SOME FACTORS AFFECTING PREGNANCY RATE DURING ARTIFICIAL INSEMINATION IN CATTLE

Haider R. Abbas¹, Hussein A. Khamees²*, Jawad K. Taher³

¹Assistant Prof: Department of surgery and obstetrics. Collage of Veterinary Medicine, Basrah University, Iraq
²Assistant lecturer: Department of surgery and obstetrics. Collage of Veterinary Medicine, AL-Muthanna University, Iraq
³Lucturer: Department of surgery and obstetrics. Collage of Veterinary Medicine, Di Qar University, Iraq

*Corresponding author: husseinalburesha1983@gmail.com, 009647712725833

Running title: Cattle pregnancy effectiveness by some factors

ABSTRACT
This study was conducted in the northern regions of Basra province / Iraq from March 2017 to February 2018. Nine-hundred cow age ranges between 2 to 5 years, weights from 200 to 400 kg and have crossbreeding and local breeds. Prior to initiating the artificial insemination, the rectal palpation of the cows was performed to determine the estrous phase and palpation the ovaries to determine the ovarian state and ovulation site. The cows was inseminated artificially using three different sources of frozen semen (Holland, Iranian and Iraqi) source with two different straw volume (0.5 or 0.25) ml., and during the insemination; the deposition of semen was performed in three different sites of female genitalia (uterine horn, uterine body and cervix). Depending on the source or origin of the frozen semen, the results showed there are no effect on successful insemination when use of frozen semen with a Holland, Iraqi or Iranian source, there are no significant differences at p < .05. (F = 1.1877). Depending on the size of the straw used (0.25 ml or 0.5 ml); the results showed there are no significant differences between the two volumes at (p < .05). Depending on the site of semen deposition within the female reproductive system; the results showed there are a significant differences at (p < .05) and (F = 8.73035). The highest percentage of successful inseminations showed when the deposition of semen in the uterine horn, compared to the deposition in the body of the uterus or cervix. Depending on the number of inseminations, the results showed that there are no significant differences between the study groups at (p < .05) and (F = 60.54751). The total percentages of successful inseminations in this study were 785/900 (87%), while the failed inseminations were 115/900 (12%). After third insemination; the cases were excluded and considered as a Repeated Breeders cows.

Keywords: cattle, artificial insemination, pregnancy rate.

INTRODUCTION
The Artificial insemination (AI) or introduction of semen in the female genitalia by means of instruments is the first generation of reproductive biotechnologies, which was feasible in cattle. It is a process by which semen are collected from the male, processed, stored and artificially introduced into the female reproductive tract for the purpose of conception (Temesgen et al., 2017). However, since the same bull mated several cows on different farms, the spread of genital diseases with decreased fertility outcomes was a constant threat. Moreover, keeping herd bulls was expensive and represented potential danger for the herd manager (Valergakis et al., 2007).

The introduction of AI in cattle was mainly required by sanitary reasons, and especially by fertility problems caused by Campylobacter foetus subspecies venerealis (vibriosis) and Trichomonas foetus. However, also the control and prevention of non-sexually transmitted diseases such as tuberculosis, brucellosis and paratuberculosis at the farms benefited from the introduction of AI (Tadesse, 2008). Semen was collected from the bull, deep-frozen and stored in a container with liquid nitrogen at a temperature (-196°C), and ready for used. Artificial insemination has been widely used for breeding dairy cattle as the most valuable management practice available to the farmers.
cattle producer and has made bulls of high genetic merit available to all. Many bulls have been testified to produce sufficient semen to provide enough sperm for 40,000 breeding units in one year (Bearden et al., 2004).

In Britain, AI in dairy cattle began to be available in 1942, and by 1950, 20% of dairy cattle were being inseminated. By 1960, more than 2 million cows were inseminated yearly, which was about 80% of the maximum level that AI would reach (Brassley, 2007).

The established procedure for AI in cattle since the 1960s is transcervical deposition of semen into the uterine body. This technique replaced the original vaginal or shallow cervical insemination performed in the 1940s as the intrauterine method proved to be more efficient and resulted in higher fertility (Lopez, 2000).

