

Low Emission Farming – a significant step forward to improve the ecological footprint of livestock production

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Abstract

Animal raising and livestock production are major players in global environmental issues. Different players along the value chain must cooperate to lever existing knowledge and move towards more sustainability-based tools to measure the overall progress. The supplementation of feed with amino acids reduces feed consumption and the protein content in feed, waste treatment in a biogas plant brings methane emissions to energy production, purification of methane offers new alternatives for improved energy provision and finally, specific treatment of digested residues provides new fertilizer applications. This LCA case study combines for the first time the different aspects of nutrient management, waste management, emissions management and finally fertilizer treatment enabling new ecological measures to improve the nutrient cycles especially for nitrogen compounds.

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The Low Emission Farming Concept (LEF)

This concept offers the best practice to reduce livestock related emissions to the lowest possible level when combining the different elements of farm operation.

Nutrient management

Improving feed efficiency and reducing the nutrient excretion enables mitigation of the overall environmental impacts of livestock production. Through simple supplementation of essential amino acids to typical pig or broiler feeds, significant positive environmental benefits can be achieved (Haasken 2015). By supplementing deficient diets with these amino acids, i.e. soybean meal and corn can be replaced and thus, the ecological footprint will be significantly improved.

Waste and Emission Management

Another technology is the emission or waste management, realized in the approach of the “**Low Emission Farming**” concept (LEF) (Binder 2015). Waste treatment by managing manure in a biogas plant brings methane emissions to energy production, and thus, additional improvement of emissions normally related to manure disposal. Further purification of methane offers new alternatives for improved energy provision and fossil fuel replacement. Finally, specific further physical and chemical treatment of biogas fermentation residues provides new fertilizer opportunities allowing more nutrient specific applications in crop production.

The **elements of LEF** – nutrient management, waste management, emissions management (Figure 1) have been evaluated through LCA methodologies to show ecological improvement potentials individually and in combination with each other on the Eutrophication Potential EP. Figures 2 to 4 show the relevant nitrogen flows based on these calculations as an example for broiler production.

FIGURE 1 The 3 elements of the Low Emission Farming concept (LEF)

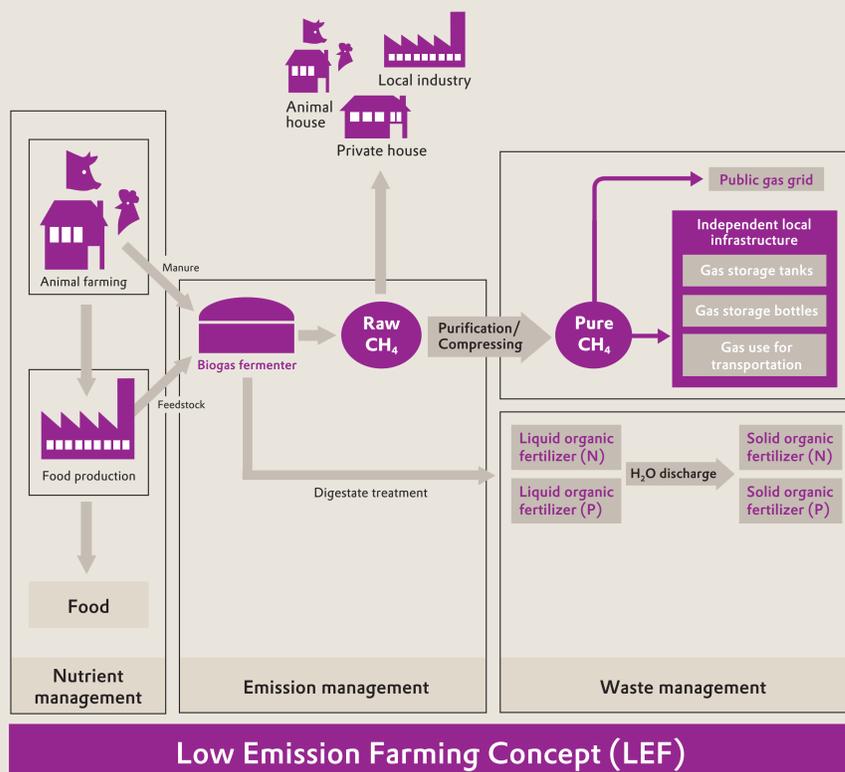


FIGURE 2 Nitrogen Flows in broiler production without Amino Acid supplementation

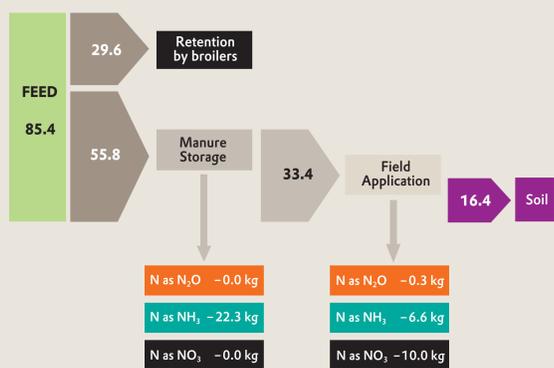


FIGURE 3 Nitrogen Flows in broiler production with Amino Acid supplementation (Nutrient Management)

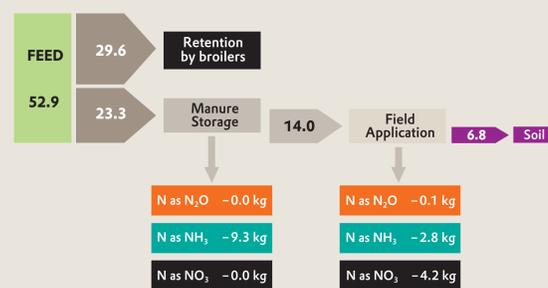
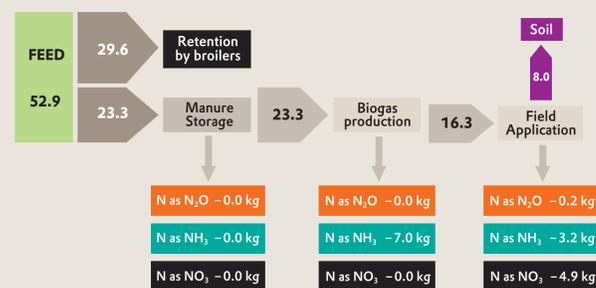


FIGURE 4 Nitrogen Flows in broiler production with Amino Acid supplementation and biogas technology (integrated Nutrient-, Waste- and Emissions-Management)



Sources: Binder, M., Rother E. and T. Kaufmann, Low Emission Farming – a significant step forward to improve the environmental impacts of livestock production in International conference on Life Cycle Assessment as reference methodology for assessing supply chains and supporting global sustainability challenges LCA FOR “FEEDING THE PLANET AND ENERGY FOR LIFE”, 2015, edited by Simona Scalbi, Arianna Dominici Loprieno, Paola Sposato, Haasken C., Binder M., 2015, Comparative life cycle assessment of MetAMINO®, Biolys®, ThreAMINO®, TrypAMINO® and ValAMINO® in broiler and pig production, Evonik 2015.