

Wageningen Impact Assessment Studies on EC 2030 Green Deal Targets for Sustainable Food Production

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Two Wageningen studies: crops & livestock

■ Crop study

- Focuses on 10 crops and 4 F2F/BD measures
- Based on typical farm-level case studies (27 cases in 10 MSs)
- Generalization/extrapolation to market, trade and landuse impacts

■ Livestock sector study

- Focuses on 5 animal sectors and 7 F2F/BD themes/measures
- Literature and expert-based (no market modelling, uses JRC)
- Assessment of potential impacts on farm income (13 cases, calculation tool based on FADN-data was used)

Crop study Assessment of impacts: 4 Scenario's

- Scenario 1:
 - 50% reduction of use and risk pesticides
 - 50% reduction of use hazardous pesticides
- Scenario 2:
 - 20% reduction use of fertilizers
 - 50% reduction in emission of nutrients
- Scenario 3: Organic production (area under organic production 25%). Grassland not included, since this assumes also increase of organic livestock farming, which is out of scope.
- Scenario 4: Objectives scenario 1 + 2 and 10% set aside (high-diversity landscape features area increase)

Farm-crop-Member State cases

- Selection of **10** crops and **7** countries → **27** cases

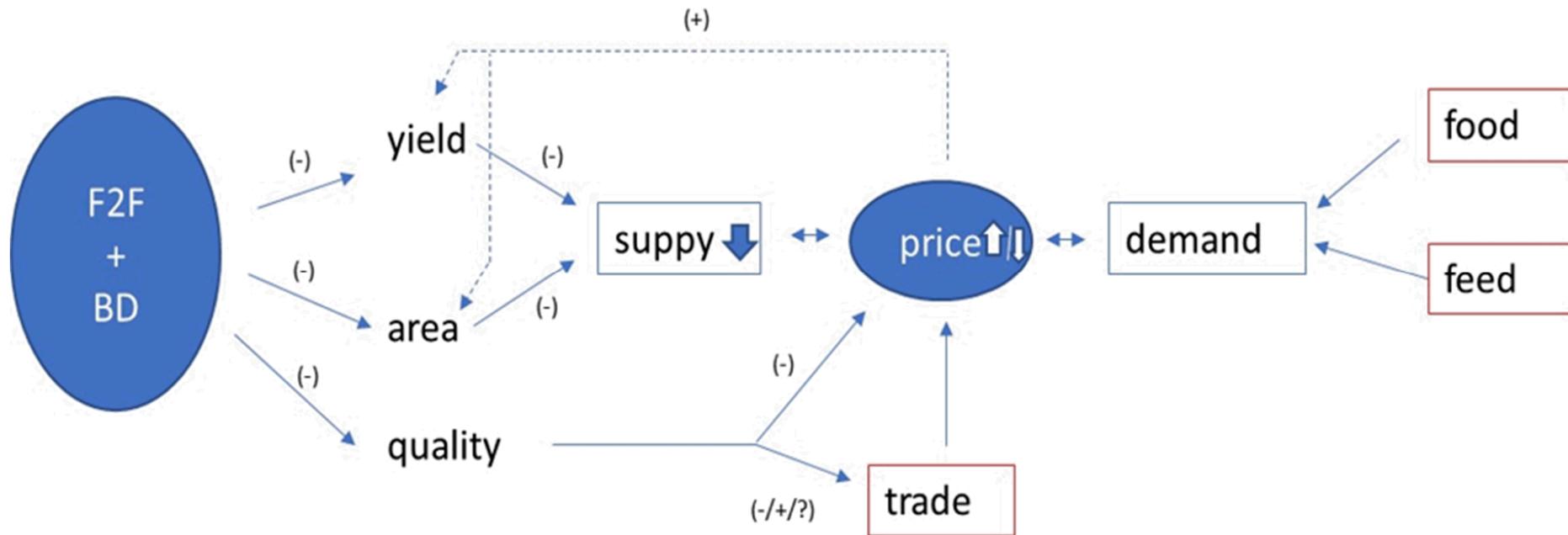
Products	Finland	Poland	Germany	France	Spain	Italy	Romania
Wheat	X		X	X			X
Rapeseed	X	X	X				
Sugar beet		X	X	X			
Maize				X			X
Apples		X				X	
Tomatoes					X	X	
Wine				X	X X	X X	
Olives					X	X	
Citrus					X	X	
Hops		X	X				

- Experts recruited at research stations and universities in case countries
- Extensive questionnaire developed with detailed questions on agronomic practice adjustments (e.g. spraying schemes) and mitigation actions (e.g. mechanical weeding)

Scenario 4 (pesticides, fertilizer, landscape elements): identified farm level yield impacts

