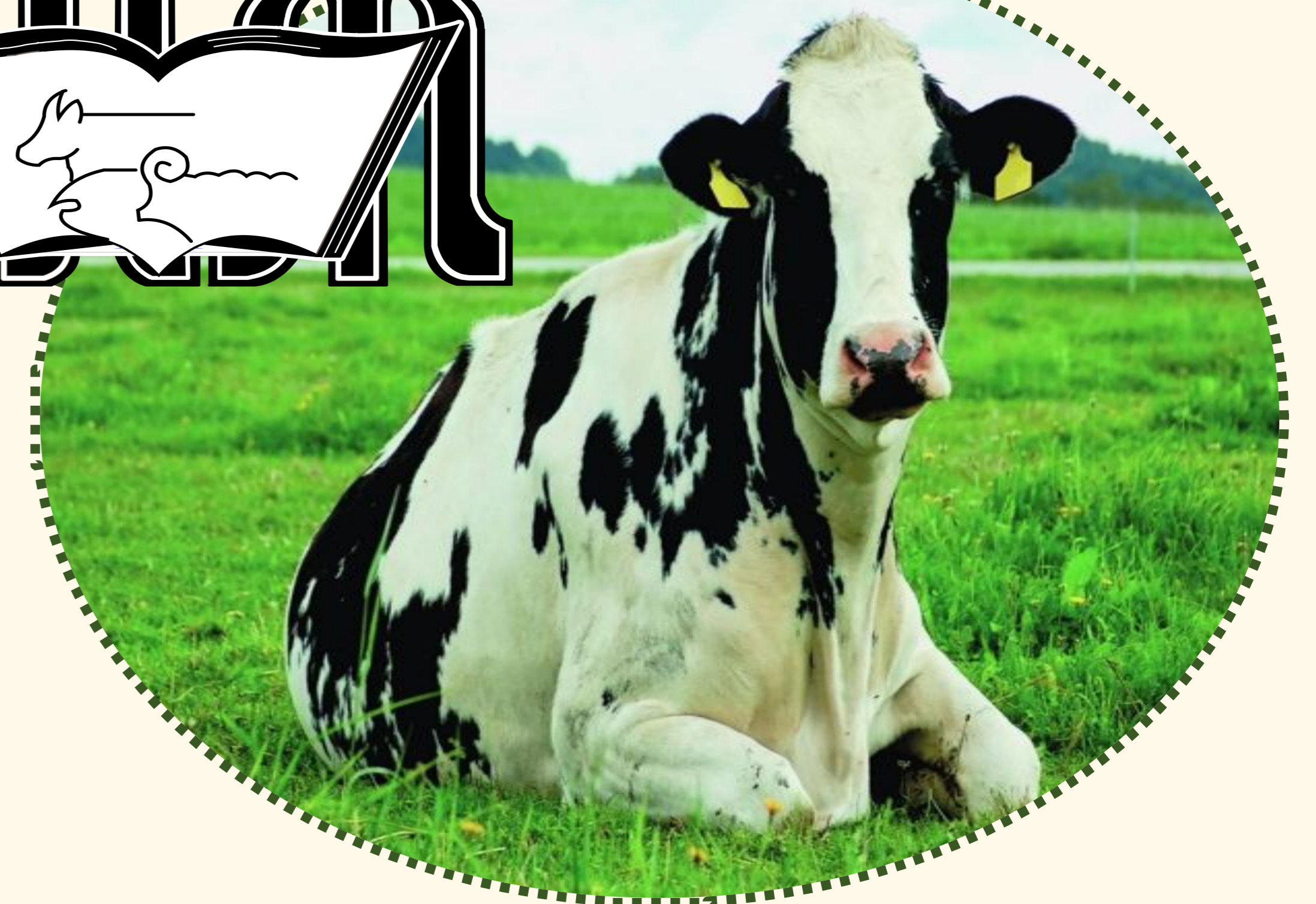
