:00		4	5	4	4	2	4	4	5	2	2	4	2	5	2	4	5	5	4	5
10:10		4	5	4	4	2	4	4	5	2	2	4	2	5	2	4	5	5	4	5
10:20		4	5	4	4	2	4	4	5	2	2	4	2	5	2	4	5	5	4	5
10:30		4	5	4	4	1	4	4	5	2	2	4	2	5	1	4	5	5	4	4
10:40		4	1	2	2	4	4	4	5	5	2	2	4	2	4	1	5	5	2	1
10:50		2	1	5	5	4	5	4	5	5	2	2	4	2	4	2	2	2	2	1
11:00		2	1	5	5	4	5	4	5	5	2	2	4	2	4	2	2	2	2	1
11:10		2	1	5	5	4	5	4	5	5	2	2	4	2	4	2	2	2	2	1
11:20		2	4	5	5	4	5	4	5	5	2	2	4	2	4	2	2	2	2	1
11:30		2	4	2	5	4	5	4	5	2	2	2	1	1	4	2	4	2	2	1
11:40		2	4	2	5	1	5	2	5	2	5	5	2	1	1	2	4	2	2	1
11:50		2	4	2	5	1	5	2	5	2	5	5	2	1	1	2	4	2	2	1
12:00		2	4	2	5	1	5	2	5	2	5	5	2	1	1	2	4	2	2	1
12:10		4	4	2	5	1	4	5	5	2	5	5	2	4	4	1	4	2	2	4

TABLE VIII (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
12:20		4	5	2	2	4	4	5	4	2	5	5	2	4	4	4	4	4	5	4
12:30		4	5	2	2	4	4	5	4	2	5	5	2	4	4	4	4	4	5	4
12:40		4	5	2	2	4	4	5	4	2	5	5	2	4	4	4	4	4	5	4
12:50		4	4	2	2	4	4	5	4	2	5	5	2	1	4	4	4	4	5	1
1:00		4	4	2	2	4	4	5	4	2	5	5	2	1	4	4	1	1	5	1
1:10		4	1	2	1	4	4	5	4	2	5	5	2	4	1	4	1	1	1	1
1:20		4	5	2	1	2	2	5	5	5	5	5	5	4	2	2	2	5	2	5
1:30		4	5	2	1	2	2	5	5	5	5	5	5	4	2	2	2	5	2	5
1:40		4	5	2	1	2	2	5	5	5	5	5	5	4	2	2	2	5	2	5
1:50		4	5	2	1	2	2	5	5	5	4	5	5	4	2	2	2	5	2	5
2:00		4	5	2	2	2	5	5	5	5	4	5	5	4	2	2	2	5	4	5
2:10		5	5	2	2	2	5	5	5	5	4	5	5	5	5	5	2	5	4	5
2:20		5	1	2	2	4	5	5	5	5	4	5	5	5	5	5	2	5	4	5
2:30		5	5	2	5	4	5	5	5	5	4	5	5	5	5	5	4	5	4	5
2:40		5	5	2	5	4	5	5	5	5	4	5	5	5	5	5	4	5	4	5
2:50		5	5	2	5	1	5	5	5	5	4	5	5	5	5	5	4	5	4	5

* Activity code:

1- Loitering in the yard.
2- Loitering in the lounge.
3- Eating silage.
4- Eating hay.
5- Resting in the lounge.
6- Resting in the yard.
8- In milking room.

