Super-Normal Milk Production Subsequent to Ventral Paramedian Abomasopexy

Jim Ehrlich, *DVM*
Dairy Veterinarians
Argyle, NY

Summary

This project was undertaken to test our impression that abomasopexied cows often seem to produce more milk than untreated normal cows, once they have recovered from the effects of displacement and surgery. Thirty-seven cows treated for abomasal displacement by ventral paramedian abomasopexy were matched to controls from the same herd. Milk production and survival were followed for a year after the date of surgery.

The design of the study relies heavily on the impartiality of the computer to neutralize possible bias of the author, or dairymen. Selection of controls and all processing of data were fully automated, using DHI records from the Cornell Dairy Records Lab. Data are presented as graphs.

This paper should be viewed as a case study, not a full analysis of a complex disease. The results suggest strongly that there may be positive effects of abomasopexy beyond simply cutting the losses associated with this production disease.

Surgical cases were slightly more likely than controls to disappear from their herds right after the surgery date. Cases were more likely to occur in winter and early spring.

Case Selection

For the 12 months following February 1, 1993, every abomasopexy performed by the author (without exception) was recorded on a short form that was filled before beginning surgery. Since ventral paramedian abomasopexy is the only invasive treatment we use for abomasal displacement, these comprise all cases presented that were not culled immediately, or treated conservatively by the owner. Fifty-one abomasopexies were done in the year. Of these, 14 were in herds with no DHI records, so excluded from the study. Of the 37 studied, 3 were diagnosed as right abomasal torsion (RTA) before surgery, and 3 as right abomasal displacement, with the remaining 31 diagnosed as LDA. Thirteen herds contributed between one and eight cases each to the study. After February 1, 1995 identifying data were entered for each case: Cow Name, Herd Code, Date of Surgery.

Selection of Controls

A computer routine was written to match each case with a control from the same herd. Controls were matched by parity (with all lactations after the second considered equivalent), calving date, and previous lactation milk production. Herd and parity were matched absolutely. Then the computer searched for the best match of calving date and previous lactation production, setting a one-day difference in calving date equivalent to a difference of 150 pounds of previous lactation 305-day ME milk production. First calf heifers could only be matched for herd, parity, and calving date.

Surgery

All surgery was done on the farm of origin using the ventral paramedian abomasopexy technique. Care was taken to locate the point on the abomasum just right of the greater curvature and about a third of the way from the antrum towards the pylorus for attachment to the body wall. Absorbable #3 gut suture was used for attachment of the abomasum, and monofilament nylon for remaining layers of the closure. Typical time for the procedure, including positioning of the cow, was one hour. Intravenous dextrose, and penicillin or ceftiofur were usually given after surgery.

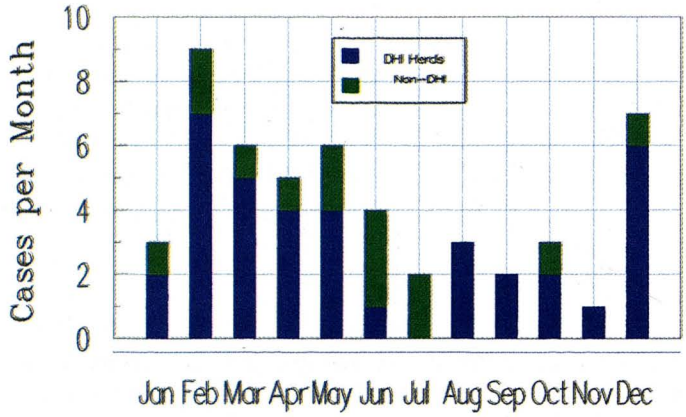
Seasonal Incidence

Graph 1A shows the seasonal incidence of DA surgery, and 1B shows the incidence of calving in the herds which provided cases for this study. Risk of abomasal displacement was higher in the winter and spring. Overall incidence of surgery was about 2% of calvings, which is an underestimate of abomasal disease since some cases would not have been treated, or may have been treated by other veterinarians. The cases in this study seem to represent a normal low-level incidence of disease in the usual seasonal pattern.

