COMPARATIVE EFFICIENCY OF INTRACERVICAL AND INTRAUTERINE METHODS OF INSEMINATION IN DAIRY CATTLE

H. J. WEETH AND H. A. HERMAN
Department of Dairy Husbandry, University of Missouri, Columbia

On a technical basis both intracervical and intrauterine methods of inseminating dairy cows have advantages and disadvantages as enumerated by Rowson (7) and Herrick (2). While technical factors may necessitate the use of one method in individual instances, the predominate method to be used should be determined by a comparison of breeding results. In a survey of inseminating techniques, Trimberger (9) concluded that the intrauterine method of breeding in which the inseminating tube could be guided through the cervix was the preferred technique. Raps (5), in 1948, found that the speculum was being used on less than 1 per cent of the cows artificially inseminated in Iowa. However, several artificial breeding associations in Missouri have made general use of the intracervical-speculum method and also the intrauterine method.

The data reported herein summarize a field comparison between the breeding efficiency of the two techniques.

EXPERIMENTAL

During a period of 3 mo. three inseminators working in one county and directly from a central bull stud inseminated part of the cows by the intracervical method, in which the inseminating pipette was passed through a speculum and the semen deposited in the posterior cervix; the remainder were inseminated by intrauterine insemination, in which the pipette was worked into the uterus by manipulation of the cervix per rectum. A total of 2,364 inseminations, 1,053 intracervical and 1,311 intrauterine, was made during the period.

To further test the effectiveness of the two insemination methods, the data were divided into first services and repeat breedings, since the reproductive ability of the first services group should be higher than that of a group of repeat breeders. Nothing but the number of previous negative services was known of the breeding history of the cows involved and all available data were used.

The data were analyzed for the efficiency of the two methods with different ages of semen. Most of the inseminations (62 per cent) were made with semen used within 12 hr. after collection and no semen over 60 hr. old was used.

All cows included in the study had been inseminated at least 150 days at the time of calculation of the percentage non-returns. In all comparisons between the two insemination techniques the Chi-square test for significance was used.

RESULTS

As shown in table 1, the tendency of the inseminators was to inseminate "repeat" cows by the intrauterine method. semen was deposited in the uterus

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in 64 per cent of the "repeat" cows. It is obvious that this selective use of the intrauterine method introduced a bias in the result. On first services the difference of 5.0 per cent in assumed conception rate in favor of the intrauterine method was not statistically significant. The data revealed a highly significant increase of 8.9 per cent in percentage non-returns with the intrauterine method on "repeat breedings." Likewise, when first services and "repeat" inseminations were combined into total services the difference was significant.

When the data were analyzed by groups according to the age of semen used, the 5.0 per cent higher percentage non-returns, intrauterine over intracervical, when fresh semen was used was not significant. With semen used 24 to 36 hr. after collection, the difference in percentage non-returns was 13.1 per cent, significant at the 1 per cent level. The number of cows bred with 48 to 60 hr. semen was too small for the difference of 10.4 per cent in percentage non-returns to be significant. The data showed a 10.1 per cent drop in assumed conception rate between fresh and 1-day-old semen when the intracervical method was used; there was only a 2.0 per cent decrease between fresh and 1-day semen with the intrauterine method. This decrease with day old semen was highly significant with the intracervical method and insignificant with the intrauterine method.

**TABLE 1**

*Comparison of intracervical and intrauterine methods of inseminating dairy cows*

<table>
<thead>
<tr>
<th>Insemination Method</th>
<th>1st Services</th>
<th>Repeat Services</th>
<th>Total Services</th>
<th>Age of semen used (hr.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>&lt;12</td>
</tr>
<tr>
<td>Intracervical</td>
<td>578</td>
<td>475</td>
<td>1053</td>
<td>637</td>
</tr>
<tr>
<td>% non-returns</td>
<td>46.7</td>
<td>49.8</td>
<td>48.1</td>
<td>52.4</td>
</tr>
<tr>
<td>Intrauterine</td>
<td>478</td>
<td>833</td>
<td>1311</td>
<td>827</td>
</tr>
<tr>
<td>% non-returns</td>
<td>51.7</td>
<td>58.7</td>
<td>56.1</td>
<td>57.4</td>
</tr>
<tr>
<td>Difference&lt;sup&gt;a&lt;/sup&gt;</td>
<td>5.0</td>
<td>8.9&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.0&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.0</td>
</tr>
<tr>
<td>% non-returns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Intrauterine vs. intracervical
<sup>b</sup> P < 0.01

