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# Including Natural and Synthetic PGF2α in a 11-day FGA-Based Estrus Synchronization Protocol in Sheep: an Efficacy Comparison of Dinoprost and Cloprostenol

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**Abstract:** *There are a variety of hormonal protocols and products on the market, but it is still unclear how they will work on specific field conditions. The efficacy of using different forms of prostaglandin F2α analogues such as dinoprost and cloprostenol in a FGA-based estrus synchronization protocols were compared in sheep. For this purpose, on the basis of a completely randomized design, 60 ewes (Tsigai breed, Rusty variety; 2–4-years old, mean body score of 2.5 ± 0.5) were divided into two estrus synchronization treatment groups, which included: fluorogestone acetate (FGA) sponges for 11 days, with the administration of an intramuscular injection of 5 mg of dinoprost on the 9-day, followed by 300 IU PMSG at the time of sponge withdrawal (FGA-D-PMSG group, n=30), and for the other group, the same synchronization protocol was followed, with the difference that instead of dinoprost, ewes received 75 µg of cloprostenol (FGA-C-PMSG group, n=30). The estrus response rate percentage (%ERR) ranged between 76.66% (FGA-C-PMSG group) and 93.33% (FGA-D-PMSG group). In this study, it is shown that the type of PGF2α (natural or synthetic) can influence the results of a 11-day FGA-PGF2α-PMSG synchronization protocol, in terms of occurrence of estrus behaviour. Additionally, hormonal treatments cost for each protocol was calculated in order to determine the most cost-effective method and whether it can be implemented in small and large-scale sheep farming.*

## Introduction

Estrus manipulation is an efficient method in order to reduce the increasing cost of labor, by concentrating work in a well-defined period. It is also a method of improving the quality and quantity of deliverable lamb. This can increase the income of sheep farms, because the farmer can plan and meet his requirements regarding delivery terms and the quantity/quality of deliverable lamb.

The purpose of this study was to test a mid-term protocol (11 days) in order to avoid the unwanted effects of long-term protocols (14 days), like vaginitis, but still not to decrease the positive effects of longer exposure to progesterone. Also, we wanted to compare the effectiveness of dinoprost and cloprostenol, which were used as luteolytic agents.

## Material and method

This study was carried out in the breeding season (September), at Agricultural Research and Development Station Turda. Healthy multiparous ewes (n=60; Tsigai breed, Rusty variety; 2–4-years old, mean body score of 2.5 ± 0.5), were divided into 2 groups (n=30) randomly.

Ewes in estrus were detected using aproned rams, once a day. Females were considered in estrus when exhibited standing reflex. Based on these recordings, estrus response rate percentage (%ERR) was calculated. Ewes were mated once, by a selected ram. The detection of ewes in estrus with aproned rams continued for 35 days (daily) after mating, thus we were able to calculate the non-return rate percentage (%NRR). All the treatments performed in this study are presented in Figure 1.

Data was statistically analyzed using GraphPad Prism (Version 9.3.1). An exact Fisher's test was performed to compare the results of the two protocols in terms of %ERR and %NRR.

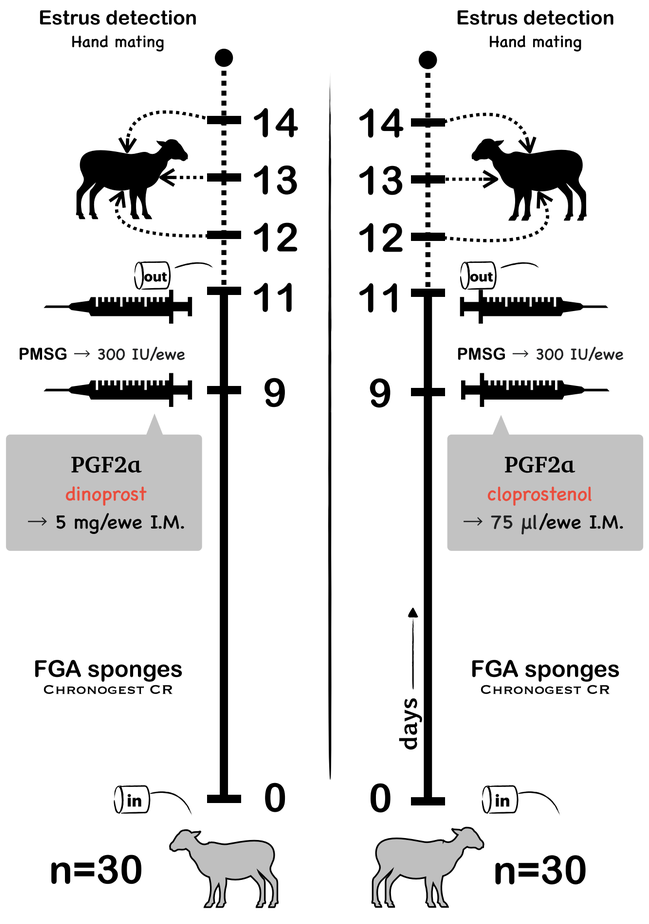


Figure 1. Protocols used in this study for estrus synchronization and the time frame of treatments: FGA-D-PMSG group (left) and FGA-C-PMSG (right).

