Adaptation of Herd Health Programs to Microcomputers

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The Problems with Main Frame Computers

The first computerised herd health programs were developed on large centrally-located, mainframe computers because, at the time, they were the only ones that were there. In the beginning we had complete confidence in our own system which was essentially a mail-in plus mainframe system. Because the principal attraction of the program was its rapid turn-around time, which allowed farmers to relate what the report said to what they had observed two days before and therefore make a decision when the arguments on both sides were still fresh in their minds, any factor which delayed the procedure was counterproductive. Similarly any procedure which significantly increased cost was a bad influence. The principal features of the mainframe-mailin system which reduced its usefulness, and at the same time turned our attention to micros were:

—A steep increase in price and a sharp reduction in efficiency of regular postal services, leading to big delays and some loss of mail.

—Dumb terminals at country centres connected to the mainframe by land-line were expensive. Rent of the land-line linking the units plus the cost of the terminal which had no other function proved too expensive to pass on to farmers. The introduction of a micro as an intelligent terminal overcame this and other difficulties but still were expensive. It also suggested that a stand-alone system would be cheaper and would avoid the delays which were occurring with increasing frequency as the usage of the mainframe increased.

—Full commercial rates for connect time to the main-frame represented financial embarrassment. Our early development rate during the time that we were developing the system made it a reality. The full rate did not. The answer had to lie in the introduction of a computing unit which could serve a number of functions, not just one, and therefore spread the costs of the hardware and the software over a larger number of cost centres in our establishment.

—Computer languages used on the mainframes were sophisticated and difficult and most applicable to research workers and dedicated computer friends. If the herd health movement was to be developed beyond an appeal to a few highly intellectual scholars it had to grow a new and friendly aspect and language. The micros began that process immediately and improved on the situation all the time.

—Programs which were capable of modification and adjustment were all very well for the enthusiasts who occupied the central positions in our systems but they were not very good for country veterinarians located many miles from the centre. Turn-key systems that specified exactly what inputs were required and asked questions and allowed answers in plain language (English in our case) were needed to cope with the situation of a stand-alone micro in a remote area. This is now achieved.

The Question of Usage of the Micro by the Farmer or the Veterinarian

To be big enough to handle the data storage and analysis with speed and ease/accuracy the computer needs to be of at least a certain minimal size (see the specification set out below). The financial investment in such a machine requires that it be used as much as possible. The paradox is that the bigger the machine is, the less time it is used. Obviously the solution is to find other ways of using the micro which are cost-effective additions to management.

This subject has great importance in the argument about who should logically control a herd health program; the farmer or the veterinarian. Some of the factors affecting this decision are:

—*Cost to the farmer.* A small, low capacity micro with an all-up cost of $4000 for hardware and software would not have to earn much income if it could be written off in income tax over three years as a business asset. However, it would be low in capacity and slow in operation. For a simple reproductive efficiency program for a herd of 120 with a retrospective analysis as the mainstay, a 16 bit, 164 K machine with software for $8000 is more like the hardware suited to the task but with the need for a once-a-month report, although data may be entered daily, the machine would be idle most of the time. It represents over-capitalisation unless there is another sizeable enterprise on the farm that requires a significant amount of record keeping and periodic data analysis and comparison with targets. On a dairy farm where there is intensive hand-feeding on a challenge basis with feed supply being matched with a measured milk yield on a continuous basis there could be a need for a much greater data management service than on the average commercial farm. A stud farm which required in addition the maintenance of detailed production and genetic records for over 100 head of cows would have a still greater need.

—*Value to the Veterinarian.* A micro with sufficient memory to handle a herd of 200 cows with complex analysis of all disease and productive parameters accurately and quickly could also handle 50 such herds with ease. There is an important point that good programs are commercially available for these machines. They are also for the smaller machines but not in such variety nor with the same sophistication.

However, the principal value to the veterinarian is that such a computer has many other uses in a practice. The commonest use is in business management, that is maintaining the financial records, including fees raised by each veterinarian in the practice, sundry debtors, drug inventory, the compilation and addressing of accounts, clinical records, and state of indebtedness statements which are immediately retrievable.

Value to the Farm as a Whole

Added to the advantages that accrue to a farmer or veterinarian is the gain that there is for the system as a whole. The farmer maintains the records and passes them to the veterinarian who analyzes them. Knowing the farm and its management he/she is in a good position to decide which cows should be examined, which ones should be culled and so on. He/she also has constant surveillance over a number of farms and, although confidentiality is essential, it is possible to introduce a spirit of competition into the system and to have a better appreciation of the potential productivity and profitability of the farms in the area. It is the fact that the veterinarian is already an adviser on matters of health to a number of farms and visits them all regularly that puts him/her in a unique position with respect to management of a local data bank. It is usual in an intensive dairying area for the number of farms on a veterinarian's books to be between 100 and 200. Only a proportion of these are likely to seek the kind of assistance that a herd health program can provide.

