

Immunomodulators Used in Cattle

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There are numerous substances that cause the suppression and/or the enhancement of non-specific and/or specific immunity. These substances are collectively referred to as **immunomodulators**. Substances that can enhance immunity in cattle will be the subject of this presentation. Although not often considered in this context numerous natural factors can enhance immunity. The most important among these natural substances are; colostrum, nutrients, cytokines, and microbial and plant factors.

Colostrum contains not only immunoglobulins which can provide and enhance specific and non-specific immunity, there are also non-immunoglobulin factors (e.g. cytokines) that serve as immunomodulators. The combination of these substances in colostrum are critical to "jump starting" the immune system of the newborn calf.

Nutrients, especially certain vitamins and trace minerals serve as excellent immunomodulators. When deficient in the diet immunosuppression can occur and when present at levels equal to or often greater than concentration recommended to maintain proper nutrition they enhance immunity. Among the most immunologically active vitamins are vitamin E, A and C, however, others can also modulate the immune system. The trace minerals studied most for effects on the immune system are; selenium, zinc, copper and iron.

Cytokines which include the interleukins (IL's), the

interferons (IFN), growth factors and other molecules such as tumor necrosis factors (TNF) plus various hormones all have an ability to modulate immunity in cattle.

Microbial factors include cell wall constituents, endotoxins (e.g. LPS), exotoxins, nucleic acids and other products. Additionally certain plant substances like phytoestrogens modulate the immune response.

Drugs have also been developed for the purpose of immunomodulation but few of those are used in cattle primarily because of cost. Drugs developed for other purposes and later shown to enhance immunity (e.g. levamisole) are also available and have been used.

Collectively the immunomodulators when used in cattle for enhancement of protection against diseases caused by a variety of pathogens have met with successes and failures. The success of these substances is dependent on multiple issues such as which immunomodulator was used, when it was used, the duration of use, and the amount of substance given. Also, the age of the animal, overall immune status of the animal, amount of stress, time of challenge with pathogen the cost, as well as other variables determine, as might be expected the outcome and success of treatment with immunomodulators.

The one most important factor that must always be considered when immunomodulators are used in cattle is, is it cost effective.