European experiences with probiotics in poultry production

by Alfred Blanch, Chr. Hansen A/S, Denmark.

When discussing European experiences with probiotics, it is important to put those experiences in the context of what happens in other regions globally. Production systems in the USA, for example, are quite different to the European Union (EU) while the history of chemotherapy including antibiotics and other management practices help us understand better the challenges that feed additives, including probiotics face in the EU.

An interesting history

The observation that certain bacteria can play a positive role in the health of the host was realised in the early 19th Century and is attributed to Metchnikoff, the Nobel Prize recipient. At the Institut Pasteur in Paris, he related the high life expectancy of Cossacks to their high consumption of fermented milk; milk containing Bacillus balgaricus, later classified as Lactobacillus bulgaricus.

In the 1930s, trials focused on probiotics and constipation. In the interim period until the 1970s, there was little interest in probiotics. However, from this period on, interest in probiotics for human and animal use gathered momentum.

The first products to be considered efficacious and meet EU standards for feed additives arrived in the 1980s. There have been many definitions of probiotics over the years but the definition that is considered the most suitable is that proposed by the FAO/WHO in 2001: 'live micro-organisms which when administered in adequate amount confer a health benefit on the host'.

Interest in probiotics is still growing as can be seen by a quick search on the number of publications on probiotics, over 13,000 in online databases such as Pubmed. Of those, over 400 are related to poultry.

Regulatory environment

The EU has a rather restrictive regulatory environment for feed additives. The increasingly firm stance of the EU Regulatory Authorities arose after the BSE (mad cow disease) outbreak as a result of feeding meat and bone meal in livestock production (Fig. 1).

In the EU, the registration process for probiotics as a feed additive is via the European Food Safety Authority (EFSA) and is typically a lengthy process, maybe 3-4 years or more.

Ideally the bacterial species is on the QPS (Qualified Presumption of Safety) list and a dossier must be compiled for each target species (fattening chickens, layers etc) that includes sections and data on:

- Safety: does the probiotic strain demonstrate antibiotic resistance, toxicity, etc.
- Efficacy: a minimum of three studies must be performed that demonstrate a statistically significant improvement in zootechnical performance.
- Production: details on the production process.

EFSA evaluates and advises on the dossier, but the EU Commission approves the application.

EFSA registration is an expensive and lengthy process (up to €5M) and requires a degree of certainty that your probiotic candidate will positively influence performance; claims for health improvement or pathogen control, for example, are not permissible.

The number of probiotics registered or undergoing registration in the EU is increasing, approximately 14 to date, targeted at various segments of the poultry industry including egg laying birds, turkeys and broilers. Of these 14 products, only two products are multi-strain.

The bacterial species used include Lactobacillus, Pediococcus, Enterococcus, Clostridium, Bifidobacterium and Bacillus spp.

In contrast, probiotic (or direct fed microbials (DFM) as they are known) registration in the USA is quite different. If the bacterial species is already listed as a feed ingredient in the AAFCO OP (Association of American Feed Control Officials Official Publication) on the DFM list, there is no formal 'federal' registration process per se.

However, the individual state requires registration of either the product (usually just the marketed label) or the manufacturing facility.

The 'label' (which includes marketing pieces in the eyes of the FDA) must be 'truthful and not misleading' with the support of sound scientific evidence that supports the claims being made. Improved production/performance claims are technically considered to be veterinary 'drug' claims in the USA. Other geographical regions tend to have registration processes as variants of either the EU or US, or very little process at all.

Market potential

Until the last few years, the use of probiotics for poultry production in the EU has been limited. However, times are changing, and probiotic use within the EU is increasing. The global market potential for probiotics is considered high, although actual market data are hard to come by.

If the regions are considered on an indexed basis relative to the US, one suggestion is that the USA and EU could represent the larger markets in the near term (Fig. 2).

Following the EU ban of antibiotic growth promoters in 2006, one would have expected to see a high adoption rate of probiotics and other feed additives by poultry producers. Interestingly, probiotic

Continued on page 9

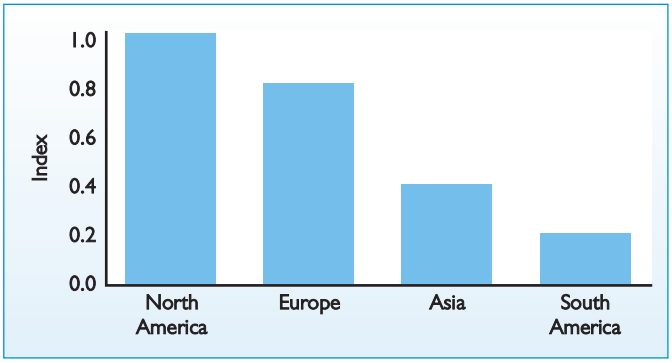
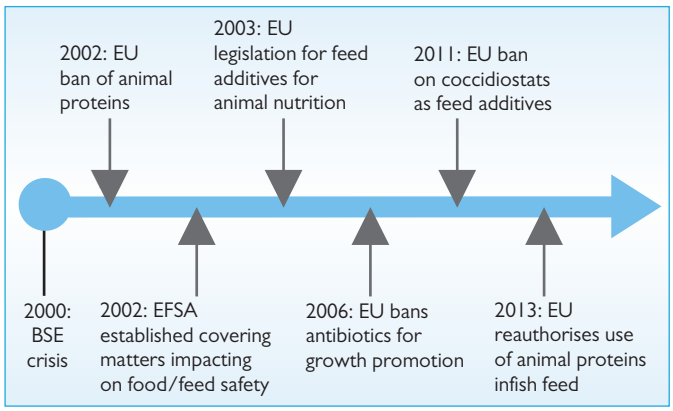


Fig. 2. Indexed global probiotic market potential by region.

