

ASSESSMENT OF THE USE OF MOIRA
(MANAGEMENT OF INSEMINATION THROUGH ROUTINE ANALYSIS)
The Delivery of Fertility Management via a Module of DAISY
The Dairy Information System

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Introduction

The MOIRA program has been developed over a period of two years from rules derived in a three year study of the tactical use of milk progesterone tests in dairy herds. McLeod, Foulkes, Williams and Weller (1991). The purpose of MOIRA is to raise the submission rate of cows for A.I. for the first and subsequent services, at the same time identifying cows not cycling normally.

MOIRA is a module of DAISY, The Dairy Information System (Esslemont R.J., Wassell B.R., Grimbleby L., Lamb J.L., and Horne S. (1991)), which copes with any type and any amount of individual cow records. Reports can be produced on a wide range of topics.

Cows can be put "onto" or taken "off" MOIRA at any time and, once on, the rule based system suggests the times for three weekly milk progesterone tests as soon as the cow reaches 20 days post partum (alternatively, cows with a definite delay imposed on their breeding are started on the MOIRA program 24 days before the start of their breeding season). Cows showing abnormal progesterone patterns can be diverted for veterinary attention.

Cows cycling normally are put forward for further tests 15 days after the low, and tested on alternate days until another "low" is found. When six "high" tests are found, from day 15 to 25, the cow is considered pregnant.

The DAISY program is already loaded with the records of calving dates, services, pregnancy diagnosis etc. When running MOIRA the farmer can choose which day of the week he wants to "test" for milk progesterone. The weekly testing can be spread across all the days of the week, and alternate day testing can be arranged to avoid relief milking days. It is not possible to have a gap of more than 2 days, and so testing must be carried out on two consecutive days once a week. Alternatively, the pattern can be allowed to shift by a day each week, so the alternate day tests are adhered to.

Based on a menu driven system, DAISY MOIRA then produces :-
1) List of Cows to Test

A list is produced daily of cows to test. The farmer enters the results of the milk progesterone tests into DAISY as a "high", "medium" or "low".

The MOIRA program analyses the patterns of the milk progesterone tests, and, when the correct pattern is found to show that the cow is cycling (e.g. HHL, LHH, HHL), she is not listed for further tests for 15 days from the low progesterone.

2) Lists of the Cows with Abnormal Cycles (Cows for the Vet)

Cows showing abnormal patterns in the weekly testing are listed on the DAISY MOIRA Action List, and can be diverted for veterinary attention. This list includes cows that have an apparent persistent corpus luteum (HHH), those that are anoestrus (LLL), those with short cycles (LHL), and cows that have started cycling and then stopped (HLL or LML).

Cows with MM are also listed on the Action List as a "check accuracy of test" command. The results of the milk progesterone test should be presented to the veterinarian on his visit, so that accurate treatment can be given, and these cows returned to the MOIRA testing programme. There is no need to take these cows "off" MOIRA as the program will continue to set up tests accordingly.

3) List of Cows for Service

The alternate day testing starts 15 days after the "marker" low or ovulation. DAISY MOIRA produces a list of cows to test on each test day. Provided the cow has passed her "fit to serve" date, DAISY MOIRA will list the cows to be served on the basis of a low milk progesterone result. These cows are listed to be served on the day after the low progesterone, without any signs of heat being observed.

4) Cows for Pregnancy Diagnosis

After service, the tests are stopped for 15 days, and then DAISY MOIRA lists the cows for testing every other day. If the cow is pregnant, 6 high progesterone results are recorded from days 15 to 25 after service, and then testing is stopped. If she is not pregnant, a low progesterone result is recorded, and the cow should be served the next day. This procedure continues until the cow is pregnant, or a decision is made to stop serving her. Cows assumed to be pregnant should later be confirmed in calf by rectal palpation or ultrasound scanner.

Between days 26 and 40 after service, embryo loss can occur. Cows which are not pregnant to the manual check can be treated and put back onto the weekly testing on DAISY MOIRA.

Materials and Methods

This study involves a dairy farm which used the DAISY MOIRA protocol in 1990 / 1991, and compares herd reproductive performance with that of the previous year (1989 / 1990), when DAISY MOIRA was not in use. The farm used the Ridgeway Science Well Test (Ridgeway Science, Rodmore Mill, Alvington, Gloucestershire, U.K.) for monitoring progesterone concentrations.

Farm Description

A 85 hectare farm run by the owner and his son, who employ a full time herdsman. The herd averages 132 Friesian / Holstein cows, which are cubicle housed and milked through a herringbone parlour. The cows are manger fed on a complete diet mix.

The farm operates a DIY A.I. system, with no natural service. The calving pattern is being moved to get more cows calving in the summer months, and so the service period ran from 14th September, 1990, to 1st May, 1991 (Experimental), compared to 5th October, 1989, to 17th May, 1990 (Control). The interval to first allowed service was 30 days in both years.