** Cow No. 1 removed from herd.

TABLE IX

INDIVIDUAL COW ACTIVITY DATA
(4:00 P. M. Feb. 27 to 4:00 P. M. Feb. 28, 1953)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4:00	**	1*	5	5	4	5	4	5	4	1	4	1	4	4	4	1	2	4	5	5
4:10		4	5	2	4	5	4	5	4	4	4	1	4	4	4	1	1	4	2	5
4:20		4	2	2	4	2	4	5	4	4	4	2	4	4	4	4	4	1	4	2
4:30		4	2	2	1	2	4	5	4	4	4	5	4	4	4	4	4	1	4	2
4:40		4	2	2	1	2	1	2	4	4	4	5	4	4	4	4	4	1	4	2
4:50		2	4	4	4	2	1	2	4	4	4	5	1	4	1	4	1	4	4	2
5:00		2	4	4	4	2	4	4	4	4	2	5	2	1	2	1	2	4	4	2
5:10		2	4	4	4	2	4	4	4	4	2	5	2	4	2	1	2	4	4	4
5:20		4	1	4	4	4	4	2	4	1	2	5	2	4	2	2	2	4	4	4
5:30		4	4	1	4	4	1	2	4	1	2	5	2	4	2	2	2	4	4	4
5:40		4	4	4	2	4	2	2	4	1	2	2	2	1	2	2	2	5	4	4
5:50		1	4	1	2	4	2	2	4	1	2	2	2	1	2	2	2	5	4	4
6:00		2	8	1	2	2	2	8	2	2	2	2	2	2	2	1	2	2	2	1
6:10		2	8	4	2	2	2	8	2	2	2	2	2	2	2	1	8	2	8	4
6:20		2	2	1	8	2	8	2	2	2	8	2	8	2	2	1	1	2	1	4
6:30		2	2	1	8	2	2	1	2	2	2	2	8	8	2	2	4	8	1	4
6:40		2	2	4	4	2	2	4	2	2	4	8	4	8	8	4	4	8	4	4
6:50		8	2	4	4	8	2	1	8	8	4	1	4	1	8	2	4	4	4	4
7:00		8	2	4	4	8	5	2	8	8	1	4	2	2	4	5	1	4	4	1
7:10		1	2	4	3	4	5	2	2	4	4	4	2	2	4	5	4	4	4	2
7:20		2	2	4	2	4	5	2	2	4	2	4	2	2	4	5	4	4	4	2
7:30		2	2	4	2	4	5	2	2	4	2	1	2	2	4	5	4	4	4	2
7:40		2	2	4	5	4	5	2	2	4	2	1	2	2	4	5	4	4	4	2
7:50		5	5	4	5	2	5	2	2	2	2	4	5	5	4	2	4	2	2	2
8:00		5	5	4	5	5	5	2	2	2	2	4	5	5	4	4	4	2	5	5
8:10		5	5	1	5	5	5	2	2	2	2	4	5	5	4	4	4	2	5	5
8:20		5	5	2	5	5	5	5	5	2	2	4	5	5	4	4	4	2	5	5
8:30		5	5	5	5	5	5	5	5	5	5	4	5	5	4	2	4	5	5	5
8:40		5	5	5	5	5	5	5	5	5	5	4	5	5	4	5	4	5	5	5
8:50		5	5	5	5	5	5	5	5	5	5	4	5	5	4	5	4	5	5	5
9:00		5	5	5	5	5	5	5	5	5	5	4	5	5	4	5	4	5	5	5
9:10		5	5	5	5	5	5	5	5	5	5	4	5	5	2	5	2	5	5	5
9:20		5	5	5	5	5	2	5	5	5	5	2	5	5	2	5	5	2	5	5
9:30		5	5	5	5	5	2	5	5	5	5	5	5	5	2	5	5	2	5	5
9:40		5	5	5	5	5	2	5	5	5	5	5	5	5	2	5	5	5	5	5
9:50		5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5
10:00		5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	5
10:10		5	5	5	5	5	2	5	5	2	5	5	5	5	5	5	5	5	5	5
10:20		5	5	5	5	5	2	5	5	2	5	5	5	5	5	2	5	5	5	5
10:30		5	5	5	5	5	2	5	5	2	5	5	5	5	5	4	5	5	5	5

TABLE IX (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
10:40		5	5	2	5	5	5	5	5	2	2	5	5	5	5	4	5	5	5	5
10:50		5	5	2	5	5	5	5	2	2	2	5	5	5	5	4	5	5	2	5
11:00		5	5	2	5	5	5	5	2	2	2	5	5	5	5	4	5	5	2	5
11:10		5	5	2	5	5	5	5	2	2	2	5	5	2	5	4	5	5	2	5
11:20		5	2	2	5	5	4	5	2	2	4	5	5	4	5	4	5	5	2	5
11:30		5	4	5	5	5	4	5	2	5	4	5	2	4	5	4	5	2	2	5
11:40		5	4	5	5	5	4	5	2	5	4	5	2	4	5	4	5	4	2	5
11:50		5	4	5	5	5	4	5	2	5	4	5	2	4	5	4	5	4	2	5
12:00		5	4	5	5	5	4	5	2	5	4	5	2	4	5	4	2	4	4	5
12:10		5	4	5	5	5	4	5	5	5	1	5	5	4	5	4	2	4	4	5
12:20		5	4	5	5	5	4	5	5	5	1	5	5	5	5	4	2	4	4	5
12:30		5	4	5	5	5	4	5	5	5	1	5	5	5	5	4	5	4	4	5
12:40		5	4	5	5	5	4	5	5	5	1	5	5	5	5	4	5	4	4	5
12:50		5	4	5	5	5	4	5	5	5	1	5	5	5	5	4	5	4	4	5
1:00		5	4	5	5	5	4	5	5	5	1	5	5	5	5	4	5	4	4	5
1:10		5	4	5	5	5	4	5	5	5	4	5	5	5	5	4	5	5	4	5
1:20		5	2	5	4	5	2	5	5	2	4	5	5	5	5	4	5	5	1	5
1:30		5	2	5	4	5	5	5	5	2	4	5	5	5	5	2	5	5	1	5
1:40		5	2	5	4	5	5	5	5	2	4	5	5	5	5	2	5	5	1	5
1:50		5	2	5	4	5	5	5	5	4	4	5	5	5	5	2	5	5	2	5
2:00		5	5	5	4	5	5	5	5	4	2	5	5	5	5	5	5	5	2	5
2:10		5	5	5	4	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
2:20		5	5	5	4	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
2:30		5	5	5	2	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
2:40		5	5	5	2	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
2:50		5	5	5	2	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
3:00		5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
3:10		5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
3:20		5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5
3:30		5	5	5	5	5	5	5	5	2	5	5	5	5	5	5	5	5	5	5
3:40		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:50		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:10		5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
4:20		5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
4:30		5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
4:40		5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
4:50		5	5	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
5:00		2	5	5	5	5	5	5	2	5	5	5	5	4	5	5	5	5	5	5
5:10		5	5	5	2	5	5	5	2	5	5	5	5	4	5	5	2	5	5	5
5:20		5	5	5	2	5	5	5	2	5	5	5	5	4	5	5	2	5	5	5
5:30		5	2	5	2	5	5	5	2	5	5	5	5	4	5	5	2	5	5	5
5:40		5	2	5	2	5	5	5	2	5	5	2	5	4	5	5	5	5	5	5
5:50		5	2	5	2	5	5	5	5	5	5	2	5	4	5	5	5	5	5	5

