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IMPROVING REPRODUCTIVE PERFORMANCE IN LACTATING DAIRY COWS BY SYNCHRONISING OVULATION OR INDUCING OESTRUS

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Lactating crossbred Holstein-Friesian dairy cows (n = 331) were started on an Ovsynch regimen 68 ± 8.2 days after calving; 200 μg GnRH intramuscularly (i.m.) on Days 0 and 9, and 35 mg prostaglandin $F_{2\alpha}$ i.m. on Day 7. Thirty-eight and 31 cows (11.5 and 9.4%, respectively) were in oestrus on Days 0 to 6 and 7 to 8, respectively, and inseminated, and the remainder were fixed-time inseminated (on Day 10). For these three groups, pregnancy rates (60–65 days after breeding) were 31.6, 38.7 and 34.0%, respectively (P = 0.82) and calving rates were 100, 100 and 89.9% (P = 0.23). In a preliminary trial, twelve lactating cows (45 to 60 days postpartum) with inactive ovaries were given 1500 IU eCG i.m.; 10 were in oestrus within 10 days after treatment (and inseminated) and eight of these were pregnant (30 days after breeding). The Ovsynch program resulted in acceptable reproductive performance in cyclic cows and eCG treatment has considerable promise for inducing oestrus in anoestrous cows.

Key words: Reproductive performance, oestrus induction, synchronisation of ovulation, Ovsynch regimen, lactating dairy cows

Although the majority (approximately 96%) of Hungarian dairy farms use artificial insemination (AI), several factors limit reproductive performance in most herds. Hungarian dairy herds are becoming larger (range: 500–1200 cows), with a change in housing from tie-stall to free-stall barns. Despite increases in milk production, on many farms, management (including nutrition, collection and analysis of data, and oestrus detection) have often not increased commensurate with increases in herd size. Consequently, there has been a general trend for decreased reproductive performance. Similarly, in the United States, oestrus detection efficiency is less than 50% on many farms (Senger, 1994) and first-service pregnancy rates in dairy cows have declined from 60 to 40% over the last half-century (Nebel, 2000), concurrent with substantial increases in milk production and changes in management.

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If cows are bred only following detection of oestrus, low oestrus detection rates severely limit the number of cattle bred, resulting in poor reproductive performance. Therefore, programs that synchronise ovulation, enabling fixed-time insemination without oestrus detection, have been developed. For example, the Ovsynch regimen (Pursley et al., 1997) utilises sequential treatments with GnRH (to synchronise ovarian follicle growth), prostaglandin $PGF_{2\alpha}$ (to cause luteolysis), and a second GnRH treatment (to synchronise ovulation). In dairy cows, the Ovsynch regime resulted in conception rates comparable to those achieved with breeding after spontaneous or PGF-induced oestrus (Risco et al., 1998). It is noteworthy that the Ovsynch program was much less effective in anoestrous vs. cycling dairy cows; pregnancy rates (74 days after breeding) were 22.4 vs. 41.7%, respectively ($P < 0.01$; Moreira et al., 2000). In previous reports, eCG has been given to increase pregnancy rates in anoestrous dairy and beef cattle (Munro and Moore, 1985) and to induce oestrus in dairy cows with cystic ovarian disease (Sanusi et al., 2000).

The primary objective of the present study was to determine pregnancy rate in lactating dairy cows in Hungary synchronised with the Ovsynch regimen. In addition, a preliminary trial was conducted to investigate the use of eCG in anoestrous cows.

Materials and methods

A field trial was conducted on a Hungarian dairy farm on three consecutive years. The herd consisted of crossbred Holstein-Friesian cattle (R3–R4), with an average of 600 lactating cows. During the course of the trials, average annual milk production increased from 6796 to 7803 litres (average, 4.0% fat and 3.3% protein).

Cows were observed several times daily for signs of behavioural oestrus. The cows used in this trial had not been detected in oestrus by approximately 50 days after calving. Therefore, they were examined by rectal palpation and/or ultrasonography (Scanner 100 VET; Pie Medical, Boxmeer, The Netherlands, with 6 MHz linear-array transrectal transducer). Approximately 35% of these cows were diagnosed with cystic ovarian disease or metritis; they were excluded from the trial and treated. Furthermore, cows with small, inactive ovaries (ovarian diameter approximately 1.0 to 1.5 cm) were also excluded from the Ovsynch treatment. The remaining cows (with active and/or cyclic ovaries) were used in the trial and were treated according to an Ovsynch protocol.

