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THE REPRODUCTIVE PERFORMANCE OF DAIRY CATTLE IN TILLAMOOK COUNTY
AND POSSIBLE RELATIONSHIP TO AVAILABLE FEED
(Progress Report)

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Dairymen in Tillamook County have reported considerable difficulty in getting cows with calf during the local breeding season from about April first to August first. There is no definite indication from the analyses of pasture and hay crops grown in the county that these are generally deficient to the point of causing difficult conception.*

SUMMARY

Difficult conception was reported and studied in several dairy herds in 1940-41. Results in 1941-42 and incomplete studies for 1942-43 indicate that reproductive performance was normal in most of about twenty herds.

The intervals between heat periods followed a normal pattern and did not indicate conception followed by abortion which is characteristic of infection.

The bulls used at times showed periods of temporary infertility often following periods of heavy service. In a few cases bulls of low fertility were responsible for the difficult breeding.

The hay grown in Tillamook County was of poor quality as evidenced by its appearance and low protein content. Phosphorus contents were likewise frequently characteristic of poor hays and in some instances so low as to suggest the possibility of phosphorus deficiency. In a few instances the calcium contents were quite low. There were, however, no widespread complaints concerning depraved appetite or other definite evidence of mineral deficiency.

The nutritive value of Tillamook County pastures is relatively high. This is indicated by the analyses of 96 pasture clippings which had an average of 16.8 percent crude protein, 0.65 percent calcium, and 0.36 percent phosphorus. If available in sufficient amounts for good milk production the pasture forage should be adequate for reproduction.

It is obvious that Tillamook County has excellent pasture but produces low quality hay. Greater emphasis should be placed on producing better quality winter feeds. The possibility of utilizing a large amount of early spring forage as grass silage is evident.

* Oregon Agricultural Experiment Station Bulletin 395 - "Reproductive Performance of Dairy Cattle" - available upon request discusses the main considerations involved in normal reproduction and indicates the factors under the general headings of inheritance, nutrition, disease and management that may cause variations from the normal resulting in either temporary or permanent sterility in male or female.

In the spring of 1941 at the request of Tillamook County dairymen and officials and with financial assistance from the county, a study was begun to ascertain if possible the causes of poor breeding results with dairy cattle in the county. The plan of the investigation was to make fairly complete study of a limited number of representative herds in the county. Dairymen selected as cooperators promised to keep accurate breeding records. Hay and pasture samples were to be taken for chemical analyses. Any disease condition or management practice thought to have a bearing on the problem were to be studied.

A summary of the 1940 breeding records in eleven dairy herds is shown in Table 1. Most of these herds were reported by the owners to have had breeding difficulties during 1940.

Table 1. Summary of 1940 Breeding Records

Herd No.	Pregnant Cows		% Conceived to Various Services					
	No.	Total Services	Average Services	1	2	3	4	5 or more
1	37	62	1.68	56.7	24.3	13.5	5.4	—
2	19	65	3.44	26.3	5.3	31.6	26.3	10.6
3	22	43	2.18	40.9	45.5	13.6	—	—
4	16	53	3.31	—	37.6	13.3	12.5	18.7
5	20	72	3.60	—	15.0	30.0	35.0	20.0
6	12	20	1.66	83.3	16.7	—	—	—
8	13	51	3.92	—	7.7	30.7	23.1	30.7
9	26	78	3.00	11.5	23.1	26.9	30.8	7.7
10	40	87	2.18	50.0	25.0	12.5	10.0	2.5
11	16	37	2.18	41.2	29.4	—	17.6	5.9
12	24	72	3.00	16.7	16.7	33.3	20.8	12.5
Total	245	645	Average 2.63	34.7	24.5	18.8	15.5	6.5

Trimberger and Davis* have summarized several reports giving results of breeding from natural service. The average number of services per conception for 22,684 fertile cows was 1.79. Of 16,555 of the cows on which records were available 64.3% conceived to the first service, 19.9% to the second, 8.6% to the third, 3.4% to the fourth, and 3.9% to five or more.

