Factors Affecting Frequency of Blind Quarters in the Dairy Research Herd

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Introduction

Dairy cows which freshen for the first time with one or more quarters which do not produce any milk are an obvious economic loss to the dairyman. These quarters usually are called blind, and either represent quarters which did not develop and were atrophied, or quarters with teats with canals which did not develop. Some of the blind quarters in the present investigation apparently were secreting milk but in no case could this milk be obtained without surgical intervention. We did not count quarters which apparently were functioning at time of parturition but which were mastitic and later dried up. Objectives of our research were to determine the frequency of occurrence of blind quarters, genetic and environmental factors which affected frequency, and the loss in productivity following parturition.

Although Turner recognized and discussed the problem back in 1952, there exists very little information about it. He described the condition as blind or imperforate teat or quarter and discussed it in detail. Genetic influence was suggested by Johansson and Rendel in 1968, as well as possible origin from injury or mastitis.

Materials and Methods

Available were detailed daily records of the Florida Agricultural Experiment Station Dairy Research Unit for the period 1959 to 1977.

Total number of first parturitions was 1112. Animals represented six breed groups. Recorded on each animal were status of each quarter (blind or normal), breed, sire, dates of birth and parturition, days in lactation, milk yield, fat yield and fat precent. Since not all animals had completed their first lactations at the time of the statistical analysis, some of the analyses included fewer than 1112 observations, but always 1059 or more.

Results and Discussion

Mean performance. Characteristics of the 1112 animals are shown in Table 1. Mean age at first parturition of all animals was 25.8 months, which reflected the practice in the herd until recently of breeding heifers during a 6-month breeding season following first normal estrus after 13 months of age. Lactation records ranged in length from 5 to 305 days in length. Breed 6 (Holstein crossbreds) consisted primarily of Holstein by Guernsey F_1 crosses, but also at least one F_1 offspring resulting from crossing Holstein with three other breeds (Ayrshire, Brown Swiss, and Jersey).

Table 1. Mean performance of 1112 first lactation cows.

	Breed[a]					
	1	2	3	4	5	6
Number	41	51	146	404	436	34
Age (months)	26.7	27.5	26.7	25.1	26.0	23.8
Days in lactation	213	224	244	270	259	241
Milk yield (lb)	6041	6801	6151	10077	6036	8133
Fat percent	3.89	3.96	4.67	3.35	4.97	3.56
Fat yield (lb)	240	278	295	340	302	298

[a] 1 = Ayrshire, 2 = Brown Swiss, 3 = Guernsey, 4 = Holstein, 5 = Jersey, 6 = Holstein crossbreds.

Frequencies of blind quarters. Table 2 shows that 38 cows (3.42%) of all cows had one or more blind quarters. Standard error of this estimate was .54%. One cow had three blind quarters and nine had two blind quarters. Hence the percentage of all 4448 quarters which were blind was 1.10 ± .16%. Statistical analysis showed that breed frequencies differed, with Holsteins and Holstein crossbreds having higher frequencies than the other four breeds. Subsequent analyses confirmed these differences and provided additional evidence of genetic effects.

Table 2. Frequencies of blind quarters by breed.

Breed[a]	1	2	3	4	5	6
Normal cows	41	51	144	378	429	31
Blind cows[b]	0	0	2	26	7	3
Blind quarters[c]	0	0	2	36	7	4

[a]1 = Ayrshire, 2 = Brown Swiss, 3 = Guernsey, 4 = Holstein, 5 = Jersey, 6 = Holstein crossbreds.

[b]Cows with one or more blind quarters (breed differences statistically significant).

[c]Total number of blind quarters (breed differences statistically significant).

In Table 3 are frequencies of blind quarters by quarter. Although the right rear quarter had the fewest cases, statistical tests of front versus rear, and left versus right, were not significant (meaning no real evidence that frequencies differed).

Table 3. Location of blind quarters.

Quarter[a]	Blind	Normal	% Blind
Left front	14	1098	1.26
Right front	15	1097	1.35
Left rear	13	1099	1.18
Right rear	7	1105	0.63
Overall	49	4399	1.11

[a]Differences in frequencies among quarters not significant.

Environmental and genetic effects:

In this phase, variables studied were breed, sire in breed, season, year, breed by season, year by season and age of cow. The response variables were presence of one or more blind quarters (variable coded 0 or 1) and number of blind quarters (0, 1, 2 or 3). The two responses obviously are highly correlated (r = .93) since there were few animals with either two or three blind quarters.

When breed and sire in breed were studied, in no case could effects due to year, season, year-season or breed-season be detected. In several analyses there appeared to be a slight positive linear effect of age at parturition. Regression of presence of one or more blind quarters on age at parturition was 0.23% and for number of blind quarters, 0.10%. These values suggest that the frequencies of blind quarters are higher in heifers freshening at older ages. The increase per month is the regression coefficient (.23% or .10%).

Effects of breed and sire in breed were significant, suggesting that the trait was heritable. Heritabilities for the two dependent variables ranged between 0.10 and 0.20.

Effects of blind quarters on production:

In additional analyses the effects of blind quarters on length of record, milk yield, fat yield and fat percentage were evaluated. Results are summarized in Table 4. Cows with one or more blind quarters produced 2176 lb less milk, and milked 48 days less, than normal cows. Obviously part of the decreased yield was due to the shorter milking period. Adjustment of milk yield for days in lactation would account for only a portion of the loss, however. Effects on fat percentage were variable and not statistically significant. Loss of 1329 lb milk with one blind quarter, and 4358 lb with two, seemed reasonable, since days in lactation decreased linearly (b = -41 days) with number of blind quarters. Loss due to one blind quarter adjusted for number of days milked was 243 lb.

Table 4. Effects of blind quarters on production.

Trait	Number of blind quarters		
	One or More	One	Two
Milk yield (lb)[a]	-2176	-1329	-4358
Fat percent[b]	-.016	+.064	+.145
Fat yield (lb)[a]	-75	-51	-150
Days in lactation[a]	-48	-41[c]	-82[c]

[a]Effects statistically significant.

[b]Effect not significant.

[c]Based on linear regression.

Summary

We studied 1112 first-calf heifers in our Dairy Research Unit herd for the period 1959-77. The animals frequency of heifers with one or more blind quarters was 3.42 ± .54%; percentage of all quarters which were afflicted was 1.10 ± .16. There was no evidence of differences in frequencies among quarters. Analyses failed to detect any effects due to year of parturition, season, or year by season or breed by season interactions. A small but significant positive linear effect of age at parturition was detected. Breed effects were large; frequency for Holsteins and Holstein crossbreds was five times that of four other dairy breeds. Differences among sire groups were found and suggested heritabilities of .1 to .2. Animals with one blind quarter averaged 1329 lb less milk and 51 lb less fat during first lactation than normal animals, and milked 41 days less. Even greater losses were sustained for animals with two or more blind quarters. Indicated further research is to obtain estimates of factors studied here from other populations, and to characterize the trait anatomically.

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