The mean (± SE) interval from calving to the start of the protocol was 68 ± 8.2 days (range, 42 to 87). The Ovsynch protocol consisted of 200 μg GnRH (Fertagyl; Intervet, The Netherlands) on Days 0 and 9 and 35 mg $PGF_{2\alpha}$ (Dinolytic; Upjohn, U.K.) on Day 7 (Pursley et al., 1997). All injections were given i.m. Any cow detected in oestrus from the time of the first injection of GnRH to the injection of $PGF_{2\alpha}$ was inseminated and no further scheduled treatments were

given. For statistical analyses, cows bred following detection of oestrus were divided into two categories; those bred before $PGF_{2\alpha}$ treatment and those bred between $PGF_{2\alpha}$ and the second GnRH treatment. Cows not detected in oestrus by the time of the second GnRH treatment were timed-inseminated 16 to 24 h later (Day 10). Frozen-thawed semen was used for all inseminations. Pregnancy rates were based on rectal palpation conducted 60 to 65 days after AI and pregnant cows were retained to determine calving rates. Chi-square analyses were used to compare pregnancy and calving rates.

In a preliminary trial, twelve lactating cows (45 to 60 days postpartum) with small, inactive ovaries (as described above), were given an i.m. injection of 1500 IU eCG (Folligon; Intervet, The Netherlands). These cows were observed for oestrus for a 10-day interval after treatment and were inseminated. Transrectal ultrasonography was performed approximately 30 days after insemination for detection of pregnancy.

Results and discussion

A total of 331 cows were used in the trial; 38 and 31 (11.5 and 9.4%, respectively) were detected in oestrus on Days 0 to 6 and 7 to 8, respectively. The remainder of the cattle were fixed-time inseminated (on Day 10). The results are summarised in Table 1.

Table 1

Reproductive performance in cattle treated with an Ovsynch program and inseminated after being detected in oestrus following the first GnRH or $PGF_{2\alpha}$ (Days 0–6 and 7–8, respectively) or inseminated at a fixed-time (Day 10) after the second GnRH. The timing of insemination did not affect pregnancy rate or calving rate (P = 0.82 and P = 0.23, respectively)

	Insemination (Day)		
	0–6	7–8	10
Cows (n)	38	31	262
Pregnant (n)	12	12	89
Pregnancy rate (%)	31.6	38.7	34.0
Calving (n)	12	12	80
Calving rate (%)	100	100	89.0

The overall pregnancy rate (31.4%) was similar to previous reports (Risco et al., 1998; Thatcher et al., 2001). However, it is noteworthy that 11.5 and 9.4% of the cows were detected in oestrus on Days 0 to 6 and 7 to 8, respectively. In a previous study (Burke et al., 1996), the incidence of oestrus was 3 and 9% respectively, for these two intervals. If the cows that were detected in oestrus early had been fixed-time inseminated, it is expected that pregnancy rates would have

been lower (Thatcher et al., 2001). Clearly these cows were not effectively synchronised by the Ovsynch treatments. A recent modification to the Ovsynch program that is being utilised in the United States is pre-synchronisation with 2 doses of $PGF_{2\alpha}$, 14 days apart, with the first GnRH given 12 days after the second $PGF_{2\alpha}$ treatment; in cycling cows, pregnancy rates were 52.3% in pre-synchronised cows compared to 31.3% in cows that were not pre-synchronised (Thatcher et al., 2001). Pre-synchronisation appears to have considerable merit and should be studied under Hungarian conditions.

In the preliminary trial, 10 of the 12 cows were detected in oestrus within 10 days after eCG treatment and were inseminated; eight of these (80%) were pregnant approximately 30 days after insemination. In previous reports, eCG has been given (along with progesterone) to increase pregnancy rates in anoestrous dairy and beef cattle (Munro and Moore, 1985). These results are very encouraging and warrant further investigation.

In conclusion, the Ovsynch program resulted in acceptable pregnancy rates in cyclic cows and has considerable potential to improve reproductive performance in herds with poor oestrus detection. Further refinements (e.g. pre-synchronisation) should also be studied. In anoestrous cows, treatment with eCG treatment has considerable promise for inducing oestrus and should be more thoroughly investigated.

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