TABLE IX (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6:00		2	2	1	8	2	2	2	2	2	2	2	2	2	2	2	8	2	2	1
6:10		2	8	1	8	2	8	2	2	2	2	2	2	2	2	2	8	2	2	4
6:20		2	8	1	2	2	8	2	2	2	2	2	8	2	2	5	2	2	8	4
6:30		8	2	1	4	5	2	2	2	2	8	2	8	2	2	5	2	2	8	4
6:40		8	4	1	4	5	4	2	2	2	8	2	2	8	2	5	2	8	2	2
6:50		1	4	1	1	8	1	2	8	2	1	8	2	8	2	5	2	2	2	2
7:00		1	4	1	1	2	1	8	8	8	1	1	2	1	8	5	2	1	2	5
7:10		4	4	4	4	2	5	8	2	8	4	4	2	1	8	5	2	4	5	5
7:20		4	4	4	4	2	5	2	2	1	4	4	2	1	1	5	1	4	5	5
7:30		4	1	1	1	2	5	2	1	1	1	4	5	1	1	5	1	4	5	5
7:40		4	1	1	1	1	2	2	4	1	1	4	5	1	1	1	1	4	5	5
7:50		1	1	1	1	1	2	2	4	1	1	4	5	1	1	1	1	4	5	5
8:00		1	1	1	1	4	2	2	4	1	1	1	5	1	1	1	1	4	5	5
8:10		1	1	4	1	4	2	2	4	1	1	1	2	1	1	4	1	4	5	1
8:20		1	1	4	1	4	1	2	4	4	4	1	1	1	1	4	1	4	1	1
8:30		1	1	4	1	4	1	2	1	4	4	1	1	1	1	4	1	1	1	1
8:40		1	1	1	1	4	1	2	1	4	4	1	1	1	1	4	1	4	1	1
8:50		1	1	1	1	4	1	2	1	4	4	1	1	1	1	4	1	4	1	1
9:00		1	4	1	1	1	1	2	1	1	1	1	1	1	4	1	1	4	1	1
9:10		1	4	1	1	1	1	2	1	1	1	1	1	1	4	1	4	4	1	4
9:20		1	4	1	1	1	1	2	1	1	1	1	1	1	4	1	4	4	1	4
9:30		1	4	1	1	1	1	2	1	1	1	1	1	1	4	1	4	4	1	4
9:40		1	4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	4	4	1
9:50		1	4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	4	4	1
10:00		1	4	1	1	1	1	2	1	1	1	1	1	1	1	1	1	4	4	4
10:10		4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4
10:20		4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4
10:30		4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	4
10:40		4	2	4	4	4	4	2	4	4	4	4	4	4	4	4	4	4	4	2
10:50		4	2	4	1	4	4	2	4	4	4	1	1	1	4	4	4	4	4	2
11:00		4	1	4	1	4	4	2	1	4	4	1	1	2	4	4	4	4	1	1
11:10		1	1	4	4	4	1	2	2	1	4	2	4	5	1	4	4	4	1	1
11:20		1	1	4	4	4	1	2	2	1	4	2	4	5	1	4	4	4	1	1
11:30		1	1	4	4	4	1	2	2	1	4	2	4	5	1	4	1	1	1	1
11:40		1	1	4	1	4	1	2	1	1	4	2	1	5	1	1	1	5	1	1
11:50		2	4	1	1	4	1	2	4	4	4	1	2	5	1	1	1	5	1	1
12:00		2	4	1	1	1	1	2	4	4	1	4	5	5	1	1	1	5	1	1
12:10		2	4	1	1	1	1	2	4	4	1	4	5	5	1	1	1	5	1	1
12:20		4	1	1	1	1	2	5	1	4	2	4	5	5	1	2	4	5	1	5
12:30		4	1	1	1	1	2	5	1	1	2	1	5	5	1	2	4	5	1	5
12:40		4	1	5	4	1	5	5	2	5	2	1	5	5	1	5	4	5	1	5
12:50		4	1	5	4	4	5	5	5	5	5	4	5	5	4	5	4	5	2	5
1:00		4	1	5	4	4	5	5	5	5	5	4	5	2	4	5	4	5	2	5

TABLE IX (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1:10		4	1	5	5	4	5	5	5	5	5	4	5	4	4	5	4	5	2	5
1:20		2	4	5	5	1	5	5	5	5	5	1	5	4	4	2	1	1	4	1
1:30		2	4	5	5	1	5	5	5	5	5	5	2	4	4	2	1	4	4	4
1:40		5	4	5	5	1	5	5	5	5	5	5	2	4	4	2	1	4	4	4
1:50		5	2	5	5	4	5	5	5	5	5	5	4	4	4	4	1	4	4	2
2:00		5	5	5	5	4	5	5	5	5	5	5	5	4	4	4	1	4	4	2
2:10		5	5	5	5	4	5	5	5	5	5	5	5	4	4	4	1	4	4	2
2:20		5	5	5	5	4	5	5	5	5	5	5	5	1	1	4	4	4	4	5
2:30		5	5	5	5	4	5	5	5	5	5	5	1	1	1	4	4	4	4	5
2:40		5	5	5	5	4	5	2	2	5	5	5	2	1	1	4	1	1	4	5
2:50		5	5	5	5	4	5	2	2	5	5	5	2	4	1	1	1	1	1	5
3:00		5	5	5	5	4	5	2	2	5	5	5	2	4	1	1	1	1	1	5
3:10		5	5	5	5	4	5	2	2	5	5	5	2	4	1	1	1	1	1	5
3:20		2	5	5	1	1	1	2	2	5	5	5	2	4	1	1	1	1	1	5
3:30		2	5	5	1	1	1	2	2	2	5	5	4	4	1	1	5	1	1	5
3:40		2	5	5	4	1	1	2	2	2	5	5	4	1	5	1	5	5	1	5
3:50		2	5	5	4	1	4	2	2	2	5	5	4	1	5	1	5	5	1	5

* Activity code:

1- Loitering in the yard.
2- Loitering in the lounge.
3- Eating silage.
4- Eating hay.
5- Resting in the lounge.
6- Resting in the yard.
8- In milking room.

