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### Grass and cattle manure digestion: a viable feedstock alternative

In Europe, anaerobic digestion (AD) is dedicated to the treatment of organic wastes, eventually in combination with energetic crops. For implementing these systems, favorable promotional measures have been proposed, creating high number of active anaerobic digesters. However, in order to consolidate its role as a favorable tool for sustainable waste management, it is important to decrease the usage of energy crops and substitute it, if possible, with biomass residues. Originating from small-scale farm based anaerobic digestion plants, the landscape of AD in Germany and Europe has changed significantly over the past 20 years. Regarding Germany, this is due to the implementation of generous feed-in tariffs and unlimited priority feed-in for renewable energies. This was regulated in the renewable energy laws of 2004 and 2009. Additionally, starting in the early 2000s, a specific subsidy for energy crop farming was introduced by the EU as an agro-political tool to avoid food overproduction and yet compensate the farmers to keep working their land. Energy crops include maize, corn, whole crop cereal, sugar beets and grass. This resulted in a massive boom in the total numbers of AD plants and the average installed capacity. Especially during the 8 years from 2004 to 2012, more than 6500 new AD plants digesting energy crops were commissioned in Germany alone. Why were energy crops so attractive as a feedstock for AD installations? Well, they have a higher specific gas yield compared to slurry, the necessary agricultural technology is well established and similar to dairy farming and it offers farmers the opportunity to become independent from agricultural price cycles. Major changes in subsidy policies in the German renewable energy law in 2014 and a complete redesign in 2017 threw all cards in the air again. Since 2017, new and existing AD plants have to compete with all other biomass plants via tender processes. As a direct consequence, expensive feedstocks such as classic energy crops instantly became much less economically viable. Thus, operators are now looking into alternative feedstocks. Increased investment costs for AD plants also factors into economic calculations. The rise took place in recent years due to an elevation in professionalism in the agricultural sector. Additionally, higher safety standards and technical requirements for AD plant equipment contributed to this development. This is where manure and grass can come in. Good quality grass silage offers an impressive specific biogas yield of around 150 m<sup>3</sup>/t compared to the 200 m<sup>3</sup>/t of the corn silage, making it a viable and abundant alternative feedstock.



### Biography

Michael Köttner with a Master's Degree as an Agricultural Biologist and as a Trained Farmer is professionally involved in biogas and bioenergy technology for more than 25 years. His portfolio ranges from professional services as a Scientist and Farmer in USA and South Africa, adult education, to being a founding Member and CEO (1992 – 2000) in Europe's biggest biogas association, the German Biogas Association with almost 5000 members today. Since 2000 he is a Consultant, Senior Expert, as well as Managing Director of the International Biogas and Bioenergy Center of Competence (IBBK Fachgruppe Biogas GmbH) and Vice-President of the German Biogas and Bioenergy Society, GERBIO/FnBB e.V. His work focuses on consulting and training in the field of industrial and small scale decentralized biogas technology with manure, plant oil for energy production, wood gas (gasification, pyrolysis) and ecological sanitation in a regional, national and international context.

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