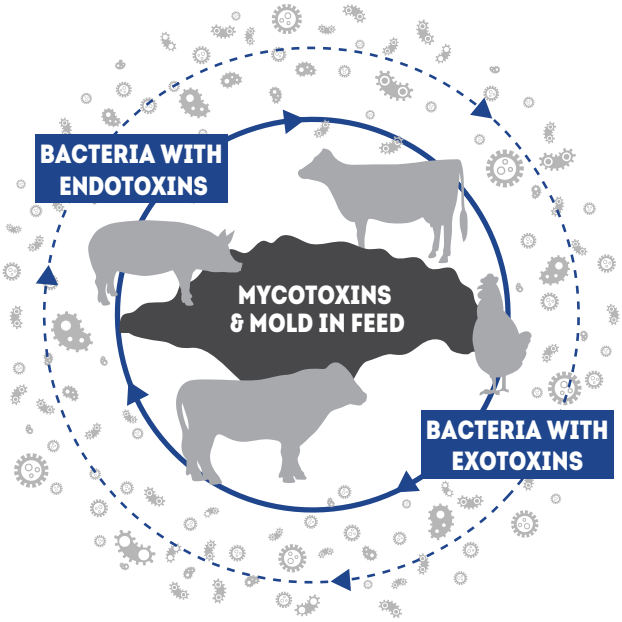
#ScienceHearted

FAQs on effect of Refined Functional Carbohydrates (RFCs) on microbial toxin exposure in animals.

WHAT ARE THE TYPES OF MICROBIAL TOXINS?

Microbial toxins are produced by microorganisms to protect their environment. There are three main types of microbial toxins:

- Endotoxins: Released when a gram-negative bacterium is killed. Most common example is Lipopolysaccharide (LPS), which is released from the cell membrane of gram-negative bacteria.
- Exotoxins: Secreted by gram-negative and gram-positive bacteria in the environment. Depending on their location they are further classified. For example, enterotoxins (affecting the gut), neurotoxins (affecting the nervous system), etc.
- Mycotoxins: Secreted by fungi, typically as a stress response (unfavorable growth environment). They are believed to be present in variable amounts in 75% of the feedstuffs and have subclinical and clinical effects. The most common mycotoxins are Aflatoxin, Ochratoxin, Deoxynivalenol (DON), Zearalenone, Trichothecene and Fumonisins.



WHAT IS THE EFFECT OF RFCs ON BACTERIAL ENDOTOXINS AND EXOTOXINS?

Refined Functional Carbohydrates™ (RFCs™) are known to have an anti-adhesion and immunomodulatory effect on certain pathogenic bacteria. *In vitro*[1] and *in vivo*[2,3] studies show a reduction in these toxin producing bacteria when RFCs are used. With this approach, we reduce the source of the bacterial toxin threat. In other words, we attack the source of the problem instead of helping the animals manage the problem. In a study,[4] when pigs fed RFCs were injected with LPS, RFCs supplementation controlled the innate immune response (fever, rapid breathing) compared to control pigs.

WHAT IS THE EFFECT OF RFCS ON MYCOTOXINS?

RFCs have a dual action against most common mycotoxins. *In vitro*[1,5] and *in vivo* studies show RFCs can reduce the toxicity caused by mycotoxins to gut tissue as well as bind some mycotoxins and reduce their absorption.[5]

WHAT IS THE EFFECT OF SIMULTANEOUS PRESENCE OF MICROBIAL TOXINS AND MYCOTOXINS ON ANIMALS? (1+1=3!)

Presence of both a mycotoxin and a toxin-producing microorganism, such as Shiga toxin-producing *E. coli* (STEC), causes more toxicity to gut cells compared to STEC alone[6]. So having a product such as RFCs which deals with both STEC and mycotoxins can be very beneficial.

To learn more contact your nutritionist, veterinarian or ARM & HAMMER™ representative or visit AHfoodchain.com.

1 Baines D, et al. A prebiotic, CELMANAX™, decreases *Escherichia coli* O157:H7 colonization of bovine cells and feed-associated cytotoxicity *in vitro*. *BMC Research Notes* 2011;4:110.
2 Baines D, Erb S. Characterization of Shiga toxin-producing *Escherichia coli* infections in beef feeder calves and the effectiveness of a prebiotic in alleviating Shiga toxin-producing *Escherichia coli* infections. *Irish Veterinary Journal* 2013;66:17
3 Danielo, et al. American Society of Animal Science (ASAS) Annual Meeting 2019 Abstract #108
4 Hung, et al. (2008) *J Anim Sci* Vol. 86, E-Suppl. 2/*J Dairy Sci* Vol. 91, E-Suppl. 1
5 Baines (2014) Gut Health Symposium, St. Louis, USA Abstract #202
6 Baines, et al. Aflatoxin, Fumonisin and Shiga Toxin-Producing *Escherichia coli* Infections in Calves and the Effectiveness of CELMANAX®/Dairyman's Choice™ Applications to Eliminate Morbidity and Mortality Losses. *Toxins* 2013;5:1872-95.