

EFFECT OF MONTH OF CALVING ON THE PRODUCTION OF QUEENSLAND DAIRY COWS

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SUMMARY

In all districts, except the Atherton Tableland and Mackay, the production of cows which calved in the months of December to March was lower than that of cows which calved in other months of the year. Cows which freshened in the months of June and July produced 20 per cent. more milk and butterfat than those which calved in December, January or February.

The month of calving influenced the length of lactation of cows. Cows which calved in the late winter and spring completed longer lactations than those which calved during other periods.

Lactation curves of cows which calved in each quarter of the year were prepared for two districts. They showed that cows which calved in the third quarter of the year produced more milk and butterfat for a period of 6-7 months of a total lactation of approximately 10 months.

The influences of breed and age of animal were considered in relation to production of cows which calved in the various months. It was found that all breeds showed similar trends in calving patterns and amounts of production.

I. INTRODUCTION

Since the inception of the production recording of cows in Queensland under the Group Herd Recording Scheme, extensive experience in dairy cow management has shown the extent to which production is influenced by several factors. Besides the well-known influences, month of calving, length of the previous dry period, period between calving, and length of lactation have been shown to affect milk and butterfat yields. The month of calving appears to exert a very great influence on yield. A knowledge of the magnitude of variation according to time of calving aids in the analysis of cow records used in preparing herd management programmes. The influence of month of calving on production is important in the preparation of sire surveys.

Extensive observation concerning the effect of month of calving on production has been carried out in Queensland since 1948. Results of surveys in all the dairying areas of the State are presented in this paper. An attempt has been made to gain a knowledge of the magnitude of variation, and to discuss the reasons for month-of-calving differences.

II. REVIEW OF LITERATURE

Some of the earliest Australian work on this subject was carried out in Queensland (Pegg 1948). Pegg made a survey of lactation records prepared from the recording of herds under the Farmer's Own Sample scheme. The survey

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revealed that in many districts the average butterfat production of cows calving in July, August and September was 40-50 lb more than that of cows which calved in the first quarter of the year. The initial survey in Queensland was followed by further surveys by Pegg and Clark (1953) and Pegg (1955).

Cullity (1950), in a report on the Dairy Herd Improvement Scheme in Western Australia, published data showing that the highest average productions were obtained from cows which calved in the months of March to July inclusive. Subsequent work by Needham and Bettenay (1956) indicated that cows which calved in the period March/April/May gave higher productions than those which calved at other times of the year.

Similar observations have been made by workers in other Australian States (Scott and Wilson (1954) in N.S.W.; Itzerott and Durney (1960) in South Australia; and Porteous (1959) in Tasmania).

Many overseas workers have observed seasonal variations in milk and butterfat production. Hammond and Sanders (1923) studied Milking Shorthorn records from four different testing societies in England. In all cases, the highest yields were obtained from cows which calved during the autumn. Cows calving during the successive winter and spring months showed decreasing yields until June or July, when the minimum was reached. In reports of the Production Division of the Milk Marketing Board (Anon. 1950, 1958) it was shown that winter calvers (November-February) gave the highest yield and summer calvers the lowest, irrespective of age of cattle.

In the U.S.A., Baum *et al.* (1954) found that cows in Washington State which freshened in the autumn produced more evenly throughout the lactation period than cows which freshened in the spring and summer. Cows freshening in August and the autumn months produced less total milk during early lactation and more during the late lactation than those calving in other months.

Henderson and Carter (1957) showed that, in New York State, cows which calved from April to July produced less butterfat than those which calved from August to March. Cows calving in September produced the most butterfat.

Annis, Erb, and Winters (1959) found that the month of calving had a significant effect upon the average maturity equivalent 305-day milk and butterfat yields. March and April were high and July and August were low. The difference between the most favourable and the least favourable months of calving was 4.9 per cent. for milk and butterfat.

