Annals Agric. Sci., Ain Shams Univ., Cairo, 48(1), 107-116, 2003

ESTRUS SYNCHRONIZATION AND ARTIFICIAL INSEMINATION IN RAHMANI EWES: A COMPARISON OF TWO METHODS OF INSEMINATION

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ABSTRACT

The present experiment was carried out by using 86 mature Rahmani ewes divided randomly into four experimental groups (22 or 21 ewes each). The study was done at EL-Serw experimental station belonging to the Animal Production Research Institute Ministry of Agriclutrue. All ewes were treated intramuscular with double doses (0.7 ml Estrumate each) nine days apart. The estrus behaviour was detected after 24 hours from both first and second Estrumate doses using vasectomized rams. Group one (22 ewes), and group two (21 ewes),were inseminated one time after 55 hours from onset of second Estrumate injection; while group three (21 ewes) and group four (22 ewes) were inseminated two times after 55 and 65 hours from onset of second Estrumate injection. Groups 1 and 3 were inseminated using Duck-bill vaginal speculum and micropipette; while group 2 and 4 were inseminated using Duck-bill vaginal speculum and mini tube. The experiment showed that 82.6% of Rahmani ewes were responed to prostaglandin estrus synchronazation after first injection; However, 84.9% of the ewes were responded after the second injection. The Rahmani ewes showed onset of estrus after (33.4 ± 0.93 and 37.0± 0.78 h) from onset of first and second Estrumate injections.Most of Rahmani ewes (57.89 and 82.19%) had normal estrus behaviour ranged between 28 and 48 hours. The lambing rate was higher ($p<0.05$) in ewes inseminated one time as compared with those inseminated two times (74.4 vs 58.1%). Furthermore, lambing rate was high ($p<0.05$) in ewes inseminated one time by using mini tube as compared with that inseminated one time by using micropipette (81.8 vs 66.6%).The gestation period in rahmani ewes ranged between 147.9 ± 0.680 and 149.0 ± 0.530 days. The litter weight ranged between 3.2±0.257 and 3.61± 0.266 Kg.In conclusion: Estrumate had poteniality to synchronize estrus in Rahmani ewes. The mini tube is a better tool for Rahmani ewes artificial insemination than micropipette.

Key words: Sheep, Estrus synchronization, Artificial insemination

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(Received March 17, 2003)
(Accepted March 22, 2003)

INTRODUCTION

Synchronization of estrus has been used in sheep industry to improve productive efficiency and facilitate the use of artificial insemination (**Beck *et al* 1993**). Successful fertilization depends on time of insemination at predetermined time after estrus synchronization (**Baril *et al* 1996**). The prostaglandin F2α has a luteolytic effect (**Acritopoulou *et al* 1982**). The Corpus Luteum of the ewe was responsive to prostaglandin between day 4 and 14 of the estrous cycle (**Chamley *et al* 1972**). The present study has been carried out to examine the effect of time and frequency of insemination and method of insemination on the reproductive performance of Rahmani ewes.

MATERIAL AND METHODS

The present study was carried out at El-Serw experimental station belonging to the Animal Production Research Institute; Ministry of Agriculture.

A total of 86 mature Rahmani ewes (3.33 years and 50.57 Kg live body weight) were used in this study. The ewes were divided randomly into four experimental groups (22 or 21 ewes each). All ewes were treated intramusclar with two doses (0.7ml Estrumate each, Coopers Animal Health LTD, Berkhmsted England; 183μg / Cloprostenol) nine days apart. (**Henderson *et al* 1984**).

After both first and second Estrumate injection the ewes were exposed to vasectomized rams after 24 hours from injection time to detect onset of estrus, which defined by the time of first exhibited estrus following treatment. The vasectomized rams were introduced every four hours after that and left with ewes approximately 45 minutes each time. The duration of estrus was calculated by difference in time between first and last detected estrus, (**Das *et al* 1992**). All ewes has inseminated artificially with fresh extended semen (200x 10^6 sperm / 0.1 ml).

The semen was diluted with an egg yolk - tris - fructose diluent (**Evans and Maxwell, 1987**). The extender was prepared at the day of insemination.

Groups 1(22 ewes) and 2 (21 ewes) were inseminated one time after 55 hours from onset of the second Estrumate injection. However, groups 3 (21 ewes) and 4 (22 ewes) were inseminated two times after 55 and 65 hours from onset of the second Estrumate injection.

