

## EFFECT OF TWO SOURCES OF FAT ON DIGESTION IN SHEEP FED ROUGHAGE DIETS

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Fat, a dense source of energy, offers potential as a supplementary feed to improve productivity of ruminants consuming high-fibre roughages. A level of fat in roughage diets of more than 2–3%, however, generally results in a decreased fibre digestibility in the rumen (Palmquist 1988). Calcium salts of long chain fatty acids (CaLCFA) and fat prills are considered to be ruminally inert. In sheep fed straw-based diets, supplementation with CaLCFA increased live-weight, gain (LWG), whereas supplementation with fat prills only increased LWG when fed together with a protein meal (Van Houtert and Leng 1986, 1987).

Mature rumen-cannulated sheep were offered a roughage-based diets with CaLCFA or fat prills to enable comparison of their effects on digestion. In Exp.1, sheep were offered a rice straw-based diet for 6 weeks with 0 (n=5) or 45 (n=4) g/d CaLCFA. In Exp.2, four groups of four sheep were offered an oaten chaff-based diet for 5 weeks, supplemented with fat prills (F) and/or formaldehyde-treated cottonseed meal (C; see Table). Measurements of *in vivo* and *in sacco* digestibility of straw (Exp.1) or oaten chaff (Exp.2), concentrations of NH<sub>3</sub>-N and volatile fatty acids (VFA) and numbers of protozoa in rumen fluid were made.

Exp./ group	DM intake (g/kg LW)		<i>In vivo</i> digest- ibility (g/kg DM)			<i>In sacco</i> degradability (g/kg DM)		Rumen fluid parameters			
	R <sup>‡</sup>	T <sup>‡</sup>		12h	36h	Protozoa count (10 <sup>-3</sup> /ml)	NH <sub>3</sub> -N conc. (mg/l)	Total VFA (mM)	Molar %		
									Acet.	Prop.	But.
<u>Exp.1:§</u>											
control	12.6	15.1	451	260	471	88	113	65	78	16	4
+CaLCFA	12.6	15.5	491	281	487	51	102	62	78	16	4
Sign.:	ns	ns	P<0.07	ns	ns	*	ns	ns	ns	ns	ns
<u>Exp.2:¶</u>											
F <sub>0</sub> C <sub>0</sub>	20.7	25.1	574	407	574	151	88	96	68	24	7
F <sub>30</sub> C <sub>0</sub>	14.9	20.2	529	372	465	186	98	96	63	30	6
F <sub>0</sub> C <sub>100</sub>	12.5	19.7	625	448	616	188	135	97	70	21	8
F <sub>30</sub> C <sub>100</sub>	15.4	22.8	570	377	479	56	63	81	62	29	7
Sign.:F	*	ns	*	***	***	ns	ns	ns	**	**	ns
C	ns	ns	P<0.06	*	*	ns	ns	ns	ns	ns	ns
F x C	*	*	ns	ns	ns	ns	ns	ns	ns	ns	ns
SEM	1.70	1.52	2.20	4.9	4.9	56.4	34.5	6.8	1.8	2.0	0.5

‡R = roughage; T = total

§Basal diet: Rice straw *ad lib*, 75g/d protein meal (cottonseed/soyabean/meat meal), 14g/d urea, minerals.

¶Basal diet: Oaten chaff *ad lib*, 50g/d lucerne, urea and minerals. Subscripts indicate grams per day.

Supplementation with CaLCFA tended to increase *in vivo* DM digestibility, but had little effect on *in sacco* degradability, nor feed intake nor on metabolite concentrations in rumen fluid. Numbers of protozoa in rumen fluid were depressed.

Supplementation with fat prills depressed feed intake in the absence, but not in the presence of protein meal in the diet, reduced digestibility, both *in vivo* and *in sacco* and resulted in a higher ratio of propionate to acetate in rumen fluid VFA; concentration of NH<sub>3</sub>-N and numbers of protozoa in rumen fluid varied widely but not significantly between diets.

Fat prills, in contrast to CaLCFA, cannot be regarded as a ruminally inert source of LCFA for sheep offered roughage-based diets.

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