DEVELOPMENT AND IMPLEMENTATION OF THE ONTARIO DAIRY MONITORING AND ANALYSIS PROGRAM

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Introduction

The importance of monitoring dairy cattle health and productivity at the herd level has become evident during the last decade (1). To monitor all aspects of the herd's performance, dairy producers and veterinarians need a variety of herd level information based on daily cow and farm events. These data are stored either on the farm or in central databases maintained by agencies serving the dairy industry. Unfortunately, in many cases the information useful for monitoring herd performance has not been gleaned from the existing cow level data, or has not been presented in a fashion that facilitates the monitoring process. The Ontario Dairy Monitoring and Analysis Program (ODMAP) evolved out of a perceived need for a herd level monitoring system that utilized the available herd data and was tailored to the characteristics of the Ontario dairy industry. The objectives of the ODMAP project included the establishment of a herd level database that could be used 1) to produce periodic summary reports useful to producers and veterinarians for monitoring herd performance, and 2) to investigate the herd level associations among measures of herd management, milk production, reproductive performance, animal health, and profitability. This manuscript outlines the development and implementation of the ODMAP and summarizes some of the data collected during the first year of the project.

Development and Implementation of the ODMAP

The development of the ODMAP began with the identification of key areas of the dairy enterprise that needed to be monitored. These areas included milk production, reproductive performance, clinical and sub-clinical animal health, adult and replacement inventories, and enterprise profitability. Existing sources of data, both on the farm and among industry agencies, that could be used to monitor these areas were identified. Ontario Dairy Herd Improvement (DHI) served as a source of production and udder health data. The Ontario Ministry of Agriculture and Food's Ontario Farm Management Analysis Project (OFMAP) was identified as a source of financial data and a recently modified on-farm breeding chart became the source of reproductive data. These existing data sources were supplemented with a monthly on-farm data collection sheet, designed to capture disease events and update heifer inventories, and monthly bulk milk samples, used to monitor the level of antibody against specific viruses.

One hundred and thirteen dairy producers were enroled in the ODMAP by twenty-seven veterinary practitioners. These dairy herds were purposively selected, by the veterinarians, based on the producer's use of official milk recording and their willingness to participate in the project for a two year period. An enrolment interview was conducted and a questionnaire to capture demographic and herd management information was administered.

Data collection began in February, 1990 and continued until March, 1992. Production and cell count data were received ten times each year directly from Ontario DHI, utilizing the duplicate report option. Completed on-farm data collection sheets were received by mail on a monthly basis. Bulk milk samples were sent to our laboratory, following each DHI test, via the local milk transporter and an existing provincial milk collection system. Financial information was collected annually in 1989, 1990 and 1991, through the Agricultural Representatives Branch of the Ontario Ministry of Agriculture and Food. All data were manually entered into a central database and

validated.

Every three months, beginning in June 1990, a summary report was prepared for each herd and sent to both the producer and the veterinarian providing service to the farm. The summary report consisted of three pages of graphical information believed to be of importance in monitoring the health and productivity of the herd. The first page contained two graphs. The first graph illustrated the herd's test day adjusted corrected milk (ACM) (2) compared to the mean ACM for all ODMAP herds for each test during the preceding two years. The second graph depicted the percent of cows in the herd with an individual somatic cell count (SCC) greater than 200,000 cell/ml, again compared to the average of all ODMAP herds. The second page of the monitoring report contained four graphs depicting the herd's reproductive performance for the preceding year compared to the mean, +/- two standard deviations, for all of the ODMAP herds. The four reproductive parameters monitored were average days to first service, average days to pregnancy, average overall pregnancy rate and average days between services. Each parameter was calculated monthly using a three-month rolling average. The final page of the summary report contained four graphs depicting the health of the herd. The four graphs were used to monitor metabolic disease (including clinical hypocalcemia, ketosis, and left displaced abomasum), reproductive disorders (including retained placenta, uterine infection, cystic ovarian disease and abortion), clinical mastitis and clinical respiratory disease. For each month during the preceding year, the number of recorded treatments was graphed against the appropriate number of cows at risk of experiencing the disease or disorder.

