CHAPTER 11

ANTIBIOTIC MANIPULATION OF THE RUMEN MICROFLORA. THE EFFECTS OF AVOPARCIN AND MONENSIN ON THE RELEASE OF TRITIUM FROM LABELLED CELLULOSE BY BACTEROIDES SUCCINOGENES AND THE RUMEN FUNGUS NEOCALLIMASTIX FRONTALIS.

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ABSTRACT

Studies were made on the effects of avoparcin and monensin on the rate of release of radioactivity from reductively tritiated cellulose by Bacteroides succinogenes and Neocallimastix frontalis. Monensin reduced the activity of B. succinogenes and N. frontalis markedly when present at >8 mcg/ml (B. succinogenes) or > 2mcg/ml (N. frontalis). Avoparcin was only marginally inhibitory to B. succinogenes when present at < 32mcg/ml, and appeared to slightly enhance the attack of labelled cellulose by N. frontalis.

INTRODUCTION

The changes in the rumen fermentation that accompany the addition of monensin or avoparcin to the diet of ruminants are thought to stem largely from decreased methanogenesis, a consequence of the supression of growth of a number of Gram-positive bacteria (and possibly some protozoa) that possess hydrogenases and thereby normally supply hydrogen for methanogenesis by interspecies transfer (20). When methanogenesis is reduced, propionate serves as an electron sink, and the combination of reduced methanogenesis and increased propionate production results in improved retention of carbon and energy in the rumen fermentation (19). The evidence for this scenario is based mainly on experiments with axenic cultures in vitro (4,6,7,12), incubation of mixed rumen contents in vitro (18,19), and experiments in vivo (reviewed by Chalupa, 3).