## Results and discussions

Considering that the main indicator of a successful estrus synchronization protocol is represented by the estrus response rate percentage (%ERR), ewes that showed behavioral signs of estrus (standing reflex) within 72 h after the withdrawal of the sponge were recorded. Since estrus detection was done once a day with aproned rams, the 72-hour time after removing the sponges was divided into 3 time periods, as can be seen in Table 1.

In the first 24 h, no ewe showed estrus behavior, most females showing estrus in the 24-48 h interval (both groups).

Table 1. Estrus response rate (%ERR) in different time periods

| Group | 0-24 h | 24-48 h | 48-72 h |
|---|---|---|---|
| FGA-D-PMSG | 0% (0/28) | 78.57% (22/28) | 21.43% (6/28) |
| FGA-C-PMSG | 0% (0/23) | 69.57% (16/23) | 30.43% (7/23) |

Estrus performance of ewes following the synchronization protocols is presented in Table 2.

Table 2. Estrus performance of ewes following the synchronization protocols

| Parameter | FGA-D-PMSG | FGA-C-PMSG |
|---|---|---|
| Sponge loss | 0% (0/30) | 0% (0/30) |
| Vaginitis rate[1] | 0% (0/30) | 3,33% (1/30) |
| ERR[2] | 93.33% (28/30) | 76.66% (23/30) |
| NRR[3] | 85.72% (24/28) | 82.60% (19/23) |

[1]Vaginitis rate (%) = ewes exhibiting vaginitis/number of ewes treated with intravaginal sponge × 100
[2]ERR (%; estrus response rate) = ewes exhibiting estrus/number of ewes treated × 100
[3]NRR (%; non-return rate) = ewes not returning to estrus (35 days)/mated ewes × 100

There were significant differences ($P < 0.05$) in terms of %ERR between the two groups (figure 2). The average percentage of non-return rate (%NRR) was not significantly different ($p>0.05$) (figure 2).

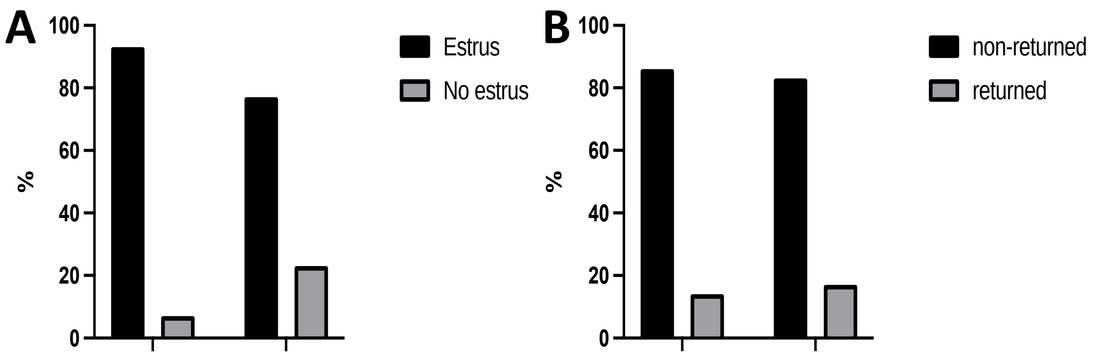


Figure 2. (A) Estrus response rate (%ERR) after FGA-D-PMSG (left) and FGA-C-PMSG (right) synchronization; (B) Non-return rate (%NRR) after FGA-D-PMSG (left) and FGA-C-PMSG (right) synchronization.

Ewes from the FGA-D-PMSG group showed a higher estrus response rate (%ERR) than those from FGA-C-PMSG group (93.33% vs. 76.66%), which could be influenced by a superior luteolytic efficiency of dinoprost.

Considering all the advantages that estrus synchronization brings to the farm's income, the cost of approximately 5.7 Euro/ewe may be economically justified.

## Conclusions

Considering the results regarding sponge loss, vaginitis rate, estrus response rate percentage (%ERR) and non-return to estrus rate percentage (%NRR), both protocols tested in this study determined satisfactory percentages. However, the protocol used for the FGA-D-PMSG group was superior to the FGA-C-PMSG, which makes it more cost-effective. Hence, these protocols are suitable for use in small and large-scale sheep farming.

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