Although some studies have indicated that faunated animals are less efficient fibre digesters than their defaunated counterparts [1], it is now more generally acknowledged that the presence of protozoa has a positive effect on the ruminal degradation of plant cell walls. The present work specifically analyses the effect of addition of protozoa into a defaunated rumen on the main neutral sugars that comprise the hemicellulose and cellulose fractions of grass hay.

Ground fescue hay was introduced into nylon bags (50 µm mesh size) and placed in the rumen of six sheep for 1, 3, 6, 12, 24, 48 and 72h. Sheep were defaunated during period 1 and refaunated with a mixed B-type protozoal population during period 2. Animals were fed a mixed diet of the same fescue hay (450g kg^{-1}) + barley (450g kg^{-1}) + soybean meal (100g kg^{-1}) which favours the growth of protozoa (6 x 10^5 ml^{-1}). Six kinetic studies were carried out during each period in each sheep. Proportions of degraded DM, OM, cell wall residue [2] and their neutral sugars [3] were calculated.

Refaunation increased the degradation of all the measured fractions after 48 hr in the rumen, but differences were only significant for the cell wall and its components. *In situ* digestibility of cell wall residues was improved by seven units when protozoa were present. Xylose and glucose, which are the most representative sugars of hemicellulose and cellulose respectively, displayed the highest increase in digestibility (+10, +15 units). Arabinose, galactose and rhamnose, as secondary sugars of hemicellulose, were better degraded in refaunated rumen but to a lesser extent (+12, +7, +5 units respectively).

These results indicated that protozoa stimulate to the same extent the digestion of the hemicellulosic and cellulosic fractions of grass hay in the rumen.

Loss of organic matter and cell wall material in the presence and absence of protozoa

Fraction	*Degradation (%) after 48h*	
	Defaunated	*Refaunated*
OM	42	44
Cell wall residue	27	34*
Glucose	26	41*
Xylose	21	31*
Arabinose	38	50*

* Significant differences between defaunated and refaunated animals ($P<0.05$)

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2. Jarrige R (1961) *Ann Biol Anim Biochim Biophys* 1, 163-212
3. Englyst HN, Cummings JH (1984) *Analyst* 109, 937-942 (adapted by Hoebler, personal communication)

Effect of addition of *Isotricha* spp or a mixed fauna to defaunated rumen contents on methane production measured in vitro.

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Hydrogen produced by protozoa is used by rumen methanogens associated with the surface and in the cytosol of ciliates. It has been shown that differences between defaunated and refaunated animals in methane production are increased when animals are fed mixed diets with starch which favour the growth of protozoa in the rumen

Methane production and protozoal numbers *in vitro*

Inocula	*Defaunated*	*Isotricha*	*Mixed-faunated*	*Effect of protozoa*
Ciliate number (ml^{-1})	0	5×10^3	1.5×10^5	-
Ciliate volume (ml^{-1})	0	4.8	9.3	-
CH_4 production in 6 hrs (ml):				
$(NH_4)_2SO_4$	205	270	329	S*
Soyabean	273	319	333	S
Fishmeal	228	296	338	S
Peas	260	309	342	S
Effect of N source	S	S	NS*	

*S : significant ($P < 0.05$) ; NS : not significant ($P > 0.05$)

[1]. This work aimed to evaluate the impact of the presence of *Isotricha* in comparison with a mixed B-type fauna or defaunated rumen contents on methane production measured in vitro, in the presence of different nitrogen sources.

The in vitro system [2] received inocula from three defaunated sheep or sheep inoculated with *Isotricha* spp. (three sheep) or a mixed B-type fauna (three sheep). All fermentors were fed with 13g wheat starch + $(NH_4)_2 SO_4$ (187mg N); some of them also received soyabean meal, or fishmeal, or peas supplying the same amount of nitrogen (125mg N). Incubations were repeated six times. Methane was analysed by GLC [3]. Means were compared by analysis of variance. The results are summarized in the table.

Methane production was significantly higher in the presence of *Isotricha* spp. (+20%) or the mixed fauna (+33%) than with the defaunated inocula. Per unit volume, *Isotricha* produced twice as much methane as the mixed B-type fauna. No influence of nitrogen source on methane production was observed with the mixed faunated inoculum. On the contrary, more methane was produced with proteins of medium and high rumen degradability like soyabean meal and peas than with proteins of low rumen degradability like fishmeal with the defaunated and *Isotricha*-inocula. The lowest methane production was observed in fermentors fed with $(NH_4)_2 SO_4$ as sole nitrogen source (Table).

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Effects of defaunation and subsequent refaunation on bacterial numbers in and microbial protein flow from the rumen of sheep. CJ Newbold[1], FM McIntosh[1], XB Chen[1], KM Koenig[2], LM Rode[2], AF Furtado[2] *([1]Rowett Research Institute, Bucksburn, Aberdeen AB21 9SB, UK; [2]Research Centre, Agriculture and Agri-Food Canada, Lethbridge, Alberta T1J 4B1, Canada)*