

# Genetic similarity of *Streptococcus bovis* in ruminants

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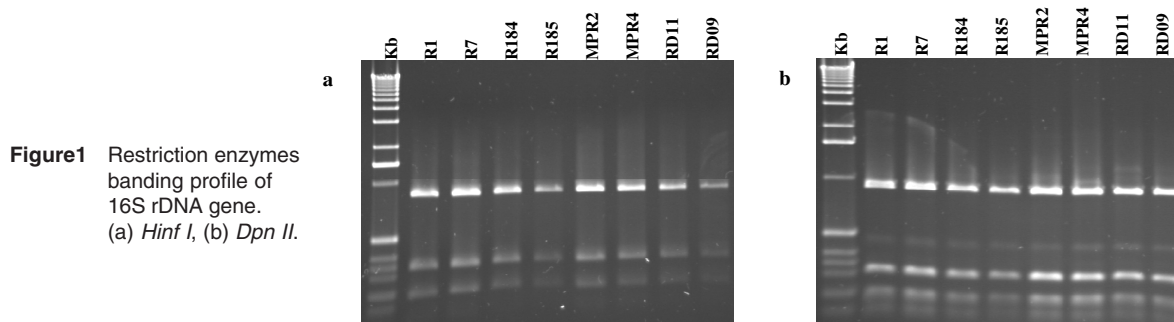
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The complexity of the rumen microbial ecosystem is widely acknowledged. Cellulolytic bacteria dominate the rumen microbial system when ruminants are fed fibre rich diets but the microbial population changes rapidly when ruminants are fed a starch-rich diet; this results in a significant increase in the proportion of lactic acid producing bacteria, including *Streptococcus bovis*. This bacterium has been implicated in the development of lactic acidosis in grain fed cattle, sheep and horses. However, it is not known whether this bacterium is present in the rumen of the dromedary camel and the rusa deer and, if present, how similar it is to *S. bovis* isolates from cattle and sheep.

In this report ruminal isolates of *S. bovis* from dromedary camel (MPR2 and MPR4) and rusa deer (RD11 and RD09) were compared with *S. bovis* isolates from cattle (R184 and R185), and sheep (R1 and R7). All animals were on roughage diet. The 16S rDNA was amplified by PCR from purified genomic DNA. The PCR products were analysed by RFLP with the

restriction enzymes *Hinf I* and *Dpn II* and then cloned into pGEM-T easy vector. The DNA sequence of each isolate was determined, and all sequences were compared by alignment with Clustal W. Isolates were also evaluated for their ability to utilize various carbohydrates, fermentation end products from glucose, and doubling time in BM10 broth with glucose (0.3% w/v; Table 1).

All isolates of *S. bovis* had the same RFLP pattern with each of the two restriction enzymes (Figure 1). DNA sequence analysis showed more than 99% similarity among all isolates. The various isolates grew rapidly with an estimated doubling time (mean  $\pm$  SE) of  $25 \pm 0.4$  minutes. All isolates are homofermentative, producing L-lactate. In addition to camel isolates and the deer isolate RD11 growing on glucose, cellobiose, fructose, galactose, inulin, lactose, maltose, mannose, raffinose, starch and sucrose, they also grew on arabinose. This report demonstrates how widely spread and similar *S. bovis* is in ruminant species.



**Figure 1** Restriction enzymes banding profile of 16S rDNA gene. (a) *Hinf I*, (b) *Dpn II*.

**Table 1** L-Lactate production, pH and doubling time of *S. bovis* from sheep, cattle, camel and deer.

Isolates:	R1	R7	R184	R185	MPR2	MPR4	RD11	RD09
L-Lactate ( $\times 10^3$ nM)*	130	155	125	130	115	135	115	120
Final pH	5.9	5.8	5.8	5.8	6.1	5.8	5.8	5.9
Doubling time (min)	27	25	25	25	25	25	23	26

\*The L-lactate produced from  $83 \times 10^3$  nM glucose after 20 h incubation at 39°C