The Use of Milk Progesterone Samples for Complete Herd Oestrous Control

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Introduction

The most common cause of poor reproductive performance in the dairy herd is poor heat detection . It is impossible to separate heat detection from conception rate as accurate timing of service is certainly a requirement for the successful use of Artificial insemination. However many workers have shown that heat detection is much more closely related to reproductive performance than is conception rate.[1,2]

Milk Progesterone Assays have been used for over 20 years to asses the stage of oestrous cycle in cattle.[3] The first widespread application was for pregnancy diagnosis due to the fact that the method was by Radioimmunoassay (RIA) which involved centralised testing and a necessary time lag between sampling and results. The development of Enzyme-Immunoassay (EIA or ELISA systems) opened up the practical application of on site or "cow-side" testing and results.

Use of the test for pregnancy diagnosis severely restricted the potential of the test as the accuracy was often poor. Use for the detection of oestrous and timing of insemination has brought many revolutionary changes.[5] This paper examines a complete system of applying the test for oestrous detection and insemination in a commercial dairy herd and the implications for routine veterinary fertility visits.

Method

A system of strategic progesterone sampling of cows in a commercial dairy herd - "MOIRA" (Management Of Insemination by Routine Analysis) - was used for the winter breeding season of 1990-91.[6] The system is part of the Reading University "DAISY" programme used to monitor and control herd health and fertility performance. Information about oestrous cycles is provided to predict ovulation and allow timed insemination; as well as identify problem cows. Microtitre EIA test kits (Ridgeway Science, Glos.) were used on the farm to determine milk progesterone levels. Although a plate reader was available for quantitative results it was not found necessary as the kits provided good qualitative results by simple visual examination (HIGH - a high level, LOW a low progesterone level). Tests are carried out on a Monday, Wednesday and Friday rota to fit the normal working week.

The basic system is summarised below:-
Weekly sampling commences at day 20 post calving at the start of the breeding season (or just before). Evidence that the animal was cycling was based on the first LOW progesterone result after a previous HIGH. Weekly testing ceases and alternate day testing starts around day 15 or 16 after this LOW. Testing is on alternate days from this to fit in with a 3 times weekly testing regime, looking for the next LOW result. Insemination is carried out 24 hours after the test LOW unless the animal is observed in oestrous before. The cow must be over 50 days post calving and after the start of the breeding season. Cows are reserved if a visible oestrous occurs within 2 days of a progesterone-timed insemination. Testing recommences again at day 15 or 16 after insemination to detect the next LOW, pregnancy was assumed if none occurred by day 23 or 24.

Cows with abnormal progesterone profiles were presented at routine visits for veterinary attention ("DAISY" programme). Cows were still examined at 2 weekly routine veterinary visits on the basis of normal fertility criteria - i.e. no visible heat at 40 days post calving, no service at 65 days post calving, manual pregnancy diagnosis at 38-52 days post service as well as abnormal cows e.g. ovarian cysts . Problem animals were progesterone sampled on the day before the visit to provide a result at the visit. All farm and veterinary fertility information was

recorded on "DAISY" along with the progesterone results to provide a full fertility analysis. "MOIRA" was used from November 1990 through till March 1991 when a "sweeper" bull was introduced.

Results and Discussion

Any system of replacing normal heat detection and insemination would be expected to effect Submission rate for first service, detection of repeat services, conception rates, and the number of cows pregnant per unit time.

Analysis of the herds results over the test season (1990-91) could be compared with 2 previous seasons fertility under traditional management – a good year 1988-89 and a poor year 1989-90. The overall fertility parameters show a useful comparison over these 3 breeding seasons and is summarised in table 1.

SEASON	1988–89 (GOOD)	1989–90 (POOR)	1990–91 (MOIRA)
COWS CALVED	159	159	124
Calving to First Service Interval (Days)	70	81	70
1st. Service Submission Rate (%)	42	45	61
Calving to Conception Interval (Days)	88	113	90
Cows Conceived of Calved (%)	75	79	90
Conception Rate to First Service (%)	48	41	48
Cows Culled (%)	21	31	5

"MOIRA" performance is very similar to traditional fertility management in 1988-89 except for a great improvement in submission rate, culling rate and percentage of cows pregnant.