** Cow No. 1 removed from herd.

TABLE X

INDIVIDUAL COW ACTIVITY DATA
(8:00 A. M. March 28 to 8:00 A. M. March 29, 1953)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
8:00	**	4*	4	4	2	4	1	1	4	4	2	2	4	4	4	4	4	1	4	2
8:10		4	4	1	4	4	1	1	4	4	2	5	4	4	4	4	4	1	4	2
8:20		4	4	1	4	4	4	1	4	4	2	5	4	4	4	4	4	1	4	1
8:30		4	4	4	4	4	4	4	4	1	2	5	4	4	1	4	4	1	4	4
8:40		4	4	4	4	4	4	4	4	1	2	5	4	4	1	4	4	4	4	4
8:50		4	4	4	4	4	4	4	4	1	2	5	1	4	1	4	4	4	4	4
9:00		4	4	4	4	4	4	4	4	1	2	5	1	1	1	4	4	4	4	1
9:10		4	4	4	4	4	4	4	4	1	2	1	1	1	1	4	4	4	4	4
9:20		4	4	4	4	4	4	4	4	1	2	4	1	1	4	4	4	4	4	4
9:30		4	4	4	4	4	4	1	4	4	2	4	4	1	4	4	4	4	4	1
9:40		1	1	4	4	4	4	1	1	4	2	4	4	4	4	1	4	4	4	1
9:50		1	1	4	4	4	4	1	2	4	2	4	4	4	4	1	4	4	4	1
10:00		1	1	4	4	4	4	1	2	4	2	4	4	4	4	1	4	4	2	1
10:10		1	2	4	4	4	1	1	2	4	2	4	4	4	1	1	4	2	2	1
10:20		1	5	2	4	4	1	5	2	1	2	1	1	4	1	2	4	2	2	4
10:30		1	5	2	1	2	5	5	2	2	2	1	1	2	2	5	2	2	2	4
10:40		1	5	1	1	2	5	5	2	2	2	4	1	5	2	5	2	2	2	4
10:50		2	5	1	1	2	5	5	2	4	2	4	2	5	2	5	2	2	2	4
11:00		2	5	2	1	2	5	5	4	4	5	4	2	5	2	5	5	2	2	4
11:10		2	4	2	2	2	5	5	4	4	5	4	2	5	2	2	5	2	2	1
11:20		2	4	2	2	2	5	5	4	4	5	4	2	5	2	2	5	2	2	1
11:30		2	4	2	5	5	5	5	4	4	5	4	2	5	2	2	5	2	2	1
11:40		2	1	5	5	5	5	5	4	4	2	2	2	5	5	5	5	2	2	1
11:50		2	1	5	5	5	5	5	4	4	2	2	2	5	5	5	5	2	2	2
12:00		1	5	5	5	5	5	4	4	4	2	2	2	5	5	5	5	2	2	2
12:10		2	1	5	5	5	5	5	4	4	2	2	2	5	5	5	5	2	2	2
12:20		2	2	5	5	5	5	5	4	4	2	2	2	5	5	5	5	2	2	5
12:30		2	2	5	5	5	4	5	2	2	5	5	2	5	5	5	2	2	2	5
12:40		2	2	5	5	4	4	5	2	5	5	5	5	5	5	5	2	5	2	5
12:50		2	2	5	5	4	4	5	2	5	5	5	5	5	5	5	2	5	2	5
1:00		2	2	5	5	4	4	2	2	5	5	5	5	5	5	5	2	5	2	5
1:10		5	2	5	5	4	4	4	2	5	5	5	5	5	5	5	4	5	4	5
1:20		5	5	5	5	2	4	4	4	5	5	5	2	5	5	5	4	5	4	5
1:30		5	5	5	5	2	2	4	4	5	5	5	2	5	5	5	1	2	4	5
1:40		5	5	5	5	2	2	4	4	2	4	4	2	5	5	5	2	4	1	2
1:50		5	2	4	4	2	4	4	1	2	4	4	2	4	4	4	2	4	1	2
2:00		5	2	4	4	2	4	4	1	2	4	4	2	4	4	4	2	4	1	2
2:10		5	2	4	4	2	4	4	1	2	4	4	2	4	4	4	2	4	1	2
2:20		5	2	4	4	2	4	1	1	2	4	4	2	4	4	1	2	4	1	2
2:30		2	2	4	2	5	4	1	1	5	4	1	2	1	4	1	5	4	2	2