DISCUSSION

Some selective rebreeding of cows by the intrauterine insemination technique has altered the comparison between the intracervical and intrauterine method; nevertheless, in the six comparisons made, intrauterine breeding gave significantly better results in three cases and the trend was the same in those comparisons where the differences were not significant. The difference observed in these data is smaller than that observed by Lasley and Bogart (4) who reported a difference of 19 per cent in favor of the intrauterine method on 68 intracervical and 199 intrauterine inseminations with beef cattle. Holt (3) reported a first services conception rate of 33.4 per cent for intracervical insemination and 56.1 per cent for intrauterine insemination on 751 cows bred at random. Raps (5), in a field comparison of the effectiveness of the speculum and deep cervical or intrauterine techniques, found a 6.7 per cent advantage in the latter on first
services only. The difference in percentage non-returns to second services by the two methods was negligible (1 per cent). This is not in agreement with the present data, for here the difference on first services is not statistically significant, but the difference is significant on inseminations after the first. If the difference in efficiency between the two techniques is real, it could be expected that some cows that failed to conceive to an intracervical insemination would become pregnant to a subsequent intrauterine insemination. Herrick (2) found no significant difference in conception rate in the Iowa State College dairy herd when half of the herd was bred by depositing semen on the external cervical os, via a speculum, and half was bred by cervical fixation. Herman and Swanson (1) found no significant difference between the two methods of insemination in the Missouri Station Dairy Herd. All cows are inseminated at the middle of the estrus period, and the speculum method still is used routinely by beginning inseminators. These observations and the present data suggest that when reproductive factors are optima the two methods may be equally efficient.

In an in vitro study of sperm penetration of bovine vaginal-cervical mucus, Roark (6) observed changes in penetration rates during estrus. Penetration was maximal in mucus collected during full and late estrus. However, individual variations in penetration rates were observed. The range was from 0 to 6 mm. penetration per minute. Furthermore, while vigorous sperm from one bull’s semen were unable to penetrate a sample of mucus, sperm of equal vigor from another bull’s semen could penetrate the same mucus. His study suggests that, in some instances, the cervical mucus may be a barrier against the migration of sperm through the cervix.

Sergin et al. (8) concluded that the physico-chemical environment in the cervix makes this area more favorable for sperm survival than either the vagina or uterus. Sperm in the cervix served as a constant supply which passed into the uteri. A combination intrauterine-intracervical insemination technique has been used in which half of the semen is deposited in the uterine horn on the side of the functional ovary and the remainder in the middle of the cervix (10). The comparative efficiency of this technique needs further investigation.

It has been suggested that by use of the intrauterine technique the detrimental effect of an infected cervix may be by-passed. Passing a catheter through an infected cervix may, however, be a dangerous practice and the use of intrauterine insemination in this instance is questionable.

SUMMARY

A study of the comparative efficiency of intracervical and intrauterine semen deposition in inseminations with dairy cattle was made.

Percentage non-returns were significantly higher with the intrauterine method on total services and repeat breedings. The difference on first services was not significant.

With semen 24 to 36 hr. old, the intrauterine method showed a significant difference of 13.1 per cent greater non-returns for cows inseminated under field conditions.
Intracervical percentage non-returns were significantly lower with semen used 24 to 36 hr. after collection than with semen used within 12 hr. after collection; with intrauterine insemination the decrease was not significant.

The data indicate that as a general insemination technique intrauterine breeding gives better results than deposition of semen in the posterior cervix, via the speculum.

REFERENCES
(1) HERMAN, H. A., AND SWANSON, E. W. Department of Dairy Husbandry, University of Missouri (Unpublished data).