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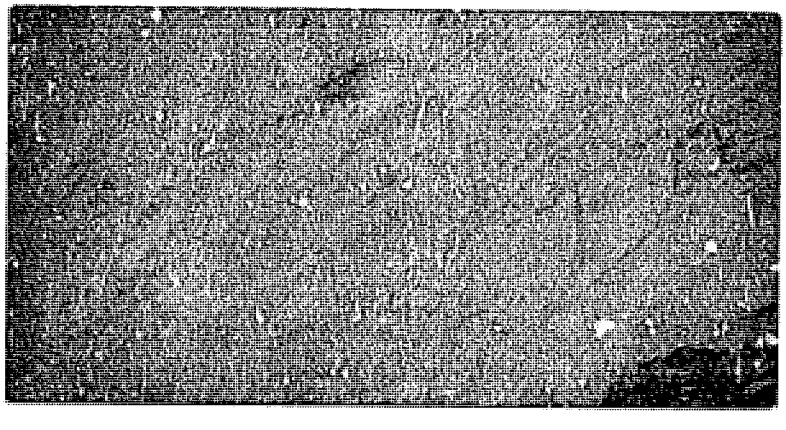

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Department of Animal, Dairy and Veterinary Sciences
Utah State University
Logan, UT 84322-4815
USA

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POSTPARTUM INTERVAL (PPI) IN SHEEP LAMBING DURING THE BREEDING AND ANESTROUS SEASONS IN THE HIGH CENTRAL SIERRA OF PERU

H. W. Vivanco, W. C. Foote, G. S. Riera,
C. Novoa, J. Camacho, H. Cardenas,
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POSTPARTUM INTERVAL (PPI) IN SHEEP LAMBING DURING THE BREEDING AND ANESTROUS SEASONS IN THE HIGH CENTRAL SIERRA OF PERU

H.W. Vivanco[1], W.C. Foote[2], G.S. Riera[2], C. Novoa[3], J. Camacho[3], H. Cardenas[1] and V. Alarcon[1]

[1]National Agrarian University, P.O. Box 456, La Molina, Lima, Peru.
[2]AID Title XII, SR-CRSP, Utah State University, Logan, Utah 34322-4815, USA.
[3]National Major San Marcos University, Lima, Peru.

SUMMARY

This study was undertaken in the Central Sierra of Peru (12° South latitude, 76° West longitude, 3,800 m elevation). A first group 180 ewes equally assigned by age (1.5, 2.5 and 3.5 years) and breed (Criollo and Junin) to evaluate the postpartum interval (PPI) during anestrous seasons. They were exposed to fertile males for 65 days during the regular breeding season (May - June, fall) to lamb during the anestrous season (October - November, spring). The second group of 22 Criollo and 22 Junin ewes were bred to fertile males in November (spring) to lamb during the regular breeding season (fall). In this group, estrus and ovulation were induced by Fluorogestone Acetate (FGA) containing intravaginal sponges and 500 IU of PMSG. All animals were managed and grazed on native pasture. All ewes were exposed to painted teaser rams to check the occurrence of the first postpartum estrus. Younger ewes (1.5 years of age) had

significantly ($P < 0.05$) longer PPI (161 days) than ewes of 2.5 and 3.5 years of age (126.8 and 150.7 days, respectively). Statistically significant differences ($P < 0.01$) occurred between Criollo and Junin sheep for live body weight at parturition, lamb birth weight and length of PPI. Fall lambing ewes had significantly shorter PPI (88.9 days) than spring lambing ewes (156.9 days) when breeds were combined. Criollo sheep showed significantly ($P < 0.05$) shorter PPI in both seasons (85.5 and 148.5 days) than Junin ewes (93.5 and 161.9 days).

INTERVALO POSPARTO (IPP) EN OVEJAS PARIDAS DURANTE LAS EPOCAS REPRODUCTIVA Y DE ANESTRO EN LA SIERRA CENTRAL DEL PERU.

RESUMEN

Este estudio fue conducido en la Sierra Central del Perú (12° Latitud sur, 76° Longitud oeste, 3,800 m de elevación) con 180 ovejas distribuidas al azar y balanceadas por edad (1.5, 2.5 y 3.5 años) y raza (Criolla y Junín) para evaluar el intervalo posparto (IPP) durante la estación regular de reproducción y de anestro. Las ovejas fueron expuestas a machos fértiles por 65 días durante la época regular de reproducción (Mayo - Junio, otoño) para que los partos ocurran durante la época de anestro (Octubre - Noviembre, Primavera). Un segundo grupo de 22 ovejas Criollas y 22 ovejas Junín, fueron expuestas a machos fértiles en Noviembre (Primavera) para que los partos ocurran durante la época regular de monta (otoño). En este grupo, el estro y la

