# Farm to Fork – Substantial Cuts in Output, Little GHG Savings in the EU

- Review of a JRC report by Yelto Zimmer[1] -

A massive reduction of agricultural output and substantial increases in farm gate prices, especially for livestock products, would be the consequences from putting the so-called EU "Farm to Fork Strategy" into practice, according to a recent report from the EU funded Joint Research Center (JRC)[2].

The JRC modeling project aims to analyze the consequences from the following general goals[3]:

1. Reducing the risks and the quantity of plant protection product (PPP) usage in EU agriculture by 50% by 2030.
2. Reducing nutrient losses by 50% by 2030. Because nitrogen surpluses are of such high importance, both with respect to overall environmental concerns and regarding greenhouse gas emissions, the study focuses on nitrogen.
3. Increasing the share of high-biodiversity land to 10 %. Since there is already 4.7% set-aside land in place, the increase equals 5.3 percentage points.
4. Raising the share of organic land use from roughly 8% currently to 25 % (equals an increase of 17 percentage points of total agricultural land).
5. Reducing the emissions of greenhouse gases (GHG) from agriculture. Here, no explicit goal has been formulated. Rather, the model was offered a list of subsidies for measures to reduce GHG emissions[4] and their respective costs to producers. Respective measures are implemented only when the farming unit would be able to generate a net benefit (cost is less than subsidies).

In this paper we attempt to briefly explain what has been done by JRC and what key assumptions were made before finally assessing whether the conclusions from the JRC report seem reasonable. The focus of this report is crop production, although a massive cut in livestock is projected.

The key challenge when assessing the likely implications of the goals put forward by the EU Commission is the fact that these goals are rather vague. This is particularly true for the goal regarding crop protection product use. There are at least three ways to measure the risks of crop protection products plus it is still subject to debate whether the reduction goals are equally relevant for both dimensions – risks and quantity. Furthermore, an EU-wide modeling of the risks is not possible because there are no data available regarding the current use of active ingredients. Therefore, the authors choose to use a respective cut in

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[2] The report can be downloaded here: http://dx.doi.org/10.2760/98160

[3] Restrictions in livestock production as a result of 50% less antibiotics use as suggested in the Farm to Fork strategy have not been analyzed.

[4] The following options in crop production are available: expanding catch crop acreage, fallowing peat land, nitrification inhibitors, precision farming.

the crop protection budget of growers by 50% and a respective increase in other cost. Due to a lack of data on the yield response from less crop protection product usage, they assumed an overall yield loss of 10 %.

However, the goal to reduce crop protection usage is interpreted as a goal for the entire sector, meaning the increase in organic farming as well as the increase of high-biodiversity land (which is translated by the researchers into a 10% set-aside obligation) have to be counted against this goal. Therefore, depending on the regional obligations to increase both organic and set-aside acreage, the assumed cut in PPP usage is less than 50% and actual assumed yield loss in conventional farming is less than 10%.

The cut in nitrogen surplus is calculated based on the current surplus (input minus withdrawal through harvest) per region. The higher the current surplus, the higher the required reduction. This implies the required cut in N input is low in regions with little surplus – presumably those with low manure usage. Consequently, overall, no tangible yield reduction is predicted due to this regulation.

### Predictions of the Report

Based on these assumptions, the report predicts the following changes in terms of output and prices:

1. Grain and oilseed production will go down by 15%, of which 11 percentage points are expected to result from yield losses and 4 points from less acreage.
2. Livestock output will be reduced by 14% as far as beef, hog and poultry are concerned. Milk and sheep meat production will go down by 10%. The only cause for this projection: The model foresees that a nutrient surplus has to be reduced in the respective region where it occurs, hence no export of manure is allowed by the model, which has been acknowledged by the authors as a problem. Therefore, the model “forces” producers to cut in livestock production accordingly.
3. Farm gate prices will increase by 7% for grains and 11% for oilseeds.
4. Because the model is calibrated in a way that does not allow increases in imports of livestock products to substitute for losses in supply from domestic production, respective farm gate prices are expected to increase massively: +43% in beef prices and +23% in pork prices.
5. Total GHG emissions from the entire ag sector – including livestock - will go down by 20%.

### Assessment of the report

What are key take home messages and open questions resulting from this report?

1. The assumption that cuts in N surplus will not compromise yields substantially is reasonable, provided that the regulation follows the same logic as the authors of the study opted for: high cuts in N application when surplus is high and no or little cuts when surplus is low. It should be mentioned, though, that the current EU policy does

not favor an approach to reduce the surplus. Rather, the priority is to cut back overall fertilizer usage. And particularly important: The model does not aim for a zero surplus because that would negatively impact soil fertility.