Groups, 1 and 3 were inseminated by using Duck-bill vaginal speculum and micropipette; (Plate, 1); while groups 2 and 4 were inseminated by using Duck-bill vaginal speculum and Mini tube; (Plate, 2).

After 15 days from insemination all ewes were checked for estrus by using Vasectomized rams as described above. Ewes obtained in estrus were mated naturally by using intact rams.

The conception rate, lambing rate, gestation period and litter weight were recorded. The data were analyzed by Chi-square or student " t " test as first appropriate at 5 % level of significance.

RESULTS AND DISCUSSIONS

The responses of Rahmani ewes to prostaglandin (PGF2α) estrus synchronization were 82.6% ranging from (76.2 to 86.4) and 84.1% ranging from (72.7 to 90.9) respectively, after first and second injections. However, the difference between the two groups was not statistically

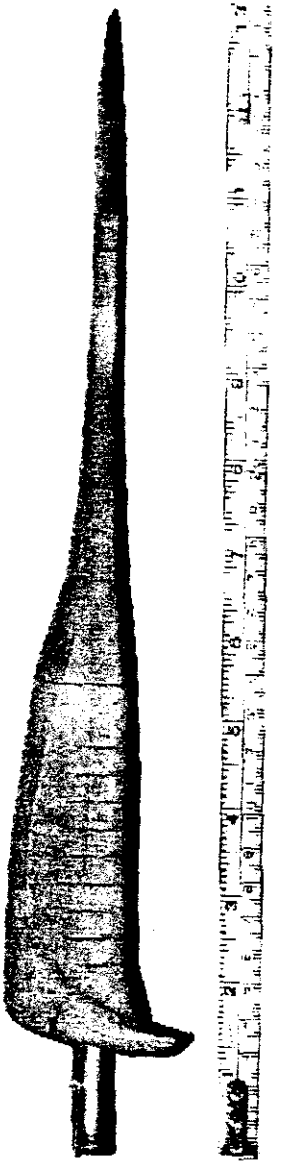

Plate 1: Micropipette

Plate 2 : Mini tube

significant. After the second PGF2α injection the estrus response increased by 2.3% (Table, 1) than that after first injection. Increases the estrus response after the second injection may be due to that ewes injected randomly at the first time at different estrous cycle stages; however, at the second injection most ewes were in diestrus and responded to PGF2α (**Fukui and Roberts, 1977 and Beck *et al* 1987**). **Deaver *et al* (1986)** showed that the endocrine and behavioural responses following PGF2α treatment vary with stage of the cycle. **Boland *et al* (1978); Acritoplulou *et al* (1982)** reported that from 88 to 98 % of the treated ewes were showed estrus activity after double injection of cloprostenol.

The Rahmani ewes showed onest of estrus after 33.4 ± 0.93 h, and 37.0 ± 0.78 h; (Table, 1) post first and second PGF2α injections, respectively. The prostaglandin reduces the lifespan of the corpus luteun during 48 hours from injection **(Deaver *et al* 1986)**. The estrus behaviour of Rahmani ewes lasted 32.0 ± 1.16 h (ranged between 29.9 ± 1.81 and 34.5 ± 2.11 h) and 37.6 ± 0.78 h (ranged between 36.4 ± 2.50 and 42.2± 2.24 h) after first and second PGF2α injection, respectively. Similar result was reported by **Kassem *et al* (1990)** who showed that estrus duration was ranged between 28.9 ± 3.73 to 41.1 ± 4.93 h in Awassi ewes. The difference between estrus behaviour after first and second PGF2α injection was not statistically significant. **Naqvi *et al* (1998)** concluded that there is no difference in estrus response, interval to estrus, duration of estrus and ovulation rate between 2 groups of Kheri ewes received different doses of PGF2α.

Following the first prostaglandin injection 36.34% of ewes showed short estrus behaviour (less than 28 hours). While 57.89 % of the ewes showed normal estrus behaviour (28 to 48 hours). Only 5.26% of the treated ewes showed long estrus behaviour (more than 48 hours) (Table, 2). The percentages of Rahmani ewes showed short, normal and long estrus behaviour after the second prostaglandin injection were 5.47%, 82.14% and 12.32% respectively. The results in Table (2) indicated that most Rahmani ewes showed normal estrus behaviour (between 28 and 48 hours).