Submission rate for first service is defined as the number of cows actually served as a percentage of those eligible for service in the first 24 days of their breeding season (i.e. after 50 days post calving and after the start of the breeding season). This is displayed in graph 1. below. The criteria on which submission rates are based change through the season, however the trends do show a marked response over the period of MOIRA control.

Detection of returns to service in Table 2. shows the analysis of intervals of returns using the approximate 1,2,and 3 cycle length repeats.

% returns in season	Intervals			
	18–25 days a.	37–48 days b.	55–72 days	Ratio a. to b.
1988–89 Good	58	13	5	4.6:1
1989–90 Poor	58	12	9	4.7:1
1990–91 MOIRA	72	9	0	8.2:1

SUBMISSION RATE

MONTH OF CALVING

☐ 1988-89   + 1989-90   ◇ 1990-91
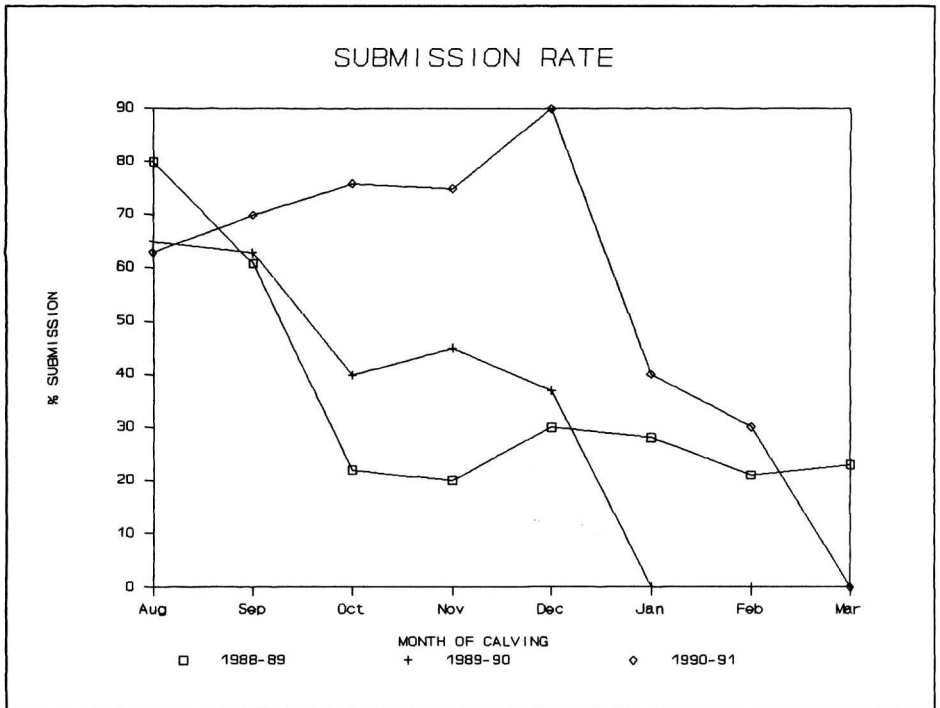
The detection of repeats is greatly improved by "MOIRA".

Pregnancy Rate involves too many variables to compare simply calving patterns alone. Heifers entering the herd and culling cows tend to distort the effect of fertility performance alone. The percentage of cows that recalved as a percentage of those available for service from the season before is a better way of displaying overall pregnancy rates. This is shown below in graph 2.

MOIRA has increased the cows pregnant per unit time and thus allows a lower culling rate.

Conception Rate could be adversely affected due to miss-timed service. There is no evidence from any of the "DAISY" analysis and comparison that "MOIRA" has had any effect on the conception rate.

