Improving Nitrogen Use Efficiency in the Chinese Food Chain to Reduce Air and Water Pollution

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Background

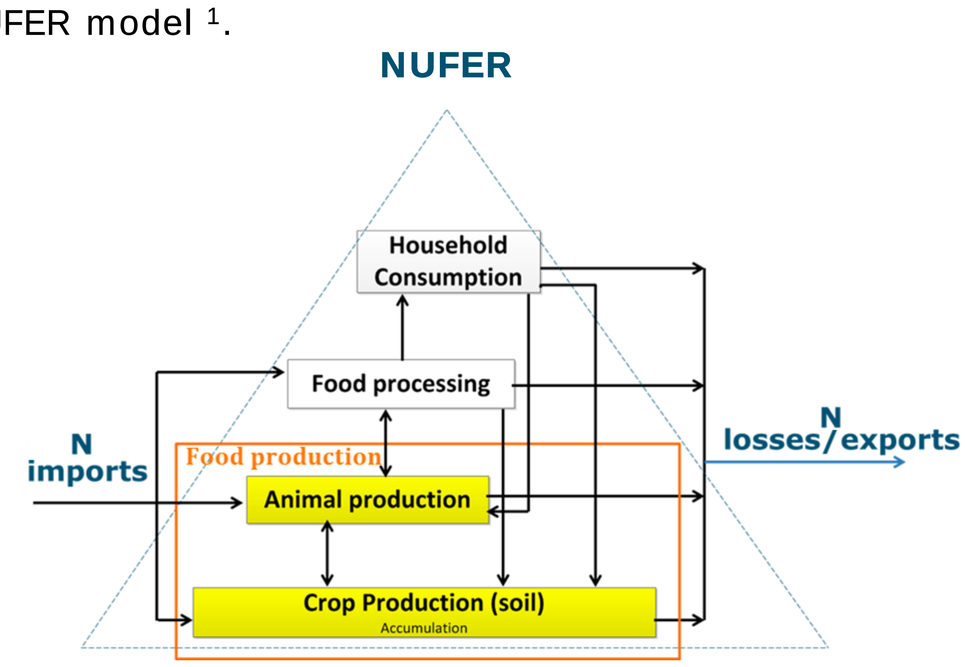
The nitrogen (N) use efficiencies of food production are low in China. This has led to large N losses to air and the aquatic systems, causing air pollution and eutrophication in Chinese rivers and seas.

Objective

To explore nutrient management options to increase N use efficiencies of food production, and to reduce water and air pollution in China.

Methods

Step 1: Quantify current N use efficiencies of food production, and N losses to the air and waters in China in 2013 using the NUFER model [1].



$$Nitrogen\ use\ effiency = \frac{Nitrogen\ \boldsymbol{exports}\ via\ crop\ and\ animal\ products}{Nitrogen\ \boldsymbol{imports}\ to\ the\ production\ system} * 100\%$$

Step 2: Explore nutrient management options to improve N use efficiencies of food production, and to reduce air and water pollution in China by 2020 and 2050 using scenario analysis.

Scenarios:

- Business As Usual (**BAU**)
- Zero Fertilizer (**ZF**) growth from 2020 [2]
- Improved Nutrient Management (**INM**)