Fig. 1. Development of EU Feed Additive Regulations.



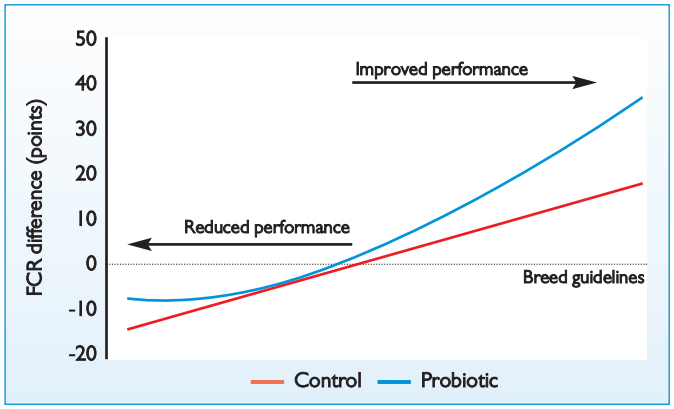


Fig. 3. The relationship of probiotic efficacy versus poultry breed performance guidelines.

adoption in the swine sector in the EU is far higher, while in the USA probiotic usage has been estimated at 70-80% of poultry producers.

However, market conditions in the USA are very different to those in the EU. The management practice of reusing litter contributes to early intestinal challenges but perhaps the biggest driving force for probiotic use was the introduction of coccidiosis vaccines.

The use of these vaccines means that ionophores and coccidiostats should not be used during the production cycle, leading to loss of the antibacterial protection conferred by the ionophore. These market conditions in addition to the increasing scrutiny of antibiotic usage and the move to antibiotic free production has driven the acceptance and adoption of probiotics in the USA far faster than the EU.

The potential benefits of probiotics in poultry production such as improved performance including increased bodyweight and reduced FCR, reduction in pathogens, and stabilisation of gut microflora, have been well documented so why the slow adoption of probiotics in the EU?

A number of factors contributed to this. Firstly, and significantly, the poultry industry had the perception that some companies 'over promised' the efficacy of their additives, that is, the additives were suggested to be efficacious for a wide variety of conditions i.e. a magic bullet. End user expectations were poorly managed and consequently this perception/opinion persists today.

Secondly, following the ban, producers looked at their production systems and sought ways to improve management, hygiene and housing thereby improving the overall management and performance of birds.

Lastly, this improved management results in high bird performance in many states of the EU.

As bird performance improves (relative to breed guidelines), it becomes more difficult to demonstrate direct effects of feed additives such as probiotics on bird performance (FCR and live weight) (Fig. 3). This phenomenon is not surprising. Birds performing to their potential are typically healthy, management is good and hygiene is high. However, the antithesis to that is if high performing birds suffer poor health via, for example, intestinal disturbance, the drop in performance can be dramatic.

Drivers for probiotic usage

The drivers for probiotic use in the EU are four-fold:

- To reduce reliance on therapeutic antibiotics to maintain antibiotic efficacy.
- Consumer and regulatory pressure for antibiotic free production, or at least reduced antibiotic usage.
- Provision of 'insurance' against sudden performance drops related to intestinal challenges.
- To promote animal welfare to comply with current recommendations in this regard as well as to increase profit.

This provides a number of opportunities by which probiotics can contribute to management programmes, both from the overall financial perspective and meeting some of the aforementioned drivers, rather than directly upon bird performance as discussed earlier.

Return on investment is clearly the main parameter to evaluate the inclusion of any additive. Other than using probiotics as an insurance policy, how else can they really be evaluated?

The challenge is to ensure that the overall financial analysis is performed, including the costs of litter, vaccines, labour and treatments, rather than simply cost of feed and money earned from sale of birds. This is because the other benefits of probiotics and their mode of action (interaction with gut morphology, positive modulation of gut microflora, improving feed passage etc) can still directly impact upon overall positive financial outcome, for example improving litter quality or contributing to a reduction in antibiotic usage.

An additional challenge for the adoption of probiotics is application. Do they need to be administered via feed or other methods?

Typically only Bacillus and Clostridium spp survive the heat treatment of feed pelleting, although some preparations of Enterococcus are also suggested to survive the feed manufacturing process.

Other lactobacilli are more sensitive to the external environment but are able to colonise the intestinal tract. If an end-user applies a probiotic via an inappropriate route or incorrectly, the bacteria will not survive and therefore no efficacy will be demonstrated. This has no doubt been a factor in the poultry industry's perception of 'over-promise' of feed additives. Managing the expectations of all stakeholders was, and is, absolutely essential.

Making a difference

There is a high level of poultry integration in the EU but many feed mills are independent. As a probiotic supplier, do you target feed mills, poultry integrators, independent growers or all three with the resources that you have? Often the customer needs can be quite different which introduces further complexity. Can a probiotic appeal to all customer segments?

Probiotic companies are beginning to develop more complete strategies; to provide solutions for the customer around intestinal integrity etc. The introduction of matrix values for swine probiotics was pioneered by Chr. Hansen who is now doing the same for poultry probiotics. In the EU market, where performance as well as feed cost is high, the ability to offset probiotic cost is extremely important. It must be understood that probiotics cannot provide a complete solution to all of the poultry producer's problems, they are not the magic bullet; we are moving away from the days of over-promising.

As we can see, the adoption of probiotics by poultry producers in the EU is a challenging process. Although usage is gathering momentum, the restrictive EU regulations have so far limited the number of available probiotics.

However, this is changing with an increasing number of products coming to market and probiotic use is gathering momentum.

We know probiotics work well, the challenge in the EU, and globally, is to convince the poultry industry probiotics are part of a solution for poultry management that brings real value and a return on investment. ■