



Dr AMIR GHANE*, explains how **nutribiosis, the interaction between gut and immune function, microbiome and nutrition, brings a holistic approach to the complex challenge of maintaining production efficiency and health when AGPs are removed or restricted.**



A winning nutritional health strategy for a post-AGP world

Antibiotics have long been used in animal production to control various disease and health challenges as well as promote growth - but times are changing. As global health bodies step up efforts to fight the threat of antimicrobial resistance in humans, this established practice is coming under ever greater scrutiny. This development is forcing the animal industry to find viable alternatives.

It goes without saying that finding the right solution is not an easy task. Removing or reducing the use of antibiotics is a highly complicated issue, with far reaching implications in terms of animal performance, health and welfare, as well as commercial return.

Not only that, evaluating the sheer number of potential replacement products currently available on the market is a confusing prospect. Probiotics, prebiotics, organic acids

and phytogenics are just some of the ingredients that can be added to animal feed. Many of which do not have the necessary credible science-based evidence to support advertised claims, and their combination does not always bring additive effects.

Factor in the need to tailor the solution to individual farming operations in order to optimize results, and the level of complexity involved with making the transition away from antibiotics becomes clear. Management techniques, national legislation and feed ingredient availability are just a few of the many variables; what works in one location or flock, may not be as successful in another.

Given that there is no silver bullet that can solve all of these issues, a new approach to animal production which is aligned with the evolving dynamics of today's industry is needed now more than ever. ▷

Table 1: Pathogenic *Clostridium perfringens* proliferation is influenced by cereal type in digested sample.

		Corn-based diet (n = 6)	Barley-based diet (n = 7)	Wheat-based diet (n = 7)
Median	(x 10 ⁸ CFU/mL)	3.78 ^a	5.90 ^b	5.80 ^b
First quartile	(x 10 ⁸ CFU/mL)	3.41	4.90	5.25
Third quartile	(x 10 ⁸ CFU/mL)	4.06	7.95	6.90

^{a, b} Median values with different superscript letters are statistically different ($p < 0.05$)

Annette et al., 2002, diets incubated at 40°C

Unlocking the animal's potential

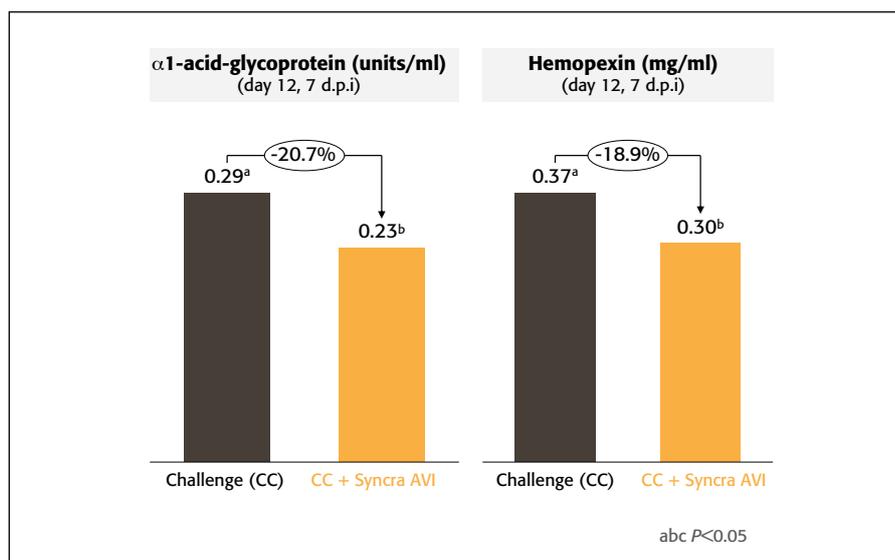
A holistic approach is the best way forward; one which focuses on the interaction between three pillars in the gut; nutrition, microbiome and gut and immune function - a state referred to as 'nutribiosis'. The aim is to understand how to positively influence all three pillars to achieve balance in the gastrointestinal tract (GIT) - known as a favourable nutribiotic state - and thereby enhance performance and protect the animal against pathogenic challenges.

Looked at through the lens of nutribiosis, an effective strategy does not solely consider nutrition or physiology in isolation. Instead, each element is combined and looked at as one functional system; where each has an influence - whether direct or indirect - within the GIT.

Viewed in this context, continuing to look solely at nutrition, without also considering the implications of the fields of microbiome and gut and immune function is no longer an option. The microbiome, for example, changes in diversity and number as the animal grows, and is influenced by various external factors which not only includes the diet, but also environmental challenges, biosecurity and farm management practices.

