

EFFECT OF SITE OF SEMEN DEPOSITION ON CONCEPTION RATE IN EWES

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SUMMARY

Ninety five crossbred (Finn X Ossimi or Rahmani) ewes were divided into three groups to study the effect of site of semen deposition, (vaginal, cervical and uterine) post- oxytocin treatment on conception percentage. Animals were inseminated with 180×10^6 post-thaw motile sperm. Animals in the first group were inseminated by the conventional insemination technique while those in the second group were injected (vaginal submucosal) with 10 I.U. oxytocin and served within 8 min. of injection. Laparoscope was used for uterine semen deposition in the third group. Animals did not conceive from the first service were reserved in the next observed estrus. Overall conception percentages for vaginal, cervical and uterine semen deposition were 65.6, 75.0 and 87.1%, respectively. The respective conception percentages/one insemination were 44.7, 54.5 and 65.8%.

Furthermore, the effect of three different doses of oxytocin (0, 10, 20 I.U.) on the dilation of cervix (site of semen deposition), was tested using 57 ewes allocated to three equal groups. Increasing level of oxytocin resulted in an increase in the depth of site in which semen could be deposited in the reproductive tract. The highest rate of successful inseminating catheter penetration into the uterus (79%) occurred in ewes injected with 20 I.U. oxytocin while in those uninjected (0 I.U. oxytocin) the catheter failed to exceed the cervical os. As oxytocin dose increased conception rate increased being 63.2, 73.7 and 84.2% in ewes treated with 0, 10 and 20 I.U. oxytocin, respectively.

Keywords: Site of semen deposition, ewes, A.I., oxytocin

INTRODUCTION

Most commonly A.I. techniques in sheep, deposit the semen into the external os-cervix, as cervix constitutes a barrier to inseminating catheter. However, conception rates in ewes increased as semen was deposited deeper in the ewe reproductive tract using non practical techniques (Saab and Sleiman, 1987; Halbert *et al.*, 1990; Machado and Simplicio, 1990; Schakell *et al.*, 1990). Halbert *et al.* (1990) and Campbell *et al.* (1995) using long forceps to retract the cervix and 16 gauge spinal needle, attempted intra-cervical insemination with a round ball on the tip for insemination. They reported an increase in conception percentage as semen deposited deeper in the reproductive tract. However, greater incidence of damage occurred as needle penetrated deeper in the cervix.

Successful attempts to dilate the cervix in ewes were reported (Khalifa *et al.*, 1992 and Khalifa, 1993) to facilitate the passage of inseminating catheter by use of oxytocin. Therefore, the objectives of this study were, to learn more about the effect of oxytocin on cervical dilation and the effect of site of semen deposition on conception percentage using three different A.I. methods for vaginal, cervical and uterine semen deposition.

MATERIALS AND METHODS

The study consisted of two experiments, using Finn X Ossimi or Rahmani ewes, carried out at Sakha Experimental Station, Ministry of Agric. Experiment 1 consisted of 95 ewes, divided into three groups, to study the effect of site of semen deposition (vaginal, cervical & intra uterine) on conception percentage. Animals in the first group were inseminated by the conventional method (at os cervix). The second group was injected (vaginal submucosal) with 10 IU oxytocin to dilate the cervix and animals were intracervically inseminated within 8 min. of injection. Intra uterine insemination was carried out in group three by use of a laparoscope. Animals returned to estrus were reserved in the next estrus using the same A.I. technique. A dose of 180×10^6 post thaw motile sperms were used for insemination.

The second experiment consisted of 57 ewes divided into three equal groups. Animals in the three groups were injected intravenously with 0, 10 and 20 I.U. oxytocin, respectively, to study the effect of level of oxytocin on cervical dilation and effect of site of semen deposition, by use of conventional inseminating catheter, on conception percentage. A dose of 180×10^6 motile sperms of freshly chilled

extended semen (5°C) were used for insemination. Animals in experiment 1 and 2 were inseminated 12-hrs post onset of heat. Teaser rams were used for heat detection (4 times/day).

Pregnancy rate was calculated for each semen deposition category and Chi square (χ^2) of independence was used to compare pregnancy rates between groups.

RESULTS AND DISCUSSION

Results of this study showed that conception percentage increased as site of semen deposition was deeper in the reproductive tract, regardless to the method of artificial insemination. Conception percentage of ewes in experiment 1, (Table 1) inseminated vaginally, trans-cervically and laparoscopically (Intra-uterine) in the 1st cycle were 43.8, 53.1 & 64.5% while those re-bred in the 2nd cycle were 46.7, 58.3 & 70%, respectively. Mean conception percentages obtained for both cycles for the respective sites of semen deposition were 65.6, 75.0 & 87.1% and the respective values calculated as conception percentage per insemination were 44.7, 54.5 & 65.8% and differences were significant ($p < 0.05$).

