of Putumayo, Colombia. There was a population of 299 animals of the Gyrolando breed. Blood samples were taken from each animal from which DNA was obtained by the salt extraction method (Miller et al., 1989). The genotyping of the alleles was carried out by amplifying a segment of the gene by Polymerase Chain Reaction (PCR) and by digestion with the restriction endonuclease Ddel (Miluchova et al., 2014). To estimate the allelic, genotypic and EHW frequencies for the entire population, specific libraries of the specialized R-Project software were used. For the Beta-lactoglobulin Simple Nucleotide Polymorphism (SNP), an allelic frequency of 95.15% was obtained for gene A and a predominant genotypic frequency for the AA homozygote with 90.30%, while the EHW was greater than 1. For the Beta-casein SNP The allelic frequency of the A2 gene was 59.70% and that of the A1 gene was 40.30%. The genotypic frequency found was mainly the AB heterozygote with 48.49% and a value greater than 1 for the EHW. Regarding the Kappa-casein SNP KCS1, the predominant allele was A with 86.45%, while 76.92% corresponds to the homozygous AA as genotypic frequency. The EHW presented a value of 0.004576. Finally, for the Kappa-casein KCS2 SNP the dominant allelic frequency corresponds to 98.33% for the A gene, while the genotypic frequency for the AA homozygous is 96.66%. The EHW presented a value of 1. For the SNPs Beta-lactoglobulin, Beta-casein, Kappa-casein and SNP Kappa-casein KCS2 they are in balance in contrast to the SNP Kappa-casein KCS1.
Keywords: Hardy-Weimberg equilibrium; allele frequency; genotypic frequency.

Producción de leche de vacas manejadas en sistemas pastoriles con distinta época de parto
Milk yield of dairy cows managed in pasture-based systems with different calving season

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Modificar la época y distribución de partos en un rodeo lechero se presenta como una herramienta que permite alinear la demanda de alimento con el crecimiento de las pasturas, generando modificaciones en la curva de lactancia a través de los días al pico de lactancia y al nivel de producción alcanzado (García & Holmes, 1999). Sin embargo, en sistemas lecheros pastoriles de regiones de clima templado con veranos calurosos como Uruguay (Peel et al., 2007), no existen antecedentes que evalúen el impacto de modificar la época de partos. Por lo tanto, el objetivo de este estudio fue evaluar el efecto de la época de partos (duración y momento del año en que se dan) sobre la producción de leche de vacas manejadas en sistemas lecheros pastoriles. El experimento se llevó a cabo en el Instituto Nacional de Investigación Agropecuaria (INIA), Colonia, Uruguay. Sesenta vacas Holstein-Friesian de origen genético neozelandés (543±50,6 Kg peso vivo; producción previa 7548±864,2 litros) fueron asignadas aleatoriamente a los siguientes tratamientos (n=20): partos compactos en otoño desde marzo hasta mayo (OTO), partos compactos en invierno desde junio hasta agosto (INV), y partos extendidos desde marzo hasta octubre (EXT). El área experimental utilizada para cada tratamiento fue de 9,2 ha (plataforma de pastoreo). La alimentación se basó en maximizar el consumo de pasto que permitía la tasa de crecimiento semanal, y se incluyeron concentrados (30% de la dieta promedio) y reservas forrajeras para cubrir la diferencia con los requerimientos previstos de los animales. La producción individual de leche fue registrada diariamente desde el parto y por un período de 40 semanas. El efecto de la época de parto, la semana de lactancia y su interacción fueron incluidos en el modelo de análisis. Los resultados indican que la producción individual de leche fue afectada por la interacción tratamiento por semana ($P<0,01$). No hubo diferencias productivas entre tratamientos hasta la semana 9 (29,3±1,07 kg/d), pero a partir de la 10 y hasta la 19 fue mayor en INV respecto a OTO y EXT (30,1±1,07 vs 27,7±1,06), que no se diferenciaron entre sí. La producción de leche no difirió entre la semana 20 y 29 (24,5±1,06 kg/d), pero a partir de este momento y hasta la semana 40 fue mayor en OTO respecto a INV (21,0±1,07 vs 18,2±1,17 kg/d), mientras que EXT no se diferenció de los demás (20,0±1,15 kg/d). Los resultados permiten concluir que la época de parto, si bien no modificó la producción individual promedio (25,3±0,80 kg/d), afectó marcadamente la dinámica a lo largo de la lactancia; estas diferencias estuvieron asociadas a los cambios en la cantidad y calidad del alimento ofrecido, y al ambiente climático al que estuvieron expuestos los animales en distintos momentos de la lactancia según la época de parto.

Palabras claves: sistemas lecheros pastoriles; época de partos.

Modifying the calving season and distribution in a dairy herd is presented as a tool that allows aligning food demand with pasture growth, generating modifications in the lactation curve through days to peak lactation and the level of production achieved (García & Holmes, 1999). However, in pasture-based dairy systems in temperate regions with hot summers such as Uruguay (Peel et al., 2007), there is no existing research evaluating the impact of modifying the calving season. Therefore, the objective of this study was to evaluate the effect of calving season (duration and timing within the year) on milk production of cows managed in pasture-based dairy systems. The experiment was conducted at the National Institute of Agriculture Research (INIA), Colonia, Uruguay. Sixty Holstein-Friesian cows of New Zealand genetic origin (543±50.6 kg live weight; previous production 7548±864.2 liters) were randomly assigned to the following treatments (n=20): compact calvings in autumn from March to May (AUT), compact calvings in winter from June to August (WIN), and extended calvings from March to October (EXT). The experimental area used for each treatment was 9.2 hectares (milking platform). Feeding was based on maximizing pasture consumption that allowed for weekly growth rates, including concentrates (30% of the average diet) and forage reserves to cover the difference with the anticipated animal requirements. Individual milk production was recorded daily from calving for a period of 40 weeks. The effect of calving season, lactation week, and their interaction were included in the analysis model. The results indicate that individual milk production was affected by the treatment by week interaction ($P<0.01$). There were no production differences between treatments until week 9 (29.3±1.07 kg/d), but from week 10 to 19, WIN was higher compared to AUT and EXT (30.1±1.07 vs 27.7±1.06), which did not differ from each other. Milk production did not differ between weeks 20 and 29 (24.5±1.06 kg/d), but from this point onward until week 40, AUT was higher compared to WIN (21.0±1.07 vs 18.2±1.17 kg/d), while EXT did not differ from the others (20.0±1.15 kg/d). The results allow us to conclude that the calving season, while not altering the average individual production (25.3±0.80 kg/d), markedly affected the dynamics throughout lactation; these differences were associated with changes in the quantity and quality of food offered, and the climatic environment to which the animals were exposed at different times during lactation according to the calving season.

Key words: pasture-based systems; calving season

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