By looking at the farm heat detection records it is possible to look at the interaction between timing of insemination from progesterone samples and the occurrence of visible oestrous. There is a trend for cows served soon after the test LOW i.e. a visible oestrous on the day of testing to have lower conception rates to those where the serve is based on an oestrous found 24 hours or more after the test LOW. The routine of testing increased the detection of visible oestrous as it appeared to prompt stockmen to target observation on test LOW cows.

The use of milk progesterone profiles can help in diagnosing ovarian function (and abnormalities) for veterinary interpretation at routine herd visits but, on their own they produce too many false results because the predictions rely on rigid "typical" profiles which are not sufficiently specific to define a situation. Work done with progesterone profiles has shown they can contradict veterinary diagnosis.[7] The results from this study show that the definitions are too rigid to allow for other options. Pregnancy diagnosis is based on a string of HIGH progesterones, however 8% of cows confirmed progesterone pregnant were found to

PREGNANCY RATE
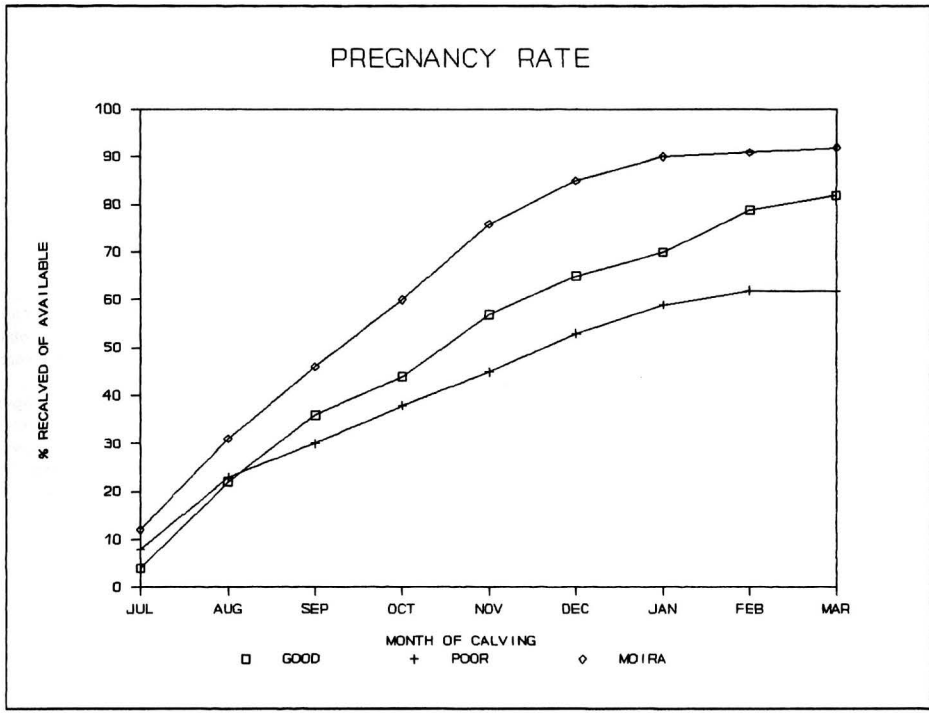
be not in calf at manual examination with various diagnoses present – mucometra, cystic, endometritis. Cystic cows are defined from progesterones as being a string of LOWs after a HIGH. Cows with cystic ovarian disease from a veterinary point of view were defined as having a fluid filled structure over 25mm in diameter on the ovary in the absence of a palpable Corpus Luteum. These were found to have very variable progesterone levels and could not be classified from these results alone, nor could a treatment be chosen. Cows exhibiting "Long Low progesterones" have been described and probably account for some 5% of cows in a herd.[8] Cows exhibiting "Long Lows" would be classified as follicular cysts if it were done purely on the basis of progesterone profiles without veterinary input. Results from this herd showed that "long lows" did occur in about 5% of the cows and were characterised by persistent LOW progesterones with vaginal and possibly ovarian signs of oestrous. Cows exhibiting "long Lows" could also be miss diagnosed by assuming any cow with a progesterone LOW at day 15 must be a repeat ovulation not an abnormality.