	Finland	Poland	Germany	France	Spain	Italy	Romania
Wheat	-10		-15	-11			-25
Rapeseed	-10	-18	-15				
Sugar beet		-23	-15	-10			
Maize				-7			-23
Apples		-50				-20	
Tomatoes					-26	-20	
Wine				-28	-13 / -18	-24 / -17	
Olives					-20	-40	
Citrus					-31	-12	
Hops		-16	-26				

Macro-results: mechanism and limitations



- Figure: mechanisms, market and farmer response and limitations of the analysis (crop-focus, ignorance animal sectors, consumer diets, world market)

Scenarios 1, 2 and 3: main findings

S1 Pesticides use reduction

- Measure causes reduction in yield as well as quality
- Limited (net) price shocks, but larger ones for olives, wine and hops
- Yield reduction induces a price increase, which dominates in most cases
- Average production decline over all considered crops decline is 9% and price increase is 8%
- The largest production decline is expected in olives

S2 Fertiliser use reduction / N surplus

- Reduction in fertiliser use leads to decline in yields as well as to quality deterioration
- As in Scenario 1, yield reduction induces a price increase which dominates the quality impact
- Expected production declines are > 10% in most cases (average decline is 11%)
- Strong reductions in apple production in the case of the key producers are expected (>20%)

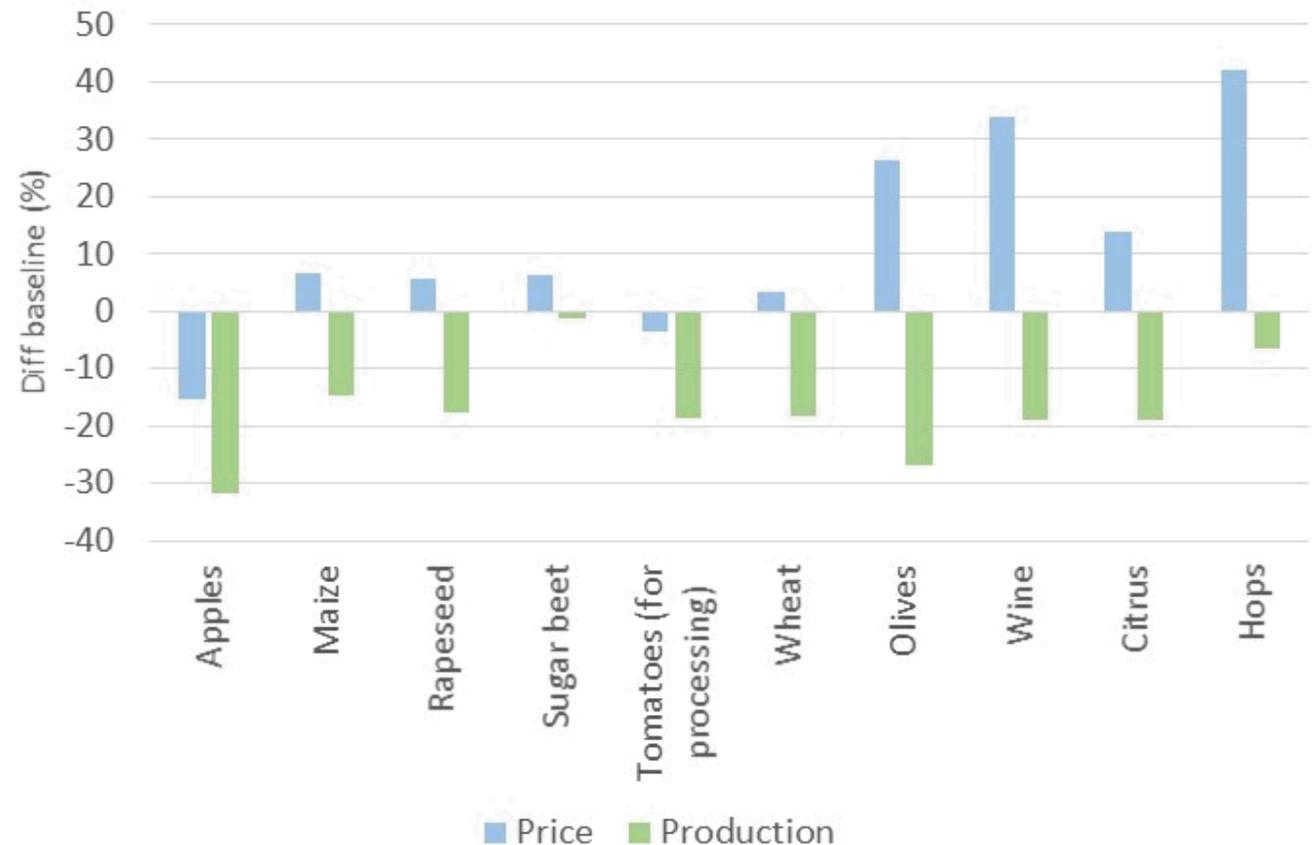
S3 Organic agriculture 25%

- Expansion of organic lead to yield declines and price increases (needed to cover additional costs of organic production)
- Prices could increase by more than 10% for maize and rapeseed and wheat
- Limited production impacts are expected for sugar beet, wine and citrus. Production could decline by more than 5% for maize, rapeseed and wheat

