Improving Dairy Herd Reproductive Efficiency - Do We Need Rectal Palpations?

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Key Facts

The majority of cows presented as "oestrus not observed" will be cycling normally and have failed to be observed in oestrus due to inadequate heat detection.

The ability to accurately define ovarian status by a single rectal palpation is limited.

A planned prostaglandin protocol for cows during the optimum breeding period can reduce calving to first service interval by increasing the frequency of oestrus cycles and increasing heat detection efficiency, and may be more cost-effective than routine rectal palpation sessions.

Rectal examinations for pregnancy diagnosis should be carried out between 32-42 days to increase heat detection efficiency on non-pregnant cows.

Time and money spent on rectal examinations of cows may be better used advising on dry cow and early lactation nutritional management.

Introduction

Traditionally, herd fertility schemes involve regular visits to examine groups of cows selected on the basis of certain targets set by the farmer/veterinarian. Normally this will include:

1) cows for post partum checks
2) cows not seen in oestrus/overdue first service
3) cows for pregnancy diagnosis
4) cows showing abnormal cycles, e.g. cystic cows

It is worth considering the impact and effectiveness of rectal examination for these categories of cows.

The post partum check

The main aim of this examination is to assess normal uterine involution and identify any post-parturient (pp) infection/endometritis present. The only abnormality detected at this examination that we can attempt to treat is endometritis. Time spent assessing the degree and severity of endometritis by vaginal/rectal palpations will probably not affect the outcome of the condition. Antibiotic/antiseptic wash outs are time consuming and expensive and of questionable benefit. The most useful treatment is likely to be single or repeated prostaglandin (PG) injections which act by increasing the number of oestrus cycles in the pre-breeding period or removing persistent luteal tissue associated with pyometra (Jackson 1977). Prostaglandins given in the early pp period may also have some direct action on the myometrium to improve uterine involution not associated with luteolysis (Rodriguez-Martinez and others 1987).

The blanket treatment of all cows, or selected groups of cows two to four weeks pp with PG may be as cost effective an approach to post-parturient endometritis as individual examinations in fertility clinics and has been shown in some studies to improve overall calving-conception figures (Young and Anderson 1986, McLary and others 1989). Other studies have found no significant differences in fertility parameters when cows were treated with PG in the early pp period (Mortimer and others 1984, Glanvill and Dobson 1991). The cows most likely to benefit from PG injection in the early pp period are those that have had assisted calvings (White and Dobson 1990) and this beneficial effect appears to be independent of progesterone status at the time of injection.

Oestrus not observed (ONO) / overdue first service

During routine fertility visits many cows are examined which come into this category and a decision is made on the basis of history and rectal palpation findings on how to deal with them. The latest DAISY report summary (63 herds) found that on average 32% of cows were treated in the category ONO. How useful is the time spent assessing ovarian status and choosing a suitable treatment for these cows?

Several studies have shown that the majority (>90%) of dairy cows have resumed normal ovarian cyclicity by 40-50 days post calving (Lamming and

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Bulman 1976, McLeod & Williams 1991) therefore, the majority of cows presented over 50 days calved as ONO will be cows where poor heat detection is the limiting factor.

Can rectal palpations influence heat detection efficiency in these cows?

We can attempt to impact heat detection through estimation of the time of the next expected oestrus. However, predicting the day of expected oestrus on the basis of rectal findings may have a negative effect on reproductive performance. Rather than carefully maintaining heat detection on the cow in question, the farmer may opt to serve her on the day predicted and hope for the best. Conception rate following these serves to a predicted oestrus period are likely to be poor due to inaccuracies of timing.

Prostaglandins can be used on cows where the veterinarian has diagnosed the presence of a viable corpus luteum (Eddy 1977, Seguin and others 1983). By identifying these cows by rectal palpation, the farmer avoids the financial loss associated with treating cows that will not respond. This protocol is flawed by the following assumptions:

1) that we can accurately palpate for functional luteal tissue and
2) that the saved treatment cost is less than the total cost of palpation.

