

# AlzChem Asserts Cellular Efficiency Will Fuel New Wave of Feed Additive Innovation

**It could be argued that animal nutrition as a global industry really kicked off when the idea of selling supplements to better balance out the nutritional values of feedstuffs began. Clearly, it was a landmark development.**

Another transformative moment came when the industry began to refine the concept of what it meant to keep an animal healthy, and to better understand how the proper functioning of the gut, a healthy microbiome, and the biochemical properties of the feed ingredients themselves interacted to create the concept of “gut health”.

Naturally, there is much more to be discovered on both fronts, but it is also fair to say that both ideas — feed supplements and gut health — are well-established, or perhaps even indispensable concepts for animal nutritionists, veterinarians, and any other professional in this industry.

AlzChem, meanwhile, has recently put forth the argument that there is a third concept, with an equally transformative potential, ready to fuel the industry’s next stage of development. In the interview below, the German company defends its notion that increased attention to the post-digestion fate of nutrients could open up a nearly completely untapped world of production improvements, but that it will require a paradigm shift in how we think about an animal’s nutritional needs.

**AlzChem is promoting what it calls the “third evolution in feed”. What were the first two evolutions?**

**[AlzChem]** The way we see it, the very first important evolution in feed was incorporating nutritional additives into feed. Prior to this, animals were fed either with “leftovers” from human nutrition, or with natural ingredients like grains etc. The composition of these kinds of feed was driven by availability of these materials rather than focusing on the nutrient requirements of the animal in its different growth phases. Understanding the real nutritional need and finding ways to fulfil them with tailored solutions was the *first evolution in feed*. The supplementing of essential nutrients, namely vitamins and amino acids, contributed to the progress of animal nutrition in ways which cannot be underestimated. Even today, they are the backbone of animal nutrition.

Once feed is nutritionally optimised, the next challenge is feed absorption. This takes place on two major fronts – performance of the digestive system and bioavailability of nutrients – both playing key roles in the concept known as “gut health”. A wide range of products, such as organic acids, enzymes, probiotics and many more, have substantially increased feed absorption. Thanks to these improvements, feed efficiency has grown significantly.

Gut health, as a simplified term for understanding and improvement of nutrient availability, is key to feed efficiency, and can be referred to as the *second evolution in feed*.

Of course, both of these, the first and the second evolution, are still valid areas of focus

for those seeking improvements in animal performance or other aspects of our industry. They have been, and remain, at the heart of the professionalisation of animal production and animal nutrition. Research in both areas is continuing, and we expect further improvement especially in gut health.

### **Can you explain what the third evolution consists of?**

**[AlzChem]** Once we have adjusted the feed to the nutritional requirements (nutritional feed additives) and have made sure to maximise the feed absorption (gut health), the next logical challenge is the optimisation of physiological processes and nutrient utilisation in the body. In this context, *cellular efficiency must be considered the third evolution in feed, as it is the next challenge in nutrient efficiency.*

Creatine is a good example. It can be produced endogenously, but this synthesis imposes a tremendous metabolic burden and is a drain on available amino acids. Moreover, most species are evolutionarily designed to receive creatine from the diet; however, creatine supply from feed is very limited. Now, the important thing is that creatine is essential for the energy metabolism. The undersupply of creatine leads to compromised cellular energy (ATP) provision, early muscle fatigue and limitations in healthy muscle growth and function, to name just a few consequences. It will potentially disturb the optimal cascade of energy sources (ATP-phosphocreatine-anaerobic glycolysis-aerobic glycolysis-aerobic lipolysis), for instance, causing a premature start of glycolysis with undesired effects, such as lactic acid increase.

### **Why do you think cellular/biochemical process efficiency deserves to be considered at the same level of importance as the other two evolutions in feed you referred to (nutrient balancing and gut health)? What makes this topic a paradigm shift rather than simply an innovation?**

**[AlzChem]** At the end, everything we are doing with feed is aimed at biochemical processes: we are giving nutrients as a basis for these processes. Now, as we have optimised the supply of these nutrients, we have to optimize the availability of physiologically-essential biomolecules alongside the ongoing improvement of genetic performance of our animals, to help them sustain the performance levels they are designed to. Healthy growth is a biochemical process – it is the ultimate goal we are working for.

The paradigm shift comes from the fact that the focus up to now was on the optimal provision of essential nutrients to the body and the understanding of growth-limiting factors from the classical nutrients that had been identified, whereas now we are exploring more and more the needs for optimal function of cellular processes.

So, to simplify: the first evolution is about understanding what is needed, the second is about getting it into the body, and the third is about optimising the use within cells.

Of course, a number of products exist already to help optimise health and performance in this way; we are *not* saying AlzChem are the only ones who have such an approach. Specifically in our case, we are focused on cellular energy metabolism. We found a limitation of cellular creatine, and this caused us to go back and identify a shortage of creatine in feed, which our product addresses.

