‘Game changers’
in Ethiopian smallholder farming systems

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Background

Small (1-5 ha) mixed crop-livestock systems generate about 98 % of Ethiopia’s cereal production. Their individual farm performance is however typically poor with (wheat) yield gaps of 45-87 %, a low nutritional diversity in production and a severe lack of livestock feed.

Objective

This study aimed to investigate features, dynamics and potentials of smallholder farming systems in the wheat-belt of Ethiopia. An emphasis was set on identifying challenges and opportunities to improve their farm performance (profits, labour, soil organic matter).

Methods

A baseline data set (n = 488; 2014) was used to produce a statistical typology. The typology served to select representative farmers for a detailed consultation in 2015. The detailed data was entered into the static bio-economic model Farm DESIGN. By capturing the different dimensions of a farm system, the model allows an integrated analysis of the current farm performance, the performance after targeted modifications as well as a Pareto-based optimization to explore alternative farm configurations.

Basic Farm Features

To exemplify the use and results of Farm DESIGN: A case study farm.

Nitrogen Cycle

Despite being a market oriented, well resource endowed farm, the system is characterized by low inputs and low outputs.

Scenarios

The farm performance would change if

• combine harvesters could also be used for other crops than wheat
• cropping areas were redistributed
• double cropping of faba bean and wheat was established
• fields were irrigated

Trade-Offs

The model was given ‘room to manoeuvre’ to test the impact of a shift in crops as well as product use. Figure 4 illustrates the associated solution spaces. Each point represents an alternative farm configuration (AFC).

Conclusions

The extended use of combine harvesters, double cropping of cereal-legumes, irrigation and the prevention of post-harvest losses seem to bear considerable potential to improve the current farm performance. A broader sustainability assessment of the suggested measures is recommended, including the determination of sustainable rates of water abstraction as well as gender-specific impacts.

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Ask the Author

Figure 1. Basic farm features

Figure 2. Nitrogen cycle of the case study farm