III. METHODS

Both monthly and complete lactation records were used for this study. Monthly records were used in compiling the lactation curves of cows which calved in different months of the year. The records used were for cows which calved normally and completed normal lactations of not more than 300 days. Records without calving dates and those of cows which aborted or were sick at the time

of calving were not used. If cows were culled or died before completing a lactation record of 240 days or more, the record was discarded. Complete lactation records were used to determine the effect of month of calving on yield of milk and butterfat. The records used for this study were those completed by cows recorded under the Group Scheme in Queensland between 1948 and 1960.

Most of the data were processed by using the Powers Samas punched card accounting system. A card containing particulars of the cow and its monthly production was punched after each recording. This card was merged with one containing all previous information and a progressive card was then punched each month. The progressive cards were replaced monthly until the cow completed its lactation. The final progressive card contained the complete lactation record, including particulars of breed, sire, etc., besides total yields of milk and butterfat, percentage butterfat content and days in lactation. The cards were then sorted to the required order. For this study tabulations were done for each herd recording group. The tabulations included (1) production of the chief breeds according to month of calving; (2) month of calving of cows in the various age groups; (3) length of lactation according to month of calving; and (4) production irrespective of breed, age or length of lactation in relation to the month calved.

Records were not adjusted to allow for three-times-a-day milking, variable age or the effects of herd management.

Dairying in Queensland is confined chiefly to an area along the coast which does not extend more than 200 miles inland. In this study the area has been divided into 10 districts. Districts have been defined in relation to the concentration of dairy farms, location of herd recording groups and variability of rainfall. The districts include Atherton Tableland, Mackay, Port Curtis, Dawson/Callide, Upper Burnett, Central Burnett, South Burnett, South-eastern Queensland, Eastern Downs and Western Downs. Comparisons of results have been made between the different districts of the State.

IV. RESULTS AND DISCUSSION

(a) Distribution of Calvings

In all the dairying districts of Queensland it is the practice to calve some cows during each month of the year. In most areas, however, more cows are calved in the early spring and early summer months than during other times of the year. In Table 1 trends in the distribution of calvings in two periods are indicated. The first period (1948-1955) was described by Pegg and Clark (1953) and Pegg (1955). Data for this period have been included for comparison with that of the 1955-1960 period. There were 246,961 completed lactation records in the 1955-1960 period and 202,896 in the previous period.

TABLE 1
DISTRIBUTION OF CALVINGS ACCORDING TO DISTRICT

District	Period	Percentages of Cows which Calved in Various Months											
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Atherton Tableland ..	1948-1955	7.9	7.2	7.0	7.0	6.8	7.6	8.2	9.0	9.3	10.9	10.0	9.1
	1955-1960	7.8	7.1	6.7	6.1	6.0	6.9	8.3	9.2	9.8	11.7	11.0	9.6
Mackay	1949-1955	7.5	5.8	8.0	6.9	7.0	8.4	8.8	10.5	9.3	9.6	10.1	8.2
	1955-1960	5.2	5.0	4.5	7.1	7.3	8.9	9.6	10.8	13.1	12.3	9.5	6.8
Port Curtis	1950-1955	8.0	5.4	4.6	4.1	4.1	4.5	6.5	9.5	11.4	14.4	15.2	12.2
	1955-1960	5.4	3.8	3.8	4.5	6.4	7.9	9.5	12.8	12.4	12.3	12.4	8.9
Dawson/Callide ..	1950-1955	7.8	5.2	3.0	4.6	3.1	3.3	5.9	9.8	16.3	16.0	13.7	11.3
	1955-1960	5.6	3.5	3.8	3.7	4.8	6.1	10.8	17.3	13.1	12.2	11.0	8.1
Upper Burnett	1948-1955	7.9	5.5	5.5	4.7	5.4	7.5	9.1	10.2	10.6	11.6	11.8	10.2
	1955-1960	5.4	3.5	2.7	2.9	3.3	6.5	12.8	16.3	13.7	12.4	11.6	8.9
Central Burnett ..	1950-1955	10.7	5.4	5.7	3.9	4.8	5.5	6.7	8.2	9.8	13.3	14.1	11.8
	1955-1960	4.6	2.8	2.2	3.0	4.5	7.5	13.3	15.9	12.8	13.5	11.5	8.5
South Burnett	1948-1955	8.5	6.4	6.2	6.0	6.3	7.4	8.7	9.8	10.1	11.0	10.2	9.4
	1955-1960	6.0	4.2	3.9	3.5	4.5	7.2	11.7	14.2	13.0	12.0	11.3	8.5
South-eastern Queensland ..	1948-1955	6.9	5.2	4.9	4.8	5.5	7.0	9.5	11.8	11.8	12.5	11.1	9.1
	1955-1960	4.9	3.4	3.8	4.5	5.6	7.7	11.9	15.0	12.8	12.0	10.8	7.7
Eastern Downs ..	1948-1955	7.3	6.0	6.3	5.5	6.1	7.8	9.5	10.8	11.2	11.3	10.0	8.2
	1955-1960	6.6	5.3	5.1	5.4	6.3	8.0	10.7	12.5	11.7	10.9	9.5	8.2
Western Downs ..	1948-1955	7.7	5.8	6.3	5.9	6.3	7.5	9.1	10.5	10.8	11.9	9.6	8.7
	1955-1960	6.5	4.9	5.0	5.2	6.2	7.3	10.4	13.3	11.5	11.2	10.6	8.1