At the conclusion of the two year study period a final interview was conducted with each producer. The usefulness of the quarterly herd monitoring reports was assessed using a willingness-to-pay questionnaire. Analyses of the data collected over the two year period are continuing.

Results

Complete data pertaining to milk production, reproduction, animal health and animal inventories were collected from one hundred and six herds for the first year of the study (March, 1990 to February, 1991). Seven producers withdrew from the project for one of three reasons; three sold their cattle and stopped shipping milk, two lost interest in the project within the first six months of data collection and two withdrew citing personal family reasons.

Initial inventory and production data were obtained during the enrolment interview and updated after each DHI test. Table 1 contains some inventory and production summary statistics for the 106 herds which completed the first year of the ODMAP.

Reproductive data were collected utilizing a modified breeding chart that is routinely used by many Ontario dairy producers. The original breeding chart was used to record each cow's breeding date, service number and service sire, ordered by cow. The modified chart was ordered by service date and included, in addition, the previous calving date, the previous service date and the outcome of the service. With this additional data, the days to first service, the days to pregnancy, the overall and service specific pregnancy rates, and the interval, in days, between services were calculated. Table 2 contains a summary of the reproductive performance of the ODMAP herds during the first year of the project.

Table 1.   Inventory and production characteristics of the 106 ODMAP dairy herds from March 1990 to February 1991.

	Mean	S.D.	Range
Number of adult cows per herd	51	20	23-144
Number of cows and heifer replacements per herd	100	43	40-297
Herd average milk production (kgs/cow/day)	24.3	3.2	12.9-33.8
Herd average fat test (%)	3.7	0.2	2.4-4.6
Herd average protein test (%)	3.2	0.1	2.8-3.8
Herd average somatic cell count (x 1000 cells/ml)	211	59	91-361

Table 2.   Reproductive performance for the 106 ODMAP herds between March 1990 and February 1991.

	Mean	S.D.	Range
Herd average days to first service	87	14	65-180
Herd average days to pregnancy	119	17	75-218
Herd overall pregnancy rate (%)	44	10	20-76
Herd 1st service pregnancy rate (%)	43	13	9-74
Herd calving interval (months)	13.1	0.5	11.9-15.8
Herd average days between services	42	9	28-73

The ODMAP was designed to collect and assess data at the herd level. Consequently, the database contained only herd level data and did not contain detailed individual animal records. Data pertaining to clinical disease was collected using the on-farm data collection sheet. Monthly tallies of the number of cows and/or heifers treated, for each of a series of carefully defined disorders, was recorded and entered into the database. The lack of detailed individual animal records limited our ability to calculate some disease rates, particularly lactational incidence rates, as the disease events could not be tied to individual animals within the herd. Disease frequencies were calculated on an annual basis using the number of recorded occurrences of the disease or disorder divided by the number of animals at risk during that year. For disorders such as retained placenta or left displaced abomasum, which are likely to occur only once during a lactation, the annual incidence rate approximates the lactational incidence rate quite closely (3). However, for diseases such as cystic ovarian disease and clinical ketosis, where each treatment was recorded and included in the numerator, the annual rate calculated was a treatment rate. This treatment rate may have overestimated the actual incidence rate, since cows treated more than once for the same condition were included in the numerator more than once. This must be taken into consideration when interpreting the summary disease frequency information presented in Table 3.

Table 3.   Reported disease frequencies for the ODMAP herds from March 1990 to February 1991.

