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# Use of commercial vs. homemade intravaginal sponges, for the synchronization of anestric sheep

## Uso de esponjas intravaginales comerciales vs caseras, para la sincronización de estros de ovejas anéstricas

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**ABSTRACT**

The synchronization of sheep in an anestric season, is an extremely useful method in sheep production units, allows to obtain offspring in non-reproductive season; however, it is sometimes untenable for the sheep farmer. The objective of the present work was to evaluate the effect of the use domestic and commercial elaboration sponges on the percentage of estrus, fertility and prolificacy in anestric sheep. Sixty seasonal anestric Suffolk/Hampshire sheep were used, divided into three groups. Treatment 1 (T1), 25 sheep, each was placed with a domestic intravaginal sponge with 40 mg of Progesterone; Treatment 2 (T2) with 25 sheep, commercial intravaginal sponges with 20 mg of Cronolone were placed. In both treatments, the sponges remained in the sheep for 12 days and they received 400 IU of eCG intramuscularly 24 hours before removing the sponges; Witness Group (WG) with 10 sheep. The percentage of estrus presentation was different between groups (T1 = 72%, T2 = 92% and WG = 50). Regarding the percentage of fertility, differences were observed, although not very significant (T1 = 64%, T2 = 76% and WG = 50%). No differences were observed in the percentage of prolificacy; in all treatments, births were simple. In conclusion, anestric sheep treated with domestic-made intravaginal sponges are induced to estrus efficiently and showed an acceptable gestation percentage compared to commercially produced sponges; In addition, the cost of processing is relatively low compared to existing products in the market; the use of intravaginal sponges of domestic elaboration, is an economically viable method for the sheep farmer; however, a higher dose of eCG is necessary to increase the percentage of prolificacy.

**Keywords:** Intravaginal sponges, anestrous ewes, synchronization, fertility, prolificacy.

**RESUMEN**

La sincronización de ovejas en temporada anéstrica, es un método sumamente útil en las unidades de producción ovina, permite obtener crías en época no reproductiva; sin embargo, en ocasiones resulta incosteable para el ovinocultor. El objetivo del presente trabajo fue evaluar el efecto del uso de esponjas de elaboración doméstica y comercial sobre el porcentaje de estro, fertilidad y prolificidad en ovejas anéstricas. Se utilizaron 60 ovejas Suffolk/Hampshire anéstricas estacionales, divididas en tres grupos. Tratamiento 1 (T1), 25 ovejas, a cada una se le colocó una esponja intravaginal de elaboración doméstica

con 40 mg de Progesterona; Tratamiento 2 (T2) con 25 ovejas, se les colocaron esponjas intravaginales comerciales con 20 mg de Cronolone. En ambos tratamientos, las esponjas permanecieron en las ovejas durante 12 días y éstas recibieron 400 U.I de eCG vía intramuscular 24 horas antes de retirar las esponjas; Grupo Testigo (GT) con 10 ovejas. El porcentaje de presentación de estro fue diferente entre grupos (T1=72%, T2=92% y GT=50). En cuanto al porcentaje de fertilidad, se observaron diferencias, aunque no muy significativas (T1=64%, T2=76% y GT=50%). No se observaron diferencias en el porcentaje de prolificidad; en todos los tratamientos los partos fueron simples. En conclusión, las ovejas anéstricas tratadas con esponjas intravaginales de elaboración doméstica son inducidas al estro de forma eficiente y mostraron un porcentaje de gestación aceptable en comparación con las esponjas de elaboración comercial; además, el costo de elaboración es relativamente bajo comparado con los productos existentes en el mercado; el uso de esponjas intravaginales de elaboración doméstica, es un método económicamente viable para el ovinocultor; no obstante, es necesaria una dosis mayor de eCG para aumentar el porcentaje de prolificidad.
**Palabras clave:** Esponjas intravaginales, ovejas anéstricas, sincronización, Fertilidad, Prolificidad.

## INTRODUCTION

The progressive growth of the human population, contrary to food production, has forced man to seek new and better techniques in agricultural production, to meet his basic nutritional needs. In Mexico, sheep production has increased significantly. But currently it is not enough to meet the demand for meat consumption of the national population, since it goes through various problems in a profitable way in Mexico, such as the low application of technologies by owners, workers, veterinary doctors, sheep farmers and bourgeois This necessitates the development and application of reproductive technologies that raise the sheep population in relation to demand (Martínez *et al*., 2010; Partida *et al*., 2013; Sosa *et al*., 2014).

One of these technologies is the synchronization of estrus, which allows the estrus to induce a specific number of sheep in order to prey them in a programmed period of time, in order to obtain up to three deliveries in two years; this induction practice is very effective when the sheep are out of the breeding season, for this reason it is widely used in the world. There is a wide variety of hormonal methods and products that are efficient and improve reproduction in domestic animals. However, in rural production systems with low technification, synchronization is not mainly applied due to the low availability and high cost of the products, which are unaffordable for the small producer, as well as the ignorance of the methodology for manufacturing and application of synchronization protocols, so the implementation of homemade techniques will allow small producers to obtain low-cost benefits similar to those offered by commercial products (Estrada *et al*., 2009; Pérez *et al*., 2012; Sosa *et al*., 2014; Manes and Ungerfel, 2015).

