

**ESTRUS DISTRIBUTION IN HAIR EWES MATED IN NOVEMBER-DECEMBER  
UNDER CONTROLLED CONDITIONS IN NORTHERN MEXICO**  
DISTRIBUCIÓN DEL ESTRO EN OVEJAS DE PELO EN NOVIEMBRE-DICIEMBRE EN  
CONDICIONES CONTROLADAS EN EL NORTE DE MEXICO

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**ABSTRACT**

An experiment with hair ewes was carried out in Northern Mexico to determine the estrus distribution after ram introduction to the herd, the effects of animal live weight (LW) on estrus distribution (ED); and the effects of body condition (BC) on estrus distribution (ED) respectively. The experiment was conducted at the El Pénsil Sheep Farm in Chihuahua, Mexico. Two hundred and sixteen ewes and nine rams were used for this experiment. Animals age range was  $2.5 \pm 0.168$  years, animal live weight (LW) of  $32.07 \pm 0.417$  kg, and body condition (BC) ranking score of  $3.26 \pm 0.047$ , in a scale 1 to 5. Animals were grazed on pastures with a mix of Bermuda grass and alfalfa for 8 hours a day. On this experiment, total of nine stallions Kathadin, Pelibuey and Black Belly breeds were used. The experiment was conducted between November 19 and December 16, 2011. Descriptive statistics were used to analyze the data. The results indicated that 41% of the ewes reached an estrus between the 6th and 11th day after the introduction of the rams. The highest percentage of estrus (52%) occurred in ewes with a LW between 30 and 40 kilograms; and a BC between 3 and 3.5. All ewes reached an estrus 18 days after introduction of the rams to the herd.

**Keywords:** estrus-distribution, hair-ewes, body-weight, body-condition.

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Recibido: 02/06/14. Aceptado: 25/08/2014.  
Identificación del artículo: abanicoveterinario4(3):25-30/0000053

**Sistema Superior Editorial sisupe.org**

## RESUMEN

Un experimento con ovejas de pelo se llevó a cabo en el norte de México para determinar la distribución de celo después de la introducción de los sementales, así como el efecto del peso y condición corporal sobre el celo en ovejas de pelo en el norte de México, se realizó un empadre dirigido en el Rancho el Pénsil, localizado a 30° 37' de latitud norte. Se utilizaron 216 ovejas adultas de pelo, de una edad de 2.5±0.168 años, con un peso promedio de 32.07±0.417 kg y una condición corporal (CC) de 3.26±0.047, en una escala de 1 a 5. Se alimentaron en pastoreo, ocho horas diarias en una pradera combinada de pasto bermuda con alfalfa. Se utilizaron 9 sementales de las razas Kathadin, Pelibuey y Panza negra, tres de cada raza. El empadre dirigido se inició el 19 de noviembre de 2011 y terminó el 16 de diciembre. La información obtenida se analizó con estadística descriptiva, se determinó el número de ovejas en celo por día, porcentaje de celos de acuerdo al peso y CC. Aproximadamente el 41% de las ovejas presentaron celo entre los días 6 al 11. El 52% de los celos se registró en las ovejas que pesaron entre los 30 y 40 kg. El mayor porcentaje de celos se presentó en las ovejas con CC 3, 3.5 y 4. Todas las ovejas entraron en celo a los 18 días, el mayor porcentaje de celos se registró en las ovejas que pesaron entre 30 y 40 kg y CC de 3 a 3.5.

**Palabras clave:** distribución de celos, ovejas de pelo, peso-corporal, condición-corporal.

## INTRODUCTION

Hair ewes present estrus throughout the year; however, the wool ewes only present estrus in the fall and winter season: there are differences among breeds. For instance, the Suffolk and Corriedale breeds have the highest percentages of estrus in the fall and beginning of the winter. In contrast, Rambouillet and Creole present estrus the whole year (De Lucas *et al.*, 1997). The Pelibuey breed in tropical areas can present several estruses throughout the year (Cruz *et al.*, 1994). A good nutrition is crucial for ewes to present estrus and it is reflected by the animal's body condition (BC). The BC ranking scores can be used to determine animal condition. Body condition scores range from 1 to 5. Number 1 is given to skinny sheep and number 5 is given to fat sheep (Pugh, 2002).

A good BC is necessary for good ovulatory rates and to build up the body reserves that the animal will use during pregnancy and lactation. The optimal BC for a maximum reproductive efficiency is 3 to 3.5 (Henderson, 1994). Another factor that impacts the presence and distribution of estrus is the animal weight. In Targhee, Columbia, Rambouillet and Polipay breeds, the fertility rates were affected by animal weight during the mating. The fertility rates were higher in animals with higher weights during the mating (Gaskins *et al.*, 2005).

Most of the information available in Mexico on hair ewes reproduction comes from tropical areas and therefore, the objective of this study is to evaluate the estrus distribution after introduction of the rams in the herd, animal live weight (LW) on estrus distribution (ED); and the effects of body condition (BC) on estrus distribution (ED).

