The Application of Planned Animal Health and Production to Dairy Farms: DAISY — The Dairy Information System

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Introduction

It is estimated that in the UK, on the 100,000 full-time farms, there are nearly 10,000 microcomputers in use. Approximately 2000 of these farms have a dairy recording program on a computer incorporated into the milking parlour or in the office.

The development of dairy recording systems on microcomputers has been taking place for over ten years. The system described (DAISY — The Dairy Informaton System) was developed from a mainframe herd health system in use in 1968 at the University of Melbourne, and developed at the University of Reading (UK) from 1972 onwards. DAISY accepts any type of individual cow record (identity, life events, health, fertility, milk yield and quality etc.,). No records are lost and all entries are thoroughly validated. The user chooses how much detail to enter.

The output is available in a range of sizes of printout and on screen, covering action lists, feed lists, analysis of health and fertility, recording forms and integrated management reports.

If the records are supplied via ASCII files, the system can integrate with a National Milk Recording system via floppy diskettes. Information automatically recorded in the milking parlour can be accepted directly into DAISY and instructions can be computed for operating feeders. The cow data can be transferred into a database to create inter-farm comparative data, league tables and a database for research purposes, and can be used to develop indices and parameters to help predict performance and allow farmers to take cost-effective preventive measures.

The lack of integrated systems from the central sector meant that in the early days many farmers were willing to use software that had not been properly tested. The software available today is likely to be chosen on the basis of whether it will make the farmer more efficient and profitable. (Nowell, 1978). While suppliers of centralized services concentrate on average requirement, there will be a small specialized market sector looking for highly developed information systems. This may only constitute some 2.5% of the farmers, but these farms may be larger than average and responsible for 7.5 to 10% of the milk produced.

The effect of computers can only be felt if the farmer makes and applies a good decision based on improved information (Carmi 1987).

In the UK, over the last ten years, the price of on-farm computers has dropped twentyfold in real terms. In general, up to this year, dairy profits have been fairly static so farmers have not had extra income for dairy automation or computerization.

Gradually, in the UK, the centralized services from the milk recording agency have developed with the inclusion of a Viewdata (telephone line and TV) service and the addition to the milk records of a limited amount of health and fertility data.

Computers are only a tool and interpretation of reports are essential. Advice may be supplied by extension agents visiting the farm, so long as they understand the program, the principles of economic animal production, and providing quality data are entered. Work is available for local bureau services where advice is part of the scheme, and a new type of facility is arising where travelling specialists offer a service, achieving and maintaining proper levels of data entry and report production on the farmer's own computer.

The Requirements of a Dairy Information System — A Summary

Simple method to start up a herd on the system.
Data validation and error checking of records.
Data can be entered in any order from many sources.
All types of records to be kept for cows and youngstock.
Ease of editing records.

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No record, once entered, to be overwritten or discarded.
Speed of response and operation to match the user's need.
Quality of presentation of output.
Any coding system: alpha not numeric, extendable to suit the user without spoiling the integrity of the records kept.

Origins of DAISY — The Dairy Information System

DAISY is designed for computers with a hard disk and needs 7 MB of space including the operating system, and up to 3 MB for work areas depending on herd size.

The original DAISY program was written for dairy cows with young stock and herd costings being added later. One of the reasons for the program's survival is its link with farmers and veterinarians, and its flexibility and extendability.

In 1981, the opportunity was taken to devise a completely new system that was useful at all levels, infinitely extendable, validated by the program and that provided a way for commonality of coding across DAISY users.

DAISY now operates at over 140 sites in 33 countries around the world. The program is used for all size herds from small-holders with three or four cows to farms with 5000 cows. Users include farmers; veterinarians and consultants running bureau services; education establishments using DAISY for teaching, as well as research farms and pharmaceutical companies recording trial data. In some countries the program is used on state farms, and in some developing countries DAISY is used as a basis for the national milk recording (NMR) system.