Ewes in group 2 (experiment 1; 32 ewes) varied in their cervical dilation, in response to oxytocin (10 I.U.) injection. Percentage of ewes didn't respond to oxytocin and were vaginally inseminated were 22% (7 ewes). Those partially dilated allowing semen deposition deeply in the cervix were 66% (21 ewes), while those completely dilated and intra-uterinely inseminated were 12% (4 ewes). Their conception percentages were 42.8, 52.3 and 75.0% for vaginal, intra-cervical and intra-uterine insemination, respectively.

It has been reported (Khalifa *et al.*, 1992) that the inseminating catheter passed into the uterus of 77% of intra-venously injected ewes with 200, 400 & 600 USP oxytocin compared to 0.0% in the non treated ewes. However the study lacked any conception evaluation.

Table 1. Effect of site of semen deposition on conception percentage (n= 95 ewes) (Experiment 1)

Site of semen deposition	Vaginal (os-cervix)	Intra-cervical ²	Uterine (Laparoscopy)
1st estrous cycle:			
No. of ewes bred.	32	32	31
No. conceived	14	17	20
Conception %	43.7^a	53.1^a	64.5^b
2nd estrous cycle:			
No. of ewes bred.	15	12	10
No. conceived.	7	7	7
Conception %	46.7^a	58.3^b	70.0^c
Overall effect of 1st+2nd Cycle			
No. of ewes bred.	32	32	31
Total No. of services	47	44	41
Total No. conceived	21	24	27
Conception %	65.6^a	75.0^b	87.1^c
Conception % per one service	44.7^a	54.5^b	65.8^c

1. Values in rows with different letters are significant ($P < 0.05$).

2. Ewes injected (vaginal submucosal) with 10 I.U. oxytocin for cervical dilation.

Results of experiment 2 (Table 2) showed that percentage of ewes with cervical dilation, in response to oxytocin, increased as dose of oxytocin increased. All ewes in group one with 0.0 I.U. oxytocin were inseminated vaginally while incidence of intra-uterine insemination was 68.5% and 78.9% for those injected with 10 and 20 I.U. oxytocin, respectively. Mean conception percentage increased (63.2, 73.7 & 84.2%) as dose of oxytocin increased (0, 10 & 20 I.U.). Also, mean conception percentage increased (54.5, 71.0 & 89.3%) as semen was deposited deeper in the reproductive tract (vaginal, cervical & intra-uterine). The highest conception percentage was 93.3% for those treated with 20 I.U. oxytocin and intra-uterinely inseminated. These results are in agreement with Halbert *et al.* (1990_b) using a non-hormonal technique (a long forceps and an inseminating needle). They obtained 14, 40 & 82% conception with vaginal, cervical and uterine semen deposition, but greater incidence of damage resulted as inseminating needle was deeper in the reproductive tract.

Generally, it was reported that the deeper the site of semen deposition in the ewe reproductive tract, the higher the conception rates achieved (Saab and Slicman, 1987; Halbert *et al.*, 1990_b; Machado and Simplicio, 1990 and Schakell *et al.*, 1990).

Table 2. Effect of level of oxytocin on cervical dilation, site of semen deposition and conception percentage (Experiment 2, n=57 ewes)

Site of semen deposition	Vaginal	Cervical	Uterine	Overall
Group 1 (0 I.U. oxytocin).				
Inseminated No.	19	0	0	19
Inseminated %	100	0	0	100
Conceived No.	12	0	0	12
Conceived %	63.2	0	0	63.2 ^a
Group 2 (10 I.U. oxytocin).				
Inseminated No.	2	4	13	19
Inseminated %	10.5	21.0	68.5	100
Conceived No.	0	3	11	14
Conceived %	0	75	84.6	73.7 ^{a,b}
Group 3 (20 I.U. oxytocin).				
Inseminated No.	1	3	15	19
Inseminated %	5.3	15.8	78.9	100
Conceived No.	0	2	14	16
Conceived %	0	66.7	93.3	84.2 ^{b,c}
Overall Effect:				
Inseminated No.	22	7	28	57
Inseminated %	38.6	12.3	49.1	100
Conceived No.	12	5	25	42
Conceived %	54.5 ^a	71.0 ^b	89.3 ^c	73.7

Overall Values in rows or columns having different letters are significant ($P < 0.05$)

The high conception percentage of the intra-uterine insemination is believed to be due to the availability of high sperm concentration close to the site of fertilization. The cervix constitutes a barrier to the passage of the spermatozoa. It causes a limitation in the availability of sperm and hence reduces conception percentage. This might explain the need of ewes to high dose of motile sperm not less than 150×10^6 vaginal insemination as compared to $5-10 \times 10^6$ motile sperms/cervical or uterine insemination in cattle. After vaginal insemination, semen drainage from the vagina to the exterior accounts for the great loss of spermatozoa from the ewe reproductive tract (Hawk and Conley, 1971 & 1972 and Fateh El-Bab, 1975). It was reported that only less than 3% of the inseminated spermatozoa was recovered from the ewe genital tract one hour after insemination (Fateh El-Bab, 1975). It is believed that lower number of motile sperm for intrauterine insemination in ewes could yield acceptable conception percentage. Hence, increases the usability of the ram and increases the efficiency of ram selection and maximizes genetic improvement through artificial insemination in sheep.

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