

within *S. ruminantium* populations. The rumen of herbivorous animals is a strongly competitive ecosystem. If similar variability, as seen in *S. ruminantium*, is observed in other ruminal bacteria, competition between bacterial species will be markedly affected by competition and diversity within the competing species.

1. Flint HJ, Bisset J (1990) *FEMS Microbiol Ecol* 73, 351-360
2. Zhang N, Attwood GT, Lockington RA, Brooker JD (1991) *Curr Microbiol* 22, 279-284
3. Pristas P, Vanat I, Javorsky, P (1995) *Gene* 158, 139-140

Lack of surface receptors rather than possession of a restriction-modification system determines F4 phage resistance in *Streptococcus bovis* II/1. I Štyriak, P Pristaš, P Javorský (*Institute of Animal Physiology, Slovak Academy of Sciences, Šoltésovej 4-6, Košice, Slovakia*)

The resistance of *Streptococcus bovis* II/1 strain, which produces the *SbyI* restriction endonuclease, to F4 phage infection was demonstrated by the double agar layer method. Although restriction endonuclease *SbyI* is able to cleave F4 phage DNA to numerous fragments in vitro, evidence obtained from adhesion experiments in vivo suggests that inhibition of adsorption is the most important defence mechanism in phage resistance of *S. bovis* II/1. Electron microscopy of phage-host mixtures showed many phage particles to be present on the surface of a phage-sensitive control strain *S. bovis* 47/3, whereas no phage particles were seen on the surface of cells of the phage-resistant strain *S. bovis* II/1.

ANTI-NUTRITIONAL FACTORS

Biotransformation of toxic substances by rumen microbial ecosystem. P Javorský¹, P Pristaš¹, A Lauková¹, J Legáth² (*¹Institute of Animal Physiology, Slovak Academy of Sciences, Šoltésovej 4-6, 04001 Košice, Slovakia;* *²University of Veterinary Medicine, Komenského 73, 04001 Košice, Slovakia*)

The liver and kidney are generally regarded as main tissues for detoxification of toxic substances absorbed by animals. In ruminants, all potential poisonous substances enter the rumen before their passage to the lower parts of the digestive tract or before direct transport into the blood via the rumen wall or via the rumeno-hepatic circulation. The chemical composition of toxic substances following entry into the rumen can be very variable. Toxic substances which could enter the rumen through feedstuffs or by water include plant toxins and fungal or bacterial toxins which are a part of the natural microflora of grains. Farm and wild ruminants are, however, at the risk of exposure to inorganic and organic environmental pollutants, including pesticides, especially in countries with intensive industrial and agricultural production. The risk for exposure of wild ruminants to pesticides increases with the intensive chemical protection of forests.

We have paid particular attention to the mechanism of ruminant intoxication by the insecticide supermethrin, frequently used in agriculture against various species of insects, and the effect of PCBs presented in the silage pit coatings on the metabolism of silage lactogenic inoculants and, subsequently, on the mixed populations of