The results in Table 1 show that there has been decreased calvings in all areas in the January/February/March period. This has been accompanied by an increased number in the July/September months. Calvings in October were similar for both periods, while November and December calvings decreased slightly in most districts during the 1955-1960 period. A further study of the calving pattern according to the breed of animal showed similar trends.

The distribution of calvings for the State during the 1955-1960 period is depicted in Figure 1. The greatest frequency of calving has been in the July to September period, when an average of 38 per cent. of cows have calved.

It is estimated that at least 15 per cent. of all dairy herds in Queensland have been recorded for at least one year during the 1955-1960 period. In many cases herds were withdrawn after one year's recording, while some herds have been recorded for the 5-year period. The majority of herds would have been recorded for 2, 3 or 4 years.

It appears that the calving pattern (Figure 1) in recorded herds would reflect that of all dairy herds. Movement from the first quarter of the year to later months has been largely due to the dissemination of the results of previous studies at meetings of farmers, at field days, in press articles and through other extension media.

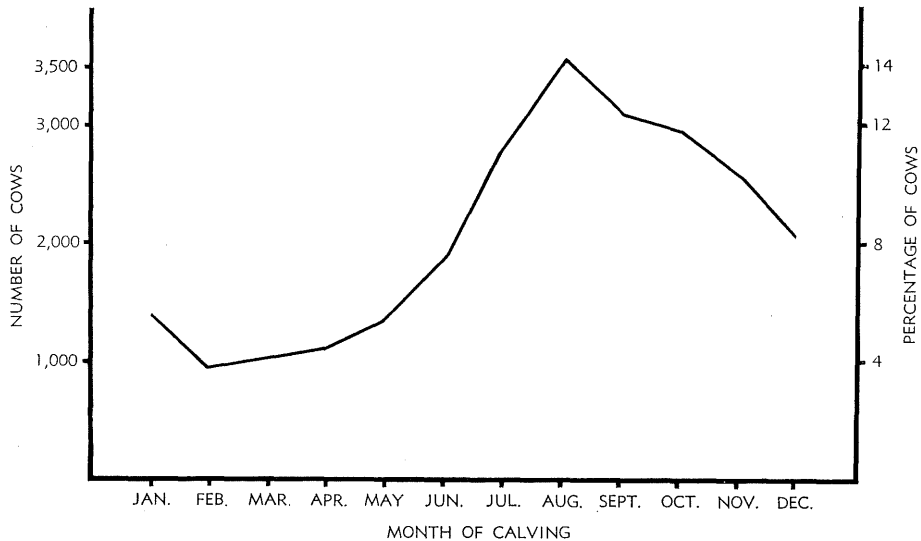


Fig. 1.—Frequency of calvings in recorded herds, 1955-1960. All districts.

