

SOME IMPORTANT ASPECTS IN UTILIZATION OF PGF_{2α} ON ESTRUS SYNCHRONIZATION OF OSSIMI EWES

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SUMMARY

One hundred and one Ossimi ewes were used to study the effect of order of mating after PGF_{2α} estrus synchronization on conception rate (CR). Ewes were weighed and scored for body condition and rams were tested for their semen by semen analysis immediately before onset of mating. Ewes were estrus-synchronized with intramuscular dose of 0.5 ml PGF_{2α}, and after 11 days of the first injection ewes that did not show estrus were injected with another 0.5 ml dose. Simultaneously, with the first and the second injections of Estrumate, ewes which came in heat were introduced to fertile rams to be hand-mated. ANOVA were performed to study the effect of CR of ewes at the first and the second estrus matings, and also to study the effect of age, body weights (BWT) and body condition scores (BCS) of ewes on CR at the first and the second estrus matings. Correlation coefficients between CR of ewes and their ages, BWT and BCS were performed.

About 77% of mated Ossimi ewes in the second estrus mating were fertilized compared to only 18% in the first one ($P < 0.001$). At the first estrus mating, the significance level ($P < 0.05$) was attained for the correlation of CR with BCS of ewes, while it was not attained for both age of ewes or their body weights. Body condition scores of ewes significantly affected CR at first estrus mating ($P = 0.017$). Therefore, it is recommended to breed ewes at the second heat after estrus synchronization with PGF_{2α} to save the power of rams and preserve their capabilities for increasing CR through the second estrus after synchronization.

Keywords: *Ossimi ewes, estrus, PGF_{2α}, conception rate*

INTRODUCTION

There are about 5 million heads of sheep in Egypt (FAO, 2008). They rank the third most numerous domesticated ruminants for meat and milk production, after cattle and buffaloes (Megahed and Etman, 2006). Reproduction in sheep has received much attention owing to its high value as a source of animal protein (Sabra and Hassan, 2008). Mutton in Egypt comes mainly from Rahmani, Ossimi and Barki breeds which represent the majority of the local sheep population. The reproductive performance of the ram represents almost 50% of sheep flock production, and the other 50% depends on the ewe reproductive performance. Hence, ram fertility is of most importance as it decides the fertility of the ewe flock. Increasing the amount of mutton (production) can be achieved also either by improving ewes' prolificacy and/or increasing the frequency of lambings. Increasing frequency of lambings needs to follow up matings on a foreshortened time table which should depend on estrus synchronization for ewes.

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The application of estrus synchronization programs has been well-documented since the 1970s. In small ruminants, estrus synchronization is achieved either by reducing the length of the luteal phase of the estrous cycle with PGF_{2α} or by extending the cycle artificially with exogenous progesterone or more potent progestagens (Kusina *et al.*, 2000 and Kridli *et al.*, 2009). Particularly that the ability to synchronize the time of breeding and lambing and the achievement of high fertility at first service is highly beneficial for farmers (Gonzalez-Bulnes *et al.*, 2005). Estrus synchronization can be an effective means of increasing the proportion of ewes that become pregnant over a short time, resulting in more uniform lamb crops (Zonturlu *et al.*, 2009). In tropical sheep, with a continuous breeding season and no seasonal anestrus, the use of prostaglandin analogues can be applied throughout the entire year (Makawi and Manahil, 2007 and Menchaca *et al.*, 2004).

Variable fertility has been reported after the use of prostaglandin or its analogues for synchronization of estrus of ewes (Gordon, 1997). Poor fertility rates after the first mating service (7-50 %) were recorded after the synchronization of estrus by prostaglandin or its analogues either when natural service or AI were applied, in ewes (Jennings, 1975; Boland *et al.*, 1978; Gonzalez-Bulnes *et al.*, 2005; Makawi and Manahil, 2007; Zonturlu *et al.*, 2009; Martemucci and D'Alessandro, 2010; Risvanli *et al.*, 2010 and Vinales *et al.*, 2011) and in does (Gade *et al.*, 2003).