ovulación, fueron inducidos con esponja intravaginal conteniendo Actetato de Fluorogestona (FGA) e injección intramuscular de 500 UI de PMSG. Todas las ovejas fueron manejadas y pastoreadas en pradera nativa y expuestas a carneros vasectomizados desde el momento del parto, para determinar la ocurrencia del primer estro posparto. Borregas de 1.5 años de edad tuvieron un IPP significativamente ($P < 0.05$) mas largo (161 dias) que ovejas de 2.5 y 3.5 años de edad (126.8 y 150.7 días, respectivamente). Diferencias estadísticamente significativas ($P < 0.01$) existieron entre criollas y Junín para peso vivo al parto de las ovejas, el peso al nacer de las crias y el intervalo entre el parto y el primer estro posparto. Las ovejas de ambas razas que parieron durante el otoño, tuvieron un IPP significativamente más corto (88.9 días) que las ovejas que parieron durante la primavera (156.9 días). Las ovejas Criolla, mostraron significativamente ($P < 0.05$) un IPP más corto que las ovejas Junín, durante los dos períodos de parición observados.

Introduction

The potential reproductive efficiency in sheep is reduced by a long postpartum interval (PPI). The PPI can be affected by both the anestrous season and the postpartum anestrous due to physiological, endocrinological and anatomical modifications during pregnancy, parturition and lactation. The influence of gestation, parturition, lactation and suckling and their interactions are not properly understood. During the PPI, ovarian

inactivity was observed. Suckled ewes had significantly smaller follicles than nonsuckled ewes (Foote, 1971). Ovulations unaccompanied by estrus have been reported to occur during this period (Fitzgerald & Cunningham, 1981), and forced matings could lead to conception (Miller & Wiggins, 1964).

Interrelationships among nutrient level, body condition and lactation together with the effect of suckling, has been reported to influence the PPI and delay ovulation and estrus (Fletcher, 1971). No influence was found on uterine involution or on ovulation with estrus. Length of lactation and suckling were shown to affect the process of uterine involution (Call et al., 1976; Honmade, 1977). Age of the ewe had no significant effect on the length of postpartum anestrus (Barker and Wiggins, 1964). Breed (Hunter and Lishman, 1967) and litter size (Barker & Wiggins, 1964) have been shown also to affect the length of postpartum anestrus. The first PP estrus occurred earlier in non suckled ewes than ewes nursing single or twin lambs (Barker and Wiggins, 1964). Introduction of the male seems to shorten the PPI in sheep (Oldham and Martin, 1979).

The purpose of this study was to determine the length between parturition and the first postpartum estrus in the Criollo and Junin breeds of ewes lambing during breeding and anestrous seasons in the Central Sierra of Peru.

Materials and Methods

This study was undertaken at the SAIS Tupac Amaru, CONSAC, Central Sierra of Peru (12° South latitude and 76° West longitude, 3,800 m elevation). One group of 180 ewes were equally assigned by age (1.5, 2.5 and 3.5 years old at breeding) and breed (Criollo and Junin). They were bred to fertile males during the 65 days of regular (fall) breeding season (beginning May 3) to lamb during the season when some ewes are in seasonal anestrus (October - November, 1983). The second group of ewes (22 Criollo and 22 Junin), approximately 2.5 years of age at breeding, were bred to fertile males during November, 1983 (spring) to lamb during the regular breeding season (April - May, 1984; fall). Estrus and ovulation, to allow mating, were induced using intravaginal sponges containing 40 mg FGA for 14 days and 500 IU of PMSG administered I.M. 36 hours prior to progesterone withdrawal. All animals were managed and grazed on native pasture. Following the first parturition, the ewes were exposed to vasectomized teaser rams fitted with marking harnesses until all ewes had shown their first postpartum estrus. Weekly jugular blood samples were drawn from each ewe lambing to obtain progesterone levels to determine the interval from parturition to first PP ovulation and the number of ovulation periods previous to the first PP estrous period. Date of first PP estrus were recorded to calculate the PPI based on the date of parturition. Live body weights of ewes at lambing and the birth weights of

lambs were recorded. Least square analysis of variance with information on PPI and weights were performed.

Results

Table 1 shows that there are no statistical differences ($P > 0.05$) between ages within breed for live body weight at parturition, lamb birth weight or the length of the PPI during spring lambing. Lambs born from Criollo ewes of 1.5 years old, produced significantly ($P < 0.05$) lighter lambs than ewes of 2.5 and 3.5 years old. Junin ewes had significantly ($P < 0.01$) heavier live body weights at parturition than Criollo ewes. Younger ewes (1.5 years old) had significantly ($P < 0.05$) longer PPI (161 days) than ewes of 2.5 and 3.5 years old (126.8 and 150.7 days), respectively.