The lambing percentage in Rahmani ewes inseminated one time at 55 hours after the second PGF2α injection was 74.4% (Table, 3). However the lambing rate was 58% when the Rahmani ewes were inseminated two times at 55 and 65 hours after second PGF2α injection. The low lambing rate obtained after double insemination may be attributed to handling stress during insemination which increase blood cortisol concentration **(Carbajo *et al* 1993)**. The later may interfere with fertilization **(Gunn and Doney 1975 and Doney *et al* 1976)**. In addition the handling stress during insemination may reduce fertility by impairing cervical sperm transport **(Robinson 1973)** thereby reducing the number of sperm reaching the anterior uterine horns and oviducts **(Mattner, 1963 and Hancock & McGovern, 1968)**. The lambing rate was 66.6% in Rahmani ewes inseminated one time by using micropipette as a catheter. However it was 81.8% in ewes inseminated one time by using mini tube (Table, 3). The high lambing rate obtained from ewes inseminated by using the mini tube may be due to the length of this tube was longer than the

Table 1. Estrus response of Rahmani ewes after 1st and 2nd prostaglandin injection

Group	No. of ewes	Estrus Response							
		After 1st injection				After 2nd injection			
		Ewes in estrus		Onset	Duration	Ewes in estrus		Onset	Duration
		No.	%	(h)	No.	No.	%	(h)	(h)
1	22	19	86.4	34.1± 2.52	29.9±1.81	20	90.9	39.6±1.24	39.6±1.91
2	21	17	80.9	329±1.90	30.3±1.68	19	90	36.6±1.78	36.4±2.50
3	21	16	76.2	36.5±1.31	32.0±1.86	18	85.7	36.4±1.35	36.7±1.71
4	22	19	86.4	32.0±1.93	34.5±2.11	16	76.2	36.0±1.86	42.2±2.24
Total	86	71	82.6	33.4±0.93	32.0±1.16	73	84.9	37.0±0.78	38.7±1.02

Table 2. Number and percentage of ewes showed short, normal, and long estrus behaviour after PGF2α injection

Group		First injection				Second injection			
		Short 24-28	Normal >28-48	Long >48	Total	Short 24-28	Normal >28-48	Long >48	Total
1	N	7	11	1	19	0	17	3	20
	%	36.34	57.89	5.26	100	0.0	85.0	15.0	100
2	N	7	10	0	17	3	14	2	19
	%	41.17	58.82	0.0	100	15.78	73.68	10.52	100
3	N	4	12	0	16	1	16	1	18
	%	25.0	75.0	0.0	100	5.50	88.88	5.550	100
4	N	5	13	1	19	0	13	3	16
	%	26.31	68.42	5.26	100	0.0	81.52	18.75	100
Overall									
	N	23	46	2	71	4	60	9	73
	%	36.34	57.89	5.26	100	5.47	82.19	12.32	100

Table 3. Effect of method of insemination and time of insemination sequance on lambing rate, gestation length (days), litter size and litter weight (Kg) at birth in Rahmani ewes

Time of insemination														
	55 hour (single)							55 and 65 hour (double)						
Insemination method	No. of ewes	No. of lambed ewes	%	Gestation (dayes)	No. ewes lambed single(%)	No. ewes lambed twins(%)	Born wieght (K.g)	No. of ewes	No. of lambed ewes	%	Gestation (dayes)	No. ewes lambed single(%)	No. ewes lambed twins(%)	Born wieght (K.g)
Micropipette	21	14	66.6^{bA}	149.64± 0.530	8(57.2)	6(42.8)	3.42±0.291	21	11	53.3^{bA}	147.90±0.680	6(54.5)	5(45.4)	3.80±0.359
Mini tube	22	18	81.8^{aB}	149.00±0.584	13(72.2)	5(27.2)	3.61±0.266	22	14	63.63^{aB}	148.35±0.80	10(71.4)	4(28.5)	3.20±0.257
Overall	43	32	74.4^{A}	149.32±0.551	21(65.6)	11(34.3)	3.52±0.285	43	25	58.1^{B}	148.12±0.77	16(64.0)	9(36.0)	3.50±0.308

1) Within the same column any two values have the same superscript (a, b) do not differ significantly (P< 0.05).
2) Within the same row any two values have the same superscript (A, B) do not differ significantly (P< 0.05).

micropipette, so the mini tube facilitated the insemination dose reach inside the cervical canal. Similar results were obtained from ewes inseminated two times at 55 and 65 hour post second PGF2α injection which was 53.3% and 63.61% in ewes inseminated by using micropipette and mini tube respectively (Table, 3).