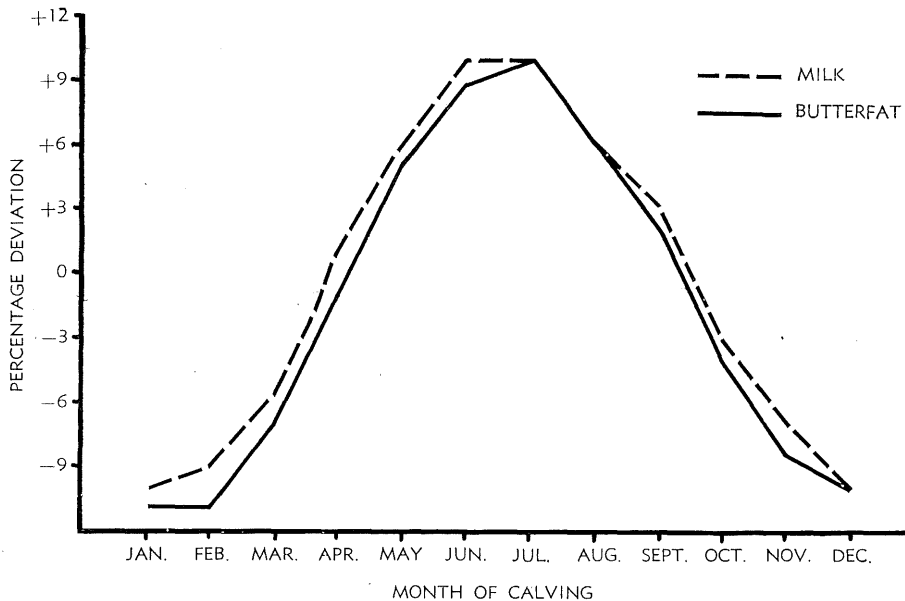


Fig. 2.—Relation of month of calving to yields of milk and butterfat. All districts.

(b) Influence of Month of Calving on Production

The effect of month of calving on milk and butterfat production per cow is shown in Table 2, where results are presented according to districts for the 1955-1960 period. The figures for all districts except the Atherton Tableland demonstrate that cows which calved in the winter and early spring months produced more milk and butterfat than cows which calved during other parts of the year. Examination of results for individual years during the period shows the same trend. The cows which calved during December to March in all districts except the Atherton Tableland and Mackay produced less milk and butterfat than cows which calved in other months.

The variation in milk and butterfat production with respect to month of calving (All Districts) is shown in Figure 2. The percentage deviation from the average production for the period is very similar for both milk and butterfat production.

The following reasons are advanced to explain why cows calving in the period June to September produce more milk and butterfat:—

(1) The stimulus for lactation is highest during the early part of the lactation, and it would appear that cows use body stores for milk production during this early period. This stimulus results in high production during the late winter months, when only a limited amount of food is available.

(2) Winter cereal crops in all districts supplement pasture until storm rains promote good growth of grass.

(3) Cows commencing lactation in this period are able to utilize to the largest extent the improved pasture in the spring.

(4) The cows which calve in June to September have been in production for 3-6 months when the wet season commences. They maintain production for a longer lactation.

(5) Summer pastures are succulent until February. After February they become poorer in quality. In the April/May period summer pastures are mature and protein content has decreased considerably.

When cows calve in the summer months they commence their lactations on succulent pasture with a high nutritive value. However, they are still early in lactation when the nutritive value of the pasture declines, and they enter the winter period when they have been milking for 5-7 months. The late-summer and autumn calvers complete their lactations in the poorest natural conditions.

