Effect of CIDR® on 4-day-service-rate, pregnancy rate and vaginal irritation in dairy heifers

X. von Krueger; W. Heuwieser
Clinic for Animal Reproduction, Faculty of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany

Key words
Cattle, heifer, estrus synchronization, progesterone, CIDR, vaginal discharge

Summary
Objective: The objective of this study was to compare reproductive performance parameters for two protocols for estrus synchronization in dairy heifers in Germany. Material and methods: In the CIDR group (n = 93) all heifers received a controlled intravaginal progesterone releasing insert (Eazi-BreedTM CIDR®; Pfizer Pharma GmbH; containing 1,38 g of progesterone) on day 0. On day 7 these cows were given prostaglandin F2α (PGF2α) analogue cloprostenol (Estrumate®, Intervet Deutschland GmbH, 0.5 mg per animal i. m.), and the CIDR® insert was removed. Any mucus attached to the insert was scored on a 4-point scale: 0 = no mucus; 1 = clear; 2 = bloody; 3 = yellow/cloudy mucus. In the PG group (n = 98) all heifers were given PGF2α analogue cloprostenol on day 7. Between day 8 and 11 heat detection was conducted twice daily for 30 minutes. All heifers in estrus were bred by artificial insemination (AI) and pregnancy was diagnosed 40 days after AI by transrectal palpation.

Results: In the CIDR group the 4-day-service rate was 91.4%, in the PG group 70.4% (p < 0.05). More heifers in the CIDR group were pregnant than in the PGF2α protocol (76.3 vs. 56.1%, p < 0.05). Mucus scores of 2 and 3 indicative of vaginal irritation were observed in 91.9% of the CIDR group but did not affect the pregnancy outcome (OR = 0.652, CI95 = 0.235–1.810; p = 0.411).

Conclusion: In conclusion, the CIDR protocol improved reproductive parameters of dairy heifers compared with a PGF 2α protocol. Mucus after removal of the CIDR® insert did not affect pregnancy rates.

Correspondence to
Xenia von Krueger
Tierklinik für Fortpflanzung
Fachbereich Veterinärmedizin
Freie Universität Berlin
Königsweg 65
14163 Berlin
Germany
Email: krueger.xenia@vetmed.fu-berlin.de

Schlüsselwörter
Rind, Färse, Brunstsynchronisation, Progesteron, CIDR, Vaginalausfluss

Zusammenfassung
Ziel dieser Studie war der Vergleich von Reproduktionsparametern zwischen zwei Synchronisationsprogrammen bei Färsen in Deutschland. Material und Methoden: Insgesamt 191 Färsen der Rasse Holstein Frisian wurden zufällig in zwei Studiengruppen eingeteilt (Tag 0). Den Färsen der Versuchsgruppe CIDR (n = 93) wurde am Tag 0 ein intra -vaginales Progesteronfreisetzungssystem (Eazi-BreedTM CIDR®; Pfizer Pharma GmbH; enthält 1,38 g Progesteron) für 7 Tage eingesetzt. Am Tag 7 erhielten die Tiere PGF2α-Analogon Cloprostenol (Estrumate®, Intervet Deutschland GmbH, 0,5 mg pro Tier i. m.). Nach Entfernen des CIDR® am Tag 7 erfolgte eine Dokumentation des vaginalen Ausflusses eingeteilt in folgende Grade: 0 = kein Ausfluss, 1 = klar, 2 = blutig, 3 = gelblich/trüb. In der Kontrollgruppe PG (n = 98) wurde allen Tieren am Tag 7 das PGF2α-Analogon Cloprostenol verabreicht. Zwischen Tag 8 und 11 fand in beiden Studiengruppen eine intensivierte Brunstbeobachtung statt. Alle brünstigen Färsen wurden künstlich besamt und am 40. Tag nach der Besamung mittels rektaler Untersuchung auf eine Trächtigkeit untersucht. Ergebnisse: In der CIDR-Gruppe lag die Brunsternutzungsrate höher als in der PG-Gruppe (91,4% vs. 70,4%, p < 0,05). Mehr Tiere in der CIDR-Gruppe wurden tragend als in der PG-Gruppe (76,3% vs. 56,1%, p < 0,05). Als Anzeichen einer vaginalen Irritation wurde bei 91,9% der Färsen der CIDR-Gruppe Ausfluss der Grade 2 und 3 festgestellt, der jedoch keinen Einfluss auf die Trächtigkeitsergebnisse zeigte (OR = 0,652; CI95 = 0,235–1,810; p = 0,411).

