TREATMENT OF ANOESTRUS IN DAIRY CATTLE

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Summary

Six priming doses of 40 mg progesterone at two day intervals followed by 1,000 I.U. P.M.S. were superior to two priming doses plus P.M.S. in inducing oestrus. At the first insemination after induction of oestrus, fertility was normal in animals which received two doses, but depressed in those which received six doses of progesterone. An injection of 40 mg of progesterone after the injection of P.M.S. lowered the incidence of oestrus and fertility, and appeared to cause foetal deaths.

I. INTRODUCTION

Although anoestrus is an important factor limiting fertility in Australian dairy herds (McTackett 1956; Fallon 1958), its treatment has received little attention. In one study, unspecified ovarian hormones gave poor results unless grain supplements were fed to animals at pasture (McTackett 1956), and in another protein, phosphorus and vitamin A supplements promoted no significant response (Fallon 1958). Stilboestrol is commonly used by veterinary practitioners to stimulate oestrus in dairy cattle but the results of Lamond, Little and Holmes (1964) suggested that stilboestrol used with progesterone had little effect in stimulating oestrus in beef heifers with small inactive ovaries. The difficulties associated with synchronisation of ovarian cycles in anoestrus ewes and in heifers and dairy cows have recently been reviewed by Lamond (1964) who found considerable variability in the response of animals to hormone treatments.

Seasonal breeding of cows as practised by many dairy farmers on the North Coast of New South Wales frequently necessitates the treatment of anoestrus in cows and heifers. This paper presents the results of hormonal and nutritional treatments of anoestrus in European-breed cows and heifers and Zebucross heifers.

II. MATERIAL AND METHODS

The animals studied were dairy cows on nine commercial farms. In 1962-63, observations were made on cows of various ages. The Jersey breed predominated in six herds, Guernsey in one, Australian Illawarra Shorthorn in one and Jersey and Friesian in another. In 1964, observations were made on the progeny of three Sahiwal-Jersey and one Red Sindhi-Jersey cross bulls which had been used in these herds in 1962 (subsequently called quarter-bred Zebu heifers). These heifers ranged in age from 13 to 18 months at the time of treatment.

All females had been vaccinated with Brucella abortus Strain 19 and had received regular vaccinations against Leptospira pomona. Records were kept of matings and calvings, all animals being individually identified. Examinations per rectum were made 30 days following treatments to assess the condition of ovaries, and at seven to nine weeks after the last insemination to diagnose pregnancy. Throughout this paper “conceptions” represent animals apparently pregnant at the

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latter examination. Females were inseminated approximately 12 to 24 h after they were first observed in oestrus. In eight herds, chilled semen from one of six bulls was used. The semen was examined at collection and only that with a minimum motility scoring of 4.5 out of 5, and estimated minimum of 80% of motile sperm and a high concentration of sperm was used. Semen was diluted with 10-20 parts of egg yolk citrate, and 1,000 I.U. of penicillin, and 500 I.U. of streptomycin per ml was added. Frozen semen used in the remaining herd in Experiment 1 only, was supplied by the New South Wales Milk Board. Animals were under close surveillance for at least six weeks before treatment and after the last insemination. None was observed to be in oestrus before treatment. Only animals with inactive ovaries were treated, and those with corpora lutea were recorded as animals with silent heats. Treatments, the intramuscular injection of progesterone suspended in peanut oil and the subcutaneous injection of P.M.S., were applied during December 1962—January 1963, and November-December 1964.

(a) Experiment 1

The 41 heifers and 27 cows observed to be in anoestrus in December 1962 were allocated to two treatments.

In treatment A a priming dose of 50 mg progesterone was injected and a second two days later; on the fifth day 1,000 I.U. P.M.S. was injected. In treatment B, six priming doses of 50 mg progesterone were given at intervals of two days followed in two days by 1,000 I.U. P.M.S.

Practical difficulties associated with the frequent mustering of heifers for treatment B made it necessary to allot more heifers to treatment A but the numbers of cows in the two groups were equal.

Three animals which did not respond to two doses of progesterone were again given the course of six doses of progesterone.

(b) Experiment 2

In 1964, hormonal treatments were applied at random to 63 out of the 93 heifers observed to be in anoestrus. The remaining 30 were untreated. Treatments A and B were as used in 1962-63 plus a third treatment, namely six priming doses of 40 mg progesterone at two day intervals followed one day after the sixth injection by 1,000 I.U. P.M.S. and a further 40 mg progesterone given one day after the P.M.S. (Treatment C).

(c) Experiment 3

In 1964, twenty quarter-bred Zebu heifers in poor condition were kept under observation for three weeks and none of them showed oestrus. When examined per rectum, they had small inactive ovaries. They were allocated randomly to two groups of ten and grazed in adjoining paddocks having similar pasture. One group of ten animals were fed 13.7 kg linseed meal (42% crude protein) daily for three weeks. Heifers showing oestrus were inseminated.

All results were analysed using the chi-square test for significance.

III. RESULTS

In Experiment 1, there were no significant treatment effects (Table 1). In Experiment 2 (Table 2), the interval from the last dose of progesterone to the mean
TABLE 1

Experiment I — Results of Treatment of Cows and Heifers for Anoestrus in 1962

<table>
<thead>
<tr>
<th>Treatment and no. of progesterone injections*</th>
<th>Animals</th>
<th>Mean interval to oestrus (h)</th>
<th>No. in oestrus</th>
<th>No. pregnant after first insemination</th>
<th>No. pregnant after subsequent insemination</th>
<th>No. not pregnant (apparent loss of foetuses)</th>
<th>No. calving</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>34 heifers</td>
<td>86 ± 3</td>
<td>28</td>
<td>18</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>7 heifers</td>
<td>84 ± 5</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>41 heifers</td>
<td>86 ± 2</td>
<td>33</td>
<td>22</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>A</td>
<td>2</td>
<td>3 cows</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>24 cows</td>
<td>100 ± 6</td>
<td>21</td>
<td>12</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27 cows</td>
<td>100 ± 6</td>
<td>21</td>
<td>12</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>

*Intervals of 2 days between injections.