The synchronization of estrus can be carried out by different methods, which may be natural or artificial (Anwar *et al*., 2008; Arroyo *et al*., 2006). The most commonly used artificial methods are the use of progestogens using sponges impregnated with synthetic progesterone analogues, Medroxyprogesterone Acetate (MAP) and Fluorogestone

Acetate (FGA). The rationale for this method is to produce in animals an effect similar to that produced naturally by progesterone, that is, a prolongation of the luteal phase and an inhibition of the action of gonadotropins and therefore of the final stages of maturation of follicles When the sponges are removed, the administration of the progestogen is canceled and with it the inhibition of the gonadotrophins, due to this, the sheep are synchronized in a similar state of their estrous cycle, the majority of them entering in heat, in a short period of Time (Gibbons and Cueto, 2007; Urete and Porras, 2013; Aké *et al*., 2014; Martínez, 2017).

The objective of the present work was to evaluate the effect of the use of sponges of domestic and commercial elaboration on the percentage of estrus, fertility and prolificity in Suffolk/Hampshire sheep.

## MATERIAL AND METHODS

60 Suffolk/Hampshire sheep between 2 and 5 years old (two to four deliveries) dewormed and vitaminized were used, especially the application of selenium (Carbajal *et al.*, 2013). The sheep were divided into three groups: Treatment 1 (T1), 25 sheep with intravaginal sponge made domestically and impregnated with 40 mg of Progesterone for 12 days, plus 400 IU of eCG intramuscularly 24 hours before removing the sponges. Treatment 2 (T2), 25 commercial intravaginal sponge sheep impregnated with 20 mg of cronolone for 12 days, plus 400 IU of eCG intramuscularly 24 hours before sponge removal.

Witness Group (WG) 10 sheeps. For the detection of estrus, the sheep were divided into three pens with 20 animals, each with an entire stallion intended to mount, mark and cover the sheep. The detection was carried out by direct observation (6:00 am-11:00 and 3:00 pm-8:00pm) for 3 days from 24 hours after sponge removal. The diagnosis of pregnancy was determined by observing no return to estrus 15 to 18 days after riding.

The variables evaluated were: percentage of estrus (percentage of animals that allowed the mount within the period of detection of estrus over the total number of females treated), percentage of fertility (number of non-repetitive sheep among the total number of sheep treated) and percentage of prolificity (percentage of sheep that gave birth to 1, 2 or 3 offspring over the total of pregnant sheep).

### Domestic manufacture of sponges

The sponge was cut in circles of 4 cm in diameter using a copper punch, each of them was crossed with 60 cm of cotton thread with a needle along and back. After crossing the sponge, the threads were knotted and the sponges were sterilized with the threads, by introducing them in boiling water for 15 min and then they began to drain. Each of the dried sponges was placed in each compartment of an ice cube mold and 40 mg of progesterone was administered per sponge, allowed to stand for 60 minutes and 1 ml of 5% enrofloxacin was placed, then covered with a new bag.

### Placement of intravaginal sponges

Before placing the sponges in the vagina of the females, the vulva was washed with water and neutral soap, the intravaginal sponge was introduced taking it with gloves on the beveled end of the applicator, taking care that the thread was out, the stem was placed inside of the applicator until making contact with the sponge, the applicator was moistened externally with petroleum jelly, the applicator and the stem were introduced to the bottom of the vagina, retracting the applicator 3-4 cm keeping the stem in place until the sponge was released, both They were removed leaving the threads out for later removal. Each sheep was registered and identified with the type of treatment administered.

### Aplication of eCG

24 hours before sponge removal, 400 IU of eCG was administered intramuscularly to all sheep of both treatments.

### Removal of intravaginal sponges

Twelve days later the sponges were removed by gently pulling the threads back, keeping a slight downward tilt. The sponges from which the threads were detached before removal were carefully removed with sterile surgical tweezers.

### Estrus detection

For the detection of estrus, the treated sheep and those of the control group were distributed equally in three pens with 20 animals each and one male to mount, mark and cover the sheep. They were also detected by direct observation at a time of 6:00 a.m. to 11:00 a.m. and from 3:00 a.m. to 8:00 p.m. from 24 hours after sponge removal, for 3 days.

### Pregnancy diagnosis

The diagnosis of pregnancy was determined by observing no return to estrus, 15 to 18 days after riding.

### Deliveries

As many births as possible were assisted, cleaning and resuscitating the young when required. Two outdoor covered pens were set aside for births, in which the baby was introduced with her mother for a week or until the lamb could follow her in grazing. Each birth was recorded.

## RESULTS

Tables 1, 2 and 3 present the results of the presentation of estrus, percentage of fertility and the cost by type of sponge, respectively.