## MATERIAL AND METHODS

This research was conducted at the *El Pénsil* Farm in Villa Ahumada, Chihuahua, Mexico, 100 kilometers southeast from Ciudad Juarez. The altitude is 1,300 meters above sea level, and latitude is 30° 37' North. Temperatures are extreme with a maximum of 40°C in the summer and -10°C in the winter, the climate is classified as arid (INEGI, 2010).

Two hundred and sixteen adult ewes and nine rams were used for this experiment. Animals range age was  $2.5 \pm 0.168$  years, animal live weight (LW) of  $32.07 \pm 0.417$  kg, and a body condition (BC) of  $3.26 \pm 0.047$ , in a ranking scale 1 to 5. Feeding consisted on a pasture with a mix of Bermuda grass and alfalfa for 8 hours per day. Three males purebred Kathadin, three Pelibuey, and Three Black Belly were separated from the herd in early July, 2011 until the beginning of the controlled estrus experiment. The controlled mating started on November 19, 2011 and ended on December 16, 2011.

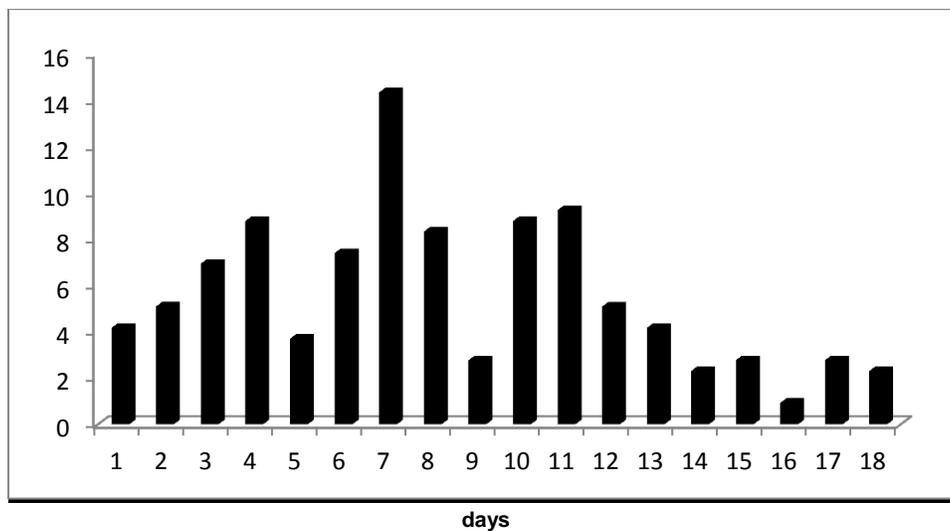
The procedures were the following: each day three rams (each of a different breed) were allowed to smell the emitting scent of the ewes until they indicate readiness through physical displays towards rams. The rutting was allowed and each ewe was identified with blue paint on the hind saddle and separated from the herd. Each ewe serviced was identified with a number, body condition (BC), body weight, age, date of the intercourse, and number and breed of the ram the information was analyzed with descriptive statistics. The variables identified were number of ewes under estrus per day, percentage of estrus according to body weight and body condition.

## RESULTS AND DISCUSSION

Figure 1 shows the relationship between estrus distribution and the days in which the rams were introduced to the ewes. The higher number of estrus (31) occurred at day number 7, followed by day 11 with 20 estruses, then day 10 with 19 estruses, followed by day 11 with 20 estruses, day 10 with 19 estruses, and day 8 with 18 estruses respectively. Approximately 41 % of the ewes had an estrus between day 6 and day 11 after introduction of the rams.

Our results are similar to the ones reported by De Lucas *et al.*, 2008; these authors reported that 100% of Columbia ewes mated in November presented an estrus on day 18 after the introduction of the rams. The difference between our results and those reported by De Lucas *et al.*, 2008 (41% VS 100%) could be attributed to the differences in the ewes breed used, the different mating dates, and the latitudes of both studies.

Perkins y Fitzgerald 1994, reported that ovulation in Targhee y Rambouillet ewes occurred  $10.8 \pm 1.6$  days after the introduction of the rams. These results are similar to the ones found in our research. However Auskwa *et al.*, 1992 reported that ewes ovulated between  $8 \pm 0.19$  days after being in contact with the rams during the month of May. This difference could be attributed to the different months in which both researches were carried out.



**Figure 1. Percentage of ewes in estrus by day after the ram introduction.**

Figure 2 shows estrus distribution according to animal live weight (LW). The highest percentage of estrus (30.55%) occurred in ewes with LW of 30 to 35 kilograms, followed by 25% of estrus in ewes with LW of 25 to 30 kg, and 21.7% in ewes with LW of 35 to 40 kg. In general, 52% of the estrus occurred in ewes with LW between 30 to 40 kilograms. In ewes with LW lower than 25 kilograms, only 13% had an estrus.