In the studies by Eddy (1977) and Seguin and others (1993) cows overdue service were selected for treatment with PG on the basis of rectal palpation of a CL.

Following treatment, 69%, and 73% of cows respectively were observed in oestrus and served.

The ability to accurately identify functional luteal tissue on the basis of a single rectal examination is limited as many viable CL's are not easily palpated lying within the ovarian stroma and some palpable CL's will be non-responsive to prostaglandin.

A study by Kelton & others (1991) comparing the accuracy of rectal palpation against milk progesterone EIA for predicting the presence of functional luteal tissue showed that clinicians were 85% accurate when selecting cows considered to have a functional CL but only 46% accurate when selecting cows considered to have no functional CL. This highlights the fact that many opportunities will be lost to cycle cows with functional CLs using PG due to inaccuracies in selection of suitable candidates by rectal palpation.

Other causes of ONO

Depending on the heat detection efficiency on the farm, a proportion of cows presented as ONO will genuinely be due to reasons other than missed heats. How can rectal palpation impact the reproductive performance of these cows?

a) True anoestrus

It is hard to accurately diagnose on the basis of one rectal finding but often age, condition score, etc. will help in accuracy of diagnosis. Simply confirming anoestrus in cows ONO will not impact the reproductive performance of these cows and if many cows are found in this category this indicates a management failure and time would be better spent investigating and giving advice on dry cow/early lactation nutritional management.

b) Cystic ovarian disease (COD)

A few cows with COD will be detected by rectal palpation in the category ONO. To impact the reproductive performance of these cows, an attempt can be made to define the type of cyst present (follicular/luteal) and treat accordingly. Again, the accuracy of type of cyst diagnosis is questionable using rectal palpation alone but can be improved using milk progesterone analysis (Booth 1988) or ultrasound (Farin and others 1992). Recent studies have shown that even using progesterone analysis to back up rectal palpation findings, the accuracy of cyst diagnosis is likely to be poor due to the wide variation in progesterone output from cysts over time and the failure to palpate concurrent corpora lutea (Carrol and others 1990). It is more important to establish whether there is a functional CL present on either ovary along with the cyst, as many cysts can be present in cows showing normal progesterone profiles and the cystic structures may be non-functional (Blowey 1992).

c) Persistent CL

May be found in association with endometritis/pyometra. Treatment with PG effective.

d) Pregnancy

Occasionally cows presented for ONO may be found to be pregnant due to inaccurate service records or immaculate conceptions!

Pregnancy Diagnosis (pd)

In the hands of an experienced clinician, the technique of pd by rectal palpation can be highly accurate after six/seven weeks of gestation. Despite this, in 1991 11% of claims against VDS were associated with abortions caused by giving PG to cows diagnosed non pregnant. The economic value of carrying out manual pd after six weeks has been questioned, especially on farms with good heat detection efficiency (Eddy 1989).

To make an impact on heat detection efficiency, pd's must be carried out before six weeks to allow identification of non-pregnant cows and

positive action to be taken to increase heat detection efficiency on these cows to ensure they achieve another service by six weeks. Many veterinarians are not confident at manual rectal pd prior to six weeks and excessive handling including membrane slip at this early stage may increase levels of embryonic death (Abbit and others 1978).

The solution to achieving early accurate pregnancy diagnosis is to use real-time ultrasound. The technique is easily learned and highly accurate between 32-42 days of gestation. It allows early identification of non-pregnant cows which can be given PG to short cycle the return oestrus or marked with tail paint or Kamars to improve heat detection efficiency. Embryonic death can be identified accurately and if care is taken to identify the embryo and embryonic heart beating for all positive diagnosis then any cows returning cannot be blamed on mistakes in pregnancy diagnosis. I believe that early pregnancy diagnosis by ultrasound should be the norm in an organized fertility program and it is up to veterinarians to acquire scanners and be trained in their use. **If we cannot offer the service our clients want, then it is reasonable to expect they will go elsewhere to seek that service.**

