

Antibiotic alternatives show promise, research required

Italian researcher's review of the literature raises hope for alternative health solutions

BY MELANIE EPP
Ontario Farmer

Experts have proposed many different ways to reduce the use of antibiotics, include further education, tighter regulations and tax incentives.

One area that lacks research is in the use of alternatives, such as probiotics and immunomodulators.

After reviewing the literature, however, chair professor of Food Microbiology at the Catholic University of Sacred Heart Pier Sandro Coconcelli said there is hope for alternatives. He presented his findings at the Livestock Forum in Barcelona, Spain in May.

While there are research reports that show the efficacy of antibiotic alternatives, reports are few and gaps in knowledge limit their use in animal husbandry, said Coconcelli.

"Most of the studies demonstrate the efficacy of these agents, but very few are clinical trials or provide robust data to demonstrate the efficacy according to the methodology recommended in market authorization criteria as feed additives or veterinary medicines," he said.

Perhaps the most promising alternative is probiotics, said Coconcelli. Probiotics are live microorganisms that when consumed in adequate amounts confer a health effect on the host. An assessment of the literature reveals that probiotics can reduce diarrhea in weaned piglets and calves.

They have also been shown to reduce the incidence of *C. perfringens*-induced necrotic enteritis and decrease ilial lesions and inflammation in young chickens.

"Clearly, probiotics is one of the most interesting areas," said Coconcelli.

Coconcelli also reviewed papers on predatory bacteria. Predatory bacteria, he explained, are essentially living antibiotics that target specific bacteria, like *Salmonella*.

Specifically, he mentioned research on the predatory bacterium *Bdellovibrio bacteriovorus*, which attacks and enters bacteria, quickly growing and dividing. Once inside, the predatory bacteria eat the host from the inside out. Research shows

that *B. bacteriovorus* can attack over 100 different bacterial pathogens. Again, however, research is lacking in this area.

Bacteriophages also present an opportunity. Used extensively in Eastern Europe, bacteriophages are viruses that target and kill bacteria, like *E. coli* and *Salmonella*. Coconcelli says there's research to support the effectiveness of bacteriophages to control colibacillosis in poultry, a secondary disease that occurs when the host's immune system has become overwhelmed by virulent *E. coli* strains.

Antimicrobial peptides, which are peptides designed specifically to kill bacteria, may provide another option. However, Coconcelli noted again that there are very few reports on their use in animals.

"We are to keep in consideration that some of them could be cytotoxic," he said.

Immunomodulators also show promise as a potential alternative to antibiotics. Immunomodulators are chemical agents that modify the immune response or function of the immune system by inhibiting or stimulating white blood cell activity, for example. In chickens, research shows that small

cationic peptides with immune modulatory properties can reduce colibacillosis, said Coconcelli. In cattle, they were shown to reduce the incidence of mastitis.

The difficulty with immunomodulators, though, is they sometimes leave a toxic residue. Further limitations include the fact that there are very few studies available on the subject, and authorization for use is still lacking.

Prebiotics and botanicals, as well as organic acids and minerals, are also being researched with some reports showing positive results.

Before any of these alternative solutions can be implemented, though, Coconcelli says more research must be conducted.

"There are a limited number of studies that could be considered as supportive to demonstrate efficacy," he said. "And most of the studies demonstrate efficacy in conditions that cannot be said to be a clinical trial."

Authorization also poses a challenge, as feed additives must be shown to improve the performance or welfare of healthy animals under the authorization procedure.

Coconcelli hopes that funding will be made available in the near future in order to research the possibility of these potential alternatives.

ing on the weight of the birds.

Weeden said he's also seeing more interest in cool pads among the new generation of Ontario broiler growers.

And, he said, growers that shift to aviaries have more dust, so there's also a demand for the sprinklers to reduce the dust.

Weeden also added that the sprinklers can be used for other species. In addition to pig barns, he has installed them on dairy operations to cool cattle waiting in the holding area for milking. On one dairy, the shower was so popular they had to shut it off to encourage cattle to move into the milking parlour!

Weeden estimates an average equipment cost for the patented system would be less than 25 cents per square foot.

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BROILERS

Continued from page 1

a new broiler barn, it included a sprinkler system.

"To me, it's no different than having a stand-by generator. I think it's an essential part of the barn. As long as you're managing the system, you won't loose birds," Dietrich said. "I grow heavy birds. Those four-kilo birds don't like getting up. You've got to find a way to keep them cool."

In the United States, Weeden has installed a lot of sprinklers in conjunction with cool pads (a wall of water-cooled baffles). Cool pads use a lot of water, so adding a sprinkler can cut water use in half. The sprinkler is the first cooling device, and the cool pads start when the temperature reaches 32°C or so, depend-