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The Use of Melengestrol Acetate as a Strategy to Improve Production Efficiency of Sheep in Rural Areas in Mexico

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Abstract: The aim of this study was to evaluate the use of melengestrol acetate (MGA) as a strategy to improve the production efficiency in ewes of rural areas in México. Twenty ewes of breeds (Dorper and Dorper with Pelibuey) non-pregnant and with ovarica activity were used. The treatment consisted of the administration of 0.22 mg MGA/ewe/d for 17 d. The MGA efficiency was measured once the treatment finalized, and the producer was responsible for the registration of the estrus presentation and prolificacy rate. 95% of the sheep presented estrus in a period of 14 d after stopping treatment. The prolificacy percentage was of 1.2 lambs born by ewe during a period of six months (including treatment and period of gestation). In conclusion, the use of MGA represents an alternative to improve the efficiency of sheep production in rural areas in México, since it can increase the number of lambs by 30% in a period of 12 months.

Key words: Melengestrol acetate, rural areas, sheep, estrus, prolificacy.

1. Introduction

Sheep production in México is an agricultural activity that takes place throughout the country, giving a clear idea of the importance of this activity [1]. There are different sheep production systems with characteristic according to each region and determined by the availability of resources, traditions and the consumption of sheep products. These systems range from the intensive systems, which use high technology to keep the animals in complete confinement on elevated floors, to the semi-intensive systems [2].

In the country, there are sheep production systems, which are developed under free grazing, in total confinement feeding or the combination of both modalities [1]. According to the intensity of their production regime, they are classified as intensive, semi-intensive and extensive; and according to its fundamental purpose, they are divided in commercial or subsistence systems. At the same time, commercial systems can be intensive, semi-intensive or extensive, and the subsistence system is generally considered as backyard production [3].

The predominant ovine production system in México is the extensive system; its feeding is basically the grazing of animals on natural rangelands; there is minimum investment in feed, health and infrastructure and generally the labor is done by the family, leading to low production costs. In the intensive system, feeding is under total or partial confinement, using supplies of high nutritional value, which significantly increases production costs; this also involves a major capital investment for infrastructure and equipment, in addition to the high value of land and the cost per payment of wage labor [4].

In semi-intensive systems, feeding is based on grazing in agricultural areas and pastures during the

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morning; in the afternoon they are housed in pens, where they receive complementary feeding, such as agricultural wastes, cereal grains or commercial feed. In this type of system, the investment in reproductive management and health is minimal [1, 2].

In rural areas of México, there is a diversity of culture in sheep production. An integrated model of the different production systems is denominated backyard production, and characterized by small landowner producers, family labor (young men, old men or women). During daytime, the animals graze in communal land of federal areas and unattended plots. At night, the animals are enclosed in their pens, where they are provided with crop residues and agricultural by-products. Although these units present different deficiencies in technology, infrastructure and land held for grazing or cultivation and the handling of the animals are similarly performed to an intensive, semi-intensive or extensive system; their feeding was focused on natural resources (pastures) or leftover agricultural products. However, backyard production does not aim to achieve production efficiency, since it is considered as a secondary activity, a source of saving money and a patrimony of the family [4].

The ovine production in rural areas is characterized by having a variable range of female sheep in production (2-60) and it is considered a complementary activity to agriculture. Because it is not a primary activity, and it has the limitations to achieve competitive levels of productivity, among which are the lack of technological innovation (essential component of rentable agricultural systems). The techniques applied are traditional and the production of this system is governed by the biology of the animals [2, 5].

Reproductive indexes are affected by lack of techniques for manipulating estrus and free mating, causing a dispersion of births and the impossibility of forming homogeneous lots of lambs. So the productivity of these systems sheep are low, obtaining only the 40% of their production capacity and accounting a percentage of prolificacy of 1.4 lambs born by ewe in a period of 12 months [6]. Therefore, the use of biotechnologies for reproductive control is definitely one of the most important aspects in any production system.