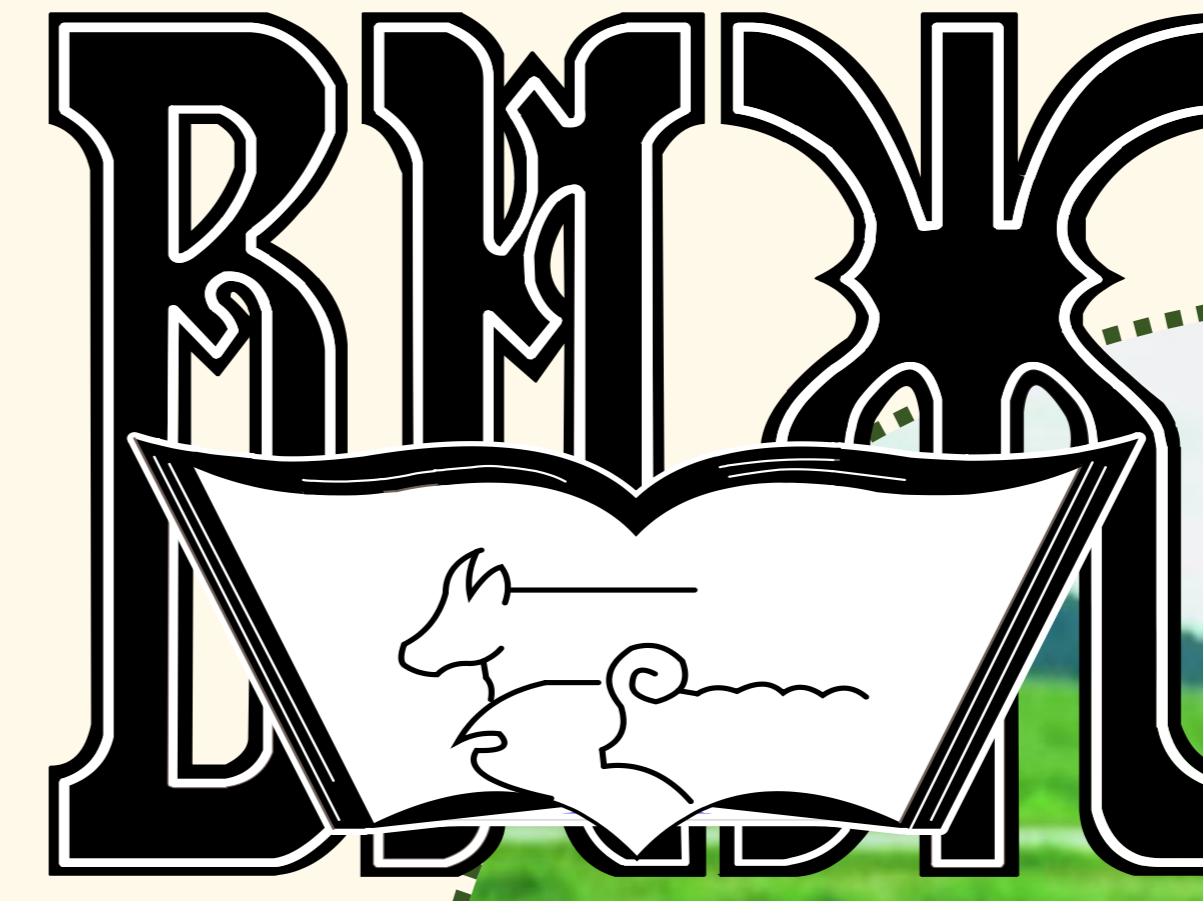