Schlussfolgerung: Zusammengefasst ließen sich in der CIDR-Gruppe bessere Fruchtbarkeitsparameter erreichen als in der PG-Gruppe. Der vaginale Ausfluss nach Entfernen des CIDR® hatte keinen negativen Effekt auf die Konzeptionsraten.

Effekt des CIDR® auf Brunsternerkennung, Besamungserfolg und vaginale Irritation bei Färsen
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Introduction

Several methods can be used to synchronize estrus in cattle. Most methods employ an injection of prostaglandin \( F_2\alpha \) (PGF\(_{2\alpha}\)) that regresses the corpus luteum (CL) (4, 6, 11). Regression of CL (luteolysis) is followed by the development of a preovulatory follicle, expression of estrus behavior, and ovulation (8). PGF\(_{2\alpha}\), however, will not regress a developing CL that is present on the ovary during the first 5 days of the estrus cycle (3, 8). In this situation one method to improve estrus synchronization in comparison to a single treatment with PGF\(_{2\alpha}\) is to give progesterone (P\(_4\)) for 7 days before the administration of PGF\(_{2\alpha}\) (9, 12, 13). This approach ensures a CL responsive to PGF\(_{2\alpha}\) because the CL is at least 7 days old (9). P\(_4\) will also delay estrus in cattle that naturally undergo CL regression during the P\(_4\) treatment period before PGF\(_{2\alpha}\) injection (10).

The objective of the present study was to quantify efficacy of an intravaginal P\(_4\) releasing insert (EaziBreed™ CIDR®; Pfizer Pharma GmbH) and an injection of PGF\(_{2\alpha}\) for synchronizing estrus in dairy heifers. Additionally, vaginal irritation caused by the CIDR\(^\circ\) insert was systematically evaluated by scoring the mucus attached to the insert.

Materials and methods

Animals and study design

The study was conducted on a commercial heifer rearing facility in Germany. Study animals were housed in free stall barns and fed a total mixed ration based on corn silage (60%) and grass silage (40%). At the age of 13 months, heifers were weighed biweekly and considered to be eligible to be bred if their body weight (BW) exceeded 400 kg. Groups of nine heifers were formed and assigned to breeding pens 9 to 10 days before artificial insemination (AI).

A total of 207 Holstein Friesian heifers were enrolled in the study and assigned to one of two treatment groups using a random treatment allocation plan generated before the initiation of the trial using a random number generator (Excel 2003, Microsoft Corporation).

In Group 1 (CIDR, \( n = 109\)) all heifers received an intravaginal progesterone releasing device (Eazi-Breed™ CIDR®; Pfizer Pharma GmbH; containing 1.38 g of progesterone) on day 0. The CIDR\(^\circ\) insert is a T-shaped device and was placed into the vagina by using a lubricated applicator. For each heifer one disinfected applicator was used. At the beginning of the study the CIDR\(^\circ\) insert was missing on day 7 in 16 heifers. These heifers were not included in the analyses (CIDR, \( n = 93\)). Therefore, before insertion, the polyester tail of the CIDR\(^\circ\) insert was clipped to a length of 5 cm for all subsequent animals to minimize losses. On day 7 these cows were given 0.5 mg per animal cloprostenol (Estrumate®, Intervet Deutschland GmbH) intramuscularly and the CIDR\(^\circ\) inserts were removed. Any mucus attached to the insert was classified using a 4-point scale: 0 = no mucus, 1 = clear, 2 = bloody, 3 = yellow/cloudy mucus. In Group 2 (PG, \( n = 98\)) heifers were given cloprostenol (0.5 mg per animal) intramuscularly on day 7.