The number of estrus was higher in ewes with a LW of 30 to 40 kilograms. These results are similar to the ones reported by Bradford y Quirke (1986) in the Barbados breed and Barbados mixed with Targhee. The aims of our research were not related to animal prolificacy or levels of fecundity, or selection criteria. However, we reviewed results found by other authors and noticed that Bradford y Quirke (1986) found a strong correlation coefficient between LW and ovulation rates between 0.33 y 0.37. Bunge *et al.*, 1990 found an effect of ewe breeding weight on prolificacy was positive in all years

(1983 and 1984) and significant in 1985 and pooled across years. Gaskins *et al.*, 2005 found in Columbia, Rambouillet and Polipay and Targhee ewe fertility affected by weight at the time of mating.

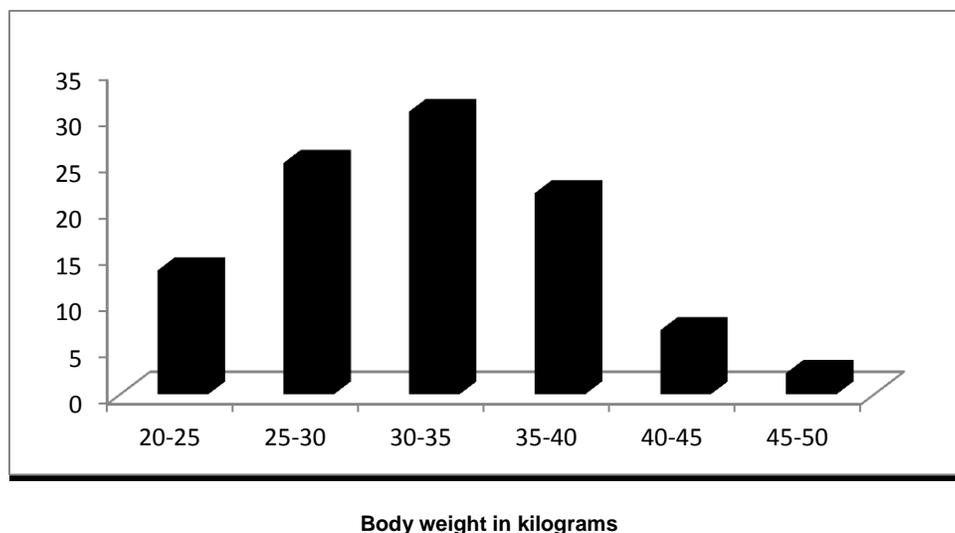


Figure 2. Percentage of estrus distribution with respect to body weight in the ewe.

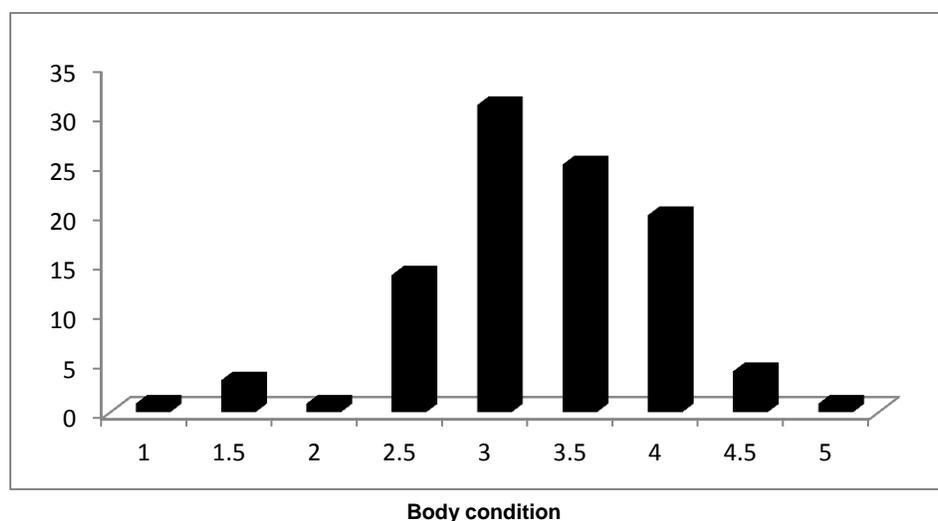


Figure 3. Estrus distribution in ewes with respect to body condition.

Regarding BC (Figure 2), the highest percentage of estrus was presented in ewe(s) with BC, 3, 3.5 and 4 (31.01%, 25% and 19.90%). The ewe(s) that showed lower percentage of estrus corresponded to the CC 1, 2 and 5 (0.92%, 3.24% and 0.92%).

The results of this study are very similar to those reported by Rosales *et al.*, 2006, who reported an 88.8% of goats in estrus, as well as 88.8% of ovulations in the month of

November, with a CC of 3. Pugh, 2002 and Henderson, 1994, recommended that the best BC for reproduction in ewe(s) must be 3 to 3.5.

## CONCLUSION

The 100% ewe(s) showed estrus 18 days after the introduction of the ram. The highest percentage of estrus was recorded in ewe(s) which weighed between 30 and 40 kg. The largest number of ewe(s) in estrus was found in BC between 3 to 3.5.

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