The increase in the sheep population in the developing countries demands the increase in knowledge of the mechanisms that control reproduction and the use of scientific information in applied productive managements (Ungerfeld, 2005). Particularly that little is still known about the possible differences in the response of the predominant breeds of the developing countries. The aim of this study is to avail information about conception rate of Ossimi ewes after estrus synchronization with PGF_{2α}.

MATERIAL AND METHODS

The present study was carried out on a commercial sheep flock of Ossimi sheep located in Sharqia Governorate to study the effect of order of mating after PGF_{2α} estrus synchronization on conception rate of ewes. A total of 101 ewes were included in this study aged between 1 and 5 years and joined to fertile rams in September 2008.

Management of ewes and rams:

A day before the onset of breeding season, ewes were weighed and scored to body condition. The BCS was estimated by using the technique of Russel *et al.* (1969) which employs a 1 to 5 score scal. The lowest score indicates an extremely emaciated sheep, and 5 represents excessive obesity. Body condition is assessed by handling over and around the backbone, on the loin area immediately behind the last rib and above the kidney, using the fingers along the top and sides of the backbone.

Twenty fertile rams were used in the experiment. One week before mating, rams were tested for their semen, and three rams were eliminated from the experiment as a result of reduction in sperm motility, live % and sperm concentration.

Animals were kept loose in semi-shaded pens, where drinking water was available all day time. Egyptian clover (*Trifolium alexandrinum*), clover hay, concentrate mixture and wheat straw were used for ration formulation according to

season of the year. Feeding requirements were calculated according to NRC recommendation (1985).

Estrous synchronization and mating:

Ewes were estrus-synchronized with intramuscular dose of 0.5 ml PGF_{2α} (Estrumate, 125μg Cloprostenol, Coopers Company, England). After 11 days of the first injection, ewes which did not show estrus were injected with another 0.5 ml dose. Simultaneously, with the first and the second injections of Estrumate, ewes came in heat were introduced to the fertile rams to be hand-mated.

Statistical analyses:

Correlation coefficients between conception rate (CR) of ewes and their ages, body weights (BWT) and body condition scores (BCS) were performed using SAS (2004). Data were subjected to one-way analysis of variance (SAS, 2004) to study the effect of CR of ewes at the first and the second estrus matings, and also to study the effect of age, BWT and BCS of ewes on conception rate at the first and the second estrus matings. Results were expressed as LSM±SE. Duncan's Multiple Range Test was used to test significance between treatments. The significance level was set at 5%.

RESULTS AND DISCUSSIONS

Conception rate (CR) of Ossimi ewes at the first and the second estrus matings are presented in fig. 1. About 77% of mated Ossimi ewes in the second estrus after synchronization were fertilized compared to only 18% in the first one (P<0.001). These results could be explained in view of the interference of PGF_{2α} with efficiency of sperm transport through cervix (Hawk and Conley, 1975) or alterations in pattern of LH release and reduction of quality of ovulation (Gonzalez-Bunles *et al.*, 2005). In previous reports, low fertility rates (7-20 %) were recorded at the first mating after synchronization of estrus with PGF_{2α} (Boland *et al.*, 1978; and Martemucci and D'Alessandro, 2010) which agree with results of the present study. While higher estimates were recorded by Makawi and Manahil (2007) (40%), Vinales *et al.* (2011) (47%) and Wolf *et al.* (1991) (48%).