Judged by the Trimberger and Davis report, herds 1 and 6 gave normal reproductive performance during 1940, and herds 3, 10 and 11 were fairly normal. The cows in herds 2, 4, 5, 8, 9 and 12 gave decided difficulty in conceiving, the average number of services for conception of 118 cows being 3.31. In addition a considerable number of cows did not conceive in the usual Tillamook County breeding season from approximately April 1 to August 1 and were either disposed of as non-breeders or held over until the following year.

The breeding records in 13 cooperating herds for the 1941 season are given in Table 2. The herds include 11 of 12 herds summarized for 1940 in Table 1 and are designated by the same herd number.

* Neb. Agr. Exp. Sta. Res. Bul. 129, April 1943.

It will be noted that the 1941 breeding performance of 527 cows averaged better than the normal reported by Trimmerger and Davis. Only two herds, 5 and 23, had real difficulty. It is probable that overuse of a young bull contributed to the large number of services per pregnancy in herd 5 and that the purchase of cows without due consideration to their fertility was the main factor in herd 23. On eliminating herds 5 and 23 it is found that 460 cows conceived with an average of only 1.54 services per pregnancy. Thirty-one cows or 5.6 percent of the 558 cows bred in the cooperating herds in 1941 did not become pregnant or were disposed of before pregnancy was definitely determined. This record may be considered to be normal.

Table 2. Summary of 1941 Breeding Records

Herd No.	Pregnant Cows		% Conceived to Various Services					
	No.	Total Services	Average Services	1	2	3	4	5 or more
1	30	47	1.57	66.7	20.0	6.7	3.3	3.3
2	39	65	1.67	59.0	23.1	12.8	2.6	2.6
3	22	35	1.59	68.2	18.2	9.1	-	4.5
4	35	49	1.40	71.4	20.0	5.7	3.9	-
5	44	121	2.75	31.8	25.0	6.8	15.9	20.5
8	19	29	1.53	63.2	26.3	5.2	5.2	-
9	26	48	1.85	57.7	27.0	3.8	3.8	7.7
10	45	71	1.58	57.8	26.7	8.9	6.7	-
11	17	21	1.23	76.5	23.5	-	-	-
12	26	44	1.57	42.4	50.0	3.8	3.8	-
13	30	36	1.20	76.7	20.0	3.3	-	-
14	47	70	1.49	70.2	19.2	4.3	4.3	2.1
15	25	37	1.48	72.0	21.0	4.0	-	4.0
16	34	46	1.35	76.4	14.7	5.9	3.0	-
19	28	45	1.61	64.3	21.4	7.1	3.6	3.6
21	23	38	1.65	56.5	30.4	8.7	-	-
22	14	27	1.93	50.0	28.5	7.1	7.1	7.1
23	23	62	2.70	39.1	13.0	13.0	17.4	17.4
Total	527	891	Average 1.69	61.1	23.2	6.6	4.7	4.4

The difficulty in getting cows with calf increased as the breeding season progressed as shown in Table 3.

Table 3. Pregnancies by Periods of Breeding Season

Period	Cows Bred	Cows Pregnant	
		No.	Percent
April 1 to May 2	185	137	74
May 3 to June 3	346	238	69
June 4 to July 5	227	137	60
July 6 to August 6	115	65	57

It is believed that the decline in breeding efficiency as the season advanced was due to the lessened chances of conception as cows return for service rather than to a seasonal effect. A further study will be made to include percentage of pregnancies to first services only throughout the breeding season.

A tabulation of the intervals between 882 repeat services showed 47 percent of these between 18 and 24 days from the previous service. About 11 percent of the heat periods were less than 18 days, another 11 percent more than 45 days and the remaining 30 percent from 25 to 45 days. Pregnant cows with trichimonad infection usually are said to return in heat after three to five normal 21-day periods have passed. None of the herds studied showed the tendency for a long delay between heat periods.

The records for the 1942 breeding season are as yet not complete as all 1943 calving records have not been obtained. However, incomplete results seem to indicate that the results for 1942 will be as favorable as for 1941.

The chemical analyses of hay samples taken from the farms of some of the dairymen cooperating in the breeding study are shown in Table 4. These include samples from both the 1939 and 1940 hay crops. It will be noted that none of these hay samples averaged particularly high in protein, which is to be expected considering that they are largely grass hays. Also the phosphorus content of many of the samples is quite low. It is believed that a good dairy cow hay should have more protein and phosphorus than is contained in most of these hays. Also a few of the samples may be low in their calcium content.

