SOME IMPORTANT ASPECTS IN UTILIZATION OF PGF$_{2\alpha}$ 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$_{2\alpha}$ 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$_{2\alpha}$ 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$_{2\alpha}$ to save the power of rams and preserve their capabilities for increasing CR through the second estrus after synchronization.

Keywords: Ossimi ewes, estrus, PGF$_{2\alpha}$, 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 (Sabry 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 dependent on estrus synchronization for ewes.
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$_{2\alpha}$ 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 Vinoles 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$_{2\alpha}$.

**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$_{2\alpha}$ 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 scale. 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%), Vinoles 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.](image)

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)

<table>
<thead>
<tr>
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<th>n</th>
<th>Age</th>
<th>BWT</th>
<th>BCS</th>
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<tbody>
<tr>
<td>CR at 1&lt;sup&gt;st&lt;/sup&gt; mating</td>
<td>101</td>
<td>0.04</td>
<td>0.12</td>
<td>0.25*</td>
</tr>
<tr>
<td>CR at 2&lt;sup&gt;nd&lt;/sup&gt; mating</td>
<td>90</td>
<td>-0.001</td>
<td>-0.06</td>
<td>0.04</td>
</tr>
</tbody>
</table>

* 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 PGF$_{2a}$ 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.

REFERENCES


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أهمية تلقيح نعاج الأسيومي عند الشبع الثاني بعد الحقن ببرمون البروستجلادين

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استخدم في هذه الدراسة عدد 101 نعاج أسيومي لدراسة تأثير ترتيب الشبع بعد المعاملة ببرمون البروستجلادين على نسبة حوض الشبع، حيث تم وزن النعاج وتقدير حالة أجسامها، وذلك تم تحليل النتائج المنوى للكلاين المستخدم في التلقيح. تم تنظيم الشبع للعلاج المستخدم بالجريخة بجرعة بروستجلادين (0.5 ملتر)، مع الحقن بجرعة أخرى للنحاج التي لم تستجيب للجرعة الأولى. تم تلقيح النعاج التي تم تنظيم الشبع لها بواسطة كلش مخصص، تم تحليل النتائج لدراسة تأثير نسبة الخصوبة في النعاج المقلة خلال الشبع الأول و الثاني بعد المعاملة. وكذلك دراسة تأثير كل من عمر النعاج ووزنها وحالاتها الجسمانية على نسبة الخصوبة. أيضا تم دراسة معامل الارتباط بين نسبة الخصوبة وكامل الفصوص لحالاتها الجسمانية، كلها عند نعاج الأسيومي في الشبع الأول أو الثاني.

وقد أن حوالي 77% من النعاج المقلة بالشبع الثاني تم إحصاءها بتفسرة 0.18% فقط من النعاج المقلة بالشبع الأول بعد المعاملة (0.01>P). أيضاً وجد أن معامل الارتباط بين نسبة الخصوبة وحالات الجسمانية عند النعاج في الشبع الأول كانت متفاوتة، بينما تم تقدير نسبة النعاج في الشبع الأول على نسبة الخصوبة (0.17<P). ومن ثم فإنه وقام تلقيح النعاج عند الشبع الثاني بعد المعاملة ببرمون البروستجلادين، وذلك للحفاظ على حيوية كيبان التلقيح وزيادة قدرتها الإخصابية خلال فترة تلقيح الشبع الثاني.