

Avoiding Greenhouse Gas Emissions

The Essential Role of Chemicals



Feed additives – 5 amino acids for pig and broiler production: DL-Methionine, L-Lysine, L-Threonine, L-Tryptophan and L-Valine

An Evonik case study



Supplementing animal feed with essential amino acids can save significant amounts of feed raw materials, resulting in minimized use of arable land for crop production and thus, fewer CO₂e emissions.

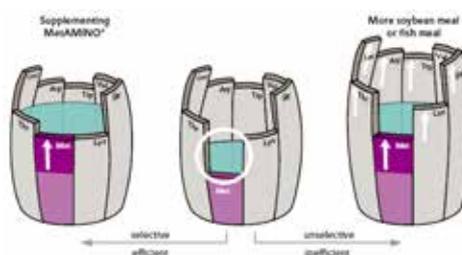
Furthermore, feed supplementation with these essential amino acids reduces both nitrogen and greenhouse gas emissions resulting from feeding and excretion.

Animal feed is specifically formulated to meet the physiological nutrition needs of animals, particularly the necessary shares of essential amino acids. Lack of certain amino acids in animal feed can be compensated either by adding a higher percentage of protein-rich feed components such as oil seed, or by fortifying the feed with essential amino acids produced by Evonik for this purpose.

In this case study, a supplemented feed mix incl. crystalline amino acids is compared to two non-supplemented feed mixes based on soybean as protein rich feed ingredient in one case and soybean and rapeseed in the second case. This is conducted for both animals, broiler and pigs. This study presents an update of Evonik's LCA on feed additives from 2011, now including L-Valine (ValAMINO®) as fifth limiting amino acid in addition to DL-Methionine (MetAMINO®), L-Lysine (Biolys®), L-Threonine (ThreAMINO®) and L-Tryptophan (TrypAMINO®).

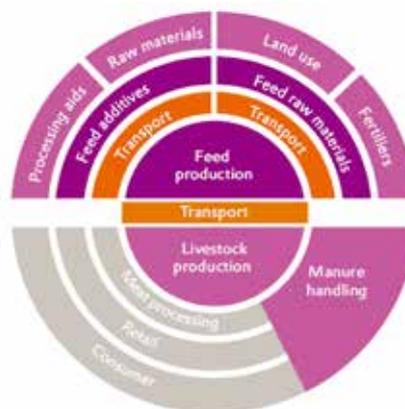
Full study available at: www.icca-chem.org/energy-climate

The barrel of Liebig, an example to overcome the limiting minimum

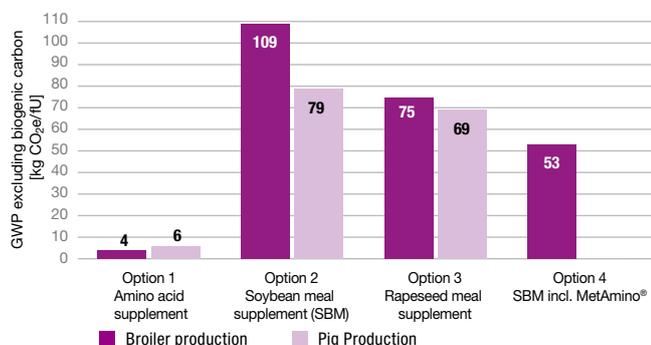


The example is explained through the specific lack of methionine in a typical broiler diet. The deficiency of methionine (barrel in the middle) can be balanced either through additional consumption of feed (barrel on the right side) or specific supplementation with pure MetAMINO® (Barrel on the left side).

System boundaries – Availability of primary data for modeling the individual scenarios for the functional unit



Global Warming Potential GWP100 [CML2001] excl. biogenic carbon of broiler and pig production



Broiler production

The global warming potential of the supplemented feed mix for broiler production shows lower environmental impacts due to substitution of protein rich feed ingredients like oil seeds by feed ingredients with lower crude protein contents. Option 4 shows the reduction potential by supplementing MetAMINO® only. The portion of soybean meal originating from land that has undergone land use change has a significant influence on the extent of GWP.

Pig production

The global warming potential of options 2 and 3 with oil seeds as source for the additional amino acids have a higher GWP than the supplemented feed mix option 1. The portion of soybean meal originating from land that has undergone land use change has a significant influence on the extent of GWP.



This case study illustrates how the reduction of greenhouse gas (GHG) emissions can be enabled by chemical products, as part of a series of case studies brought to you by ICCA. Chemical industry members offered Life Cycle Assessment [LCA] case studies for the purpose of showing illustrative examples on how to calculate avoided greenhouse gas emissions. The avoided emission calculations were based on the guidelines developed by ICCA and WBSCD (World Business Council for Sustainable Development) - Chemical Sector, with the support of Arthur D. Little and Ecofys. Other life cycle environmental impacts such as water and land use change were outside the scope and usually not considered.