**Table 1. Presentation of estrus in both treatment and in the control group.**

| Hours of presentation | T1 (N) | % | T2 (N) | % | WG (N) | % |
|---|---|---|---|---|---|---|
| **24** | 2 | 8% | 0 | 0% | 2 | 20% |
| **48** | 11 | 44% | 14 | 56% | 3 | 30% |
| **72** | 5 | 20% | 9 | 36% | 0 | 0% |
| **Total** | 18 | 72% | 23 | 92% | 5 | 50% |

T1 = Home-made sponges. T2 = Commercial Sponges. WG = Witness Group. N = Number of animals.

**Table 2. Fertility of sheep in both treatments and in the control group**

| Fertility | T1 (N) | % | T2 (N) | % | WG (N) | % |
|---|---|---|---|---|---|---|
| **Pregnant sheep** | 16 | 64% | 19 | 76% | 5 | 50% |

T1 = Home-made sponges. T2 = Commercial Sponges. WG = Witness Group. N = Number of animals.

## DISCUSSION

**Presentation of estrus**. - Regarding the percentage of induction to estrus, this was 72% in the group of sheep treated with home-made intravaginal sponges plus 400 U.I. of eCG, against 92% in the treatment with the commercial product, while for the control group, the percentage was 50%. In all cases, estrus occurred after 24 hours of sponge removal, with most occurring after 48 hours (Table 1).

**Fertility.** - Fertility, expressed as pregnant sheep on treated sheep, showed the following results (table 2). The percentage of fertility obtained in the present work was 64% for the group treated with home-made sponges and 76% for the treatment with commercial sponges, while for the control group the result obtained was 50%.

**Table 3. Cost in Mexican pesos of sponges used, commercial and domestic manufacturing**

| Treatment | Material | Cost/sheep in pesos |
|---|---|---|
| | Sponge | 64.00 |
| Commercial sponges | Applicator | 12.00 |
| | eCG (Gonaforte-Parfarm) | 14.00 |
| | Iodine | 0.80 |
| | Gauze | 0.80 |
| | Total | 91.60 |
| | Sponge of uphosltery | 0.30 |
| | Cotton thread | 0.20 |
| | Applicator | 12.00 |
| Homemade sponge | Progesterone (Fort Dodge) | 10.80 |
| | Enroxil | 2.00 |
| | Ice boxes | 1.20 |
| | Bags | 0.40 |
| | eCG (Gonaforte-Parfarm) | 14.00 |
| | Iodine | 0.80 |
| | Gauzes | 0.80 |
| | Total | 42.50 |

**Prolificity.** - With respect to prolificacy, no differences were observed between animals treated with sponges of domestic manufacture, commercial manufacture and those of the control group; all females had simple deliveries.

**Economic viability**. - The evaluation of the economic viability of household-made sponges was determined by comparing expenses between said treatment and that performed with commercial sponges (table 3).

The cost analysis showed important economic differences, the cost per induced animal was higher for the commercial product (T2) with a cost per sheep of 91.60 pesos; the home manufacturing sponge had a cost of 42.50 pesos, resulting in 53.6% cheaper than the commercial manufacturing sponge; even though the home manufacturing sponge had an efficiency of 21.7% lower than those of commercial manufacturing, it does not affect its profitability, from the cost-benefit point of view.

The control of reproductive activity is a fundamental management technique in modern sheep production units, since it allows increasing the profitability. It enables better planning of activities such as food and times of coverage and delivery, according to the

annual variations in market demand and resources. Consequently, fertility and birth rates, system productivity (number of carcass/number of sheep covered) and obtaining higher quality and more homogeneous products are increased (Azevedo *et al*., 2006).

The results of estrus presentation, found in this work (table 1) coincide with those reported by (Uribe-Velazquez *et al*., 2008), who indicated that the supply of FGA plus PMSG induces the presence of estrus of 36-72 hours after the removal of the FGA implant in Bergamacia sheep, confirming what Lozano *et al*. (2012), that FGA is one of the most widely used progestogens in the manufacture of intravaginal sponges.

In the work carried out by (Estrada *et al*., 2009), it was obtained that the use of sponges manufactured domestically, indicated reproductive parameters, percentage of estrus and fertilization similar to those reported in studies, where commercial sponges were used to synchronize these; in the work of these authors with house-made sponges, they obtained at retirement, a result of 79% estrus and 58% gestation. In the present work, with house-made sponges, 72% was obtained as a result of the presentation of estrus and 64% of pregnancy (tables 1 and 2), the latter being more favorable, even with the results obtained with a lower percentage of estrus, when buying it with those obtained by the aforementioned authors.

In the present work, no results were obtained regarding prolificacy, since all females, considered at work, had simple deliveries. This differs from that presented by (Raso *et al*., 2006), where when using sponges impregnated with Medroxyprogesterone Acetate (MAP) for 12 days plus 300 IU from PMSG to sponge removal, they obtained 14 offspring of 10 females. In our work, we expected to obtain percentages of prolificacy; however, the animal's body condition was probably one of the causes of these results.

In conclusion, the synchronization of Suffolk/Hampshire sheep with homemade sponges is an extremely effective, useful, practical and economical method; it is a possibility for the sheep breeder due to the high costs of synchronization with commercial products, thus giving it a greater number of offspring per year making sheep production more profitable.

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