TABLE X (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
2:40		2	5	4	2	5	2	2	2	5	5	1	2	1	4	2	5	4	5	2
2:50		2	5	4	2	5	2	2	5	5	5	1	2	2	4	5	5	4	5	2
3:00		2	5	4	2	5	2	2	5	5	5	1	2	2	4	5	5	4	5	2
3:10		2	5	4	2	5	2	2	5	5	5	1	2	2	4	5	5	4	5	2
3:20		2	5	4	2	5	2	2	5	5	5	1	2	2	1	5	2	4	5	2
3:30		5	5	2	2	5	5	2	5	5	5	4	2	5	1	5	2	4	2	5
3:40		5	5	2	2	5	5	2	5	5	5	4	2	5	2	5	2	4	2	5
3:50		5	5	2	2	5	5	2	5	5	5	4	2	5	5	5	2	4	2	5
4:00		5	5	2	2	5	5	2	5	5	5	4	2	5	5	5	2	4	2	5
4:10		2	5	2	2	1	1	2	5	5	5	4	2	5	5	5	2	4	1	5
4:20		4	1	2	2	1	4	1	2	1	2	4	2	5	5	2	2	4	4	5
4:30		4	1	2	2	4	4	1	2	4	2	4	2	5	5	2	4	2	4	5
4:40		4	1	2	2	4	1	1	2	4	2	1	2	4	2	2	4	2	4	5
4:50		4	4	2	2	4	1	1	2	4	2	1	2	4	2	2	4	2	4	5
5:00		4	4	2	2	4	1	1	2	4	2	1	2	4	2	2	4	2	4	5
5:10		4	4	2	2	4	1	4	2	4	2	1	1	4	2	2	4	2	4	5
5:20		4	4	2	2	1	4	4	4	4	4	1	1	4	2	2	4	2	2	5
5:30		1	4	2	2	1	4	4	4	4	4	1	1	4	2	2	4	2	2	2
5:40		1	4	2	2	1	4	4	4	4	4	1	1	4	2	2	4	2	2	2
5:50		2	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2	2	1
6:00		2	8	1	8	2	8	2	2	2	2	1	8	2	2	2	2	2	2	1
6:10		2	8	4	8	2	8	2	2	2	2	1	8	2	2	2	2	2	2	1
6:20		2	4	4	1	2	4	8	2	2	2	2	4	2	8	2	8	2	8	1
6:30		2	4	4	1	2	4	8	8	2	2	2	4	8	8	2	1	2	4	1
6:40		8	4	4	1	8	4	1	8	2	2	2	4	8	4	2	1	2	4	1
6:50		8	4	4	1	8	4	1	1	8	8	2	4	1	4	2	2	8	4	2
7:00		1	2	1	1	2	2	4	2	4	2	2	2	1	4	2	2	4	2	1
7:10		1	2	1	1	2	2	4	2	4	2	2	2	1	4	2	2	4	2	1
7:20		1	2	1	1	2	2	4	2	4	2	2	2	1	4	2	2	4	2	1
7:30		1	5	2	1	1	2	2	2	4	2	2	2	1	4	2	2	4	2	4
7:40		2	5	2	2	1	2	2	2	4	2	2	2	1	4	2	2	4	2	4
7:50		2	5	2	5	1	1	2	2	4	2	2	2	4	4	2	1	4	2	4
8:00		2	5	2	5	1	1	2	2	4	2	2	2	4	4	2	1	4	2	4
8:10		2	5	2	5	1	1	2	2	4	2	1	2	4	1	2	1	4	2	4
8:20		2	2	5	5	2	1	2	2	1	2	4	2	4	1	2	1	2	2	2
8:30		2	2	5	5	2	1	2	2	2	2	4	2	4	5	2	1	2	2	5
8:40		2	2	5	5	2	1	2	2	2	2	4	2	4	5	2	2	2	2	5
8:50		2	5	5	5	2	1	2	2	2	5	4	2	4	5	2	2	2	2	5
9:00		2	5	5	5	2	1	2	2	2	5	4	2	2	5	2	2	2	2	5
9:10		5	5	5	5	2	2	5	2	2	5	4	2	2	5	2	2	5	5	5
9:20		5	5	5	5	2	2	5	5	5	5	2	2	2	5	5	2	5	5	5
9:30		5	5	5	5	2	5	5	5	5	5	2	5	5	5	5	2	5	5	5
9:40		5	5	5	5	2	5	5	5	5	5	5	5	5	5	5	2	5	5	5
9:50		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5