To compare the performance of ewes lambed during the spring with those that lambed during the fall, all information of spring lambing ewes was pooled by breed over all ages, Table 2. Statistically significant differences ($P < 0.01$) occurred between Criollo and Junin sheep for live body weight at parturition, lamb birth weight and length of PPI. The Criollo ewes had lighter live body weights at parturition as well as the weights of lambs at birth. Fall lambing ewes had a shorter PPI than spring lambing ewes for each breed (Criollo 85.5 vs. 148.5 days; Junin 93.5 vs 161.9 days and the combined breeds 89.9 vs. 156.9 days). The Criollo breed has shown a shorter PPI to the first ovulation 18.6 days and higher progesterone levels (1.8 ng/ml) assessed by

plasma progesterone levels compared to Junin sheep (30.5 days and 1.4 ng/ml Table 2). The interval from parturition to the first postpartum ovulation (based on blood progesterone levels > 1 ng/ml) during fall season tended to be shorter (24.3 days) than during spring season (26.4 days). The first progesterone peak observed during spring (1.9 ng/ml) tended to be greater than during Fall (1.3 ng/ml). No significant difference was found among seasons for live body weight at parturition (34.3 vs. 33.6 kg). The mean birth weight of lambs was statistically ($P < 0.01$) higher for lambs born in the spring (3.4 kg) than for lambs born in the fall (2.7 kg).

Discussion

The live body weight at parturition of Criollo sheep are lower than Junin sheep under the same management and grazing conditions. Likewise, the birth weights of Criollo lambs are lighter than Junin lambs. However, the birth weights of lambs-corrected for body weight of dam at parturition, did not differ (Vivanco et al., 1985). This indicates that the lamb birth weight per unit of the dam weight for these two breeds is the same.

The Criollo breed showed a shorter ($P < 0.05$) PPI than the Junin at both spring and fall lambing. This demonstrates that Criollo sheep have a higher potential for intensive breeding programs than the Junin. These results also agree with the report of Hunter and Lishman (1967) that breed differences exist.

The postpartum interval was longer in the spring than in the fall for both breeds. This performance seems to be due to the interference of the anestrous season. These findings agree with those reported by Restall and Starr (1977) in Australia.

It is possible that the level of nutrition and the high elevation at Central Sierra of Peru could affect the length of the PPI. Hunter (1968) and Dunn and Kaltenbach (1980) have demonstrated that lighter or undernourished animals have longer PPI than heavier animals or those on a high plane of nutrition. Although there is no information available on the influence of high elevation, this might also be considered a factor. Both lactating and non-lactating postpartum ewes often ovulate at one or more periods before ovulation is accompanied with behavioral estrus (Restall, 1971).

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Table 1. Least square means (± SD) of live body weight of ewes and lambs and PPI of ewes lambing during anestrous season (spring).

Age of Dam (years)	Breed[1]		
	Criollo	Junin	Total[2]
Ewe lambing weight (kg)			
1.5	24.0 (1.4)a	37.5 (2.5)b	36.3a
2.5	26.5 (3.2)a	38.6 (3.1)b	33.8b
3.5	25.9 (3.9)a	40.9 (3.4)b	33.7b
Lamb birth weight (kg)			
1.5	2.0 (0.0)a	3.7 (0.5)b	3.5b
2.5	2.8 (0.3)b	3.8 (0.5)b	3.1a
3.5	2.9 (0.4)b	3.9 (0.5)b	3.4b
PPI of ewes (days)			
1.5	147.0 (0.0)a	162.2 (17.2)a	161.0c
2.5	157.4 (22.8)a	167.0 (19.9)a	126.8a
3.5	144.6 (14.2)a	157.6 (12.2)a	150.7b

[1] $P < 0.01$ for means with different superscript letters among breeds.

[2] $P < 0.05$ between ages within breeds combined.

Table 2. Least square means (± SD) of live body weight of ewes and lambs PPI, PP ovulation and progesterone concentration during spring (1983) and fall (1984) lambings.

Season	Breed[1]		
	Criollo	Junin	Total[2]
Ewe lambing weight (kg)			
Spring	25.7 (3.6)a	39.5 (4.3)b	34.3a
Fall	25.6 (2.5)a	42.2 (4.5)b	33.6[a]
Subtotal	25.7a	39.7b	—
Lamb birth weight (kg)			
Spring	2.8 (0.4)a	3.8 (0.5)b	3.4b
Fall	2.4 (0.5)a	3.1 (0.5)b	2.7[a]
Subtotal	2.7a	3.7b	—
PPI (days)			
Spring	148.5 (18.1)a	161.9 (17.0)b	156.9 (18.4)b
Fall	85.5 (22.3)a	93.5 (14.2)b	88.9 (19.4)[a]
Subtotal	128.2a	149.1b	—
PP ovulation (days)[3]			
Spring	17.2	32.5	26.4
Fall	20.0	28.6	24.3
Subtotal	18.6	30.5	25.3
Progesterone Concent. (ng/ml)[4]			
Spring	2.3	1.5	1.9
Fall	1.3	1.3	1.3
Subtotal	1.8	1.4	1.6

[1]$P < 0.05$ for means with different superscript letters among breeds.

[2]$P < 0.01$ among seasons for two breeds combined.

[3]Preliminary data only. Interval from parturition day to the day at which the progesterone concentration greater than 1 ng/ml was detected by RIA.

[4]Preliminary data only. First postpartum serum progesterone peak indicating ovulation.