

TECHNICAL BULLETIN

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OREGO-STIM[®] PROMOTES A BALANCED INTESTINAL MICROBIOTA



Introduction

Antibiotic growth promoters (AGPs) have played a fundamental role in livestock production as growth and health enhancers for the past fifty years. However, there has been a characteristic trend in the last decade to seek alternatives to these feed additives due to public concerns regarding public health and safety issues, related to their residues in livestock products and subsequent occurrence of the transfer of resistant bacteria to humans via the food chain.

AGPs presumably benefit the animal by acting on the intestinal microbiota, which leads to improved growth and performance. Because of these widely accepted facts, most alternative feed supplements claim to also have effects on the microbiota, either directly or indirectly. Thus, the impact of microbiota function in livestock animals should not be ignored in relation to their growth and performance. Although monogastric animals may seem to have rather marginal nutritional benefits from these intestinal microbes as compared to ruminant and non-ruminant herbivores, the intestinal microbiota still plays a major role in various health and growth functions and can adversely affect the resilience of the host if not properly controlled or regulated. Therefore, it is clear that effective control of intestinal microbiota could positively influence the health and growth performance of all livestock and production animals.

Understanding the Role & Importance of Intestinal Microbiota

The intestinal tract provides a complex interface between the animal and its environment. It has to cope with abrupt and fluctuating dietary changes at various stages of the animal's lifecycle, formulated to provide optimum growth according to its capability, at the lowest possible cost. Studies of the development and function of the gastrointestinal system have yielded enormous advances in our understanding of the interaction between host tissue and the luminal contents of the gut, including digesta and microbiota. Therefore the effects of Orego-Stim[®] on the interactions between nutrition, gut physiology and intestinal microbiota are no longer speculative or theoretical. It holds high relevance to solving various disease problems associated with dietary change, harmful pathogens and livestock performance.

A normal and healthy intestine usually consists of more than 99% anaerobic bacteria. Although anaerobes are mostly part of the normal commensal gut flora, some exist as opportunistic pathogens. Such microorganisms may potentially become disease agents that cause the clinical signs of diarrhoea and serious, sometimes fatal infections, if they escape from the colonic milieu. These unfortunate circumstances usually begin with only a slight decline in the population numbers of commensal or beneficial microorganisms, causing a void that is quickly filled by opportunistic pathogens through the process of competitive exclusion (CE). Such diarrhoea-causing pathogenic bacteria usually consist of *Clostridia*, *Campylobacter*, *Salmonella* and *E. coli*.

The Effect of Orego-Stim[®] on Intestinal Microbiota

An ideal intestinal microbiota allows for optimum growth performance. Any alteration of the indigenous microbiota by diet or environmental stress can be deleterious to the host. One of the growth-enhancing features of Orego-Stim[®] is due to its effect on the intestinal microbiota.

It is known that beneficial and pathogenic bacteria co-exist in the gastrointestinal tract in an inverse relationship that is ruled by CE. When an animal undergoes a period of stress or disease challenge, the intestinal population of beneficial and commensal bacteria declines. This contingency allows certain opportunistic pathogens to multiply to a certain threshold which then causes the clinical signs of intestinal disease.

The essential oils within Orego-Stim[®] consist predominantly of a unique ratio and concentration of the natural phenolic compounds *carvacrol* and *thymol*, which are known to be powerful antimicrobial agents. Phenols kill bacteria through its toxic effect on the cell wall, by denaturing and coagulating the proteins within the cell wall structure. The increase in permeability causes leakage of cellular constituents, resulting in water imbalance and cell death.

Besides its direct antibacterial mode of action, Orego-Stim[®] has also been proven to act indirectly

upon the gut lining by increasing the rate of enterocyte turnover, which results in cellular exfoliation. The accelerated shedding and replenishment of these enterocytes effectively removes intestinal epithelial cells that are infected by pathogenic bacteria such as *E. coli*, which attach to the enterocyte receptors via specific surface structure adhesins.