Thyroid profiles and the reproductive ability in Russian Black Pied cows in relation to a single-nucleotide polymorphism within the DIO1 gene

O. Mityashova, O. Kostyunina, N. Bardukov, A. Solomakhin, I. Lebedeva

INTRODUCTION

Thyroid hormones regulate metabolic processes and thereby affect reproduction. The thyroid system depends on the deiodinase activity. This study was aimed to search for associations of cow genotypes with SNPs in the deiodinase gene of the first type (DIO1) with the reproductive ability and prepartum (PrP) and postpartum (PP) thyroid profiles.



MATERIALS AND METHODS

Blood samples from 61 Russian Black Pied cows were collected at different time points:

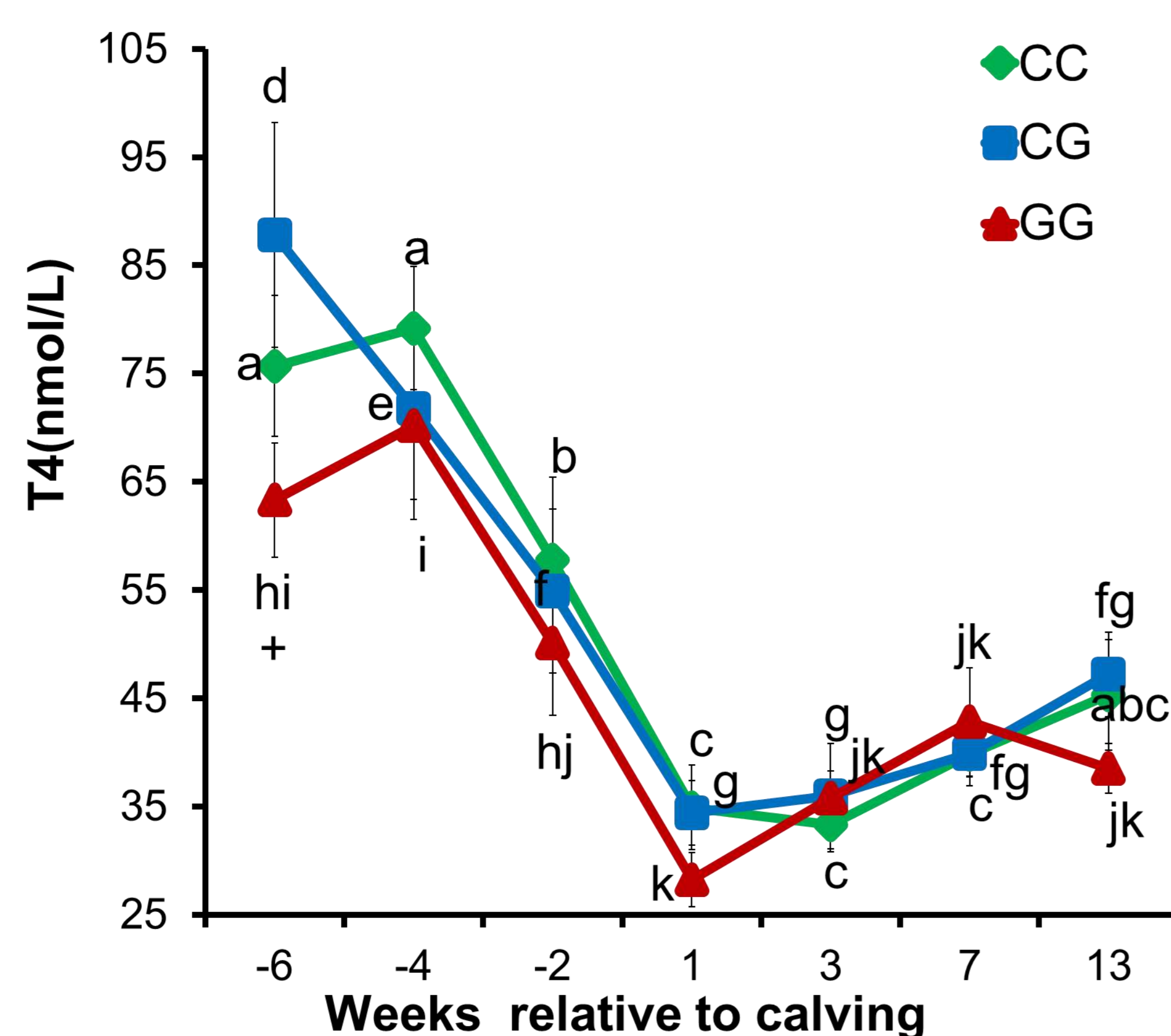
- 6, 4, 2 weeks before calving;
- 1, 3, 7, and 13 weeks after calving.

Genetic variants for the DIO1 gene were tested by RT-PCR and polymorphism at position 13149 (NC_037330) was found. The cows were divided into three groups depending on genotype: CC (n=29), CG (n=21), and GG (n=11). Duration of days open was classified as short (<120 days; SOP), medium (120-240 days; MOP), and long (241-370 days; LOP). Hormonal levels in the serum were measured by ELISA. Data were analyzed by ANOVA.