TABLE X (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
10:00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	5	5	5
10:10		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	2	5	5
10:20		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	2	5	5
10:30		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	2	4	5	5
10:40		5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
10:50		5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
11:00		5	5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	4	5	5
11:10		5	5	5	2	5	5	5	5	5	5	5	5	2	5	5	5	4	5	5
11:20		2	2	5	2	5	1	5	5	5	5	5	4	1	5	5	5	4	5	5
11:30		2	1	5	2	5	4	4	5	5	5	4	4	4	5	5	5	4	5	5
11:40		2	4	5	2	5	4	4	5	2	5	4	4	4	5	5	5	4	1	5
11:50		2	4	2	5	5	1	4	5	2	2	4	1	4	5	5	5	5	1	5
12:00		2	4	2	5	5	1	1	5	2	2	4	1	4	5	5	5	5	1	5
12:10		2	4	2	5	5	4	1	5	2	2	4	1	4	5	5	2	5	1	5
12:20		2	4	2	5	5	4	4	5	5	2	4	1	4	5	5	1	5	4	5
12:30		5	4	1	5	5	4	4	5	5	2	5	4	5	5	5	4	5	4	5
12:40		5	2	4	5	5	4	4	5	5	2	5	5	5	5	5	4	5	4	5
12:50		5	5	4	5	5	4	4	5	5	5	5	5	5	5	5	4	5	4	5
1:00		5	5	4	5	5	4	4	5	5	5	5	5	5	5	5	4	5	4	5
1:10		5	5	4	5	5	4	4	5	5	5	5	5	5	5	5	4	5	4	5
1:20		5	5	4	5	5	4	4	5	5	5	5	5	5	5	2	4	5	4	5
1:30		5	5	4	5	5	4	4	5	2	5	5	5	5	5	2	4	5	4	5
1:40		5	5	4	5	5	1	4	5	2	5	5	5	5	5	2	4	5	4	5
1:50		5	5	4	5	5	2	1	5	2	5	5	5	5	5	2	4	5	4	5
2:00		5	5	4	5	5	2	2	5	2	5	5	5	5	5	5	4	5	4	5
2:10		5	5	4	5	5	5	5	5	2	5	5	5	5	5	5	4	5	4	5
2:20		5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	4	5	4	5
2:30		5	5	2	5	5	5	5	5	5	5	5	5	5	5	5	4	5	2	5
2:40		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
2:50		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:00		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:10		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:20		5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:40		5	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
3:50		5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:00		5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
4:10		5	4	5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
4:20		5	2	5	5	5	5	5	5	5	5	5	5	2	5	5	5	5	5	5
4:30		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
4:40		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
4:50		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
5:00		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
5:10		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
5:20		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5

TABLE X (Continued)

Time	Cow Identification Numbers																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
5:30		5	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
5:40		2	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
5:50		2	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5
6:00		2	2	5	5	5	5	5	5	5	5	5	5	4	5	5	5	5	2	5
6:10		5	2	2	2	5	5	2	5	5	2	5	2	4	2	2	5	5	2	2
6:20		2	8	1	8	2	8	2	2	2	2	1	2	8	2	2	2	2	2	2
6:30		2	8	4	8	2	8	2	2	2	2	1	2	8	2	2	2	2	2	2
6:40		2	2	4	2	2	2	8	8	8	2	4	2	1	8	2	2	2	2	1
6:50		2	4	4	2	2	4	8	8	8	2	4	2	1	8	2	2	2	2	1
7:00		8	4	4	4	8	4	2	1	4	2	4	8	1	1	1	2	8	2	5
7:10		8	4	4	4	8	1	2	1	4	2	4	8	1	1	4	2	8	2	5
7:20		1	4	1	4	2	1	2	1	4	8	1	2	1	1	4	8	2	8	5
7:30		1	4	4	1	2	1	5	4	4	8	1	2	1	4	4	8	1	8	5
7:40		4	1	4	1	2	5	5	4	1	2	5	2	1	4	2	2	4	2	5
7:50		4	1	2	4	2	5	5	4	2	2	5	5	1	1	2	2	4	2	5

* Activity code:

1- Loitering in the yard.
2- Loitering in the lounge.
3- Eating silage.
4- Eating hay.
5- Resting in the lounge.
6- Resting in the yard.
8- In milking room.

** Cow No. 1 removed from herd.

TABLE XI

INDIVIDUAL COW WEEKLY PULSE RATE DATA

Cow No.	Date					
	Nov. 11	Nov. 19	Nov. 26	Dec. 4	Dec. 11	Dec. 18
Holsteins in Tie Stall Barn						
1.	62	60	56	60	56	60
2.	60	60	56	56	56	60
3.	76	76	72	64	68	64
4.	68	68	68	60	60	64
5.	64	64	64	60	64	64
6.	60	60	60	56	56	50
Brown Swiss in Loose Housing Barn						
1.	76	68	64	68	68	60
2.	64	64	68	76	68	64
3.	72	84	72	68	72	68
4.	68	64	64	60	68	64
5.	76	64	76	68	76	64
6.	68	64	68	80	76	68
7.	76	72	68	84	76	68
8.	72	72	76	72	68	64
9.	72	68	72	76	72	68
10.	68	64	76	76	84	68
11.	68	68	68	72	76	72
12.	68	76	72	76	76	68
13.	64	68	76	72	76	68
14.	80	76	76	68	76	68
15.	80	76	76	76	80	72
16.	68	68	72	76	76	69
17.	68	68	72	72	72	68
18.	76	72	68	68	76	68
19.	72	76	68	76	72	68
20.	64	68	68	68	76	64

TABLE XI (Continued)

Cow No.	Date					
	Dec. 26	Jan. 7	Jan. 14	Jan. 21	Feb. 4	Feb. 11
	Holsteins in Tie Stall Barn					
1.	64	60	68	64	76	72
2.	64	48	52	56	52	52
3.	68	64	60	64	68	68
4.	68	60	64	64	68	72
5.	64	60	64	68	64	68
	Brown Swiss in Loose Housing Barn					
1.	64					
2.	60	60	60	48	48	56
3.	64	68	56	48	48	56
4.	68	64	60	48	48	48
5.	64	64	56	48	48	56
6.	64	60	64	56	52	52
7.	68	68	68	52	52	48
8.	68	60	60	60	56	52
9.	68	64	72	56	56	52
10.	64	68	68	52	60	64
11.	68	68	68	48	60	56
12.	68	64	60	60	60	56
13.	68	64	60	48	60	56
14.	64	60	68	60	56	60
15.	68	64	68	60	60	48
16.	68	64	64	48	56	60
17.	68	64	60	48	56	52
18.	64	64	64	48	52	60
19.	72	68	64	48	56	60
20.	68	60	64	52	60	60