Because of the close relationship that exist between health and management it is important that, if possible the herd health program be in fact a health and production management program. This requires that out of the same service come advice and assistance on health and management and that to each farm this assistance be provided as a coordinated whole. The best service is provided by a veterinarian who has familiarised himself/herself with the dairy industry as a whole, its targets, potential, financial resources, and long term future; added to this must be a knowledge of nutrition, and in pastoral areas pasture management, genetics and farm economics. Alternately, and in our experience, as successful is a combination of enthusiastic veterinarian and animal husbandry adviser. However, unless the animal husbandry adviser knows each farm intimately he/she is confined to giving general advice or to problem-solving when the problems arise and the veterinarian works them up first.

It would be reasonable to accept that a highly motivated animal husbandry adviser who was committed to a relatively small number of farms, say 50, would be able to provide the management advice that required the backup of a microcomputer and that a health program could be added on. The veterinarian would then be in a subsidiary position. It is a reasonable proposition but it has not developed in our environment. Veterinarians are largely in private practice, animal husbandry advisers are not. Veterinarians are self-employed, they risk their livelihood in an open market and their income fluctuates with the fluctuations of his/her clients' financial viability. The animal husbandman is usually employed by a government or other service and his/her judgments and inputs are not so critical in maintaining his/her income.

Types of Health and Production Management Programs Available on Microcomputers

There is no rigid classification of the available programs. They vary in larger or smaller ways from each other as the program writer perceives the needs of his/her locality. This is influenced to a very large degree by the financial viability of the farmers, combined with the farmers' willingness to invest money in a management advice system, which these programs are. The latter factor depends to a large degree on the confidence that the farmer has in the veterinarian who is to provide the service, and the motivation and enthusiasm of the veterinarian for the program.

The following classification gives a general idea of the range of programs available. It would be reasonable to begin with a simpler program. They are arranged below in the order increasing confidence of both parties grew. This is not a common procedure. More common is the provision from the beginning of a basic program with a series of options which can be added on by the farmer as his confidence increases.

(1) *Retrospective Reproductive Analysis.* Reproductive data is fed into the system and an analysis done of reproductive efficiency at specified time intervals. This may be monthly in an intensive dairying industry or annual where dairying is seasonal and exploitative of natural pasture growth. A variety of parameters are used in assessing reproductive efficiency but the following is a basic grouping of them.

—Estrus detection
—Conception efficiency
—Calving rate
—Impregnation rate of bulls especially in natural mating herds

It is common to provide two options, one for year-round dairying and one for herds that breed and milk seasonally.

(2) *Retrospective and Predictive Reproductive Analysis.* A reproductive program which inputs data at short intervals is in a position to give valuable predictions about calving

dates and numbers as well as retrospective analyses. It is also capable of giving early warnings of trends of reproductive efficiency so that early preventive steps can be taken.

(3) *Reproduction Analysis plus Nutrition Advice.* Programs which predict reproductive events, and therefore the number of cows in lactation on any day in the year are in a position to predict feed needs on each day. This provides an opportunity for forward feed planning and budgeting including forward purchasing of feed, sowing of cereal crops and changes in pasture management.

(4) *Financial Management.* A program which predicts reproductive events and budgets for feed needs is in a position to predict cash flow in and out of the dairy enterprise. It is therefore capable of accepting a financial management option as an addition. Such a program would plan for optimum times for the sale of excess livestock including surplus young stock and cull cows. It would also predict the availability of cash for further investment in the dairy enterprise or in another enterprise.

(5) *Mastitis Management.* A program based on the assessment of the mastitis status of each cow would be most valuable as an adjunct to a reproductive program. It would be expected to analyze the periodic individual cow milk cell counts now being provided by some production recording services. This could be used to put out lists of cows to receive dry period treatment and to be culled, and to relate the cell counts to productive efficiency.

(6) *Other Diseases—Management Of.* An additional option is the inclusion of other diseases especially the important ones in a particular region. Early calf deaths especially colibacillosis, intestinal parasitism, including coccidiosis in young cattle, and leg injuries and foot lameness, hypomagnesemic tetany and either bloat or traumatic reticulitis or rumen overload are the common ones that farmers want to keep records of.

(7) *Production Analysis as an Option.* Herds that participate in a record of production program or who measure individual cow milk yield are invaluable in that the simultaneous recording of health and yield allows for correlation of these two parameters, and if nutrition and other production variables are also measured there is an opportunity to include that in the analysis of relationships.

(8) *Omnibus programs* are those that provide all of the above options. In summary these are: Reproductive performance, mastitis status, other disease prevalence, production record, nutritional status, genetic background (on some stud herds), financial management.

(9) *Other Programs.* There are currently developing programs that can be put in place quickly when a diagnosis is required e.g. there is a program to analyze a year's breeding data in a dairy herd which provides an instant report on reproductive efficiency and highlights the area of the breeding program which is at fault.

With some minor exceptions these programs are available on microcomputers now. One of the most exciting aspects of these developments which have occurred in as short a period as the last three years is the involvment of working veterinarians in the development of the software. In the days of the mainframes and the Fortran language there was really no opportunity for input by anyone other than a computer analyst. Nowadays the software is being written by the veterinarians or to their specific requirements and this avoids most of the incongruities that an engineer-generated program is likely to contain.