The gestation period ranging between 147.9 ± 0.68 and 149.6 ± 0.53 days in Rahmani ewes. Both types of inseminating catheters and time of insemination have not effect on the gestation period. The percentage of ewes lambed single was 65.6% (Table, 3). The average litter weight at lambing were 3.5 ±0.29 and 3.5 ± 0.31Kg in Rahmani ewes which had single and double inseminating doses respectively, (Table, 3), and long estrus behaviour after PGF2α injection.

CONCLUSION

The Rahmani ewes have shown good response to prostaglandin (Estrumate) estrus synchronization. The estrus behaviour of the ewes ranged between 28 and 48 hours. Single insemination at 55 hours after second PGF2α injection has higher lambing rate than double inseminations due to minimizing the handling stress effect. The mini tube catheter is better tool for artificial insemination than micropipette in Rahmani ewes.

REFERENCES

Acritopoulou S. Fourcroy; V. Pappas; G. Peclaris and M. Zerras (1982). Synchronization of oestrus in ewes with provera sponges/PMSG, prostaglandin $PGF_2\alpha$ or the prostaglandin analogue, ICI 80996 and fertility following natural mating or artificial insemination. ***Reproduction, Nutrition and Development 22: 345-354.***

Baril, G.; B. Remy; B. Leboeuf; T.F. Beckers and J. Saumande (1996). Synchronization of estrus in goats; the relationship between ECG binding in Plasma, time of occurrence of estrus and fertility following artificial insemination. ***Theriogenology. 45: 1553-1559.***

Beck, K.N.F.G.; M.C.G. Davies and J.L. less (1987). Estrus synchronization and fertility in ewes : A comparison of three methods. ***Anim. Prod. 44: 251–254.***

Beck, N.F.G.; B. Davies and S.P. Williams (1993). Estrus Synchronization in ewes:The effect of combining a prostaglandin analogue with a 5-day progesterone treatment. ***Anim. Prod. 56: 207-210.***

Boland, M.P.; F. Lemaonque and I. Gordon (1978). Comparison of lambing outcome in ewes after synchronization of estrus by progesterone or prostaglandin treatment. ***J. Agric. Sci. 91: 765 – 766.***

Carbajo, M.; Anel J.C. Dominguez; L. Anel; C. Garcia; B. Alegre and G. Gutierrez (1993). Blood cortisol concentration in ewes after cervical insemination using the vaginal route. ***Publicacoes-do-so- Simposio-Internacional-de-Reproducas***-Animal,-luso, Portugal, 30-de Setembro-a-2-de Outubro.**Vol.11: 316-321.**

Chamley, W.A.; J.M. Buckmaster; M.D. Cain; J. Cerine; M.E. Cerini; I.A. Cunningham and J.R. Goding (1972). The effect of PGF2α on Progesterone, estradiol and LH secretion in sheep with ovarian transplants. ***J. Endocrin. 55: 253 - 263.***

Das, G.K.; S.M.K. Naqvi; R.Gulyani; Anil Joshi and J.P. Mittal (1992). Effect of two protocols of PGF2α treatment for

synchronization of estrus in a tropical sheep. ***Theriogenology., 3: 285-289.***

Deaver, D.R.; N.J. Stilley; R.A. Dailey; E.K. Inskeep and P.E. Lewis (1986). Concentrations of ovarian and pituitary hormones following prostaglandin F2α induced luteal regression in ewes varies with day of the estrous cycle at treatment *J. Anim. Sci. 62: 422 – 427.*

Doney, J.M.; W.F. Smith and G.R. Gunn (1976). Effect of post-mating environmental stress or administration of ACTH on early embryonic loss in sheep. *J. Agric. Sci. Cambridge 87: 133-136.*

Evans, G. and W.M.C. Maxwell (1987). ***Salamon's Artificial Insemination of sheep and Goats.*** Sydn Butterworth. N.Y., p 109.

Fukui, Y. and E.M. Roberts (1977). Fertility of ewes treated with prostaglandin F2α and artificially inseminated at predetermined intervals. ***Aust. J. Agric. Res., 28: 891-897.***

Gunn, R.G. and J.M. Dony (1975). The interaction of nutrition and body condition at mating on ovulation rate and early embryo mortality in Scottish blackface ewes. *J. Agric. Sci. Comb., 85: 465-470.*

Hancock, J.L. and P.T. McGovern (1968). The trnsport of sheep and goat spermatozoa in the ewe. *J. Reprod. Ferti 15, 289-295.*