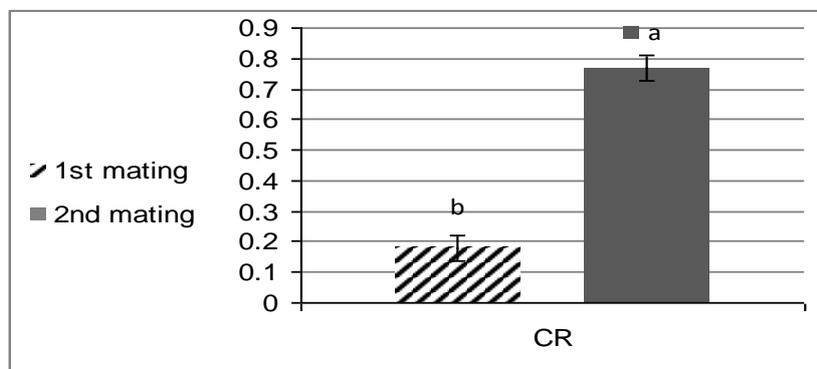


Fig. 1. Conception rate (CR) of Ossimi ewes at the first and the second estrus matings.

Columns with different letters differ significantly from each other (P < 0.05)

Correlation coefficients between CR of Ossimi ewes and their ages, body weights (BWT) and body condition scores (BCS) are presented in table 1. At the first estrus

mating, the significance level ($P < 0.05$) was attained for the correlation of CR with BCS of ewes, while it was not attained between CR and either ages of ewes or their body weights.

Table 1. Correlation coefficients between conception rate (CR) of Ossimi ewes and their ages, body weights (BWT) and body condition scores (BCS)

	n	Age	BWT	BCS
CR at 1 st mating	101	0.04	0.12	0.25*
CR at 2 nd mating	90	-0.001	-0.06	0.04

* $P < 0.05$

The effects of age, BCS and BWT of Ossimi ewes on CR at first and second estrus matings are presented in figs. 2 and 3. Body condition scores of ewes significantly affected CR at first estrus mating ($P = 0.017$), where it reached 2.51 in conceived ewes and only 2.00 in non-conceived ones. While BCS in the second estrus mating, and also BWT in the two matings, tended to increase in conceived ewes than the non-conceived ones. Fukui *et al.* (2010) reported that, BCS tended to be an important factor influencing on fertility of ewes, that is in accordance with results of the present study. The non-significant effect of ewes' body weight in the present study was previously confirmed by Ben Salem *et al.* (2009) and Fukui *et al.* (2010).

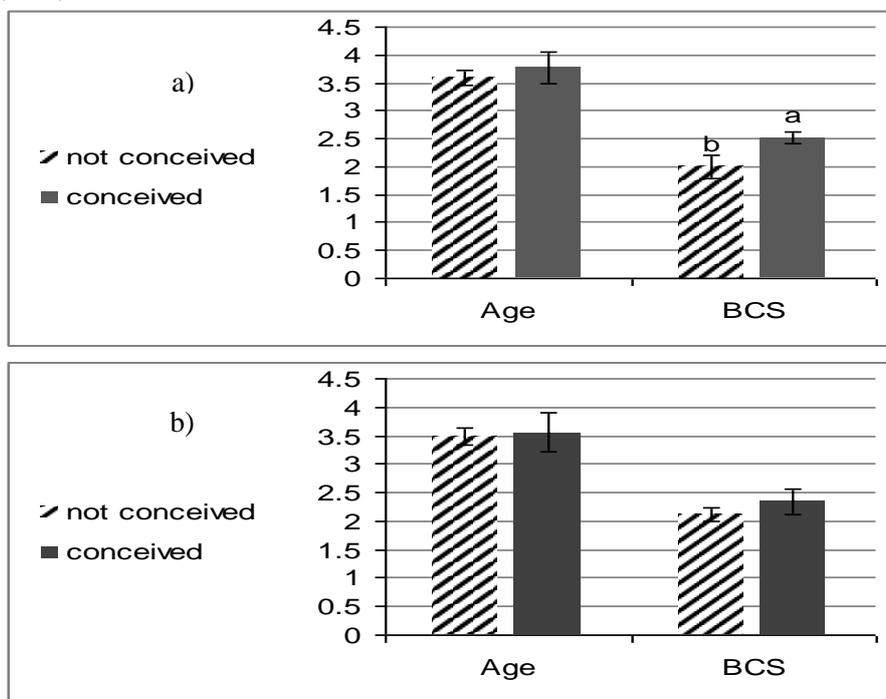


Fig 2. Effect of age and body condition score (BCS) of Ossimi ewes on conception rate at first estrus mating (a) and second estrus mating (b). Columns with different letters differ significantly from each other ($P < 0.05$)

