FrontLine®
TECHNICAL INFORMATION FOR TODAY'S FEED PROFESSIONAL

What is FOS?

Third in a series on potential alternatives to subtherapeutic antibiotics in calf milk replacers

Fructo-oligosaccharide (FOS, or inulin) is a sugar extracted from the chicory plant. This sugar is not digested by mammals and moves intact through the digestive tract. Once it reaches the large intestine or colon, this sugar nourishes the beneficial bacteria. FOS (inulin) is a "natural" prebiotic.

What is a "Prebiotic"?

A "prebiotic" is a food that nourishes the beneficial bacteria in the digestive system. This is important because the animal needs to maintain a balance of beneficial and non-beneficial (pathogenic) bacteria. A healthy digestive system has more beneficial bacteria. The most prevalent beneficial bacteria are *Bifidobacteria* and *Lactobacillus* species. Beneficial bacteria improve digestion, produce essential B-vitamins, and may help to improve the absorption of key minerals (Ca, Mg) and vitamins. FOS selectively nourishes the beneficial bacteria in the digestive system maintaining an optimum condition in the animal.

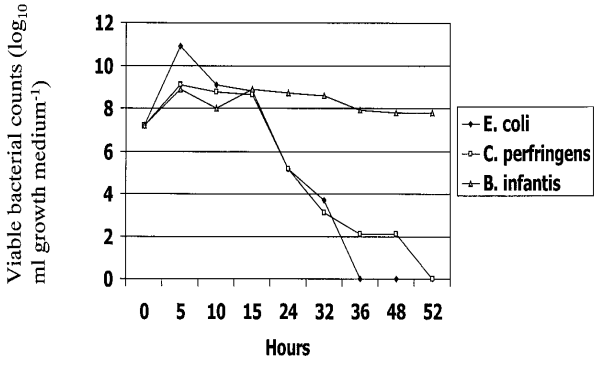
What is the difference between a Prebiotic and Probiotic?

Prebiotics are foods that nourish the good bacteria already in the digestive system to optimize performance. Probiotics, or, more correctly, direct-fed microbials, are live bacterial cultures that are added to animal feeds to improve performance. Both prebiotics and probiotics are safe.

Potential Benefits of FOS

Research has shown that the potential beneficial effects of enhanced bifidogenesis in livestock are:

- Production of certain bacteriostatic or antibiotic compounds which inhibit pathogens
- Limits or eliminates potential pathogens in colon and feces. Higher populations of *Bifidobacteria* may competitively exclude some pathogens.
- Assists in reestablishment of beneficial microbes after scouring. Can be used with oral electrolytes.
- Aids in improvement in gain and feed efficiency when administered with Direct Fed Microbials (DFM's).
- Enhances the uptake of calcium, magnesium, copper, zinc and iron along certain vitamins.



Wang and Gibson, 1993

The ability of FOS to inhibit pathogens is demonstrated by the *in-vitro* study referenced above. In this study the researchers plotted the progression in growth of *Bifidobacteria* vs. *E. coli* and *C. perfringens* over time in a growth media with FOS as the primary energy source. Within 48 hours, the *Bifidobacteria* were the dominant bacteria. Other pathogens were eliminated.

FOS added to livestock diets has shown enhanced animal performance

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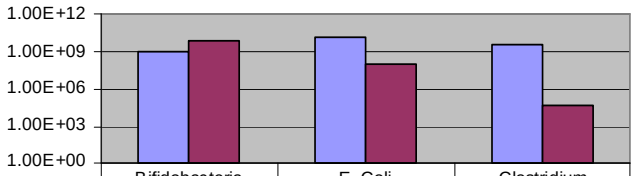
Reduction of Pathogens in the Environment

The addition of FOS to the diets of young calves and the increase in *Bifidobacteria* and decrease in *E. coli* and *Clostridium spp.* were demonstrated in this research from the University of Missouri. Calves were given no FOS or 2 gm FOS per head daily for a 35-day trial period. A 2-3 log change (reduction) in the level of pathogens in the feces was seen after the administration of FOS, plus a slight increase in beneficial bacteria (*Bifidobacteria*).

Effect of FOS on Microbial Populations in the Colon of Calves Fed Non-Medicated Milk Replacer and Fructo-oligosaccharides (Bunce et al., Univ. of Missouri)

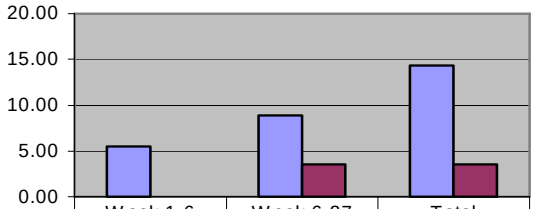


	Bifidobacteria	E. Coli	Clostridium
Control	1.20E+09	1.80E+10	4.20E+09
FOS	7.03E+09	8.70E+07	5.12E+04

May Aid in Growth of Calves

Fructooligosaccharides have been used in Europe in calf diets. Results have shown equal to improved results vs. standard antibiotics. Results are more consistent when a bovine specific *Lactobacillus* probiotic is added to the mix. The average weight gains in the first 6 weeks showed a 6 pound improvement in growth vs. the controls. Overall growth was significantly higher in the FOS fed animals.

Live Weight Gain Advantage over the Control Diet of Veal Calves Fed FOS and a *Lactobacillus* Preparation in a 50% Skim-Milk Milk Replacer
(European Study - Aalfs,Mul, Resink, unpublished data)



	Week 1-6	Week 6-27	Total
FOS & Lactobacillus Preparation	5.50	8.89	14.30
Antibiotic	0	3.52	3.52

References:

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