Disadvantages of the Microcomputer System

The very real loss in leaving the mailin-mainframe system is the disappearance of a massive accumulation of data at a central point. Such a data bank offered a potential for providing information about the prevalence of disease, the variability of production efficiency and the prediction of these parameters. The advantage was a largely hypothetical one and no one has attempted to utilise what stored material there is to demonstrate its usefulness. To a large extent this is due to variation between data collecting units in the data collected and the collection technique. This is most important when farmer observations are included in the data. From our own experience we know how unreliable this data can be because of inconsistency on the part of the farmer and recording enthusiasm and accuracy by the veterinarian. The data is probably badly biased because the good recorders are the good performers with the best performance and lowest disease prevalence.

The move to micros does not completely eliminate the possible development of a large data bank but it would require a cooperative arrangement between veterinary practices and some central organization such as a Department of Agriculture to network data files to make it possible. It would also be necessary to devise a standard format for records which was available to all participants and insistence by the central organization on the submission of sound data.

There are other difficulties which need to be dealt with elsewhere.

(1) The poor availability of programs on some micros. The cardinal step in buying a micro is to ensure that there is a program available for what you want to do.

(2) Incompatibility between micros so that programs and data are not transferable.

(3) Sometimes poor backup service for repairs and maintenance.

Specifications for a Desirable Computer

There are too many suitable machines to be comfortable about specifying individual models. Even capacity specifications have some hazards. It is possible to do it with less and it is possible to do it faster with more but for a reasonable facility the following is suggested for a system handling 50-100 farms of average 120 milking cows each, with a complete health and production management program, and with other potential uses of the hardware to use 50% of the computer's time:

Hardware- 16 bit computer with 128 K of RAM.
2 x disc drives with 1.2 megabyte floppies
A 132 column printer of speed 150-180 characters/second

Reminder: the absolute essential before buying a micro is to ensure that a well-performed software package is available for it.

Other Incidental Uses for the Micro

Besides herd health programs and business management there are other potential uses for a micro in a veterinary practice. Some of them are:

—Use of decision-tree type of differential diagnosis programs to resolve complex clinical problems such as convulsions in calves, red urine in cows, post-parturient recumbency in cows.

—As a calculator with printout.

—Storage and retrieval of literature references and drug dose rates.

—Word processor

—Hobbies including bird sightings, native flora identifications, music recordings, wine listings.

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Abstracts

The role of *Fusobacterium necrophorum* and *Bacteroides melaninogenicus* in the aetiology of interdigital necrobacillosis in cattle

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Aust. vet J. 62:47-49

SUMMARY: When cultures of known pathogenic strains of *Fusobacterium necrophorum,* isolated either from cattle or sheep were injected through the interdigital skin of cattle typical lesions of interdigital necrobacillosis were produced. The inclusion of *Bacteroides melaninogenicus* in the inoculum did not appear to contribute to the development of lesions.

Failure of oral zinc therapy to alleviate *Bacteroides nodosus* infections in cattle and sheep

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SUMMARY: Cattle and sheep with *Bacteroides nodosus* infection were treated orally with both high (65 mg Zn/kg and 82 mg Zn/kg) and low (1 mg Zn/kg and 8.6 mg Zn/kg) doses of zinc sulphate respectively. The lower dose rates administered weekly for one month, in the case of cattle, or daily for 2 weeks, in the case of sheep, had no effect either on serum zinc levels or the prevalence or severity of infection in treated animals. High dose rates of zinc (approximately 2.5 g Zn per head per day) were required to elevate serum levels above those normally present in both cattle and sheep. Even these dose rates continued daily for about 2 weeks had no beneficial effect on *B. nodosus* infection in either species.
Aust. vet J. 62: 85-89

Boluses of controlled release glass for supplementing ruminants with cobalt

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Veterinary Record (1985) 116, 175-177

Boluses of controlled release glass containing cobalt and weighing approximately either 60 g or 14·5 g were administered to 22 steers and 21sheep respectively. The steers were housed and slaughtered at intervals between 17 and 145 days after dosing. The boluses released more than 0·85 mg cobalt daily. In both untreated and dosed animals serum and liver vitamin B^{12} concentrations were at the upper end of the normal range. Two types of glass were administered to sheep. In five wethers one glass released 0·07 mg cobalt per day, and in 16 grazing lambs a second glass released more than 0·15 mg cobalt per day. Fourteen of the boluses were recovered from the lambs up to 276 days after dosing. The concentration of B^{12} in serum of lambs increased significantly from a mean ± sd of 1·64 ± 0·47 to 2·02± 0·04 ng/ml serum and the concentration in liver from 3·84 ± 0·85 to 4·99 ± 0·72 ug/g dry weight liver.

Use of electroacupuncture as an analgestic for laparotomies in two dairy cows

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Aust. vet. J. 62: 52-54

SUMMARY: Electroacupuncture was used as the sole analgesic for standing laparotomies on 2 Friesan cows. Needles placed in the lumbosacral space, and second lumbar interspinous space and high in the lumbar fossa were stimulated with an AC current at 15 to 28 Hz. The analgesia produced was similar to that of a paralumbar nerve block.