RESULTS

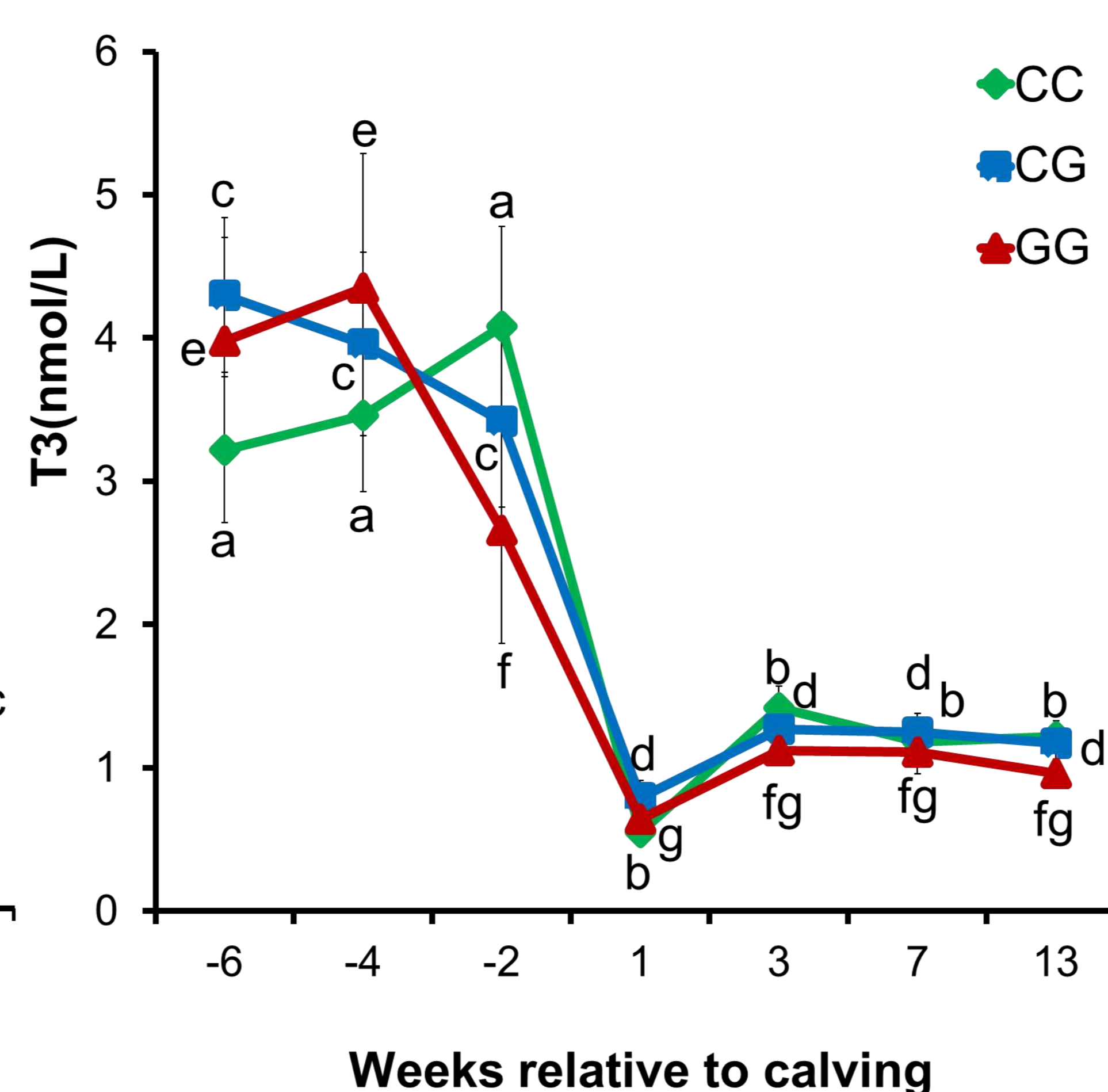
A proportion of animals with SOP in the CC group was higher than in the CG group (48.3% vs. 19.1%, $p < 0.05$, Fisher's exact test), but did not differ from that in the GG group (45.5%). Concurrently, the proportion of cows with MOP was the lowest in the GG group (9.1%, $p < 0.01$). The level of triiodothyronine (T3) and reverse T3 (rT3) in the blood of CC animals decreased later (the 1st and 3rd weeks PP, respectively) than in GG animals (T3: the 2nd week PrP) or CG animals (rT3: the 2nd week PrP).