Results

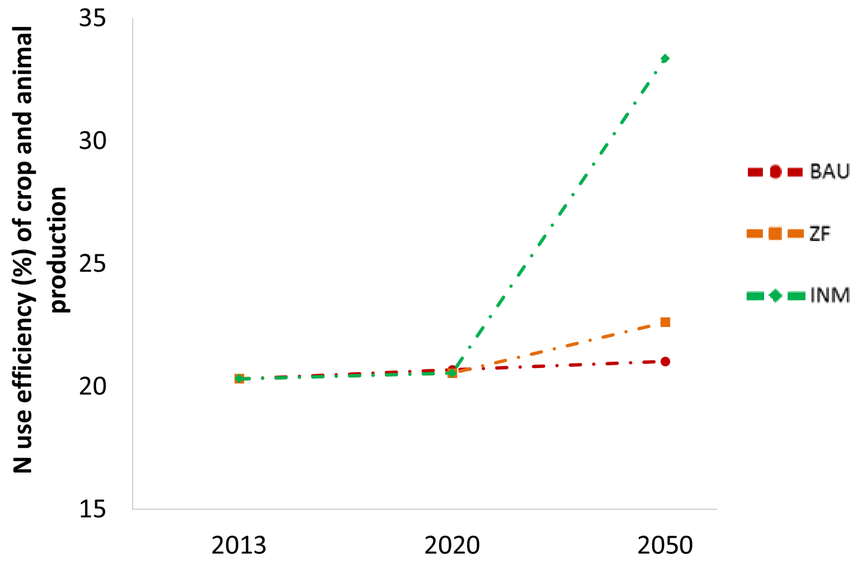


Figure 1. N use efficiencies of food (crop and animal) production

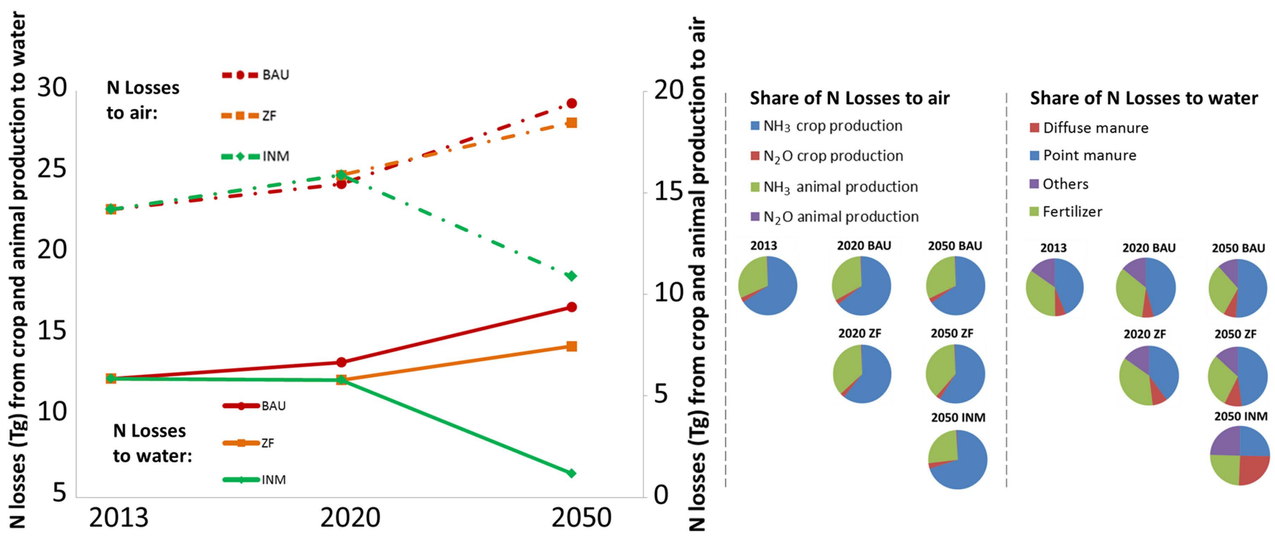


Figure 2. N losses to the air and waters. Diffuse manure refers to animal manure that are applied on land. Point manure refers to direct discharge of animal manure.

Conclusions

- N use efficiency in Chinese food production is low in 2013.
- N losses from food production to the air and waters in China are high in 2013.
- N use efficiencies of food production vary largely among provinces.
- N use efficiencies of food production in China will likely remain low in the future.
- Current policies are not enough to improve N use efficiencies.
- Improved nutrient management is needed to improve N use efficiencies, and to reduce water pollution in China.

References

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2. MOA. 2015b. Zero growth in synthetic fertilizer use from 2020 onwards (in Chinese) [Online]. Ministry of Agriculture of the People's Republic of China. Available: http://www.moa.gov.cn/zwllm/tzgg/tfw/201505/t20150525_4614695.htm [Accessed 15-12 2015].

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