Between day 8 and 11 heat detection was conducted twice daily for 30 minutes for the two breeding pens holding nine heifers each. All heifers in estrus were bred by AI and pregnancy was diagnosed 40 days after AI by transrectal palpation.

Statistical analyses

Data were analyzed using SPSS for Windows (PASW Statistics 18.0, SPSS Inc., Munich, Germany). Effect of treatment on pregnancy outcome was evaluated using chi square analyses. Logistic regression model for a positive pregnancy diagnosis in the CIDR group included the score of mucus attached to the insert as covariate. Adjusted odds ratios (OR), confidence intervals (CI\(_{95}\)), and \( p \)-values are reported. Level of significance for all statistical analyses was \( \alpha = 0.05 \). For logistic regression, confidence interval was set at 95%.

Results

AI of heifers in estrus was performed within 4 days after treatment. In both groups, CIDR and PG group, respectively, most AI were carried out 2 days after treatment (Fig. 1).

As shown in Table 1 the 4-day-service rate was higher in the CIDR group (91.4%; 85 of 93) compared to the PG group (70.4%; 69 of 98; \( p < 0.05 \)). Conception rates to first service were 83.5% (71 of 85) and 79.7% (55 of 69) for CIDR and PG group, respectively (\( p = 0.541 \)). Significantly (\( p < 0.05 \)) more heifers in the CIDR group (76.3%; 71 of 93) were pregnant than in the PG group (56.1%; 55 of 98).

Mucus scores were obtained for each of the 93 heifers that had retained the CIDR\(^\circ\) insert for 7 days. Mucus attached to the CIDR\(^\circ\) insert was classified as 0 in 3.2% (3 of 93), as 1 in 5.4% (5 of 93), as...
2 in 16.1% (15 of 93), and as 3 in 75.3% (70 of 93) of the inserts. There were no effects of mucus on pregnancy outcome in the CIDR group (OR = 0.652, CI95 = 0.235–1.810; p = 0.411).

Discussion

A 7-day administration of the CIDR® insert with an injection of PGF2α at insert removal on day 7 was an effective method for estrus synchronization in dairy heifers. In suckled beef cows the use of a CIDR® insert without an injection of PGF2α has also been shown to shorten the interval from initiation of the breeding season to conception (7). The additional application of PGF2α 24 hour before or at the time of insert removal (5, 12) assures luteolysis of a potentially existing CL. Within 96 hours after removal of the CIDR® insert 91.4% of heifers got in standing heat comparable to 89.4% of heifers in a previous study (12). This allows reducing time allocated to estrus detection. Furthermore, estrus detection and utilization was improved compared to a control group as reported previously (9). In the PG group only 70.4% of heifers were inseminated during 4 days after PGF2α injection. Because a diagnosis of ovarian activity and presence of CL was not conducted before treatment only heifers of the PGF2α protocol with functional CL were responsive to PGF2α. If heifers had a developing CL on day 0 of the study, the previous treatment with CIDR® ensures that the CL is at least 7 days old and consequently responsive to PGF2α (9). P2 will also delay estrus in cattle that naturally undergo CL regression during the P2 treatment period before PGF2α injection (10). Therefore, pregnancy rate for heifers of the CIDR group was higher compared to heifers of the PG group.

Table 1

<table>
<thead>
<tr>
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<th>CIDR group (n = 93)</th>
<th>PG group (n = 98)</th>
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<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
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<tr>
<td>4-day-service rate</td>
<td>85/93</td>
<td>91.4a</td>
</tr>
<tr>
<td>Conception rate to first service</td>
<td>71/85</td>
<td>83.5</td>
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<tr>
<td>Pregnancy rate</td>
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<td>76.3a</td>
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α p < 0.05

Conclusion for practice

A 7-day CIDR® protocol for estrus synchronization improved reproductive performance of dairy heifers in Germany compared with a PGF2α protocol. While the majority of heifers in the CIDR group showed bloody or yellow/cloudy mucus after removal these findings did not affect pregnancy rates.

References


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