Fig.1. Serum thyroxine (T4) concentrations during the prepartum and postpartum periods in dairy cows with polymorphic variants of the DIO1 gene



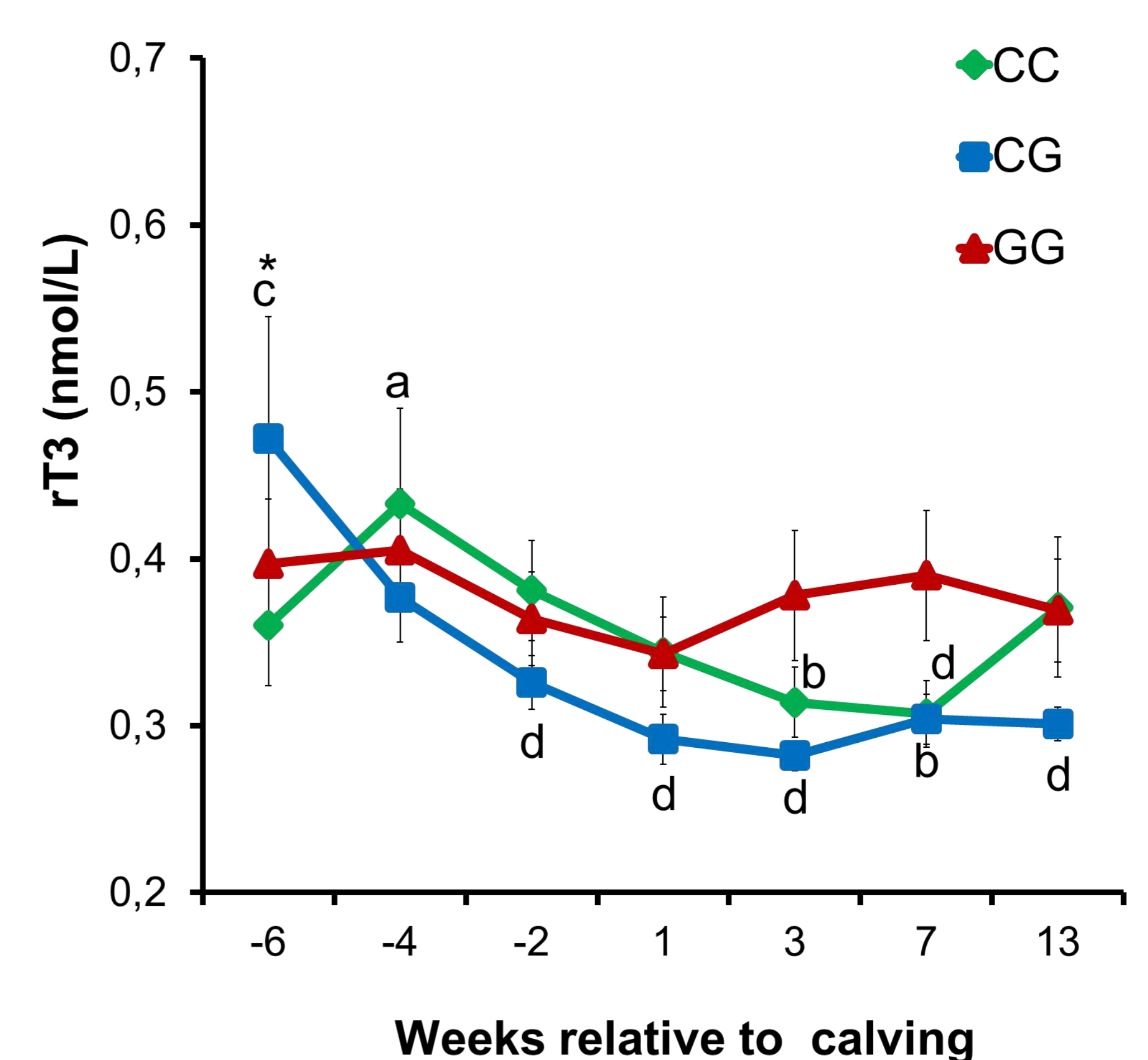
Means with different letters differ significantly within each group (at least $P < 0.05$).
+ $P < 0.05$ (between CG and GG).

Fig.2. Serum triiodothyronine (T3) concentrations during the prepartum and postpartum periods in dairy cows with polymorphic variants of the DIO1 gene



Means with different letters differ significantly within each group (at least $P < 0.05$).

Fig.3. Serum reverse T3 (rT3) concentrations during the prepartum and postpartum periods in dairy cows with polymorphic variants of the DIO1 gene



Means with different letters differ significantly within each group (at least $P < 0.05$).
* $P < 0.05$ (between CG and CC).

CONCLUSIONS

Cows with DIO1 gene CC genotype more often have SOP or MOP compared to cows with CG or GG genotypes, which may be due to peculiarities of changes in thyroid profiles during the transition from pregnancy to lactation.