It is felt that reliance on summer-grown pasture in this State is the chief reason for large variations in yield according to month of calving. If all cows were fed adequately throughout the year, production would not vary a great deal, and the length of lactation of late-summer and autumn calvers would be similar to that of cows which calve at other times of the year.

TABLE 2

EFFECT OF MONTH OF CALVING ON PRODUCTION ACCORDING TO DISTRICT

District	Month of Calving and Production (lb)																							
	Jan.		Feb.		Mar.		Apr.		May		June		July		Aug.		Sept.		Oct.		Nov.		Dec.	
	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat
Atherton Tableland	4,087	166	3,900	161	3,837	156	3,796	153	3,853	156	3,992	162	4,155	170	4,115	171	4,307	180	4,329	181	4,259	178	4,062	169
Mackay	2,852	129	2,638	119	3,009	131	2,955	129	3,055	129	3,105	135	3,115	139	2,977	133	2,943	130	2,876	127	2,850	124	3,001	136
Port Curtis ..	2,601	119	2,409	108	2,620	118	2,787	126	2,904	130	3,003	136	3,003	137	2,925	134	2,944	136	2,776	129	2,674	125	2,534	117
Dawson/Callide ..	2,892	123	2,672	115	2,682	118	2,954	129	3,080	137	3,203	140	3,519	154	3,437	151	3,253	142	3,045	133	3,038	131	2,832	122
Upper Burnett ..	2,970	130	2,870	123	2,879	124	2,837	122	3,813	163	3,801	161	3,846	166	3,705	162	3,587	158	3,397	148	3,236	142	2,995	130
Central Burnett ..	2,829	120	2,775	119	3,239	139	3,552	152	3,719	161	3,877	166	3,815	162	3,595	152	3,473	148	3,215	137	3,100	132	2,954	126
South Burnett ..	3,296	135	3,304	134	3,476	141	3,654	149	3,927	160	4,099	167	4,156	172	4,125	169	4,137	168	3,756	152	3,543	144	3,363	137
South-eastern Queensland ..	3,063	130	3,167	130	3,351	139	3,715	151	3,890	160	3,960	166	3,892	167	3,652	161	3,525	153	3,366	147	3,193	139	3,097	134
Eastern Downs ..	4,217	169	4,278	176	4,372	179	4,643	194	4,916	206	5,228	219	5,256	218	5,077	209	4,872	202	4,562	189	4,376	182	4,343	182
Western Downs ..	3,814	154	3,840	157	3,919	161	4,096	170	4,319	179	4,463	185	4,600	190	4,434	181	4,121	170	3,867	157	3,685	150	3,738	154

EFFECT OF MONTH OF CALVING

(c) Relationship between Month of Calving and Length of Lactation

The results show that cows which calve in the late winter and early summer complete longer lactations than those which calve in other periods of the year. Figure 3 illustrates that month of calving is closely related to length of lactation. The material presented is a summary of the 5-year period 1955-1960. Similar trends were observed in each of the years studied.

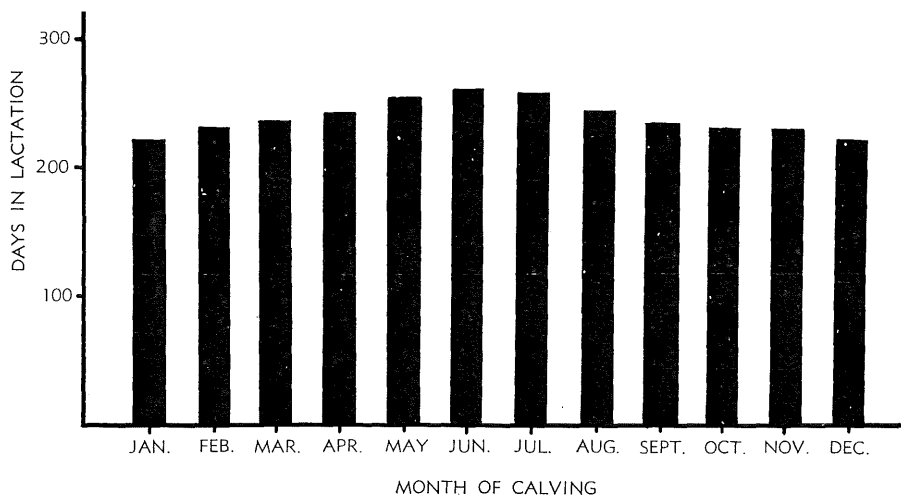


Fig. 3.—Effect of month of calving on length of lactation of cows recorded 1955-1960. All districts.

