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Brief Communication

MARINE FAT
DIGESTIBILITY OF ITS FATTY ACIDS IN YOUNG CALVES

This paper describes the results from an experiment with four Jersey calves. The calves were bucket fed with a milk substitute consisting of skimmed milk powder and marine fat, supplemented with soyalecithin, vitamins and minerals. They were slaughtered after 30—32 days of such feeding. During the last two weeks a balance study was performed with a collection period of two days. Hay was given ad lib., and during the balance period the calves took between 125—150 g per day. The lipid content of the hay was considered negligible. Total content and distribution of fatty acids in the milk substitute are shown in Table 1. Table 2 shows the age of the calves, the total intake of lipid and fatty acids, and the total amount of fatty acids excreted with feces. The apparent digestibility coefficients of the individual fatty acids in each trial are shown in Table 3.

Lipids were extracted by the method of *Folch et al.* (1957). To extract all the fatty acids in the feces, it was, however, necessary to add 10 ml 4 N-HCl to the extraction mixture. The amount of each fatty acid was measured by gas-liquid chromatography using $C_{19:0}$ as the internal standard.

Table 1. Fatty acid content and distribution of fatty acids in the milk substitutes (weight percentage).

Fatty acid cont.*	C_{12}	C_{14}	$C_{14:1}$	C_{16}	$C_{16:1}$	C_{18}	$C_{18:1}$	$C_{18:2}$	C_{20}	$C_{18:3/20:1}$	C_{22}	$C_{22:1}$	C_x	Total
Marg. 38/40**	0.6	7.6	0.4	20.8	7.0	7.9	13.7	2.4	5.6	14.4	5.1	10.5	4.0	58.7 %
N-Kal. 31—33***	0.1	6.1	0.8	15.0	10.3	3.2	12.9	1.8	2.6	20.0	2.2	20.0	5.0	68.2 %

* The fatty acids are indicated by a C with a subscription giving the number of C-atoms and number of double bonds.
** Marine fat with the trade name Margarit, melting point 38—40°C.
*** Marine fat with the trade name Ny-Kalorit, melting point 31—33°C.

Table 2. Experimental data.

Calf no.	I	II	III	IV
Age at start of the balance period, days	46	41	41	60
Type of fat used	Marg. 38/40	Marg. 38/40	N-Kal. 31—33	N-Kal. 31—33
Total intake of lipid per day, g	161	142	152	171
Total intake of fatty acids per day, g	95	83	104	117
Total output of fatty acids in feces per day, g	14	10	20	5
Digestibility of total fatty acids, %	85	88	81	96

DISCUSSION

Radostits & Bell (1968) determined the digestibility of various fatty acids in fat given to calves. They found that short chain fatty acids were absorbed fairly well, whereas saturated long chain fatty acids were very poorly utilized. The calves were from 2 to 26 days old, and this is probably important.

In the present experiment the calves were from 41 to 60 days old. It is evident from Table 3 that the digestibility of fatty acids decreases with increasing chain length.

Table 3. Digestibility coefficients of individual fatty acids.

Fatty acids	Calf no.			
	I	II	III	IV
C_{12}	91	100	100	100
C_{14}	95	94	91	98
$C_{14:1}$	88	100	88	100
C_{16}	90	91	84	95
$C_{16:1}$	95	94	94	99
C_{18}	80	85	62	81
$C_{18:1}$	92	91	88	98
$C_{18:2}$	98	98	95	100
C_{20}	74	79	54	80
$C_{18:3/20:1}$	85	86	82	97
C_{22}	73	80	48	83
$C_{22:1}$	76	79	76	95
C_x (others)	74	82	74	95

The results also show that unsaturated fatty acids are better utilized than their saturated analogs. The differences between the digestibility coefficients of individual fatty acids were most pronounced in the trials with calf III and calf IV. These calves received the milk substitute containing N-Kal. 31—33. N-Kal. 31—33 had higher content of C_{22}-acids than had Marg.38/40.

No correlation was found between melting point of the two substitutes and the digestibility of their fatty acids. Calf III did not digest the fatty acids as well as the other calves, especially the longer chained saturated ones. A less developed rumen function in this calf compared to that in the other three calves may perhaps explain this. No clinical signs of disease were observed. The oldest calf, IV, showed digestibility coefficients over 80 for all the fatty acids.

The average digestibility of fatty acids was in all calves more than 80 %. This indicates that marine fats may be a useful component of the substitutes.

A certain development of the forestomachs is probably necessary for the utilization of long chain fatty acids. However, more investigations are needed to elucidate this important problem.

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