2. The fact that the model does not allow regional manure exports is not good reasoning and, in reality, this is an important activity in EU agriculture. As long as the imported manure is replacing mineral fertilizers and is already being generated somewhere, this should be beneficial with regard to GHG emissions. The use of mineral fertilizers causes roughly two times more GHG emissions than manure, the reason being the production processes and use of fossil fuels to produce mineral fertilizer.

3. The 10% cut in yields due to a 50% cut in the use of PPP in each crop can be considered to be a rather optimistic assumption. There might be situations where this is attainable – for example late-seeded wheat where weed pressure and fungus infection in the autumn are low. But we have a few indications that the cost in terms of yield loss in other crops will be significantly higher – up to the situation in which certain crops will basically disappear. For example, growing rapeseed, which is a very sensitive crop, will be almost impossible. The fact that rapeseed is almost non-existent in organic production can be cited as an indicator. Furthermore, important (in terms of acreage and economic value to growers) crops such potatoes and sugar beets are currently highly dependent on PPP usage as well. In addition, currently less important crops such as beans, peas, or soybeans, which are badly needed for the envisaged widening of rotations, are heavily reliant on PPP application. In fact, the lack of crop-specific and registered PPP is a key reason for their current niche role. To cite empirical evidence: When the use of PPP in legumes production was banned in Germany to comply with greening obligations, legume acreage went down substantially. Hence, any obligation to further reduce PPP usage most likely would make it even harder to grow such crops economically.

4. What complicates the analysis even further: The EU is planning to use the so-called *harmonized risk indicator* to measure the reduction of risks from PPP usage. This indicator uses the legal status of PPP products to assess risks and not the possible impact of PPP on the environment and on human health. The way it is designed can lead to a situation in which, for example, the EU-wide ban of glyphosate would reduce the indicator by more than 40%. Furthermore, it is still unclear whether the obligation to reduce risks from PPP usage will be allocated to individual crops, the entire farm, or the entire region. The more detailed the allocation, the lower the room to maneuver between crops, farms, and regions and the higher the impact on yield and certain crop acreage.

5. We sense the only way to generate some further insights into the likely implications from a cut in PPP usage in the short run would be case studies for prevailing crop production systems. With the help of focus groups – the key method applied by *agri benchmark* - scientists would be able to design alternative crop protection strategies – including possible changes in cropping systems and rotations – and to understand the

impact on the use of PPP. Some first considerations for such case studies: Substitute herbicide usage with mechanical weeding and/or spot spraying. And in order to increase the acreage with mechanical weeding: Grow rapeseed as a row crop and increase the share of another row crop - corn. Replace current (wheat) varieties by those with higher resistance against fungus infections.

6. We really wonder about the assumption that the cut in domestic livestock production will not be compensated by increased imports – and thereby offset the savings in GHG emissions through leakage. A few facts about the market figures: The EU (w/o UK) produces roughly 22 million tons of pig meat annually. A 15% cut in that output equals 3.3 million tons. While the model of JRC suggests that the global ag sector will not be able to close that gap, in the long run we have to keep in mind that:
   (a) From 2015 to 2020 annual Chinese pig meat imports grew by about 3 million tons.
   (b) During the same time span, Russian pig meat production alone rose by 1 million tons.

   These figures suggest that the predicted ongoing shortage in EU pig meat supply – and hence high EU livestock prices – are not very reasonable.

6. We have the impression that this report has been written with political good will. How else is it possible to positively comment upon the projected 20% reduction of GHG emissions when total output in grains and livestock is expected to decrease by about 15%? This scenario would mean that the bulk of the reduction in GHG emissions would come from a change in diets of EU citizens – provided imports wouldn't rise. Only a 5% reduction would be realized from the agricultural sector itself. Considering all the substantial political and financial effort that will be made to make the ag sector climate smart, such a result would be a political disaster.

7. We also wonder about the various vague promises of the authors regarding positive side-effects on yields from the proposed changes, which will reduce the cost of suggested policy interventions. "Organic farming is associated with higher species richness that could have a positive impact on ecosystem services such as pollinators (Tuck et al., 2014). This increase could lead to higher yields in the rest of the agricultural area similar to the case of reduced pesticide use." Furthermore, the authors speculate about the positive yield effect in grain and oilseed production from increased permanent grassland.

8. All in all, the study is a brave attempt, but it demonstrates the strong need for further research to better understand the options to reduce the environmental footprint of agriculture and to gain more insights about likely implications. And given the complexity of possible growers' reactions to assumed cuts in PPP usage, conventional modeling as a stand-alone approach does not seem to be very promising. Rather, a combination of case studies regarding on-farm implications from F2F interventions and modelling is needed.