

RELATIONSHIP BETWEEN THE THYROID ACTIVITY IN YOUNG CATTLE
AND THEIR FUTURE PRODUCTIVITY

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Summary

The experiment was carried out on the 37 Red-and-White heifers. Thyroxine (T_4) and triiodothyronine (T_3) were measured in blood serum by specific double antibody radioimmunoassay. Blood samples were taken at about 90, 270, 450, 540 days age and during the mating period also.

The results indicate a positive correlation of concentration T_4 in blood serum at day of age with milk yield $r=0,337$. This relationship in cows producing 4048 kg of milk was $r=0,686$ but in cows producing 2963 kg of milk was not significant $r=0,035$. There were not significant correlation between the level of T_3 in blood serum and the future milk yield.

Introduction

Since the application of radioimmunoassay techniques to the measurement of metabolic hormones in blood might be used to predict at an early age the production capacity of calves for milk and meat. Several authors (Heitzman and Mallinson 1972; Vanjonack and Johnson 1975; Hart et al. 1978; Edfors-Lilja et al. 1981) suggested a relationship between circulating thyroid hormone concentrations and level of milk production in the cow. Our present study was to determine relationship between concentrations T_4 and T_3 in young female cattle during early life and their future milk performance.

Materials and Methods

The investigations were carried out on 37 heifers Red-and-White. Blood samples were taken by jugular venipuncture at about 90, 270, 450, 540 days of age and at during mating period also. The heifers were mating at 623-92 days of age. The time of collection was between 0900 and 1100 h.

The plasma was stored at -20°C until analyzed. T_4 and T_3 concentrations in blood plasma were measured in duplicate by specific double antibody radioimmunoassays. Plasma T_4 and T_3 data were correlated with milk yield for first lactation. He persist 283-25 days.

Results

The results obtained in the present work is presented in Table 1. Our results indicate a positive correlation ($p < 0,05$) of concentration T_4 in blood plasma with milk yield ($r=0,337$). Relationship between concentrations T_3 in blood plasma at 90 days of age to mating period of cattle and their milk future performance was not significant.

In Table 2 all animals are dividet on high- or low-yielding cows in first lactation. Twenty two low-yielding cows (2963-345 kg of milk) compared with fifteen high-yielding cows (average milk yield was 4048-471 kg). In high-yielding cows we demonstrated significant ($p < 0,01$) correlation of concentration T_4 with their future milk yield during 540 days of age ($r=0,686$). In low-yielding cows this

correlation was not present ($p > 0,05$). There were not significant correlation between the level of T_3 in blood serum and the future milk yield in both groups of cows.

Discussion

At correlation of T_3 in young cattle with their future milk yield during the 3 to 3 month of age that we described Seeland et al.(1981). The genetic correlations was at $r = -0,285$ to $-0,344$. Heitzman and Mallinson (1972) or Vanjonack and Johnson (1975) indicated that the concentration of T_4 in the blood was lower in lactating than in non-lactating cows and that this concentration was negatively related to the level of milk production. Support for these results in provided by Hart et al.(1978). However, they suggested that average concentration of T_4 in the plasma was generally higher in the low-yielding cows and also the level of T_4 was significantly higher during the dry period than at the time of peak lactation in high- and low-yielding cows. Our results suggested that concentration of T_4 in blood plasma of high-yielding cows determined at 540 days of live may be utilize to selection of milking cows.

References

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Table.1. Thyroxine (T_4) and triiodothyronine (T_3) in blood plasma of cows Red-and-White breed ($\bar{x} \pm SE$).

Hormones ng/ml	Age (days)				
	90	270	450	540	during mating period
T_3	1,42 \pm 0,71	1,76 \pm 0,68	1,74 \pm 0,72	1,51 \pm 0,68	1,45 \pm 0,65
T_4	75,06 \pm 44,12	75,93 \pm 51,41	83,02 \pm 42,76	74,00 \pm 37,27	76,43 \pm 39,12

Relationship between blood plasma thyroxine (T_4) and triiodothyronine (T_3) and milk yield.

Hormones ng/ml	Age (days)				
	90	270	450	540	during mating period
T_3	r= - 0,05	r= 0,001	r= -0,003	r= 0,178	r= -0,037
T_4	r= 0,001	r= 0,097	r= 0,305	r= 0,337 ^x	r= 0,165

^x_p < 0,05

Table 2. Thyroxine (T_4) and triiodothyronine (T_3) in blood plasma of cows Red-and-White breed in relation of milk yield ($\bar{x} \pm SE$).

Milk yield fat correlated		Age (days)				
		90	270	450	540	during mating period
2963 \pm 345	T_3	1,69 \pm 0,87	1,89 \pm 0,61	1,78 \pm 0,64	1,50 \pm 0,65	1,41 \pm 0,64
	T_4	69,85 \pm 39,60	60,60 \pm 44,50	69,71 \pm 36,46	72,38 \pm 37,94	77,09 \pm 42,52
4048 \pm 471	T_3	1,32 \pm 0,38	1,99 \pm 0,63	1,88 \pm 0,83	1,56 \pm 0,61	1,47 \pm 0,58
	T_4	64,85 \pm 34,08	77,20 \pm 52,20	91,35 \pm 48,43	79,20 \pm 40,74	79,15 \pm 36,42

Relationship between blood plasma thyroxine (T_4) and triiodothyronine (T_3) in cows Red-and-White breed and milk yield.

Milk yield fat correlated		Age (days)				
		90	270	450	540	during mating period
2963 \pm 345	T_3	r= 0,164	r= -0,155	r= 0,306	r= -0,092	r= -0,034
	T_4	r=-0,071	r= 0,109	r= 0,036	r= 0,034	r= 0,046
4048 \pm 471	T_3	r= 0,145	r= -0,420	r=-0,456	r= 0,156	r= -0,168
	T_4	r= 0,077	r= 0,492	r= 0,309	r= 0,686 ^{xx}	r= 0,240

^{xx}p < 0,01