(d) Influence of Month of Calving on Lactation Curve

The monthly productions for cows in the two areas were summarized for consecutive months following calving. When the summaries for each month were tabulated they enabled lactation curves to be drawn. The curves were drawn for cows which completed lactations of at least 240 days. There were 783 records in the study on the Western Downs area during 1956 and 666 records for the Dawson/Callide in 1958. It was not possible to prepare lactation curves for all recorded cows, so comparisons of results have been confined to the data for the areas examined.

The results of the analyses are shown in Figure 4. Lactation curves have been drawn for cows which calved in the various quarters of the year. It may be seen that the cows which calved in the July-September quarter commenced their lactations at a similar level of butterfat production to that of cows which calved in other quarters of the year. However, the decline was not so rapid and production was maintained to the sixth or seventh month of lactation. The curves of cows which calved in the first two quarters of the year showed a distinct influence from lack of native pasture. Although initial production was similar to that of cows calving in the second half of the year, it was only maintained for

a short time before showing a steady decline. The cows which calved during the early summer months (October-December) produced well until the native pastures deteriorated in quality early in their lactations.

In the 1958-59 year, summer rains were late and pastures did not mature until later in the season. This explains the variation in some of the curves.

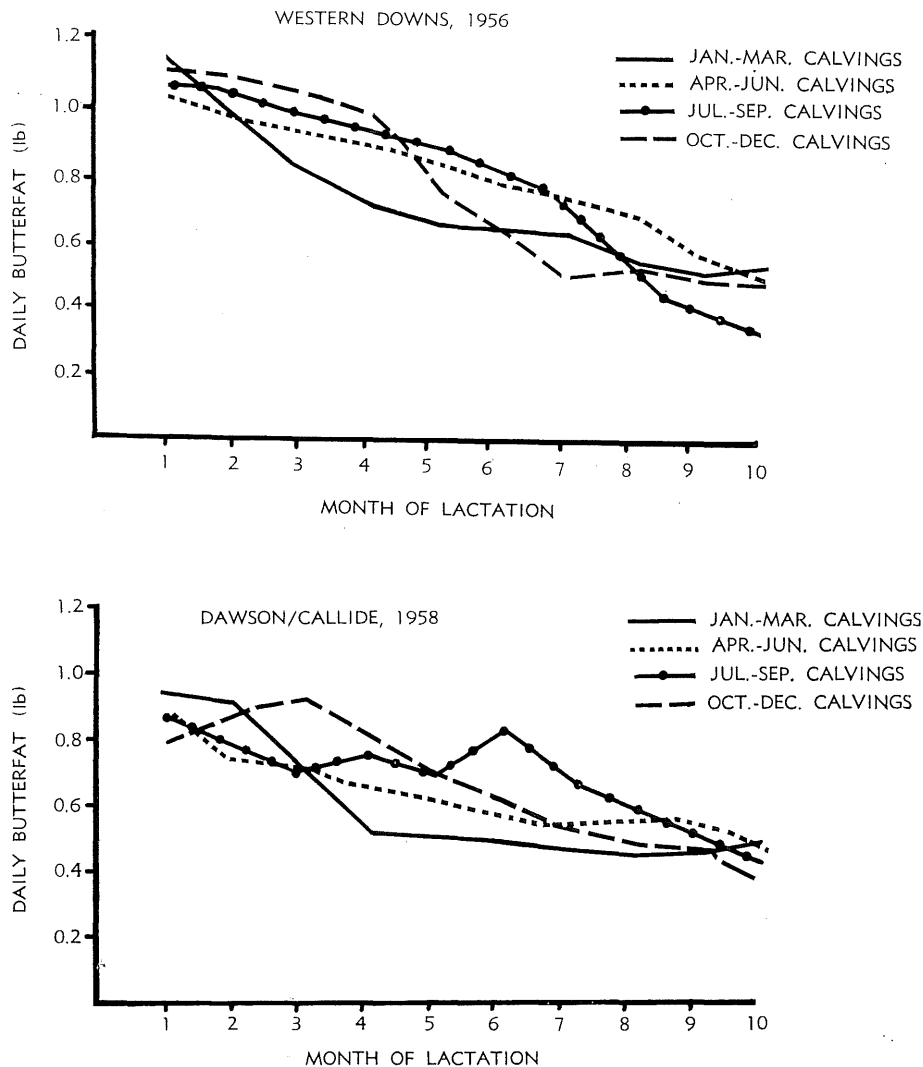


Fig. 4.—Influence of month of calving on lactation curves for butterfat production.

(e) Factors Associated with Results

It is possible that several factors are associated with the results of the study. The chief of these are considered to be breed of animal, age of cow, period between calvings and treatment prior to calving.

While it has been shown that the period between calvings has an effect on production (Pegg 1957), its effect according to month of calving has not been demonstrated. The effect of treatment prior to calving has not been shown.

An analysis of the effect of month of calving according to breed of animal was done on the lactations completed during the 1948–1955 period. There was little variation among breeds.