The combination of these direct and indirect modes of action against bacteria is what effectively prevents diarrhoea and gastrointestinal tract diseases in livestock animals.

Based upon the results of antimicrobial sensitivity testing, Orego-Stim[®] has a higher killing affinity towards first the *Campylobacter*, *Clostridium* and *Salmonella* group, followed by the *E. coli* group, then the *Streptococcus*, *Staphylococcus* and *Enterococcus* group, and lastly other bacteria, including beneficial bacteria such as *Bifidus* and *Lactobacillus*.

If Orego-Stim[®] selectively kills just a small percentage of pathogens, it actually represents a large percentage of overall reduction and this reflects upon the intestinal microbiota by ensuring that the amounts of pathogens are kept to a check, while multiplication and repopulation of the intestines by beneficial bacteria takes place naturally via CE. The selective inhibition of pathogenic bacteria in the gastrointestinal tract by Orego-Stim[®] therefore has a pharmacological role in balancing the intestinal microbiota, by keeping beneficial bacteria and by killing or expelling pathogenic ones.

The inclusion of Orego-Stim[®] in livestock feed at the recommended rates was designed to kill and remove a certain percentage of bacteria constituting the intestinal microbiota. However, due to its more selective killing characteristics, it is relatively easier to eliminate the pathogens, which in turn promotes multiplication of beneficial intestinal microbiota to fill that void. Continuous use of Orego-Stim[®] will ensure that the numbers of pathogenic bacteria are kept at the lowest possible levels, while maintaining and preserving healthy levels of the beneficial bacteria in the intestines.

The Function of Probiotics

Supplementation of animal feed with probiotic bacteria has been claimed to bring about certain advantages in terms of nutrition, health and safety. In livestock production, microbial supplementation has accordingly been shown to improve animal health, as observed via increased values of production indicators such as feed efficiency and live weight gain, and immune function parameters. It is also claimed to be able to reduce excretion of certain strains of pathogenic bacteria in animal faeces, thus lessening environmental contamination and reducing dissemination of infectious diseases.

Most probiotics contain mainly saccharolytic bacteria such as *Lactobacilli* and *Bifidobacteria*, and

hence produce short chain fatty acids from carbohydrate fermentation. This provides energy for the epithelial cells in the digestive system and lowers pH, consequently inhibit typical proteolytic bacteria, which are responsible for release of such compounds as β -glucuronidase and β -glucosidase that induce toxic compound formation in the gastrointestinal tract.

Can Orego-Stim[®] Be Used In Conjunction With Probiotics?

Yes! A combination of Orego-Stim[®] and probiotics will not harm the animal. In fact, Orego-Stim[®] works even better when used in combination with probiotics. As Orego-Stim cleanses the intestines and rids it of pathogens and infected cells, the probiotics would continually supplement and replace bacteria that are lost to fill the void, adding to the amount of competing beneficial microbiota.

However, we must bear in mind that because a small portion of the probiotics would be killed or removed as well, this may not be the most economical choice or best solution for a livestock producer, so when faced with having to make a practical decision, most would choose to stick to using Orego-Stim[®] solely without concurrent inclusion of probiotics. This is simply because probiotics have a higher tendency to fail in terms of efficacy, especially in times of severe stress or disease challenge when CE is in favour of the highly pathogenic bacteria, whereas continuous usage of Orego-Stim[®] ensures effective killing and removal of the said pathogens, allowing beneficial and commensal bacteria to thrive in the intestines naturally.

Summary

Orego-Stim[®] is a phytobiotic that is able to stabilise the intestinal microbiota by killing and removing pathogens, while promoting the growth of commensal and beneficial bacteria. Contrary to popular belief, Orego-Stim[®] can safely be used in conjunction with probiotics to boost the numbers of beneficial bacteria in the intestines. However, because Orego-Stim favours the existence of beneficial and commensal bacteria notwithstanding, the inclusion of probiotics is not necessary and may not be economical due to fractional loss caused by the antimicrobial properties of Orego-Stim[®].

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