The first part of this paper has aimed to review the rationale behind traditional herd fertility schemes where routine visits are carried out to examine categories of cows selected on the basis of targets set for reproductive performance. Considering the limitations of rectal palpation as an accurate predictor of ovarian status, we decided to assess the usefulness of a planned prostaglandin regime without any rectal palpation to deal with cows normally presented as oestrus not observed/overdue first service at routine fertility clinics. By giving PG injections every two weeks until served to this category of cow we hoped to improve reproductive performance by increasing the number of cycles in the optimum breeding period and increasing heat detection efficiency. Cows not cycling due to persistent CL or luteal cysts would also be effectively treated using this approach.

Materials and Methods

Three 200 cow dairy herds were used in the trial. All 3 herds were autumn/winter calving herds. Starting two weeks after day one of the breeding season, weekly or fortnightly fertility visits were carried out on the farms. Any cows calved >65 days with no service recorded were presented for routine PG injection (500 mcg Cloprostenol; Estrumate, Mallinckrodt Veterinary Ltd.) on Monday mornings. Cows were served to observed oestrus following injections and any cows not served following PG injections were re-injected 2 weeks later until served. Progesterone assay was carried out on milk samples collected on the day of injection using an EIA kit (Ridgway Sciences Ltd). Cows still unserved after 2 PG injections where milk progesterone assay showed two low progesterone values (<2ng/ml) had a PRID inserted. On all 3 farms pregnancy diagnosis was carried out at 32-42 days post service using ultrasound scanner. The routine prostaglandin injection protocol was carried out until the majority of cows had received a first service. Lists of cows due for injection and pd were compiled and routine fertility analysis were carried out using the practice DAISY computer. In the results analysis, a service following PG injection was defined as service to an observed oestrus within 5 days of injection.

Results

The basic fertility parameters for the 3 herds for the trial breeding season and the season preceeding the trial (figures in brackets) are shown in Table 1.

Table 1

	Farm A	Farm B	Farm C
Calving-1st service (days)	66 (80)	81 (84)	69 (76)
No. cows 1st served >100 days	5 (33)	26 (25)	13 (20)
Calving-conception (days)	81 (100)	100 (102)	97 (107)
1st serve preg. rate	56% (51%)	47% (47%)	43% (44%)
All serve preg. rate	60% (52%)	49% (49%)	42% (45%)
Calving interval (days)	361 (384)	379 (382)	377 (388)

Reductions in calving - 1st service, calving - conception and calving intervals were seen in all 3 herds. The number of cows receiving 1st service >100 days pp was reduced substantially in herd A and this led to a reduction in the average calving - 1st service interval of 14 days, which, when combined with a high conception rate led to a reduction of 23 days in the average calving interval.

Table 2 below shows the number of cows entering the synchrony scheme in each herd and the response and pregnancy rate (PR) to PG induced heats.

Table 2

	Farm A	Farm B	Farm C
No. cows served	183	161	182
No. cows entering Pg scheme	46 (25%)	40 (25%)	37 (20%)
No. served after 1 PG injection	27 (59%)	20 (50%)	16 (43%)
No. served after 2 PG injections	12 (26%)	5 (13%)	10 (27%)
Preg. rate to PG induced heats	64%	44%	46%
Herd 1st service preg. rate	56%	47%	43%

Overall, 23% of cows entered the synchrony scheme

as ONO by 65 days calved. 73% of cows that entered the PG scheme were served within 19 days of entering the synchrony program. 51% of cows entering the scheme were served following the 1st injection and this varied from 59% on farm A to 43% on farm C. The PR to services following PG induced heats were 53% overall and in herds A and C was greater than the average herd PR.