This study scrutinized the comparison of the pregnancy rates of artificially inseminated cows using three different sources of frozen semen and two different volume of the straw used for each source, as well as the comparison of the sperm deposition site during the insemination.

**MATERIALS AND METHODS**

This study was conducted on the northern regions of Basra province / Iraq from March 2017 to February 2018. Nine-handed cow aging between 2 to 5 years, weights from 200 to 400 kg and have crossbreeding and local breeds.

Prior to initiating the artificial insemination, the rectal palpation of the cows was performed to determine the estrous phase and palpation the ovaries to determine the ovarian status and ovulation site. The study cows inseminated artificially using three different sources of frozen semen (Holland, Iraqi and Iranian) source with two different straw volume (0.5 or 0.25) ml.

The groups divinding:
1. **Group 1**: Three hundred cow inseminated by using frozen semen from Holland origin (150 cow inseminated by using 0.5 ml straw and other 150 cow inseminated by 0.25 ml straw).
2. **Group 2**: Three hundred cow inseminated by using frozen semen from Iraqi origin (150 cow inseminated by using 0.5 ml straw and other 150 cow inseminated by 0.25 ml straw).
3. **Group 3**: Three hundred cow inseminated by using frozen semen from Iranian origin (150 cow inseminated by using 0.5 ml straw and other 150 cow inseminated by 0.25 ml straw).

Each 150 cow from each group were subdivided into three groups as the following:
- Fifty cows: the frozen semen was deposit at the cervix.
- Fifty cows: the frozen semen was deposit at the uterine body.
- Fifty cows: the frozen semen was deposit at the uterine horn (at the same region where ovulation occurred).

The study groups were shown in the tables (1).

<table>
<thead>
<tr>
<th>Origin of frozen semen</th>
<th>Holland AI straws</th>
<th>Iraqi AI straws</th>
<th>Iranian AI straws</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume of the used straw (ml)</td>
<td>0.5</td>
<td>0.25</td>
<td>0.5</td>
</tr>
<tr>
<td>N of inseminated cows</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Site of cow genitalia which inseminated perform</td>
<td>Cervix</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Uterine Body</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Uterine Horne</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Total inseminated cows</td>
<td>900 cow</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STATISTICAL ANALYSIS**

Estrus response and reproductive performance were analyzed using the chi –square test (SPSS 10.0.1 software program) was use for all statistical analysis. Differences were considered significant at level of p< 0.05.

**RESULTS AND DISCUSSION**
In order for the results to be more accurate and objective, the comparison between totals was carried out according to the variables studied and as follows:

1. Depending on the source or origin of the frozen semen, the results showed that no effect on successful insemination was the use of frozen semen with Holland, Iraqi and Iranian source respectively Table (2). There is no significant difference at \( p < .05 \). (\( F = 1.1877 \)).

<table>
<thead>
<tr>
<th>Frozen semen source</th>
<th>Clinical groups</th>
<th>Total successful inseminations</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holland</td>
<td>1,2,3,4,5,6</td>
<td>272/300</td>
<td>90%</td>
</tr>
<tr>
<td>Iraqi</td>
<td>7,8,9,10,11,12</td>
<td>263/300</td>
<td>87%</td>
</tr>
<tr>
<td>Iranian</td>
<td>13,14,15,16,17,18</td>
<td>250/300</td>
<td>83%</td>
</tr>
</tbody>
</table>

The \( f \)-ratio value is 1.1877. The \( p \)-value is .332026. The result is not significant at \( p < .05 \).

2. Depending on the volume of the straw used (0.25 ml or 0.5 ml), the results were showed that there are no significant difference between the two volumes at \( p < .05 \) but the results showed increase the pregnancy rate when used the 0.5 ml straw comparative with use of 0.25 ml straw. Table (3).

