

415 Bacterial direct-fed microbials in ruminant diets:

Performance response and mode of action. C.R.

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Direct-fed microbials (DFM) have been shown to increase daily gain and feed efficiency in feedlot cattle, enhance milk production in dairy cows, and improve health and performance of young calves. However, effects of DFM on performance have been mixed, and the mode of action remains unclear. Bacteria used as DFM have been defined as mono or mixed cultures of live organisms that beneficially affect the host by improving the properties of the indigenous microflora. The original concept of feeding DFM to livestock was based on potential intestinal effects, including improved establishment of gut microflora and prevention of the establishment of pathogenic organisms. More recently, however, there has been some indication that certain bacterial DFM may have beneficial effects in the rumen, such as reducing the potential for ruminal acidosis. In 13 experiments, supplementing feedlot steers with lactate-utilizing and (or) lactate-producing bacteria has been shown to improve feed efficiency (range = -3.0 to 9.6%; avg = 3.3%) and daily gain (range = -5.4 to 5.0%; avg = 2.2%) with little change in DMI. In addition, increased milk yield has been reported in studies in dairy cows fed DFM, with little change in milk composition. Few attempts have been made to determine the mechanisms responsible for the beneficial effects of DFM; attempts made have involved the potential for a reduction in subacute acidosis. Responses to bacterial DFM have included a reduction in area below subacute ruminal pH, increases in propionate and butyrate concentrations, increased protozoal numbers, and changes in viable bacterial counts. Some blood variables (lower CO₂ and LDH) also have indicated a reduced risk of metabolic acidosis. Recent research has shown reduced or inhibited fecal shedding of *Escherichia coli* O157:H7 from experimentally infected calves. Therefore, a possible application for DFM might be to reduce shedding of this pathogen from cattle. Overall, data indicate that DFM have the potential to reduce ruminal acidosis in feedlot cattle and dairy cows, and improve immune response in stressed calves. More research is needed to describe the mode of action, and thereby improve the efficiency of DFM use.

Key Words: Direct-fed microbials, Ruminant, Ruminal fermentation