Table 4. Chemical Analyses of Hay Samples

Farm No.	Description	Crude Protein %	Calcium %	Phosphorus %
<u>1939 Crop Year - Sampled February 4-5, 1940</u>				
1	Native hay, bottom land	6.94	0.52	0.22
5	Ryegrass and clover, bottom sub-irrigated	8.20	0.83	0.16
5	Prairie hay, first bench	6.93	0.40	0.18
6	Native hay upland	7.43	0.44	0.22
6	Native hay upland	9.02	0.60	0.20
8	Prairie hay	5.65	0.19	0.14
10	Native, bottom land	7.53	0.62	0.23
13	Ryegrass and clover, irrigated, phosphated	7.61	0.51	0.24
<u>1940 Crop Year - Sampled March 5-8, 1941</u>				
3	Prairie hay	5.40	0.28	0.11
5	Ryegrass and clover, new seeding, upland	6.00	0.75	0.15
7	Native hay, hill land	5.90	0.20	0.12
8	Prairie hay	6.00	0.30	0.15
9	Native hay, bottom, no phosphate	4.80	0.45	0.12
9	Native hay, upland, much sweet vernal	5.00	0.33	0.10
12	Native hay, upland	5.70	0.34	0.15
20	Prairie hay, Mesquite	4.40	0.35	0.11

Table 4. Chemical Analyses of Hay Samples
(Continued)

Farm No.	Description	Crude Protein %	Calcium %	Phosphorus %
<u>Average of Hay Samples:</u>				
	Bottom land (5 samples)	7.02	0.59	0.19
	Upland, prairie and hill land (11 samples)	6.13	0.38	0.15
	All samples	6.41	0.44	0.16
	Five highest protein samples	7.98	0.60	0.21
	Second five highest protein samples	6.36	0.43	0.16
	Lowest six protein samples	5.16	0.32	0.12

It will be noted at the bottom of Table 4 that the average bottomland hay shows a better chemical analysis than the average upland, prairie and hill land hays. Also it will be noted that the hays higher in protein have correspondingly higher calcium and phosphorus contents, resulting in better feeding value for these higher protein hays.

During the 1941 season pasture clippings were obtained from the farms of twelve cooperating dairymen. Cages were set up in the pastures on June 3 or 4 in areas considered to be representative of the entire pasture. It is estimated that the grass when the cages were set up represented a 7 to 10 days growth. The grass was first cut in these protected areas on June 25 which means that the period of growth for the first clipping was longer than for later clippings which were made approximately every 21 days. Inasmuch as the last clipping was made on either December 9 or December 11, the yield data cover approximately a two-hundred day period. A twenty-five square foot area was clipped during each clipping period.

The clipping data included green weight yields and an estimation of the type of forage growing. As would be expected the percentage of dry matter in the pasture grass when clipped showed wide variations depending on the season of the year, the amount of growth and relative dryness of the grass. The percentage of dry matter in the 96 samples when clipped ranged between a low of 9.4 and a high of 52.8. The average dry matter of all samples when clipped was 17.7 percent. If we assume that the dry matter of the grass was 72 percent digestible, there would be 12.8 pounds of total digestible nutrients in 100 pounds of grass. A 900-lb. cow should consume at least 100 pounds of such grass daily which would allow her to maintain her body and produce 16 pounds of 4.5 percent milk daily. Beyond this production grain feeding would be necessary at the rate of one pound for each two pounds of milk produced.

The pastures, with the exception of the tideland pastures (largely tideland bent grass) consisted mostly of ryegrass and white clover with the clover more prevalent in the early season.

The entire samples clipped were dried and brought to the experiment station for analysis with the results given in Table 5. It will be noted that there was considerable variation in the air-dry (equivalent to the dryness of hay) material growing on these protected plots on different farms. As reported on an acre basis

these vary from more than five tons per acre to only a little more than two tons per acre. The variation on pasture yields on different farms is probably due to differences in soil types, fertilization, kind of grasses and clover growing and pasture management. It is not known how much or when water was applied in the case of the irrigated pastures. The value of irrigation is indicated by farms designated as 2 and 4 as the yields were much greater during July and August than on farms without irrigation.