Discussion

Using this pre-breeding PG protocol, the main impact we are hoping to make is a reduction in the mean calving - 1st service interval and most importantly a reduction in the number of cows receiving their 1st serve >100 days. **It is this group of cows that constitute most to extending the herd calving interval and contribute the greatest proportion of economic loss caused by reproductive inefficiency.**

This can be achieved using PG programs by (1) increasing the number of cycles in the optimum breeding period, (2) improving heat detection efficiency by targeting treated cows for heat detection and increasing overall oestrus activity in these cows by synchronizing oestrus. Increasing the number of animals in oestrus at one time from one to five has been reported to increase the frequency of standing ten times (Helmer and Ritt 1985).

This protocol works particularly well in large seasonal breeding herds particularly at the start of the breeding season when it is important to get all cows already overdue 1st service served as soon as possible.

In herd B the protocol made no impact and this was probably due to a combination of inaccurate heat detection and nutritional anoestrus (demonstrated by the number of cows with too low progesterone values and poor metabolic profile results). By doing milk progesterone estimations on all cows at the time of PG injection, it was possible to monitor heat detection efficiency by seeing the proportion of cows that were served following high progesterone values.

Progesterone levels were most useful to monitor cows which had not been served following two PG injections. Cows with too low progesterone values were likely to be anoestrus but could also be suffering from follicular cysts or short cycling with failure of heat detection. Cows in this category were treated effectively with a PRID coil.

It is not possible to read too much into the results of this trial as fertility data were compared to the previous season's results and not to a control group. Despite this, the indications are that it is possible to reduce the average calving-1st service interval and subsequently the calving interval using a planned PG protocol. It would seem there is little benefit in examining by rectal palpation the category of cow ONO/overdue 1st service, as 70-80% of these cows could be served following one or two PG injections without attempting to diagnose the presence of a corpus luteum.

An improved pregnancy rate following insemination at observed heats induced by PG injections has been reported by several authors. In a review of these studies McIntosh and others (1984) found an average increase of 7% in pregnancy rate over untreated controls.

In this study farms A and C had a superior pregnancy rate to PG induced services compared to herd 1st service pregnancy rates (Table 2).

The reasons for this apparent improved pregnancy rate are not clear but may be related to more accurate heat detection as treated cows are being targeted for heat detection and perhaps show more positive oestrus signs due to group interactions. Whatever the reason, it is another positive benefit from PG synchrony schemes which may help to reduce calving intervals.

It must be stressed that this effect is only seen with services to *observed* heats and the use of fixed-time AI in dairy cows following PG injection is not likely to lead to higher pregnancy rates than untreated controls (Young and Henderson 1981).

On farms where nutritional management and heat detection efficiency are already good, an effective herd fertility program could therefore be run with rectal palpations being limited to particular problem cows. A possible program could be:

1. 3-4 weeks post calving (or earlier)

Give all cows routine PG injection or limit to problem cows selected by stockman (eg RFM, vulvar discharge, assisted calving, caesar etc). Repeat PG in 10-14 days for cows with persistent vulvar discharge.

2. Cows >55 days calved no service recorded

Routine fortnightly (Monday or Friday) PG injection to cows in this category until served. Take milk sample on day of injection and store at 4°C with preservative tablet (Lactab).

Do progesterone analysis on cows not served following 2nd injection and PRID cows if too low progesterone values recorded.

This protocol will effectively deal with cows cycling but ONO, cows with persistent CL or luteal cysts (PG will treat), cows with true anoestrus or follicular cysts (PRID will treat).

3. Cows for pregnancy diagnosis

Done using ultrasound scanner at 32-42 days. Target non-pregnant cows for oestrus detection using Kamar/tail paint or can re-enter PG synchrony if 100% accurate with scanner!

We intend to implement this program on our larger seasonally calving herds this winter and monitor the

results. For this scheme to work, good record keeping and enthusiastic farmers are essential with heat detection efforts being made a priority. A computerized record scheme such as DAISY is ideal for producing lists of cows due for PG injection but the data must be updated regularly and accurately before action lists are made to avoid the risk of injecting cows already served. The onus should be on the herdsman to double-check the cows listed for PG injection are correct.

Perhaps it may be possible to spend less time with our arms up cows' rectums examining problem cows and more time giving advice on the management of cows to prevent fertility problems.

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