Conclusion

"MOIRA" is a very efficient management prompt to determine the time of ovulation and to apply insemination. It allows consistent results to be obtained for all aspects of heat detection regardless of other variables in the herd. It can also give extremely valuable information in the way of profiles on problem cows for the routine veterinary visit.

However it is not accurate enough to diagnose problems cows without the help of veterinary input. The key to success is to incorporate the system into the farm and veterinary routine management and not try and replace them.

References
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SUMMARY

A structured system of routine progesterone sampling ("MOIRA" - University of Reading) makes it possible to predict the timing of oestrous and facilitate the fixed time insemination of cows. The results of this system in a commercial dairy herd are compared with 2 previous years traditional fertility management -a good year (1988-89) and a poor year (1989-90).

There is a marked improvement in both oestrous detection for first service and repeat services with no deterioration in the conception rate. Although very similar results were obtained when compared with a good year's fertility management "MOIRA" produced much more consistent results than traditional oestrous detection with lower culling rates and more cows pregnant per unit time. The system was incorporated into a routine veterinary fertility programme to provide more information on problem cows presented. The conclusion from this study was that in a commercial situation the key to success is to incorporate the system into the farm routine and not try to replace it.

ZUSAMMENFASSUNG

Ein strukturiertes System von Routine-Progesteron-Tests ("MOIRA" - Universität Reading) ermöglicht es, den Zeitpunkt der Brunst (Östrus) vorauszusagen und erleichtert die Befruchtung von Kühen zu einem festen Zeipunkt. Die Ergebnisse dieses Systems in einer kommerziellen Milchvieherde werden mit dem traditionellen Fruchtbarkeits management der vorausgegangenen 2 Jahre verglichen-einem guten Jahr 1988-89 und einem schlechten (1989-90).

Er ergibt sich eine deutliche Verbesserung in der Östrusermittlung für die erste Deckung und Wiederholungsdeckungen bei keiner Verschlechterung der Empfängnisrate.

Obwohl sich beim Vergleich mit einem guten Jahr des Fruchbarkeitsmanagements ähnliche Ergebnisse herausstellten, führte "MOIRA" zu beständigeren Ergebnissen als die traditionelle Östrusermittlung, bei geringeren Schlachtquoten und mehr trächtigen Kühen über eine bestimmte Zeitspanne.

Das System wurde in eine Veterinärmedizinisches Routinefruchtbarkeitsprogramm eingebaut, um mehr Informationen über Problemkühe zu liefern.

Die Studie schlußfolgert daß in einer kommerziellen Situation der Erfolg im Einbau des Systems in die Arbeitsroutine des Landwirts liegt, und nicht in deren völliger Änderung.

RESUMEN

Un sistema estructurado para detectar regularmente la presencia de progesterona ("MOIRA" Universidad de Reading) posibilita predecir el comienzo del estro y determinar el momento preciso en que las vacas han de ser inseminadas. Los resultados de este sistema en un ganado lechero comercial se compararon con los resultados obtenidos en dos años (1989-90) cuando se utilizó un sistema tradicional de fertilización.

Hay una mejora notable de la detección del estro para primera unión y para repetidas uniones sin deterioro en los indices de concepción.

Aunque se obtuvieron resultados muy parecidos cuando se compararon con un buen año del sistema de fertilización "MOIRA" produjo resultados mucho más consistentes que los obtenidos con la detección menores y más vacas embarazadas en un periodo especifico de tiempo.

Se incorporó el sistema en un programa regular de fertilidad veterinario para proporcionar más información sobre las vacas que tienen problemas de fertilidad.

Se ha sacado de este estudio la conclusión de que en una situación comercial para asegurar el éxito hay que incorporar el sistema en la rutina de la granja y no tratar de sustituirla.