The farm purchased the DAISY Cow Recording program (University of Reading) in 1989, having previously used another herd health monitoring system through the veterinary practitioner. The MOIRA program was purchased in 1990 to improve fertility management.

Analysis of Data

For the purpose of this study, only cows which followed the MOIRA protocol from calving to conception (or until it was decided to stop serving a cow) were included in the analysis.

These were cows calving from 1st June, 1990, to 21st October, 1990. For a comparative Control herd, only cows which calved over the same period in 1989 / 1990 in the respective herds were analysed. The economic evaluation was based on model figures quoted by Esslemont (1992).

Results and Discussion

As a result of purchasing DAISY in 1989 to monitor fertility in this herd, the reproductive performance was already higher than in previous years, due to improved record keeping and the use of the analysed data for management decisions. Therefore the improvement to be made by using DAISY MOIRA could only be relatively small.

Results for cows calving from 1st June to 21st October in 1989 (Control year) and in 1990 (Experiential year) are presented in Table 1. Analysis of the data shows that the use of DAISY MOIRA reduced the calving to first service interval by five days, and increased by 8 points the percentage of cows conceiving of those served.

The use of the MOIRA protocol to detect cows which returned to service between 16 and 28 days after the previous insemination was significantly higher in the Experimental year (86 per cent), compared to detection by herdsman observation alone (Control year, 49 per cent, $P < 0.001$).

The average calving interval was reduced by 7 days in the Experimental year, to the optimum of 365 days. Oestrus detection is kept to a minimum on this farm, with MOIRA forming the basis for detection. This is a great benefit to the farmer, especially at busy times of the year.

The overall culling rate was reduced by 5 percentage points (23 and 18 per cent, Control and Experimental years respectively), but since DAISY MOIRA can only affect the number of cows culled for failure to get in calf, it is this figure which is used in the economic calculations.

There were 8 per cent fewer cows culled for failure to conceive in the Experimental year (5 per cent), compared to the Control year (13 per cent). As a result the farmer has been able to cull cows for other reasons, such as poor milk yield or quality, instead of keeping these cows because too many others have to be culled for poor fertility.

The farmer reported a reduction of almost 50 per cent in his veterinary bill in the Experimental year. This was a reflection of the reduction in the number of cows being examined for oestrus not observed (29 per cent in the Control year, and 15.3 per cent in the Experimental year).

It was assumed that every case costs £7.50 per cow (Esslemont, 1992). Table 2 gives the economic calculations of the benefit of using DAISY MOIRA in this herd. It is estimated that a benefit of £7003 was made per 100 cows, by reducing wasted days, and reducing the culling rate for failing to conceive. The costs incurred, based on the cost of the MOIRA program (£350 to buy), labour to sample and test the milk, and the milk progesterone tests (13 per cow at 30 pence per test), total £10.20 per cow (Table 2). Thus a net benefit of £5983 was made per 100 cows in the herd.

As this farm carries out DIY A.I., it was decided to adapt the DAISY MOIRA rules to minimise the need for double inseminations. When cows are listed for alternate day testing from day 15 of the cycle in order to predict ovulation, the farmer collects milk samples from the relevant cows every day, but continues to progesterone test on the specified alternate days.

When a low progesterone result is obtained, the previous day's milk is then tested to see whether the cow is on her first or second day of low progesterone. The cow is then inseminated on day 3 of low progesterone, when conception rates are highest (Foulkes and Goodey, 1988). Using this method, only 2 cows required double inseminations.

The problem with analysing results from commercial dairy farms, in order to assess the benefit of the MOIRA system, is that there is no researcher control over the way in which the farmer / herdsman uses the program.

The farm studied appeared to have followed the sampling protocol fairly accurately, whilst other farms which were considered for analysis were found to have varied the way in which the system was used. This was often due to a resistance by the herdsman to change, and also to an apparently increased workload. The herdsman taking on MOIRA more recently have been instructed in how to use MOIRA to make the task of oestrus detection easier.

Similarly, it is also difficult to correctly compare performance results from two different years, to provide a Control and Experimental year. There are various external factors, such as a policy to change the calving pattern, or forage quality or quantity, which may differ from one year to the next, and have a significantly different effect on fertility and profitability. However it was assumed that, for the purpose of this study, the two years were similar.

The system has also been tested by veterinarians who would wish to run DAISY MOIRA as a bureau service for farmers. The options for running such a system would be either to get farmers to carry out the progesterone testing on the farm and to phone in the results, or for a technician to travel around the farms, collecting the milk samples and testing them back at the surgery.

