

COMPUTER GRAPHICS FOR THE DIAGNOSIS OF HERD REPRODUCTIVE STATUS

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Introduction

Reproductive performance of a herd of cows is a major determinant of productivity for both beef and dairy cattle. Production is maximized when each individual in the herd calves at the optimum time, determined by that individual's previous calving date (if any) and the desired pattern of seasonal calving for the herd. Commonly used measures like "Calving Interval" over-summarize data by giving us an average only, when the distribution of points around the mean is both important and highly variable among herds.

We have designed two graphs that may be used as aids in screening for, and diagnosing, herd reproductive problems. Because they use shape to convey information about distributions within the herd they are partially qualitative measures of herd reproductive status. All the same, they convey important information that is not available from the usual statistics. They are practical, and easy to interpret. We generate the graphs automatically from data downloaded from a Dairy Herd Improvement Association (DHIA) computer, at a cost that makes them easily affordable for routine use in herds of any size. Algorithms for generating the graphs are straightforward and printing is done with block characters so that graphs can be printed quickly on an inexpensive computer printer. In fact, the graphs are a great deal harder to describe than they are to interpret.

Graph Design

The **Breeding Profile**¹ (Figure 1) emphasizes the distribution of Days Open (Days between Calving and Breeding) in the herd, which is of primary importance in optimizing milk produced per cow per year. First the herd is separated into first lactation heifers and an older-cows group, with a separate graph for each.

Each parity group is then divided into those animals that have been bred, and those that have not (or that have been bred but confirmed to be not pregnant). The "not bred" group is plotted on the left side of each graph according to the number of days since calving, with the length of the bar for each category (of days since calving) being proportional to the number of animals in that category.

The right side of each graph shows animals that have been bred, with dark bars representing animals that have been confirmed pregnant and light bars representing animals bred but not yet examined for pregnancy. The length of the bar for each category of Days Open is proportional to the number of animals in that category.

The **Calving Profile**¹ (Figure 2) is of similar design, but emphasizes season of calving which is of primary importance in beef herds, and variable importance in dairy herds (that may want to match production to seasonal demand for milk). The category for each horizontal bar is calving date rather than Days Open, with the previous year shown on the left and the coming year on the right. The projected

calving date for animals that have not been bred is estimated as 365 days from their last calving, or 284 days from the date the data were collected (whichever is later). In some cases we use a "filter" to print a report for a sub-group of the herd (such as heifers only), or decrease the granularity by using week periods for each category, rather than months.

Interpretation of Graphs

On the **Breeding Profile**¹ we first look at the left side which may reveal poor intensity of heat detection. The length of the bars before the end of the voluntary wait period reflects only the calving pattern of the herd. After the voluntary wait period we expect the bars to shorten rapidly as animals are detected in estrus and bred.

The right side of the graph is directly related to lactation length since each Calving Interval is the sum of Days Open plus the constant Gestation Length. Optimum lactation length is subject to argument, but we look for a strong peak between 60 and 100 Days Open with few animals in the less-than-40 or greater-than-120 categories. Days Open of 100 days corresponds to a Calving Interval of 12.6 months. That would yield a 324 day lactation, assuming a 60 day dry period.

Separate graphs are produced for heifers and older cows because the economic significance of increased lactation length is much different in heifers than it is for cows. Heifers normally have much greater persistence of milk production than older cows, so the cost of a longer calving interval is generally lower. Also, we commonly see true anestrus in heifers that may not be able to eat enough to match energy demands for milk production and growth and estrus, but we rarely find true anestrus in older cows except with sickness.

On Figure 1 we have penciled in lines representing shapes we would consider excellent in a high-producing dairy herd, but these should not be considered optima for all circumstances.

The **Calving Profile**¹ shows past and projected season of calving. We may want to project income, or feed needs, or plan other management practices associated with calving. We keep in mind that light or medium bars for the coming year indicate a "best case" projection.

Graphs, by themselves, rarely lead to a firm diagnosis. Rather, they can be used as a monitoring tool and to suggest possible diagnoses for further workup. Their greatest value is their economy of generation and interpretation. We can produce them very cheaply, and a glance allows us to judge whether a reproductive program is on-track, or that something is not working and further study and intervention may be needed.