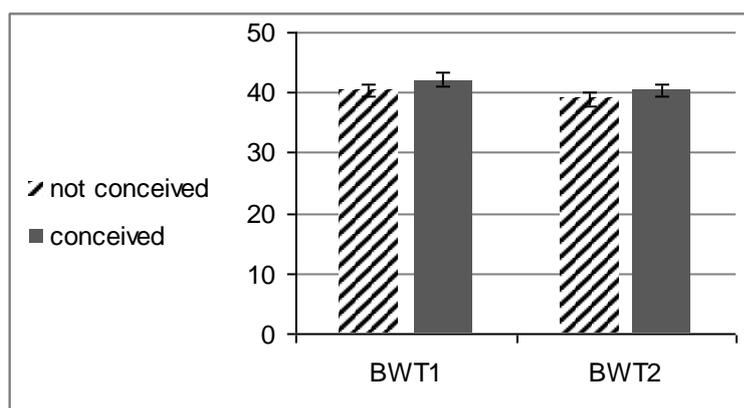


Fig 3. Effect of body weight of Ossimi ewes on conception rate at first estrus mating (BWT1) and second estrus mating (BWT2).

The results of the present study indicate to the importance of postponing mating of ewes those are estrus-synchronized with $\text{PGF}_{2\alpha}$ to the second heat after synchronization. These postponing of mating will save the power of rams and then will preserve their capabilities for increasing CR through the second estrus after synchronization.

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أهمية تلقيح نعاج الأوسيمي عند الشياح الثاني بعد الحقن بهرمون البروستجلاندين $F_{2\alpha}$

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أستخدم في هذه الدراسة عدد ١٠١ نعجة أوسيمي لدراسة تأثير ترتيب الشياح بعد المعاملة بهرمون البروستجلاندين على نسبة خصب النعاج. حيث تم وزن النعاج و تقدير حالة أجسامها ، وكذلك تم تحليل السائل المنوي للكباش المستخدمة في التلقيح. تم تنظيم الشياح للنعاج المستخدمة بالتجربة بجرعة بروستجلاندين (٥.٠ مللتر) ، مع الحقن بجرعة أخرى للنعاج التي لم تستجيب للجرعة الأولى. ثم تلقيح النعاج التي تم تنظيم الشياح لها بواسطة كباش مخصبة. تم تحليل التباين لدراسة تأثير نسبة الخصب في النعاج الملقحة خلال الشياح الأول و الثاني بعد المعاملة. وكذلك دراسة تأثير كل من عمر النعجة ووزنها و حالتها الجسمانية على نسبة الخصب. أيضاً تم دراسة معامل الارتباط بين نسبة الخصب وكل من عمر النعجة ووزنها و حالتها الجسمانية سواء عند التلقيح بالشياح الأول أو الثاني.

وجد أن حوالي ٧٧% من النعاج الملقحة بالشياح الثاني تم إخصابها مقارنة بـ ١٨% فقط من النعاج الملقحة بالشياح الأول بعد المعاملة ($P < 0.001$). أيضاً وجد أن معامل الارتباط بين نسبة الخصوبة و الحالة الجسمانية عند التلقيح بالشياح الأول كانت معنوية ، بينما لم تكن معنوية لبقية الصفات سواء بالشياح الأول أو الثاني. وقد أثرت حالة جسم النعاج عند الشياح الأول على نسبة الخصب ($P = 0.017$). ومن ثم فإنه يوصى بتلقيح النعاج عند الشياح الثاني بعد المعاملة بهرمون البروستجلاندين $F_{2\alpha}$ وذلك للحفاظ على حيوية كباش التلقيح وزيادة قدرتها الإخصابية خلال فترة تلقيح الشياح التالي.