TABLE 2

Effect of progesterone and P.M.S. on oestrus and fertility at first insemination of quarter-bred Zebu heifers in 1964

<table>
<thead>
<tr>
<th>Progesterone treatment</th>
<th>No. of animals</th>
<th>No. of animals in oestrus within six days of last progesterone dose</th>
<th>Mean time from treatment to oestrus (h)</th>
<th>No. conceiving to first insemination of those in oestrus</th>
<th>No. in oestrus after 30 days</th>
<th>No. calved after insemination</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>2</td>
<td>29</td>
<td>96 ± 4*</td>
<td>13*</td>
<td>24</td>
<td>23*</td>
</tr>
<tr>
<td>B</td>
<td>6</td>
<td>17</td>
<td>124 ± 4</td>
<td>1</td>
<td>17</td>
<td>16</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
<td>17</td>
<td>67 ± 7</td>
<td>3</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*All treatments significantly different (P<0.05) within columns.

time of the onset of oestrus was significantly (P<0.05) shorter for treatment A than for treatment B. The percentage of heifers showing oestrus was highest after treatment B, but fertility at the first insemination was lower in these heifers than in those which showed oestrus after treatment A. Administration of progesterone after the P.M.S. (Treatment C) reduced both the incidence of oestrus and fertility in those which showed oestrus. Within 30 days of treatment, 83% of heifers on treatment A and all of those on treatment B had shown oestrus, but this difference was not significant. There was a significant effect of treatment (P<0.05) on the percentage of heifers which produced calves. Only eight of the 30 control heifers showed oestrus at the end of the breeding season and were not bred.

TABLE 3

Effect of Linseed Meal given to grazing quarter-bred Zebu heifers on the incidence and time to oestrus and on fertility

<table>
<thead>
<tr>
<th>Linseed Meal (kg/group/day)</th>
<th>No. of Animals</th>
<th>No. in Oestrus</th>
<th>Mean Time to Oestrus Days</th>
<th>Conceptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.7</td>
<td>10</td>
<td>7*</td>
<td>13 ± 6</td>
<td>6*</td>
</tr>
<tr>
<td>Nil</td>
<td>10</td>
<td>1</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

* (P<0.05).
The effects of 13.7 kg linseed meal daily on the incidence of oestrus and on fertility in a group of 10 heifers in poor condition are shown in Table 3. Seventy per cent of heifers receiving the supplement showed oestrus and conceived compared with 10% of control heifers.

IV. DISCUSSION

The long term aim for north coast dairy farmers should be prevention of the underlying cause of anoestrus, but these results illustrate that, in the short term, anoestrus in cows and heifers can be treated successfully with progesterone and P.M.S. and normal fertility may follow. Only eight of the 30 heifers which remained untreated showed oestrus, and this occurred at the end of the breeding season. Six doses of progesterone increased the incidence of oestrus, but was accompanied by a longer interval from treatment with progesterone to oestrus than were two or seven doses. Further, fertility at the first oestrus following treatment was lower with six doses than with comparable animals showing oestrus after a short treatment with progesterone.

In the treatment of anoestrus, the choice of treatment between two and six doses of progesterone must depend on the ease with which cattle can be handled. Two doses of progesterone resulted in fewer animals showing oestrus accompanied by higher fertility at the first insemination, whereas six doses had opposite effects. However, many of the cows not conceiving to the first service on both treatments did so at a subsequent normal oestrus. Hence, the reduced handling connected with the short treatment may be an important consideration favouring this method.

Information on the detrimental effect of progesterone on fertility in synchronisation experiments with cows was recently reviewed by Lamond (1964), who provided no explanation for the considerable variability in results. In our experiments there were three way interactions between herd, treatment and response, but no interactions between herds and response. There was some imbalance in the allotment of animals to blocks, but it is also possible that variability of response between herds was also responsible for some interaction. A seventh dose of progesterone following P.M.S. resulted in a lower incidence than two or six doses and an apparent loss of embryos by some heifers during the period from pregnancy diagnosis to calving. Heifers which appeared to lose embryos returned to oestrus at four to seven months after their last insemination. While no pathological organisms were recovered from a foetus from one heifer, or from a portion of a foetal membrane from another heifer, it is still possible that foetal losses were caused by infective agents. Parker et al. (1965) found that embryonic mortality was higher in synchronised heifers treated with progesterone to synchronise oestrus, than in untreated controls.

A daily ration of linseed meal given to anoestrous heifers was followed by onset of oestrus within six to nineteen days of the commencement of feeding, but since liveweights and liveweight changes were not recorded, it is difficult to interpret the effect of this supplement. Other attempts, made later in the season, to repeat this effect on heifers in better body condition and on better pasture by giving linseed meal were unsuccessful (Hewetson, unpublished data). It would, therefore, seem desirable to clarify the conditions under which anoestrus in heifers may be treated successfully by short term feeding of protein and energy supplements.
V. ACKNOWLEDGMENTS

Computer programmes developed by Dr. P. J. Claringbold were used by Mr. N. Westwood to analyse the results. The advice of Dr. D. R. Lamond of the Division of Animal Physiology, CSIRO, in the preparation of this paper is acknowledged. The technical assistance of Mr. B. J. Thompson and the co-operation of the nine farmers is also gratefully acknowledged.

VI. REFERENCES