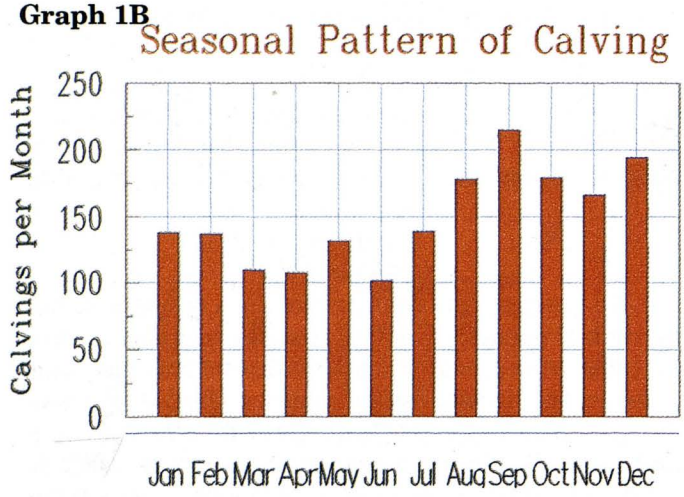
Normalizing Milk Production

Milk production data were normalized with respect to parity, stage of lactation, and herdmate milk produc-

Graph 1A Seasonal Incidence of DAs



Graph 1B



tion using a custom-fitted equation based on our clients' herds' historical production. Predicted milk production for each cow on each test date in each herd was calculated using the formula:

PMilk = 56-(.22-.14/(Lacno))
*** (DIM-300)-250/(DIM+5) - .019*DIM**

"PMilk" is predicted daily milk production in pounds
"DIM" is days since calving for each cow and test date
"Lacno" is lactation number (parity)

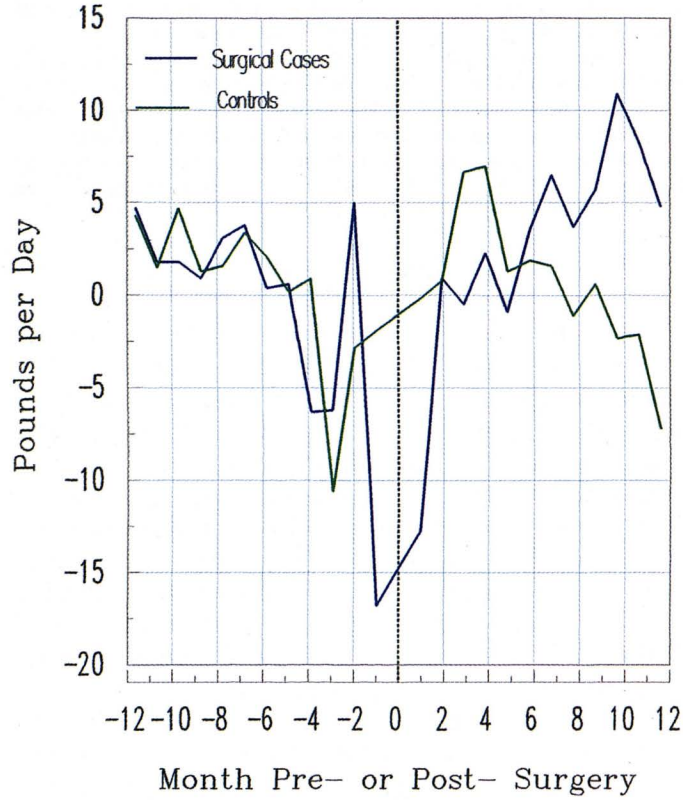
This formula corresponds to 2nd lactation 305-day production of 21,800 pounds.

The deviation (measured milk - PMilk) was averaged for all cows in each herd for each test date, and the deviation of surgical case and control compared to this average. For example, if herd X on test date Y produced, on the average, 5 pounds more than predicted by the PMilk formula for each cow on that date, then the herd production bias would be +5 for that test. If an individual cow in that test produced 2 pounds *less* than PMilk predicted for her, then her normalized production for that test date would be -7 pounds. This procedure adds correction for herd and test day effects, in addition to the parity and stage-of-lactation corrections built into the PMilk formula.

Milk Production

Graph 2 shows normalized milk production for surgical cases and controls for the year before and year after surgery. Production by cases and controls was very close for most of the year before surgery, showing that controls were well matched. The slight downward trend is an artifact resulting from the PMilk formula's overestimate of late-lactation production (surgery was nearly always within the first few weeks of a lactation). This small systematic bias affected cases and controls equally, and a similar trend can be seen in the controls for the 12 months after surgery.

Graph 2 Normalized Milk Production



Production by surgical cases dropped markedly at the test before surgery, clearly an indication of disease.