Hendreson, D.C.; J.M. Downing; N.F.G. Beck and J.L. Lees (1984). Estrus synchronazation in ewes: A comparison of prostaglandin F2α tham salt with a progestagen pessary. ***Anim. Prod., 39: 229-233.***

Kassem, R.; J.B. Owen and I. Fade (1990). A Note on the characteristics of estrus and ovulation in Awassi ewes. *Anim. Prod. 50: 198 – 200.*

Mattner, P.E. (1963). Spermatozoa in the genital tract of the ewe. 11. destribution after coitus. ***Australian J. Biol. Sci., 16: 688-694.***

Naqvi, S.M.K.; R. Gulyani and J.P. Mittal (1998). Estrus Synchronization response in Kheri ewes treated with prostaglandin F2α. *Ind. J. Anim. Sci. 68 (6): 564 - 565.*

Robinson, T.J. (1973). Concentration and sperm transport in domistic animals. ***INSERM, 26: 453-478.***

مجلة حوليات العلوم الزراعية ، كلية الزراعة ، جامعة عين شمس ، القاهرة ، م٤٨ ، ع(١) ، ١٠٧-١١٦، ٢٠٠٣

تنظيم الشياع والتلقيح الاصطناعى فى نعاج الرحمانى: مقارنة طريقتين للتلقيح

[٨]

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أجريت هذه الدراسة بإستخدام ٨٦ نعجة رحمانى ناضجة قسمت عشوائيا إلى أربعة مجاميع بكل منها (٢٢ أو ٢١ نعجة). اجريت التجربة بمحطة تجارب السرو التابعة لمعهد بحوث الإنتاج الحيوانى بوزارة الزراعة. جميع النعاج حقنت بالعضل بجرعتين من مستحضر(Estrumate ٠,٧ ملل لكل جرعة) بينهما ٩ أيام. تم كشف الشياع بعد ٢٤ ساعة من كلا من الحقنة الأولى والثانية بإستخدام كباش مقطوعة الوعاء الناقل. المجموعة الأولى (٢٢ نعجة) والمجموعة الثانية (٢١ نعجة) تم تلقيحها مرة واحدة بعد ٥٥ ساعة من الحقنة الثانية من Estrumate بينما المجموعة الثالثة (٢١ نعجة) والمجموعة الرابعة (٢٢ نعجة) لقحت مرتين بعد ٥٥ و٦٥ ساعة من الحقنة الثانية من-Estru mate المجموعات الأولى والثالثة لقحت صناعيا باستخدام الموسع المهلبى و micropipette بينما المجموعات الثانية والرابعة لقحت صناعيا بإستخدام الموسع المهلبى وMini tube .

أوضحت النتائج أن ٨٢,٦% من النعاج الرحمانى أظهرت شياع بعد الحقنة الأولى من Estrumate بينما ٨٤,٩% أظهر شياع بعد الحقنة الثانية من .Estrumate كان متوسط الفترة اللازمة لظهور الشياع على النعاج ٣٣,٤ ± ٠,٩٣ ، ٣٧,٠ ± ٠,٧٨ ساعة عقب الجرعة الأولى والثانية من Estrumate على الترتيب.

أغلب النعاج الرحمانى (٥٧,٨٩ ، ٨٢,١٩%) أظهرت شياع طبيعى طوله من ٢٨ إلى ٤٨ ساعة بعد الحقنة الأولى والثانية من Estrumate على الترتيب. كان معدل الولادة عالى (لمستوى معنوية أقل من٠,٠٥) فى النعاج التى لقحت مرة واحدة بالمقارنة بتلك التى لقحت مرتين (٧٤,٤% مقارنة ٥٨,١%).

كما أن معدل الولادة فى النعاج التى لقحت مرة واحدة بإستخدامMini tube عالى % ٨١,٨(لمستوى معنوية أقل من ٠,٠٥) مقارنة بتلك التى لقحت مرة واحدة بإستخدام Micropepitte ٦٦,٦٠%. تراوح

متوسط طـول فتـرة الحمل بيـن ١٤٧,٩ ± ٠,٦٨٠، ١٤٩,٦٤ ± ٠,٥٣٠ وكـان متـوسط وزن البطن يتراوح بيـن ٣,٢ ± ٠,٢٥٧ ، ٣,٦ ± ٠,٢٦٦ كجم .

من الناتج يمكن استنتاج ان مسـتحضر Estrumate له قدرة علـى تنظيـم الشـياع فـى أغنام الرحمانى وأن Mini tube أفضـل لإجراء التلقيح الإصطناعى لأغنام الرحمـانى من micopepette .

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