Other dairy programs which have been developed include those from Cornell (Rasmussen 1986), Minnesota (Williamson 1988), Michigan (Mather & Bartlett 1984), Saskatoon (Radostits and Blood 1985) and California (Bywater and Goodger 1984).

Structure of DAISY, Cow Records Program

DAISY has been designed in a modular form (Fig 1). The central component is Dairy Cow Records. Milk Yield Manager calculates individual cow concentrate feed requirements. The young stock program can be linked to the DAISY Cow Records, or can be independent to manage the records of male or castrated calves. Two other programs run independently, the ration calculation and herd costings programs.

1) Data Management

a) Herd Identity

A new herd is started by entering a herd number and the farmer's name and address. The user chooses how to record cow identity from one of four ways; either all alpha, all numeric, alpha-numeric with four numbers preceeded or followed by a letter.

Fig. 1
The Suite of DAISY Programs:

DAISY (including BOS operating system)
Milk Yield Management
Youngstock
Costings
Feed Package
Special Data Entry Facility
Individual Cow Margins

b) Cow Data Entry

Once the cow identity, current lactation number and calving date have been entered, further data can be added. The user enters the cow number, the reason the cow has been recorded and the date. Reasons cover all the events in the cow's life and are classified in two categories. The first type is the system-defined Reasons that include Calving (CA), Heats (HE), Services (SE), Pregnancy Diagnosis (PD) and Drying Off (DO). The other Reasons are the ones added by the user or by the DAISY group to suit the purpose of the site involved, and can include such diseases as Mastitis, Lameness, Vulval Discharge and Milk Fever. When a Reason is recorded, any additional information to do with the Reason can be added. These are classified in DAISY as Findings (F), Diagnoses (D) and Treatments (T) (Fig 2).

Fig. 2
Event Codes - Examples of Types Used in DAISY

Reason	CA	Calving
F	ABTN	Abortion
F	RFM	Retained Foetal Membrane
F	Torn	Torn Vaginal Tissue
D	MF	Milk Fever
T	TR1	Traction Level 1

Daisy will operate with a minimum of information and under a Calving only the elements marked with a * are essential (Fig 3). Data validation is incorporated checking cow numbers, reasons and grouping. Taking calving as an example, the program automatically checks that the cow was recorded in calf, had been dried off, and is not calving more than ten days early.

Comments (C) and Errors (E) are incorporated into the data entry routine and appropriate messages appear on the screen. A Comment can be overwritten, but an Error

Fig. 3
Example of Data Entry for Calving – A System Defined Code

Cow: 292A* Reason: CA* Date: 20/9/88*

Number of Calves: 1* Group: YD12
Live or Dead: Calf 1: L*
Comments on Calving: (Calved in Dry Cow Yard)
Number of Weeks before Revisiting: 1
Cow Weight: Cow Score:

Events	Type	Code	Description
	F	Diff	Difficult Calving
	T	TR2	Traction Level 2
	F	RFM	Retained Foetal Membrane
	T	UTOC	Utocyl Pessaries

means that alteration is necessary to this particular data entry, or another part of the cow's record.

A Reason can be up to four alpha-numeric characters long. Up to five Events can be entered. When an Event is entered the code list checks for its presence and the full description is given under "Description" (Fig 3). When entering data there is a facility to "View" the cow's whole record for this lactation.

Having entered a calving, calf details can be included, covering identity, sex, breed, weight and fate.

Data can be entered in any order and hence taken from a single or several recording books kept on the farm, a log being printed by DAISY of all data entered.

It is possible to transfer records automatically to another herd on DAISY, which is often necessary where one owner operates several herds.

DAISY Reporting System

The output from DAISY was designed to suit a wide range of users, and is available in a variety of formats, sizes and contents. The output is always available on the printer and, where appropriate, on the screen.

The reports cover six main areas - Action Lists, Data Review, Performance Analysis, Feeding and Integrated Management Reports, Events Analysis and Recording Forms.

The eleven Action lists are split into three categories; the first set covers the fertility cycle of the cow; the second set has lists of animals needing attention from the herdsman or veterinarian on a time crucial basis, and the third set lists cows that have been "flagged" for a specific purpose - to be culled or for a "revisit".