This will need entirely new skills and understanding. AlzChem's Creamino (GAA) was born from AlzChem's more than 100 years' experience in agro markets and 30 years' experience in human nutrition. Our ambition is to be the specialist in energy metabolism.

Optimising this metabolism is one of our key targets.

Pivoting the focus from feed to intracellular processes is the paradigm shift we speak about.

**Is there room in the “third evolution in feed” concept for products other than creatine/GAA? Is AlzChem exploring this additional space itself, potentially branching out beyond creatine?**

**[AlzChem]** There are many more biochemical bottlenecks beyond energy, some of which are already being addressed, as mentioned above. The map of metabolic pathways is more like a street map of a megacity, not a desert highway. There is much more to explore and of course AlzChem is working on it – alone and in partnerships with other innovative companies.

**Animal nutrition has a variety of different goals these days—improving animal performance, boosting animal health, improving reproductive success, reducing pollution of animal waste, fulfilling consumers’ demands (organic, slow-growth, vegetarian diets, etc.) Which of these goals can cellular/biochemical process efficiency (the “third evolution in feed”) help with?**

**[AlzChem]** We are exploring most of these fields and have seen interesting ways creatine could contribute to many of them. It has significant and proven effects on performance indicators such feed conversion ratios (FCR) and body weight gain (BWG) and meat quality, but also on reproduction and mortality, to name a few. Improving FCR clearly links into a more sustainable production of animal products, as does as a reduction of N/P emissions.

First, if you think of all the places where energy is of importance in the body, you can understand that making it more readily available on a cellular level has the potential to be advantageous in many different ways. Let me give a few examples:

- The body weight gain induced by creatine is almost exclusively coming from muscle growth. Spontaneous energy availability allows more contractions and thereby specifically stimulates muscle growth. Moreover, protein formation from amino acids is an energy intensive metabolic process requiring ATP.
- The heart is a muscle as well, and its strength has an impact on stress resilience and related mortality levels.
- Creatine can also support the energy shortage occurring during reproduction and early nutrition
- Meat abnormalities and muscle myopathies in broilers are associated with heavy growth, and at the same time, muscle from wooden breast, white striping and “spaghetti meat” reportedly contains less creatine than unaffected muscle. There is interesting evidence that the severity of muscle degeneration can be reduced from improved muscular creatine levels. But here, we are getting deep into cellular metabolic processes where energy availability is essential to avoid or reduce undesired processes and effects.

Next, the provision of creatine from Creamino is clearly the most sustainable way to supply creatine. Animal proteins such as fishmeal are other natural sources for creatine; however, their creatine levels are pretty low. 1kg of Creamino corresponds to 4.5 tonnes of living fish when it comes to creatine sourcing.

Indeed, creatine, in the form of its endogenous precursor GAA, is very often used in all-vegetarian feed formulations, which have an absence of natural creatine, so the creatine

demand of the body would not be met without supplementation. Creamino has been specifically designed to fill this nutritional creatine gap in animal nutrition. The lower the level of animal protein used, the more important it is to consider creatine supply in the matrix.

Creatine is a solution we have been selling for some 30 years to human applications, but it is an innovative concept in animal feed and we are working on various new findings.

**Indeed, AlzChem's background is in the application and production of GAA/creatine for the human nutrition and pharmaceutical industries. Do you think that being a bit of an outsider to the animal nutrition sector helped to spot the white space where this industry was ripe for the next stage of its evolution?**

**[AlzChem]** Innovations often happen at the interfaces of competences. For us, our background of creatine application in human nutrition gave us expertise in muscle function and health, but we were also inspired to look beyond this sector.

We managed to transfer our know-how into animal nutrition, combining it with a “fresh” view on animal feed. Meanwhile, we developed our own science team specialised in animal nutrition. Our technical specialists, all with long experience in the feed industry, are working closely together with our R&D team on the human nutrition side. A couple of further ideas are growing out of this this combined knowledge, and we hope to offer them to the market soon.

**What is AlzChem doing to support the industry's understanding of “the third evolution in feed”? What do your educational efforts on this topic look like?**

**[AlzChem]** First, we are actively spreading and discussing this new concept within the scientific community, and second, we are putting a lot of effort into proving that it pays off in real life. We participate in webinars and do customer trainings. As an initial introduction to the topic, we have made a [short film which you can find on YouTube](#).

We are conducting high number of studies and trials to sharpen the understanding of the benefits and prove the commercial viability of the concept of creatine. Creatine must have a dedicated place in each matrix, because it covers a need and offers more flexibility in diet formulation. For example, given the current high feed costs, we are now carrying out many trials around energy sparing. Depending on the application strategy (cost saving vs performance increase) a significant ROI of 3-5 could be achieved.

The 3rd evolution in feed is complementary to the first two. It is the next logical step for improvement of optimization in animal nutrition.

*First publication in association with Feedinfo 05/05/2021*