The use of reproductive biotechnologies helps program the period of births to take advantage of the availability of forage and other resources for production, attend the market demand, create homogeneous groups of animals for feeding with the same diet, shorten the calving interval and make possible the preparation of intensive breeding programs [7].

Among the various methods or biotechnologies, which can be employed to control the reproductive cycle of the ewes is the use of synthetic progestin, like melengestrol acetate (MGA), which represents an ideal choice for this type of production in rural areas, where the farmers do not have the economic resource and sufficient technology [8]. MGA is a low cost product, easy to administer (can be mixed in feed) and does not cause abortions [9]. The latter is of great importance since it is common that in these production systems the physiological stage of the female is unknown (pregnant or empty). The objective of this study was to evaluate the use of MGA as a strategy to improve production efficiency in ewes of rural areas in México.

2. Materials and Methods

The study was conducted in the municipality of Contepec, Michoacán, México, on 19°55′ North latitude and 100°11′ West longitude, at an altitude of 2,490 m above sea level, intemperate climate with summer rains, rainfall of 1,168 mm and temperature ranging between 8.6 °C and 22.4 °C [10]. A backyard production system was used, located in a rural area known as Agua Fria, with family labor. Twenty ewes of breeds (Dorper and Dorper with Pelibuey) non-pregnant and with ovarica activity were used. The ewes were grazed during the morning and in the

afternoon oat and barley were offered. The treatment in the administration consisted of 0.22 mg of MGA for 17 d, and the dose was administered individually once a day. The efficiency of MGA was measured once the treatment was completed. The producer was the responsible of registering the estrus presentation and prolificacy rate. No control group was used; the percentage of prolificacy was compared with the percentage of the characteristic prolificacy of sheep production in rural areas of México. The results were analyzed with descriptive statistical techniques.

3. Results and Discussion

The 95% of the ewes treated presented estrus in a period of 14 days after treatment. These results are similar to those reported by Salas et al. [9], who evaluated the effect of MGA on the induction and synchronization of estrus in 20 ewes and observed that 100% presented estrous. The similarity of the results in both studies may be due to the fact that the administration of MGA was for a long period (17 d) [11, 12]. The administration of MGA represents an alternative for the extensive and backyard production systems according to the observed by the producer.

Meanwhile, Giménez et al. [13] and Jackson et al. [14] evaluated the efficiency of MGA on the induction and synchronization of estrus in ewes and in goats, respectively; the response observed was 80% in ewes and 84% in goats. This confirms the efficiency of MGA in the induction and synchronization of estrus, representing an alternative for production sheep in rural areas.

The percentage of prolificacy obtained was 1.2 lambs born by ewe, over a period of six months (including treatment and period of gestation), which is equivalent to a percentage of prolificacy of 2.0 lambs born by ewe annual (considering into account an open period of three months); when compared with the rate of prolificacy in rural areas, it is 1.4 lambs born by ewe in a period of 12 months. Therefore the use of MGA represents a strategy to improve the production efficiency of sheep in backyard systems, and even more if you consider the low cost of treatment (17 days) equivalent to $0.21 USD by ewe [15, 16].

It is recommended that the dose of 0.22 mg of MGA/ewe/day is administered individually, in order to get the best response in the fertility rate. Emsen et al. [17] obtained a fertility percentage of 45%, when administered a dose of 0.125 mg of MGA/ewe/day during 12 days; Castonguay et al. [18] used a dose of 0.4 mg of MGA/ewe/day during 10 days and reported a fertility percentage of 45%. In both studies, the low fertility rate may be because: when low doses are administered, MGA (≤ 0.12 mg) generates a high frequency of luteinize hormone (LH) pulses, triggering the development of persistent follicles [19, 20]; while when high doses are administered (≥ 0.4 mg), LH suppression can be so intense, which inhibits follicular development [21, 22].

4. Conclusions

The use of MGA represents an alternative to improve the efficiency of sheep production in rural areas in México, since it can increase the number of lambs by 30% in a period of 12 months, which translates into higher economic income for the producer.

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