

# New tools for sustainable farming

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Environmentalists are just as fond of talking about it as are politicians, economists or marketing experts - "sustainability" has become a buzzword. The problem is that the term sustainability can refer to many things and have manifold interpretations. Agricultural scientists at the Technische Universitaet Muenchen have shed light on the subject. Together with colleagues in theoretical and applied science they have managed to give the term "sustainability" a more definite meaning. They have helped to make this multi-faceted concept quantifiable - a benefit to farmers, food manufacturers and consumers alike.

Not to live at the expense of the environment and of coming generations, but rather to strike a balance between exploitation and renewal when using resources - this is a central idea of sustainability. It originated in forestry and can be reduced to one basic principle: Never fell more trees

in a forest than can grow back. Today the idea of sustainability has taken on significance in all sectors of the economy, but the crux lies in the implementation. "Regenerative systems tend to be very complex. Farmers aiming at running their enterprises in a sustainable way need a solid basis for their decision-making," says Prof. Kurt-Juergen Huelsbergen from the Chair of Organic Farming and Crop Production Systems at the Technische Universitaet Muenchen.

The research question was: How can the sustainability status of farms with available operating data be determined and systematically improved? The goal was very ambitious - to improve the environmental balance of agricultural enterprises without compromising their operating efficiency and social performance. In years of meticulous work to this end, the team of researchers developed indicators and models to analyze, assess and optimize the sustainability of agricultural enterprises. After all, sustainable farming really does benefit everybody: It conserves natural resources, saves energy, reduces the need for pesticides and fertilizers, and fosters a healthier environment, more competitive farms and safe foodstuffs.

Thanks to their new indicator model, the TUM researchers are now able to describe agricultural enterprises as systems based on their material and energy flows. "We now have absolutely accurate methods for determining the emissions in air and water, as well as special tools for assessing the threat to soils from erosion and compaction. In recent years, groundbreaking methods for calculating the climate balance as well as indicators for bio-diversity have emerged. These allow us to collect data on all significant environmental effects of agriculture," said Hülsbergen. Working together with agricultural researchers from the Universitaet Halle-Wittenberg, TUM scientists integrated these model components into a single software application. In field tests at 80 farms across Germany, the computer generated "virtual enterprises" and visualized their environmental data using charts and graphs.

Of course, operating in an environmentally sound way is not enough. For it is only when an enterprise strikes a balance between ecological factors and economic and social aspects that it becomes truly sustainable. To include these factors the TUM Chair for Agricultural Economics, in collaboration with the Institute for Agricultural Engineering Potsdam-Bornim, developed a second set of indicators. This set includes relevant economic indicators such as profit or investment rate, as well as social factors such as co-determination, workload and remuneration level. With this extension the sustainability status of an agricultural enterprise is now fully quantifiable.

The German Agricultural Society has already set up a certification system according to European DIN norms based on these scientific results. If a tested enterprise can meet its target values, it receives the certificate "Sustainable Farming - Fit for the Future." The food industry is also employing the new indicator model. Two large-scale bakery enterprises have already used it to test how sustainably their grain suppliers operate.

Source: Technische Universitaet Muenchen

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