The Data Review Reports give full or condensed information on each cow, or categories of cows, in the herd and can be used in the parlour or office.

The Milk Yield Management Reports give a one line summary for each cow, of age, calving date, services, bull used, cases of mastitis and lameness, summarized and last three yield records, and the feed required by each cow. Poorly performing cows can be highlighted by the adviser-/manager to help the herdsman alter, for example, the feeding for specific cows.

Performance Analysis reports examine the herd over a period of weeks, months or years. P1 looks at the fertility of the herd for up to three years, showing, by month of calving, the main fertility indices. This report allows the advisor to see if the levels of husbandry are being achieved, and to intervene to improve the levels to set the herd back on target.

The other reports give an overview of health, fertility and yield for the year, in bar charts and histograms. Health events can be examined separately or in many combinations, as can production performance.

Further analysis can be run when any of these reports show under-performance. Bar charts, tables and cumulative sums can be produced for heat detection and conception rates and can look at the overall herd or groups of cows, bulls used, stockman, days of the week, age of the cow, days since calving, etc.

The Successful Application of Integrated Decision Support Systems

The application of this type of information needs a particular type of adviser, who can define the objectives at the outset of the operation, and will have realistic targets to aim for.

The program is in use in 25 leading practices in the UK who operate bureau services for up to 40 herds in each practice. Schemes revolve around raw records kept on the farm in a self duplicating note book, the top copy (containing all the health, fertility and cow events) being sent or taken to the practice on a regular basis. The relevant reports are then returned or picked up.

The output for the veterinarian may differ from that of the farmer, with more detailed action lists and analytical reports, giving the practitioner an overview of the herd performance and trends of fertility on the farm.

As technology improves, the data management system will play a larger part in delivering near-model standards of fertility. Formula health management, knowledge based, expert or decision support systems are arising faster in animal health than in the medical field.

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Abstracts:

Apparent decline in fertility in heifers after repeated oestrus synchronization with cloprostenol

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Veterinary Record (1991) **128:** 404-407

Over several years groups of heifers which were repeatedly treated with the $PGF_{2\alpha}$ analogue, cloprostenol, to synchronize oestrus were artificially inseminated. When sperm treated was optimized, a reduction in conception rate was observed which was related to the number of synchronization treatments the animals had received. Although factors such as a sensonal reduction in fertility may have contributed to the effect, there appeared to be a decrease in the proportion of animals becoming pregnant after successive synchronizations. Possible explanations for this observation are suggested.

Premature expulsion of the placenta and bovine perinatal mortality

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Veterinary Record (1991) **128,** 521-523

In one study two cases of premature expulsion of the placenta were recorded among 60 supervised calving (3•3 per cent); both calves died. In a second study, 47 cases were recorded among 332 cases of perinatal mortality (14•2 per cent). The condition was associated with fetal malpresentation and malposture, and mortality either before or during parturition. There was no significant realtionship between the occurrence of premature expulsion of the placenta and parity, calving difficulty, previous calving history or the sex of the calf. The condition in cattle is compared with placenta praevia in women.

Efficacy of danofloxacin in the therapy of acute bacterial pneumonia in housed beef cattle

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Veterinary Record (1991) **128,** 296-300

Danofloxacin, a novel fluoroquinolone antimicrobial drug was evaluated in the treatment of acute bacterial pneumonia in recently housed beef cattle of approximately 300 kg liveweight. The clinical responses of 67 pneumonic cattle treated with danofloxacin were compared with those of 65 cattle treated with oxytetracycline, both treatments being given by intramuscular injection for either three or five days, depending on clinical response. Both treatments resulted in a rapid fall in group mean rectal temperature and improved the clinical condition of the majority of cases. However, in comparison with oxytetracycline, danofloxacin therapy was characterized by significantly fewer treatment days, a higher response rate, significantly better reduction of pyrexia and fewer cattle requiring re-treatment.