After examining the production of the cows according to age it is logical to assume that the number of cows included would influence the results of the study, particularly if large numbers of young animals had calved during a certain period of the year. The age of animals according to their month of calving was analysed and results for the 1959–60 year are given in Table 3. These results show that calvings of cows in all age groups follow a similar pattern.

TABLE 3
PERCENTAGE OF COWS OF VARIOUS AGES ACCORDING TO MONTH OF CALVING
(1959–60)

Age	Percentage of Cows Calving in Each Month (As a percentage of all cows calved)											
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2-year-old	1.3	1.0	1.0	0.8	0.9	1.4	1.9	2.2	2.2	3.0	2.2	1.9
3-year-old	0.9	0.7	0.7	0.7	0.8	0.9	1.6	1.7	1.8	2.3	1.7	1.4
4-year-old	0.6	0.5	0.4	0.5	0.6	0.9	1.3	1.5	1.4	1.6	1.2	0.9
Mature	2.8	2.2	2.0	2.8	3.6	4.7	7.0	7.6	5.9	6.3	4.8	3.8

V. CONCLUSIONS

In all dairying districts of Queensland, except perhaps the northern areas of Mackay and the Atherton Tableland, calvings could be reduced considerably in the months of December, January, February and March to increase the overall production of herds by permitting the better use of feedstuffs available.

The work reported herein has brought to light evidence demonstrating the benefits accruing from planned calving programmes designed to make the fullest use of available feedstuffs.

In some years, particularly during adverse winters, the cost of feeding would be reduced if cows calved in the late-winter/early spring period. In prolonged droughts, stock losses would be curtailed if cows calved before October. The worst effects of most bad droughts have been felt in the October–December period, and losses are most likely to occur amongst cows which are advanced in pregnancy at this time of the year.

Besides the advantages of higher and cheaper production, the calving of cows in the late-winter/early spring period enables farmers to have more leisure time. Personnel engaged in manufacture of butter and cheese could benefit also if supplies to factories were reduced during the early winter. Reduced intakes for a short period could enable the staff to overhaul machinery and carry out maintenance work.

A change in the calving pattern of cows would not involve changes in farming operations or costs. It would be necessary to have complete control of bulls, which may necessitate the construction of secure bull paddocks.

VI. ACKNOWLEDGEMENTS

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