It should be kept in mind that the pasture yields are not for the entire season as they do not include the large early spring growth previous to about May 25.

The nutritive value of the pastures as indicated by the crude protein content of the individual pasture clippings is for the most part relatively high. As given, the crude protein content is on an air-dry basis which means approximately the same dry matter as would be found in hay. In comparison average alfalfa hay contains 14.8% crude protein and very leafy alfalfa 16.5% crude protein. It will be noted that the average pasture on seven of the twelve farms had a higher crude protein content than even very leafy alfalfa hay, and on only three farms was the protein content a little less than average alfalfa hay.

The average calcium content of the 96 clippings was 0.65 percent, about 50 percent higher than average Tillamook hays as shown in Table 4. With the exception of farm No. 19 the calcium content of the pastures should be sufficiently high for good feeding value.

In comparison with the hay crops the phosphorus content of the dried pasture clippings is much better, averaging 0.36 percent in comparison with 0.16 percent for Tillamook County-grown hays. The pasture forage should in most cases be adequate for good milk production and for normal reproduction. It is obvious that this county has excellent pasture but produces poor quality hay.

In order to obtain further information on the composition of Tillamook County feedstuffs, clippings are being obtained from the farms of fourteen dairymen during the present (1943) season. Hay samples will also be obtained from the farms of more than 20 dairymen cooperating at the present time in keeping breeding records on their dairy herds. Further reports will be put out as results of additional studies become available.

Table 5. Pasture Yields and Composition, 1941

Date of Clipping	Air Dry Wt. Per Acre Lbs.	Crude Protein %	Crude Protein Per Acre Lbs.	Remarks	
June 25	1758	14.61	257	Farm No. 2. Irrigated bottomland pasture	
July 16	3158	13.19	417		
Aug. 5	718	15.77	113		
Aug. 26	817	17.24	141		
Sept. 16	675	18.96	128		Average calcium 0.722%
Oct. 7	572	19.71	113		Average phosphorus 0.420%
Oct. 28	342	21.49	73		
Nov. 18	188	21.61	41		
Dec. 9	265	20.11	53		
Total & Average	8493	15.73	1336		
June 25	3396	17.61	401	Farm No. 4. Irrigated pasture	
July 16	1389	17.81	326		
Aug. 6	2517	21.48	418		
Aug. 27	871	22.85	118		Average calcium 0.433%
Sept. 17	756	23.60	94		Average phosphorus 0.403%
Oct. 8	479	23.81	73		
Oct. 29	330	24.51	57		
Nov. 19	188	24.39	25		
Dec. 11	96	22.71	18		
Total & Average	10022	15.27	1530		
June 24	2575	15.43	397	Farm No. 14. Irrigated bottomland pasture	
July 15	948	16.66	158		
Aug. 5	526	16.73	88		
Aug. 26	545	20.49	112		
Sept. 16	560	23.00	129		Average calcium 0.703%
Oct. 7	545	19.28	105		Average phosphorus 0.397%
Oct. 28	330	20.51	68		
Nov. 18	272	20.01	54		
Dec. 9	288	18.50	53		
Total & Average	6589	17.67	1164		

Table 5. Pasture Yields and Composition, 1941
(Continued)