TABLE 1. Summary of Reproductive Performance, Cows Calving 1st June to 21st October, 1989 (Control), and 1990 (Experimental)

HERD 1		<u>Control</u>	<u>Experimental</u>
Number Calving :	Heifers	23	25
	Cows	78	70
	Total	101	95
Number Served		97	91
% of Calved		96	95
Mean Calving to First Service Interval		61	56
First Service 24 day Submission Rate (%)		70	71
% of Re-Serves 16-28 days		49	86
First Service Pregnancy Rate		44	43
All Service Pregnancy Rate		42	38
Number Conceiving		84	86
% of Served		86	94
% of Calved		83	90
Mean Calving to Conception Interval		90	85
Mean Days Open		101	89
Mean Number Serves per Conception		2.3	2.5
Mean Calving Interval		372	365
% Culled of Calved		23	18
% Culled for "Failure to Conceive"		13	5

TABLE 2. Economic Evaluation of the Use of DAISY MOIRA Protocol in HERD 1

	<u>Per 100 Cows</u>
<u>Savings</u>	
Improvement of 7 days on the Calving Interval @ £3 per day	2100
8 FTC Culls Saved @ £600 per Cull	4800
Reduced ONO and FTC Vet Costs @ £7.50 per case	103
TOTAL SAVINGS	7003
<u>Costs</u>	
Tests; 13 per Cow @ £3.90 per Cow	390
Time; 120 Hours @ £4 per Hour	480
DAISY MOIRA (share)	150
TOTAL COSTS	1020
NET BENEFIT	5983

In both cases, the list of cows to test and serve would then be phoned back to the farmer on the same day. Of the veterinarians concerned, one decided that the complexity involved in running such a system was too great for it to be practical, though another two are persevering. At present some 20 herds are using the MOIRA system.

The uptake of new technology by farmers will often be slower than anticipated, however much systems such as MOIRA report on the benefits that can be achieved, since an educational process is often involved. Heat detection is a major problem on many dairy farms, and so any system that makes the task easier and more accurate must be of benefit.

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SUMMARY

MOIRA (The Management of Insemination through Routine Analysis) is a computer program that is a module of DAISY, The Dairy Information System. DAISY allows the recording of all events; treatments, health, disease, yield, milk and blood parameters, and produces reports to help action or management. MOIRA uses appropriate parts of this data and, in particular, uses the results of milk progesterone tests. The MOIRA program actually plans a series of weekly tests for each cow "on" the program to check for cyclicity. Subsequently, the program lists cows for alternate day tests to isolate the day when the cow should be served. On this basis, if necessary, the cow can be served "blind" without the cow being seen in heat.

The program is operating on 20 farms and at 2 veterinary practices at present. The research work which led to the development of MOIRA showed that ovulation detection rates of 98% were achieved; in commercial herds the rate achieved is 90%. As pregnancy rates are unchanged, the effect of MOIRA is to reduce herd calving intervals to 365 days and culling rates for failure to conceive to 5%. As the farmer gains confidence in using such a system it has been found that he extends the interval to first allowed service, thus increasing pregnancy rates. The cost effectiveness (using 15 tests per cow at 30 pence each) produces an extra net profit for the farmer of £60/cow.

SOMMAIRE

MOIRA (la conduite de l'insémination par l'analyse journalière) est un logiciel d'ordinateur et est un module de DAISY (le système des renseignements laitiers). DAISY permet l'enregistrement de toutes les données (par exemple, les traitements, les maladies, la production laitière) et produit des rapports qui facilitent la conduite du troupeau laitier. MOIRA utilise quelques-unes de ces données, surtout les résultats des examens du lait pour le progesterone. MOIRA fait un plan des examens hebdomadaires des vaches pour évaluer leurs périodes cycliques. Puis le logiciel MOIRA dresse une liste des vaches qui doivent être examinées tous les deux jours. Ainsi on trouve le jour quand la vache doit être inséminée. De cette

façon, si nécessaire, les vaches peuvent être inséminer même quand on n'a pas vu des signes d'oestre.

Vingt fermiers et deux groupes vétérinaires utilisent MOIRA à présent. Le pourcentage de la decouverte d'oestre était 98% dans les recherches qu'on a fait pour développer MOIRA. Le pourcentage qu'on a atteint dans les troupeaux commerciaux est 90%. MOIRA donne au fermier un bénéfice net de £60 pour chaque vache (si on utilise 15 épreuves par vache - une épreuve coûte £0.30).

RESUMEN

MOIRA (la dirección de la inseminación por análisis rutinario) es una programa computadora que es módulo de DAISY (el sistema de información lechera). DAISY almacena todos los registros lecheros (por ejemplo, tratamientos, eventos de salud y fertilidad, catidad y calidad de leche). Produce los informes para facilitar los aspectos de manejo. MOIRA usa estos registros y, sobre todo, los resultados de las pruebas de leche para el progesterone. Entonces, el programa MOIRA proyecta un plan de pruebas cada semana para descubrir las vacas para servir. Después, el programa hace una lista de vacas para examinar un día si y otro no. De este manera, se puede descubrir el día de servido para cada vaca. Si necesario, la vaca puede ser servido sin ninguna otra detección de calor.

Actualmente, MOIRA es usado por 20 granjeros y 2 grupos veterinarios. Una tasa de detección de calor de 98 por ciento estaba lograda durante las investigaciones de MOIRA; con rebanos comerciales la tasa es 90 por ciento. Para el granjero, MOIRA obtiene beneficios de £60 de cada vaca.