TABLE XI (CONTINUED)

Cow No.	Date					
	Feb. 18	Feb. 25	Mar. 4	Mar. 11	Mar. 18	Mar. 25
	Holsteins in Tie Stall Barn					
1.	76	72	72	76	68	68
2.	56	52	48	48	48	48
3.	68	68	72	68	72	80
4.	68	68	72	72	88	60
5.	64	72	68	72	68	68
6.	72	64	60	64	64	68
	Brown Swiss in Loose Housing Barn					
1.						
2.	56	56	52	52	44	56
3.	56	48	52	56	60	56
4.	52	52	56	52	52	56
5.	48	52	48	48	48	52
6.	56	48	56	52	48	60
7.	56	48	56	56	44	60
8.	56	56	64	60	60	60
9.	52	68	60	60	48	52
10.	60	52	60	56	52	56
11.	48	52	52	56	52	56
12.	52	60	56	60	56	64
13.	56	52	48	48	52	52
14.	64	64	60	64	68	64
15.	48	48	52	52	44	56
16.	56	60	60	60	60	60
17.	60	52	56	52	48	56
18.	56	52	52	56	52	56
19.	56	60	52	52	52	60
20.	56	52	60	64	60	56

TABLE XII

INDIVIDUAL COW WEEKLY RESPIRATION RATE DATA

Cow No.	Date					
	Nov. 11	Nov. 19	Nov. 26	Dec. 4	Dec. 11	Dec. 18
	Holsteins in Tie Stall Barn					
1.	28	28	28	32	28	24
2.	24	20	28	28	32	28
3.	24	20	24	28	28	28
4.	24	24	24	28	24	28
5.	28	24	32	32	32	36
6.	24	20	28	32	28	28
	Brown Swiss in Loose Housing Barn					
1.	20	20	20	16	16	16
2.	20	20	20	20	16	20
3.	28	32	20	20	20	24
4.	24	20	20	20	16	20
5.	24	24	24	28	24	24
6.	24	24	20	20	20	24
7.	24	24	20	20	20	20
8.	24	24	20	20	20	24
9.	24	24	20	20	20	20
10.	24	24	20	24	24	24
11.	24	24	20	20	20	24
12.	28	24	20	24	20	20
13.	28	20	20	20	18	20
14.	28	24	24	28	18	20
15.	24	24	20	18	20	20
16.	24	20	20	20	18	20
17.	28	24	20	20	20	20
18.	28	28	20	20	20	24
19.	24	24	18	20	20	20
20.	28	24	20	20	20	20

TABLE XII (Continued)

Cow No.	Date					
	Dec. 26	Jan. 7	Jan. 14	Jan. 21	Feb. 4	Feb. 11
Holsteins in Tie Stall Barn						
1.	24	20	28	24	20	20
2.	24	18	28	24	24	24
3.	24	20	26	24	24	24
4.	24	20	28	28	28	28
5.	28	24	26	28	24	28
6.	24	24	26	24	24	32
Brown Swiss in Loose Housing Barn						
1.	16					
2.	16	14	18	16	16	18
3.	18	18	16	18	18	16
4.	20	16	18	18	16	14
5.	16	16	20	16	16	16
6.	20	16	20	20	16	16
7.	16	18	22	20	16	14
8.	20	14	18	20	18	16
9.	20	18	28	20	20	14
10.	20	16	20	18	20	22
11.	20	18	16	16	20	16
12.	16	16	20	20	20	16
13.	20	16	18	18	20	14
14.	24	14	20	18	16	16
15.	20	16	20	20	20	14
16.	18	16	18	18	18	16
17.	16	16	18	16	16	16
18.	18	16	18	18	16	16
19.	20	18	24	18	16	16
20.	18	14	20	18	20	18

TABLE XII (Continued)

Cow No.	Date					
	Feb. 18	Feb. 25	Mar. 4	Mar. 11	Mar.18	Mar. 25
Holsteins in Tie Stall Barn						
1.	20	20	20	24	24	24
2.	20	20	20	22	22	24
3.	24	20	20	26	28	28
4.	24	20	24	22	24	24
5.	24	20	24	28	28	32
6.	20	16	20	24	24	28
Brown Swiss in Loose Housing Barn						
1.						
2.	16	12	14	16	16	16
3.	14	16	14	16	18	18
4.	12	14	14	14	14	16
5.	14	16	14	18	18	14
6.	16	16	14	16	14	16
7.	16	12	12	16	14	16
8.	16	20	24	16	16	16
9.	14	16	14	16	14	14
10.	16	14	14	16	14	14
11.	14	14	12	14	14	20
12.	16	18	14	16	16	16
13.	16	14	12	14	14	14
14.	16	16	14	16	16	16
15.	14	14	14	16	14	16
16.	14	18	20	18	18	18
17.	16	14	14	14	14	14
18.	14	16	16	18	18	18
19.	14	16	14	16	16	16
20.	18	14	16	16	14	14