	Mean	S.D.	Range
Observed abortion (%)	3	2	0-11
Retained placenta (%)	9	6	0-28
Clinical hypocalcemia[a] (%)	13	13	0-73
Clinical primary ketosis[a] (%)	3	5	0-34
Cystic ovarian disease[a] (%)	12	10	0-44
Left displaced abomasum (%)	2	3	0-11
Crude morbidity rate[ab] (%) for heifers from birth to weaning	19	28	0-179
Mortality rate (%) for heifers from birth to weaning	5	9	0-71

[a] represents treatment rate
[b] includes treatment for all gastrointestinal and respiratory diseases

Discussion

The data summarized in the three tables presented here are representative of the three types of data used to assemble our database. The production data were obtained directly from Ontario DHI and required no involvement on the part of the dairy producer, except the granting of written permission for us to access the farm's DHI records. The production data were summarized to the herd level by Ontario DHI and required no additional manipulation on our part. There was total producer compliance with this part of the data collection process. In spite of the fact that our sample of herds was not chosen at random, the production characteristics presented in Table 1 are similar to those of Ontario herds enroled in official milk recording (5).

The reproductive data were collected on the farm using a modified breeding chart. Most of the producers participating in the ODMAP, and their local artificial insemination technician, were in the habit of using a similar chart and had little trouble adapting to the modifications. Data from the breeding chart were transcribed onto a data collection sheet and mailed to us monthly. The possibility of transcription error occurring at the farm level was a concern and steps were taken to validate the quality of the reproductive data. Each breeding on each farm was manually entered into our database to allow us to summarize the data by month for each farm. In spite of the need to transcribe the breeding data from the barn chart unto a data collection form, the compliance with this portion of the data collection process was also very high. The summary data presented in Table 2 are consistent with similar summaries of the reproductive performance of Ontario dairy herds published previously (3,4). It is interesting to note that the average days to pregnancy and average calving interval are virtually identical to those reported ten years ago by Dohoo (3).

The disease data were representative of the information that was collected monthly

using the ancillary on-farm collection sheet. Since most producers had an existing record system of some description, this represented a duplication of effort on their part and therefore met with various levels of compliance. In those few cases where computerized farm records were kept, direct access to those records made it easy to extract the data required. As we had anticipated, considerable effort was spent on our part in collecting the ancillary data sheets and validating the data that they contained. The rates of disease for adult cows reported in Table 3 were similar, in most cases, to those reported by Dohoo (3). Although the mortality rate for heifers was similar to that reported in a previous Ontario study (6), the morbidity rate was somewhat lower.

Acknowledgements

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Summary

The Ontario Dairy Monitoring and Analysis Program (ODMAP) evolved out of a perceived need for a herd level monitoring system that utilized the available dairy herd data and was tailored to the characteristics of the Ontario dairy industry. The objectives of the ODMAP project included the establishment of a herd level database that could be used to produce periodic summary reports useful to producers and veterinarians for monitoring herd performance. This manuscript outlines the development and implementation of the ODMAP and summarizes some of the data collected during the first year of the project.

Resumen

El Programa de análisis y monitoreo lechero de Ontario (ODMAP) nació de la necesidad de un sistema de monitoreo a nivel del hato, que utilizase la información disponible en hatos lecheros y que además fuese adaptado a las características de la industria lechera de Ontario. Los objectivos del proyecto ODMAP incluyen el establecimiento de un banco de datos a nivel de hato que puedan ser utilizados para producir reportes periódicos de producción, que sean útiles para los productores y veterinarios en el monitoreo del rendimiento productivo del hato. Este manuscrito describe el desarrollo e implementación del programa ODMAP y resume parte de la información recolectada durante el primer año del proyecto.

Résumé

L'Ontario Dairy Monitoring and Analysis Program (ODMAP) a été conçu en réponse au besoin de développer un système de surveillance de troupeau qui utiliserait les données disponibles sur les troupeaux laitiers et qui réponderait aux caractéristiques de l'industrie laitière de l'Ontario. L'objectif du projet ODMAP étaient d'établir une banque de données de troupeau qui servirait à produire des rapports sommaires périodiques, utiles à l'éleveur et au vétérinaire, pour le suivi de la performance de troupeau. Ce texte décrit le développement et l'impantation de l'ODMAP et résume une partie des données récoltées lors de la première année du projet.