Production by cases continued below that of controls until the fifth month after surgery. For the sixth through 12th month after surgery the surgical cases

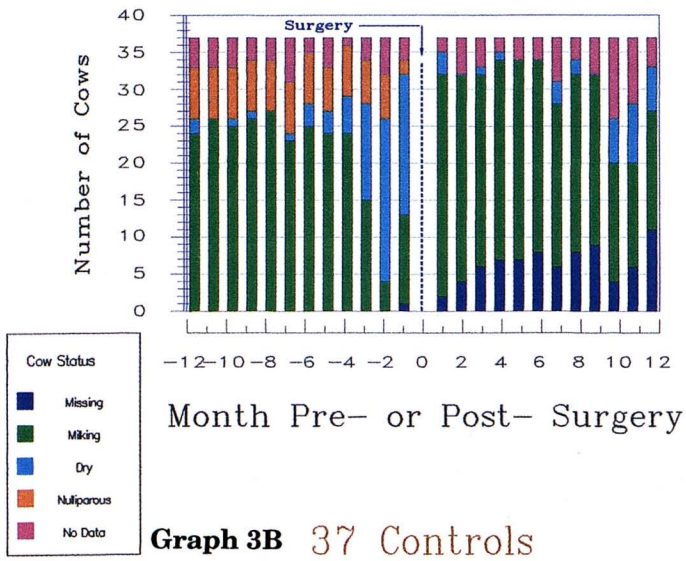
produced 5 to 10 pounds more milk per day than did controls. This is the basis of our suggestion of supernormal production by abomasopexied cows.

A small complication is that rBST became available towards the end of the study, and was used by some of the participating herds. We have no reason to suspect that either cases or controls would have been more likely to receive exogenous BST.

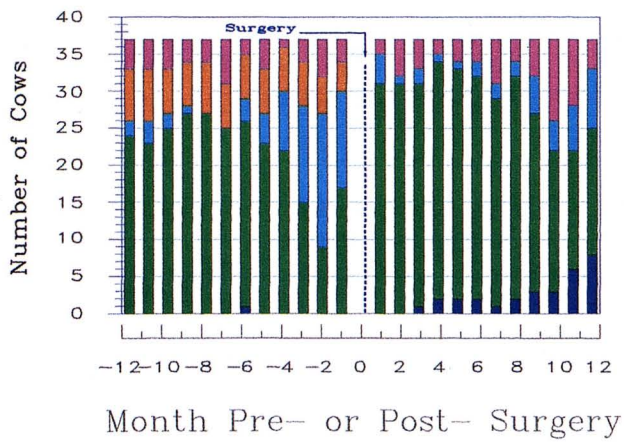
Survival in Herd

Graphs 3A and 3B show status of case and control cows for the year before and after surgery. Data were downloaded from Cornell in herd-test blocks, and "No Data" points represent months for which no data were downloaded for a particular herd. Since cases and controls were matched by herd, Graphs 3A and 3B always show equal numbers of "No Data" cows for each month.

Graph 3A Status of 37 Surgical Cases



Graph 3B 37 Controls



"Missing" cows are those not found in the herd for a month, and so represent cows that died or were culled, or which disappeared from the record for some other reason.

There is a clear surplus of "Missing" cows in the surgical case group (Graph 3A) after surgery (relative to controls, Graph 3B). This represents, no doubt, failures of treatment. By the 5th month after surgery 7 cases and 2 controls are missing, suggesting that about 5 of the 37 surgical cases (14%) died or were culled as a result of surgery (including 3 of the 4 RTA cases, by the way). By the 12th month this gap narrowed to 3, with 8 controls and 11 cases "Missing", suggesting that cows that were not lost or culled soon after surgery were less likely than controls to be culled later on, possibly due to superior milk production.

Discussion

We hypothesize that sub-clinical abomasal displacement is a common cause of sub-maximal performance in modern high-producing dairy cows. If such a disease exists, it may cause transient reduction in feed intake and reduced efficiency of digestion, and consequent loss of milk production without overt signs of disease. Paramedian abomasopexy seems to us the most precise method of accurately and permanently fixing the position of the abomasum and preventing this possibility. There seemed to be a small, but economically significant, long-term improvement in productivity associated with permanent fixation of the abomasum.

An advantage of graphic presentation of data is that few assumptions need be made. It is also difficult to make firm conclusions. We find examination of the graphs which represent the meat of this paper convincing, more convincing than would be the traditional quantitative statistical tests which necessarily present data in a more condensed form. However, the full dataset is available to researchers or practitioners wanting to do further analyses.