



## Microbiome Talk Offers Lots to Digest

By Geoff Geddes, for Swine Innovation Porc

Many would say that diving into the pork business takes guts. For those who wish to thrive and not just survive, keeping current on the latest science is crucial. One area that is gaining more attention these days is the gut microbiome (the genetic material of all the microbes - bacteria, fungi, protozoa and viruses - that live on and inside the body) and its implications for both human and pig health.

To better understand this complex but critical area, Swine Innovation Porc held an information session just prior to the 2020 Banff Pork Seminar featuring three leading experts. The first speaker, presenting on “The Gut Microbiome and Why You Should Care About It”, was Dr. Emma Allen-Vercoe, Professor, Canada Research Chair, Department of Molecular and Cellular Biology at the University of Guelph.

“I don’t know a lot about pigs.”

As openings go, it might seem an odd choice for a pork event talk; fortunately, Dr. Allen-Vercoe was quick to elaborate.

“I do know a lot about humans, and today I’ll present some basic research about the microbiome in humans that can be easily applied to animal science.”

### What do we know about the human gut microbiome?

As it turns out, we know quite a bit. For starters, we are not just humans, but complex super organisms with both human and microbial cells. In Dr. Allen-Vercoe’s words, “we are nothing without our microbes [microscopic organisms which may exist in single-celled form or in a colony of cells] and they are nothing without us”.

In the gut, microbes form communities, where they are connected through networks either by direct physical contact or via chemical messengers. This is a key concept, as many studies cover one or two microbes, forgetting that they behave differently with their “friends” than when growing on their own in a petri dish. Thus to gain a full understanding, it’s important to study the whole microbiome rather than a few elements.



Above: Dr. Allen-Vercoe speaks about the gut microbiome at SIP’s gut health session in Banff, January 2020 (photo: SIP).  
Inset: Dr. Allen-Vercoe (photo: University of Guelph).

Another key concept around the gut microbiome is the importance of biodiversity. The more diversity you have, the healthier or more robust that ecosystem becomes. For the layperson, this can be best understood with a timely analogy.

“If you stand in the rainforest with thousands of species and close your eyes while one species is removed, when you open your eyes again you can’t tell

“Overall, the gut microbiome is as needed as our liver, and nobody thinks we can live without a liver.” - Dr. Emma Allen-Vercoe

which one is gone because things that are still present step up to take the job of elements now extinct.”

While this is true to a point, it's possible to push an ecosystem like the rainforest too far. Once the diversity of species is lowered enough, the ecosystem starts to break down, and the same is true with the microbiome. If we keep whittling away at that ecosystem and removing species, it leads to collapse and a gut that can no longer function properly.

#### Where does our microbiome come from?

To figure out where we're going, it helps to know where we started. Though babies are born sterile, their microbiome quickly becomes colonized. By age three, a time when infants have been weaned and are eating a more adult-like diet, a mature gut microbiome has developed.

“At this age, the microbiome becomes fixed in its composition, so that the species present there will now dominate within that ecosystem. From then on, the system is hard to change, maintaining itself for years and maybe for life.”

#### What does the gut microbiome do for you?

Though it's interesting to know where the microbiome comes from and how it's composed, there's another issue that many will find more pressing: What's in it for me?


“The question should really be this: What doesn't the microbiome do for you? Top among its functions is

regulating our immune system and educating it on how to respond appropriately to disease threats.”

The microbiome is also vital for extracting energy from foods like fibers and resistant starches, substances that travel down to the colon but can't be properly digested without assistance. It helps us control potential pathogens, improves intestinal function and removes toxins and carcinogens from our diet.

“Overall, the gut microbiome is as needed as our liver, and nobody thinks we can live without a liver.”

Another critical role for the microbiome relates to host physiology. In this case, the best way to appreciate something is to see what happens when it's gone.

“When we study animals that have no microbiome, such as germ-free mice that are bred and live in sterile conditions, they are not very healthy. They have reduced immune cells, fertility, bone mass and cardiac output, have trouble digesting food and tend to be very anxious and hyper responsive to hormones. These findings really underline that animals need their microbiome.” 

To watch a video of Dr. Allen-Vercoe's talk, [please click here](#).

This article is part two of a special four-part series on the Swine Innovation Porc health session held in January 2020. [Check out our website](#) for more R&D featured articles.