Summary

We have designed two graph formats for the display of data on reproductive status of a herd of cows. They may easily be generated by a microcomputer. The **Breeding Profile**¹ is used in dairy herds to help optimize lactation length. The **Calving Profile**¹ is used in beef and dairy herds to monitor seasonal calving patterns.

Auf Deutsch

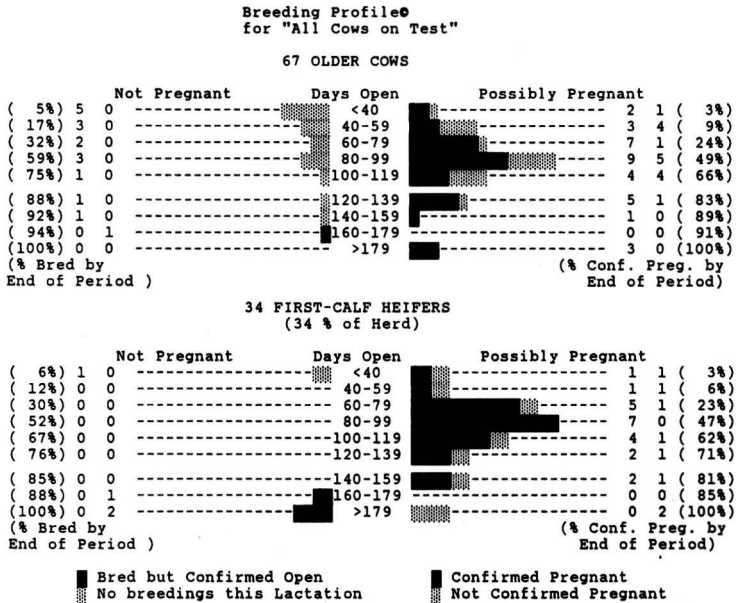
Wir haben zwei Graphen entworfen, um die Daten des Reproduktionsstandes

einer Kuhherde aufzuzeigen. Sie mögen leichter von einem Computer erzeugt werden. Das Besamungsprofil[®] wird in Milchkuhherden benutzt, um die Laktationslänge optimieren zu helfen. Das Kalbprofil[®] wird in Fleischrinderherden und Milchkuhherden gebraucht, um das saisonale Kalbmuster aufzuzeigen.

Français

Nous avons développés deux formes graphiques pour l'étude de l'état reproductif d'un troupeau de vaches. Les représentations sont aisément engendrés par ordinateur. Le Profil Réproductif[®] (Breeding Profile[®]) aide à améliorer la durée de lactation pour les vaches laitières. Le Profil du Vêlage[®] (Calving Profile[®]) sert la méthode de surveillance de variation saisonnel de vêlage dans les troupeaux laitiers et allaitants.

1) Breeding Profile[®] and Calving Profile[®] are copyrighted formats belonging to Dairy Vet Software, RD 1 Box 1162, Argyle, NY 12809. Use of either format without written permission is prohibited. All rights reserved.



There were 6 cow(s) and No heifer(s) designated as "Not-To-Breed". This is 6% of the herd. They are not considered in this report.

Minimum Projected Average Days Open: 96 days, Entire herd.
106 days, First-Calf Heifers only.
91 days, Cows only.

Services per Pregnancy, pregnant cows: 1.6 Entire Herd
1.8 First-Calf Heifers only
1.5 Cows only

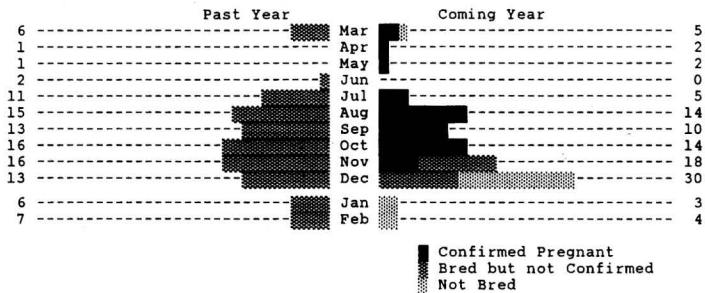
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Figure 1

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Calving Profile[®]
for "All Cows on Test"

107 Total Calvings



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Figure 2