Date of Clipping	Air Dry Mt. Per Acre Lbs.	Crude Protein %	Crude Protein Per Acre Lbs.	Remarks
June 25	1646	18.87	311	Farm No. 21. Bottomland pasture Average calcium 0.817% Average phosphorus 0.409%
July 16	986	20.23	199	
Aug. 5	660	21.16	140	
Aug. 27	403	20.60	83	
Sept. 17	537	21.88	117	
Oct. 8	414	20.84	86	
Oct. 29	307	22.35	69	
Nov. 19	177	22.20	39	
Dec. 11	138	20.91	29	
Total & Average	5268	20.37	1073	
June 25	1098	15.80	173	Farm No. 10. Bottomland pasture Average calcium 0.599% Average phosphorus 0.359%
July 15	1144	15.52	178	
Aug. 5	303	16.52	50	
Aug. 26	468	19.41	91	
Sept. 16	514	22.07	113	
Oct. 7	307	20.31	62	
Oct. 28	265	21.59	57	
Nov. 18	161	21.20	34	
Dec. 9	92	19.95	18	
Total & Average	4352	17.83	776	
June 24	1266	18.22	231	Farm No. 16. Bottomland pasture Average calcium 0.980% Average phosphorus 0.451%
July 15	664	15.19	101	
Aug. 5	683	15.85	103	
Aug. 26	315	15.07	47	
Sept. 16	840	22.52	189	
Oct. 7	522	22.58	138	
Oct. 28	407	25.01	102	
Nov. 18	441	20.04	88	
Dec. 9	188	22.80	43	
Total & Average	5326	19.28	1027	

Table 5. Pasture Yields and Composition, 1941
(Continued)

Date of Clipping	Air Dry Wt. Per Acre Lbs.	Crude Protein %	Crude Protein Per Acre Lbs.	Remarks	
June 24	794	13.37	106	Farm No. 5. Bottomland pasture Average calcium 1.115% Average phosphorus 0.366%	
July 15	1228	12.55	154		
Aug. 5	595	14.08	84		
Aug. 26	480	15.01	72		
Sept. 16	434	17.56	76		
Oct. 7	250	17.66	44		
Oct. 28	261	18.43	48		
Nov. 18	230	17.65	41		
Dec. 9	134	15.69	21		
Total & Average	4406	14.66	646		
June 24	2909	11.30	329		Farm No. 24. Upland pasture Average calcium 0.487% Average phosphorus 0.216%
July 15	2069	9.49	196		
Aug. 5	161	11.64	19		
Aug. 26	180	12.37	22		
Sept. 16	645	15.30	99		
Oct. 7	422	17.82	75		
Oct. 28	383	19.55	75		
Nov. 18	180	20.61	37		
Dec. 9	134	19.55	26		
Total & Average	7083	12.40	878		
June 24	1025	16.75	172	Farm No. 9. Prairie pasture Average calcium 0.561% Average phosphorus 0.344%	
July 15	1727	19.08	330		
Aug. 5	380	19.83	75		
Aug. 26	380	20.01	76		
Sept. 16	837	24.36	204		
Oct. 7	549	24.06	132		
Oct. 28	345	24.28	84		
Nov. 18	257	25.51	65		
Dec. 9	123	21.70	27		
Total & Average	5623	20.72	1165		

Table 5. Pasture Yields and Composition, 1941
(Continued)

Date of Clipping	Air Dry Wt. Per Acre Lbs	Crude Protein %	Crude Protein Per Acre Lbs.	Remarks	
June 24	1312	13.74	180	Farm No. 8. Prairie pasture Average calcium 0.463% Average phosphorus 0.393%	
July 15	1366	15.34	210		
Aug. 5	200	15.24	30		
Aug. 26	257	16.36	42		
Sept. 16	441	21.90	97		
Oct. 7	299	22.70	68		
Oct. 28	272	23.62	64		
Nov. 18	253	21.99	56		
Dec. 9	123	20.88	26		
Total & Average	4523	17.09	773		
June 25	2648	10.52	276		Farm No. 19. Untamed tideland pasture Average calcium 0.259% Average phosphorus 0.217%
July 16	1431	12.83	184		
Aug. 5	760	13.99	106		
Aug. 27	599	15.28	92		
Sept. 17	583	16.59	97		
Oct. 8	480	16.99	82		
Oct. 29	334	15.96	53		
Nov. 19	138	17.65	24		
Dec. 11	107	14.82	16		
Total & Average	7080	13.14	930		
June 24	1305	11.55	151	Farm No. 11. Diked tideland pasture Average calcium 0.608% Average phosphorus 0.348%	
July 16	867	13.35	116		
Aug. 6	119	15.93	19		
Aug. 27	610	11.11	67		
Sept. 17	583	26.88	157		
Oct. 8	902	21.28	192		
Oct. 29	434	21.94	95		
Nov. 19	215	22.16	48		
Dec. 11	161	20.65	33		
Total & Average	5196	16.90	878		