<table>
<thead>
<tr>
<th>Straw volume</th>
<th>Clinical groups</th>
<th>Total successful inseminations</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 ml</td>
<td>1,3,5,7,9,11,13,15,17</td>
<td>397/450</td>
<td>88%</td>
</tr>
<tr>
<td>0.25 ml</td>
<td>2,4,6,8,10,12,14,16,18</td>
<td>388/450</td>
<td>86%</td>
</tr>
</tbody>
</table>

The \( t \)-value is 0.49506. The \( p \)-value is .313644. The result is not significant at \( p < .05 \).

3. Depending on the site of semen deposition within the female reproductive system, the results showed that the highest percentage of successful inseminations were the deposition of semen in the uterine horn compared to the deposition in the body of the uterus or cervix at \( p < .05 \) and \( ( F = 8.73035) \). Table (4).

This result compatible with (Lopez et al., 2000) that confirmed by research the established procedure for AI in cattle since the 1960s is transcervical deposition of semen into the uterine body. This technique replaced the original vaginal or shallow cervical insemination performed in the 1940s as the intrauterine method proved to be more efficient and resulted in higher fertility.

This study is consistent with the study by Meirelles et al., (2012) that show; in beef cattle, the results of comparing deep intrauterine horn artificial insemination (DIAI) with intrauterine body AI revealed that in DIAI, the pregnancy rates were
higher (67.4%) as compared to AI (48.8%).
In bilateral DIAI, the semen deposition in middle part of uterine horn enhanced fertilization of oocytes (Daltonet al., 1999).
The total pregnancy rates after intrauterine horn insemination with 2 million spermatozoa at a fixed period as well as at a spontaneous estrus differed non-significantly from that obtained after insemination in the body of the uterus (Andersson, 2004).
Others have reported both significantly increased [Lopez and Camon, 1988]and(Senger et al., 1988) reduced (Marshall et al., 1988) pregnancy proportions from intrauterine horn inseminations.

<table>
<thead>
<tr>
<th>Site of semen deposition</th>
<th>Clinical groups</th>
<th>Total successful inseminations</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uterine horn</td>
<td>1,2,7,8,13,14</td>
<td>279/300</td>
<td>93%</td>
</tr>
<tr>
<td>Uterine body</td>
<td>3,4,9,10,15,16</td>
<td>269/300</td>
<td>89%</td>
</tr>
<tr>
<td>Cervix</td>
<td>5,6,11,12,17,18</td>
<td>273/300</td>
<td>79%</td>
</tr>
</tbody>
</table>

The f-ratio value is 8.73035. The p-value is .003058. The result is significant at p < .05

4. Depending on the number of inseminations, the results showed no significant difference between the groups at (p < .05) and (F = 60.54751). Table (5)

<table>
<thead>
<tr>
<th>sequence of insemination</th>
<th>Total pregnancy rate</th>
<th>percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>424/900</td>
<td>47%</td>
</tr>
<tr>
<td>Second</td>
<td>324/476</td>
<td>68%</td>
</tr>
<tr>
<td>Third</td>
<td>37/142</td>
<td>26%</td>
</tr>
</tbody>
</table>

The f-ratio value is 60.54751. The p-value is < .00001. The result is significant at p < .05.

5. The total percentages of successful inseminations in this study were 785/900 (87%), while the failed inseminations were 115/900 (12%).

6. After third inseminations; the cases were excluded and considered as a Repeated Breeders cows.

**CONCLUSIONS**
The successful of artificial insemination does not depend on the volume of the straw, especially if the semen was deposited into deep uterus or uterine horn, which the results showed increased fertilization rates, and no recurrence of the cows to estrous compared to the uterine body or cervix.
The acceptable pregnancies may be achieved even if the side of ovulation is not known in case of deep-uterine inseminations. A productive means for achieving reasonable pregnancies with low sperm doses may be by deep-uterine inseminations. Re-insemination increases the chances of fertilization probably due to more regulation of the estrous cycle and determining ovulation time.
There is no relationship to the source of frozen semen and the successful rate of insemination if you were interested in the right ways to collect, treat, freeze and publicizing frozen semen.
REFERENCES


