REPRODUCTIVE INDICES FOR DAIRY CATTLE

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SUMMARY

Data for the period January 1st to December 31st, 1981 collected from 124 herds enrolled in the University of Melbourne Computerized Dairy Herd Health Program were analysed. The mean of herd means for selected reproductive indices were calculated for the 124 herds and for the 90th percentile when herds were ranked in order of performance. Values of the mean of herd means and the 90th percentile in brackets, for some of the more important reproductive indices include: calving to calving interval, 379 (362) days; calving to conception interval, 90 (77) days; first service conception rate, 47 (60)%; percent of heat intervals 18-24 days length, 50 (67)%; ratio of heat intervals 18-24 days to heat intervals 39-45 days, 7: 1 (14:1); percent of cows pregnant at first pregnancy diagnosis examination, 89 (96)%.

INTRODUCTION

Despite the fact that the major infectious diseases which cause infertility of dairy cattle have declined considerably in importance in most dairy areas of Australia in recent years, reproductive performance in dairy herds is still commonly economically unsatisfactory (Morris 1971). The effects of chronic and subclinical diseases or deficiencies are insidious and are frequently overlooked by the farmer (and a number of veterinarians) unless the loss of profit is highlighted. Limited information is available to indicate the potential economic benefits of improved reproductive performance in Australian dairy herds (Williamson 1980). The ideal intercalving interval has been reported to be 365 days (Blood et al.1978). Clark (1969) and Morris (1971) have demonstrated the financial losses associated with extended intercalving intervals.

This paper reports on the analyses of reproductive data from 124 dairy herds enrolled in the University of Melbourne Dairy Herd Health Program (Blood et al, 1978) and presents values for reproductive indices which may assist in assessing herd reproductive performance.

UNIVERSITY OF MELBOURNE COMPUTERIZED DAIRY HERD HEALTH PROGRAM

Collection of Data

For enrolment of cows on the program the following individual cow information is recorded on the computer: cow identification, dates of birth, last calving, subsequent heats and services and pregnancy test results. Further input data is obtained at regular intervals from farmer diaries and veterinary examination results and includes all reproductive and clinical events and their dates.

For each herd, data analysis is performed by a Cyber 170-730 computer each month and a Monthly Report containing important reproductive indices which evaluate herd performance is produced. Once a year an Annual Report, which provides a retrospective analysis of herd performance during the past year, is printed. The Annual Report may be used to review progress in herd performance and to aid in planning management for the ensuing season.

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RESULTS AND DISCUSSION

Results of analysis of reproductive data for 124 dairy herds enrolled in the University of Melbourne Computerized Dairy Herd Health Program are shown in Table 1.

<table>
<thead>
<tr>
<th>Reproductive Index</th>
<th>Mean of Herd</th>
<th>90th Percentile (Target)</th>
</tr>
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<tbody>
<tr>
<td>Calving to calving interval (days)</td>
<td>379</td>
<td>362 (ideal 365)</td>
</tr>
<tr>
<td>Standard deviation of calving to calving interval (days)</td>
<td>55</td>
<td>25</td>
</tr>
<tr>
<td>Calving to conception interval (based on preg. diagnosis) (days)</td>
<td>90</td>
<td>77 (ideal 83)</td>
</tr>
<tr>
<td>Standard deviation of calving to conception interval (days)</td>
<td>42</td>
<td>25</td>
</tr>
<tr>
<td>Number of services per conception</td>
<td>1.6</td>
<td>1.3</td>
</tr>
<tr>
<td>First service conception rate (%)</td>
<td>47</td>
<td>60</td>
</tr>
<tr>
<td>NVO examinations as a percent of total number of calvings (%)</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>PTC examinations as a percent of total number of calvings (%)</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>Percent of heat intervals 18-24 days in length</td>
<td>50</td>
<td>67</td>
</tr>
<tr>
<td>Percent of heat intervals exceeding 24 days in length</td>
<td>35</td>
<td>19</td>
</tr>
<tr>
<td>Ratio of heat intervals 18-24 days to heat intervals 39-45 days</td>
<td>7:1</td>
<td>14:1</td>
</tr>
<tr>
<td>Percent cows pregnant at first pregnancy diagnosis</td>
<td>89</td>
<td>96</td>
</tr>
</tbody>
</table>

* Average herd size 106, of mixed ages and mixed breeds, in which both A.I. and natural service were used.

