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Phenotypic relationships between milk protein
percentage, reproductive performance and body
condition score in Irish dairy cattle

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Abstract

A positive phenotypic correlation between milk protein percentage and reproductive performance in dairy cattle, especially during early lactation has been recently reported. The objective of this study was to quantify the relationship between milk protein percentage and different measures of fertility in Irish, seasonal calving, dairy cattle using data from experiments comparing strains of Holstein-Friesian cows under different feeding systems. The relationships between body condition score, milk production and fertility were also investigated.

The data used in this study consisted of 584 lactation records over a 5-yr period. Principal component analysis and logistic regression was used to study the relationship between milk protein percentage and fertility performance of the cow. Greater milk protein percentage during the first 60 days post-calving was associated with better reproductive performance. The probability of a cow being submitted in the first 21 days of the breeding season increased with increased milk protein percentage during early lactation. Similarly, the probability of a cow becoming pregnant to its first service or to the whole breeding season also increased. Cows were classified as either high or low milk protein percentage based on their protein percentage over the whole lactation. Cows in the high milk protein group had a 7% greater conception rate compared to cows in the low protein percentage group. In conclusion, cows with higher protein percentage, especially during early lactation are submitted earlier in the breeding season, and have a higher conception rate. Physiologically, the shortage of glucose caused by negative energy balance restricts the synthesis of milk protein in the udder. On the other side, negative energy balance also causes the reduction of IGF-I, LH and oestradiol, which consequently delay the ovarian follicular development and finally reduces fertility. Therefore, there is a biological explanation for the association between milk protein percentage and fertility performance.

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