

TWINNING FREQUENCY IN DAUGHTER GROUPS OF BULLS
TESTED FOR THYROXINE DEGRADATION RATES

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Introduction

Studies on twinning rate of women with evidence of thyroid disease before the studied pregnancy, indicate a increased twinning rate in mothers with a history of thyroid pathology. (De George, 1970). Also other investigations on hyperthyroidism associated with pregnancy indicate an overrepresentation of twins in such pregnancies (Galuboff, 1974; Pekonon et al. 1978).

The purpose of the present investigation was to study the twinning frequency of daughter groups of AI-bulls tested for serum thyroxine level and thyroxine degradation rate, and to calculate the correlation coefficient between the two parameters of thyroid activity and twinning frequency.

Material and methods.

Thyroid activity informations were available on three groups of AI bulls. In Group 1 consisting of 127 bulls the thyroxine degradation rate had been tested at an age of 4-12 months of age (Joakimsen, 1975). On Group 2, 183 bulls, the serum level of protein bound iodine (PBI) was tested two times at an age of 14 to 29 months of age. The thyroid-secretion rate, or thyroxine degradation rate, was estimated at the same occasions by a method developed by Yosef and Johnson (1967) and modified by Joakimsen et al. (1971). On Group 3, 91 bulls of the same ages as Group 2, the serum thyroxine level T_4 was analysed by a radioimmunoassay method (Larsen et al., 1973) and the degradation rate of T_4 was based on T_4 directly instead of on PBI as before.

Twinning rate of daughter groups was taken from the dairy herd calving records, and was calculated for each parity separately. Serum level of PBI and thyroxine secretion rate was adjusted for age at test, and correlation between the thyroid activity parameters and twinning rate was calculated for each parity and for each sire group separately. Since the thyroid activity estimates were performed on different batches of bulls, batch was also included in the statistical model.

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Table 1. Twinning frequency in daughter groups and correlation with thyroxine degradation rate (TDR) of sires in Group 1.

	No. of daughter groups	Twining frequency	Correlation with T.D.R.
Parity 1	127	0.35	0.05
" 2	125	1.19	-0.03
" 3	107	2.11	-0.07
" 4	53	2.80	-0.06

Table 2. Twinning frequency in daughter groups and correlation with thyroxine degradation rate (TDR) and serum thyroxine level (T_4) of sires in Group 2.

	No. of daughter groups	Twining frequency	Correlation with TDR	Correlation with T_4
Parity 1	183	0.47	-0.14	-0.02
" 2	156	1.42	-0.09	-0.02
" 3	42	1.81	-0.07	0.03
" 4	11	2.92	0.49	0.03
" 5	10	2.69	-0.50	-0.18
" >6	8	2.29	-0.19	-0.38

Table 3. Twinning frequency in daughter groups and correlation with thyroxine degradation rate (TDR) and serum thyroxine level (T_4) of sires in Group 3.

	No. of daughter groups	Twining frequency	Correlation with TDR	Correlation with T_4
Parity 1	80	0.59	-0.17	0.14
" 2	19	1.32	-0.16	-0.10
" 3	19	2.14	-0.32	0.04
" 4	19	2.85	0.31	0.30
" 5	19	2.40	-0.11	0.05
" >6	19	3.76	0.19	-0.18

Results and Discussion.

The average thyroxine degradation rate, calculated on the basis of PBI analysis and converted to its thyroxine equivalent by the multiplicative factor 1.54 (Joakimsen, 1971), for the 127 bulls in Group 1 was 1.44 $\mu\text{mol/day}$ with a standard deviation (SD) of 0.18.

The average twinning frequency for daughter groups in parity 1-4 and the correlation between twinning frequency and the dam-sire's thyroxine degradation rate is given in Table 1. Only daughter groups with 100 or more calvings in each of the first three parities, and 50 or more calvings in later parities were included.

Table 2 gives the similar results for Group 2 of bulls. For this group serum level of PBI was also available. The average thyroxine level (calculated from PBI analysis) was 57.5 n mol/l with SD 7.8. The average thyroxine degradation rate was 1.03 $\mu\text{mol/day}$ with SD = 0.24.

The twinning frequency and the correlation with the two thyroid activity parameters for different parities are given in Table 2. The restrictions on number of calvings per daughter group were the same as for Group 1.

The results for the last group of bulls, 98 bulls in Group 3, is given in Table 3. For this group the average T_4 serum level was 77 n mol/l with SD 9.0 and an average thyroxine degradation rate of 0.96 $\mu\text{mol/day}$ with SD 0.16.

The twinning frequencies in the three groups of bull daughters are similar to the total data from the Norwegian Dairy Herd Records.

None of the 28 single correlation coefficients are significantly different from zero at the 5% level. There was no clear tendency in the correlations, except perhaps a slight tendency for the thyroxine degradation rate to be negatively correlated to twinning frequency.

Danish results (Tang Sørensen et al., 1981) indicate that the heritability of serum thyroxine level is high, $h^2 = 0.78 \pm 0.27$. For thyroxine degradation rate h^2 was 0.19 ± 0.25 . If we assume a heritability of these traits of the magnitude found in the Danish results, the conclusion must be that there is no clear connection between thyroid activity and twinning rate of dairy cattle.

Summary

Thyroxine degradation rate has been tested in three groups of AI bulls. In addition serum thyroxine level has been tested in two of the groups.

For 127 bulls thyroxine degradation rate was tested at the age of 4-12 months. For two other groups of 183 and 80 bulls both parameters were tested at an age between 14 and 29 months.

Twinning frequency in daughter groups of more than 100 daughters in 1st to 3rd parity and more than 50 daughters in later parities was not found to be significantly correlated to the thyroidea activity parameters of the sire.

R E S U M E N

El tipo de degradación de la tiroxina se ha investigado en tres grupos de toros destinados a la inseminación artificial. Adicionalmente, se ha investigado el nivel de tiroxina sérica en dos de los grupos. Para ~~otros~~ 127 toros, la degradación de latiroxina se investigó a la edad de 4-12 meses. Para otros dos grupos de 183 y de 80 toros, ambos parámetros se investigaron a una edad entre 14 y 29 meses. La frecuencia de gemelos en grupos de hijas de más de ¹⁰⁰ellos en el primer al tercer parto, más de 50 hijas en partos posteriores no se encontró estar significativamente correlacionado con ~~la actividad del tiroides~~ los parámetros de actividad del tiroides del padre.

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