TABLE XIII

INDIVIDUAL COW WEEKLY BODY TEMPERATURE DATA

Cow No.	Date					
	Nov. 11	Nov. 19	Nov. 25	Dec. 4	Dec. 11	Dec. 18
	Holsteins in Tie Stall Barn					
1.	101.7	101.5	100.9	101.3	101.3	101.6
2.	101.4	101.1	100.8	101.4	101.1	101.0
3.	101.5	101.7	101.4	100.5	101.5	101.2
4.	101.9	102.8	102.1	101.4	101.7	101.4
5.	101.1	100.9	101.3	100.8	101.7	101.5
6.	101.4	101.0	101.5	101.5	101.4	102.2
	Brown Swiss in Loose Housing Barn					
1.	101.9	100.5	100.2	100.2	101.5	99.8
2.	101.1	101.1	99.4	101.3	100.6	100.4
3.	101.5	101.7	101.3	100.8	100.8	100.6
4.	101.3	101.1	100.6	101.1	101.3	101.5
5.	101.9	101.7	101.6	102.0	103.9	102.9
6.	101.5	101.0	101.4	101.2	101.6	101.2
7.	101.0	101.3	101.2	101.7	101.6	99.9
8.	102.0	101.4	101.7	101.6	101.4	101.4
9.	101.7	101.4	100.8	100.7	101.0	100.7
10.	101.4	101.8	102.1	101.9	102.0	101.2
11.	102.0	101.1	101.5	101.8	101.7	101.9
12.	101.8	101.2	100.8	101.5	101.5	101.2
13.	101.6	101.9	101.3	101.0	101.0	101.4
14.	102.4	102.0	102.2	101.8	101.6	101.3
15.	101.8	101.8	101.1	101.3	101.7	101.6
16.	100.9	101.1	101.2	102.2	101.0	101.1
17.	101.8	101.1	100.6	100.3	101.4	101.5
18.	101.7	101.5	101.7	101.3	101.4	101.4
19.	100.9	101.2	100.0	101.5	101.3	101.6
20.	101.4	101.3	101.6	101.6	101.1	101.5

TABLE XIII (Continued)

Cow No.	Date					
	Dec. 26	Jan. 7	Jan. 14	Jan. 21	Feb. 4	Feb. 11
	Holsteins in Tie Stall Barn					
1.	101.9	101.3	101.2	101.6	101.6	100.8
2.	101.0	100.8	100.9	101.0	100.9	100.5
3.	101.6	101.0	101.0	101.2	101.4	101.4
4.	102.0	101.7	102.8	102.0	102.4	101.4
5.	101.7	101.4	101.0	101.7	101.0	101.2
6.	102.2	101.8	101.5	102.1	101.3	101.1
	Brown Swiss in Loose Housing Barn					
1.	99.9					
2.	101.5	99.8	100.7	100.6	99.8	100.4
3.	101.1	101.0	101.2	101.3	101.3	100.5
4.	101.4	101.4	101.3	101.5	100.7	100.6
5.	102.0	100.7	101.2	101.2	100.6	101.3
6.	101.1	100.4	101.1	101.4	101.1	101.1
7.	101.4	100.4	100.8	100.5	101.4	101.2
8.	101.3	101.5	101.9	101.6	101.2	101.8
9.	101.1	101.9	101.2	100.3	99.9	101.5
10.	101.6	101.7	102.0	100.9	101.6	100.8
11.	101.0	101.6	101.6	101.3	103.4	100.6
12.	102.0	101.0	101.2	101.1	101.6	100.4
13.	101.5	101.2	101.3	101.4	100.7	100.5
14.	101.3	101.7	101.5	101.4	101.2	100.6
15.	101.2	101.5	100.5	101.5	100.9	100.0
16.	101.0	101.8	101.4	101.7	101.1	101.4
17.	101.4	100.0	100.9	101.2	101.4	100.4
18.	100.8	101.6	101.2	101.7	101.2	101.1
19.	101.1	101.3	101.3	101.1	100.8	101.4
20.	101.5	101.3	101.4	100.6	102.0	101.5

TABLE XIII (Continued)

Cow No.	Date					
	Feb. 18	Feb. 25	Mar. 4	Mar. 11	Mar. 18	Mar. 25
	Holsteins in Tie Stall Barn					
1.	101.4	101.5	101.4	101.4	102.0	101.7
2.	100.9	101.6	100.6	100.6	100.8	100.8
3.	101.2	101.5	100.8	101.5	101.7	101.8
4.	101.4	102.4	102.3	102.1	102.6	102.0
5.	101.5	101.2	101.2	101.4	101.5	101.8
6.	100.6	101.1	101.4	101.3	101.1	101.1
	Brown Swiss in Loose Housing Barn					
1.						
2.	100.7	100.0	100.7	99.8	99.9	99.7
3.	100.1	100.3	100.8	100.8	100.7	100.6
4.	101.0	101.2	101.1	101.1	100.9	100.5
5.	101.0	100.9	100.0	102.2	100.7	100.5
6.	101.2	101.2	101.2	101.2	100.9	100.5
7.	100.6	100.6	100.6	100.8	100.4	100.3
8.	101.8	101.0	101.7	101.9	101.5	101.4
9.	101.4	100.4	100.0	100.4	100.5	99.9
10.	101.0	100.7	100.6	101.0	101.0	100.6
11.	100.9	100.4	100.3	100.7	100.9	100.2
12.	101.2	100.6	101.0	101.1	101.0	101.3
13.	100.9	100.8	100.9	101.2	101.1	101.2
14.	100.6	101.4	101.2	101.0	101.0	100.8
15.	100.9	100.4	100.5	101.0	100.8	100.9
16.	101.4	101.4	103.6	101.4	101.6	101.5
17.	102.5	100.6	100.8	100.6	100.3	100.9
18.	100.7	101.4	101.3	101.6	101.2	101.4
19.	100.9	101.4	100.8	100.9	100.9	100.8
20.	101.3	101.0	101.5	100.8	100.6	102.2

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