As an example, consider a chick hatched from healthy breeders with optimal immunity (proper vaccination and microbiota of the breeder) in a clean hatchery environment and then transferred to a brooding facility that is properly managed to eliminate pathogenic organisms. This young animal would experience a completely different growth trajectory compared to another which has been exposed to pathogenic or opportunistic micro-organisms in one or more of the early stages of its development.

Figure 1: Specific enzyme and probiotic combination contribute to the regulation of acute induce immune responses during challenge. (day 12, 7dpi)



Nutrition also plays a key role in animal performance; not only affecting its microbiota and functional capabilities, but also immune response and readiness. The presence of microorganisms in the gut, for example, is influenced by the type of cereal based diet (Table 1) In particular, maximizing digestibility is a key goal for producers; largely because undigested feed reaching the terminal ileum can provide the ideal substrate for non-beneficial bacteria to feed on and thrive, which can potentially lead to subclinical diseases, inflammation and gut damage.

Understanding these complex interactions between the gut and immune function, microbiome and nutrition is of utmost importance and forms the foundation of effective solutions and practical concepts.

Nutribiosis in action

It is important to understand what animal producers are looking to

achieve with their feed strategy, with or without antibiotics. What is the goal and how will it be measured at the farm level? Generally, this can be divided into two groups; enhancing performance versus preventing or correcting a health challenge or disease. This simple categorization is necessary as some operations are faced with existing health challenges, while others enjoy minimal health issues but are focused on improving performance. In nearly every case, the underlying goal is to identify the best strategy to reduce or eliminate antibiotics to meet consumer demand and achieve individual business targets.

One of the most successful nutritional health solutions is Syncra AVI. Combining two proven technologies, its unique formulation contains enzymes, which improve nutrient digestibility and a three-strain probiotic formulated to protect birds against health challenges and accelerate immune development.

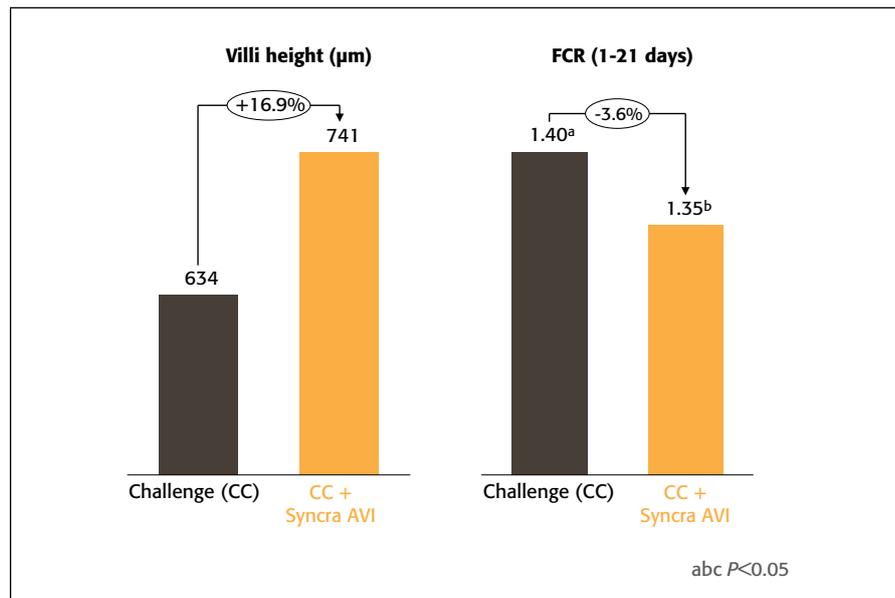
These positive, measurable effects have been proven to generate a synergistic effect in the nutrbiotic state of the animal, supporting the desired conditions in each of the three key pillars of nutrition, microbiome and gut and immune function. For example, Figure 1 shows positive results in terms of modulating the immune system while Figure 2 illustrates the resulting effects on the gut structure and ultimately performance.

Conclusion

There is, however, no 'one size fits all' replacement. Programs will vary according to the type, dosing and category of products chosen to achieve optimal results. Implementation of antibiotic-free or reduced strategies is a complex task that requires a holistic view and is supported by a thorough knowledge of multiple areas such as nutrition, physiology, microbiology, immune function, as well as practical operational experience and regulatory expertise.

So as the industry moves towards removal or reduction of antibiotics in

Figure 2: Effect of specific enzyme and probiotic combination on villus length (left) and FCR (right).



animal production, a greater understanding of nutrbiosis offers a new platform to create a winning nutritional health strategy; providing valuable insights for improved animal performance and ultimately helping producers make informed decisions to support commercial success. Ap

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