Data for the Annual Report of the University of Melbourne Herd Health Program are analysed three months after the end of the report period (e.g. 1st January to 31st December, 1981) so that the pregnancy status of cows mated during the later part of the report period can be assessed.

Individual identification of all cows is essential for accuracy of information. The pocket diary carried by the farmer during work hours has proved convenient and successful for recording cow events soon after they occur and for increasing accuracy of records.

The aim in reproductive management of the dairy herd is to have all cows on an annual cycle which for a 365 day intercalving interval demands a mean calving to conception interval of 83 days. While this figure is ideal for an individual cow, in a herd there will obviously be variation between cows. The extent of variation between cows is almost as important as the average in economic terms and thus the standard deviation as well as the mean of the reproductive index is important in assessing reproductive efficiency of the herd (Morris et al., 1978).
Although non-return rates give an estimate of the pregnancy rate they are not an accurate indicator of pregnancy as they are strongly influenced by the efficiency of the farmer's oestrous detection. We therefore aim to pregnancy test all cows between 7 and 11 weeks post service provided they have not exhibited oestrus since service. If pregnant, the date of conception is allotted by the veterinarian to the logical recorded service.

**Reproductive Indices**

The value of the 90th percentile for each index was selected as the target for dairymen to strive to attain.

Mean calving to conception interval (90 days) was 7 days longer than that required for a 365 intercalving interval and 7 days longer than that observed by Teakle (1982). This interval is strongly influenced by the values for the following indices (mean of herd means followed by values of the 90th percentile are given in brackets):
- percent cows on heat by 60 days (70%, 90%)
- calving to first heat interval (51 days, 34 days)
- calving to first service interval (70 days, 55 days)
- number of services per conception (1.6, 1.3).

The values for the two intervals, calving to first heat and calving to first service, are each 5 days longer than those reported by Teakle (1982) but values of the other two indices are similar to those he reported.

Extended calving to conception intervals may be due to apparent or real failure of the cow to exhibit oestrus at the time when breeding would normally be carried out, or may be due to failure of conception to occur or a combination of these two factors. Recent reports have referred to prolonged calving to conception intervals in some Victorian dairy herds due to a high frequency of apparent "anoestrus" (NVO cows - No Visible Oestrus for 49 days) and in some herds to an abnormally low conception rate (Williamson et al. 1972). Prolonged postpartum anoestrous interval is probably the most common infertility syndrome seen now in many dairy herds. Diagnostic features include an extended calving to first oestrus interval (>50 days) and less than 85% of cows on heat by 60 days postpartum and typically prolonged interoestral intervals. Frequently first calf heifers are the worst affected usually, followed by second calf cows, while mature cows are least affected. The state of ovarian activity in NVO cows can usually be determined fairly accurately and quickly by ovarian palpation when ovarian structures including corpora lutea and follicles can be identified. The use of "tail paint" or Kamar Heat Mount Detectors fitted to these cows facilitates oestrous detection and frequently will show that a number are cycling. Increased efficiency of oestrous detection usually results in a significant reduction of the NVO cows (Williamson et al.-1972).

Our detailed study of FTC (Fail to Conceive) cows (named because they have had 3 or more services) has shown that approximately 66% conceive to their third service.

**Oestrous Detection**

The four remaining indices in Table 1 may be used to assess oestrous detection efficiency of the farmer.
The traditional view is that about 85% of interoestral intervals should be between 18 and 24 days in length, with 5% of intervals shorter than 18 days and 10% intervals longer than 24 days. We have not observed this pattern in our studies as we usually see about 15% intervals less than 18 days in length. Satisfactory oestrous detection is indicated by 50% or greater of intervals with length 18 to 24 days.

A useful index to assess oestrous detection efficiency is the ratio of the number of intervals of length 18-24 days to the number of intervals between 39 and 45 days (2 cycles). A ratio with a value of at least 7 indicates satisfactory oestrous detection while a value of 14 or more indicates highoestrous detection efficiency. This index is a fairly specific indicator of oestrous detection efficiency and is usually not confounded by nutritional or infectious problems.

A fourth index which is useful, is the percent of cows pregnant at pregnancy diagnosis. Small variations from the accepted values for these four indices suggest that it is advisable to consider all four indices to accurately assess oestrous detection efficiency.

Definition of the pattern and the extent of reproductive inefficiency in the dairy herd is an essential step in any investigation to establish the cause of reduced reproductive performance and to improve herd profitability. The reproductive indices reported in this paper may serve as useful guides to investigations.

REFERENCES