Scenario 4 – Market impacts (prices, production)

Production & price

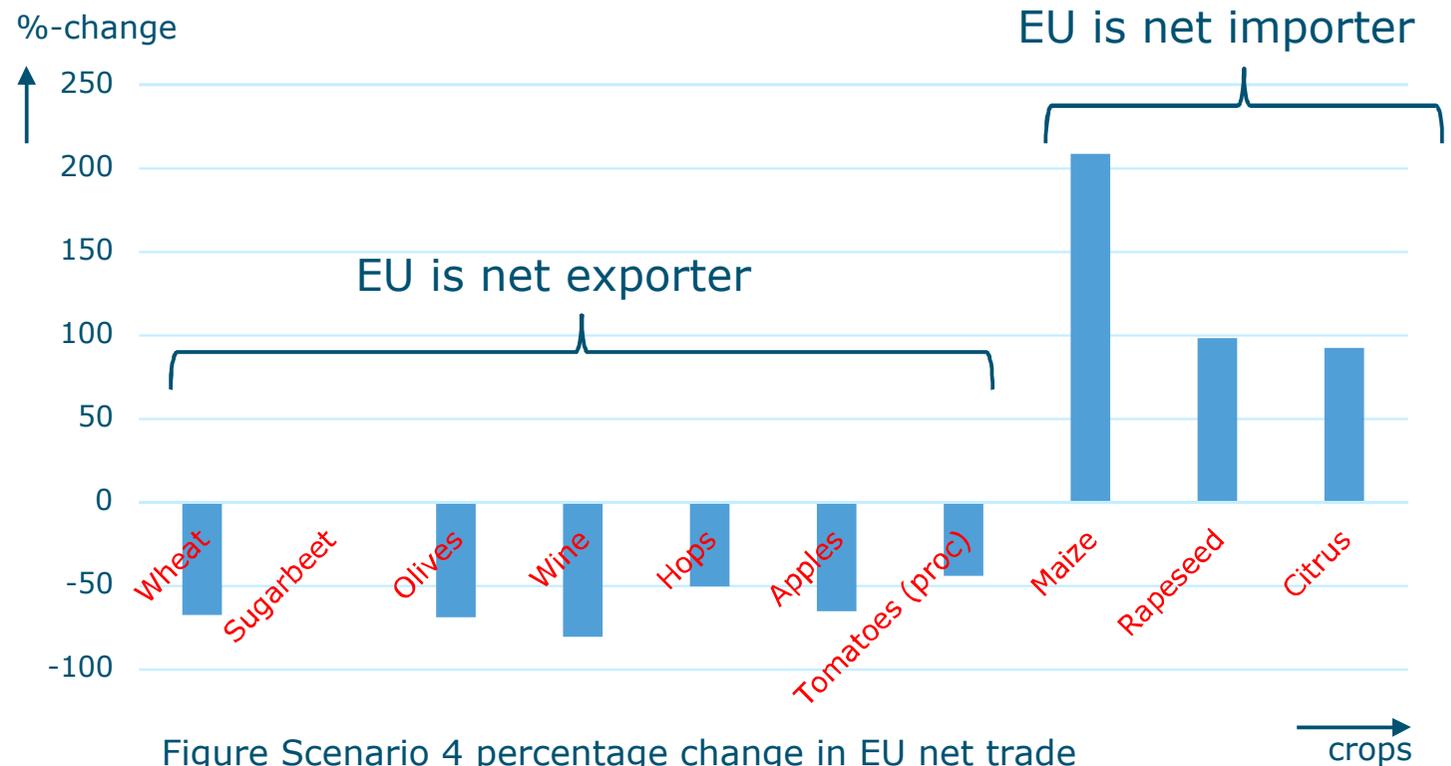
- If quality effects would not be considered, prices would increase (unweighted average price +14%, supply quantity -17%)
- Main reasons: increased 'scarcity' due to yield losses and land set-aside (biodiversity)
- Strong potential price increases are expected for wine, olives and hops (> 20%)



Scenario 4 – Trade impacts and ILUC

Trade impacts

- Net imports are expected to increase in the case of maize and rapeseed, and citrus
- Net exports would decline for the other products
- In the case of the key producers, net exports are expected to decline in both cases (apples and tomatoes)
- The estimated indirect land use effect related to EU net imports change is 2.5 mil. ha and to EU net exports change is 4.4 mil. ha (is about 10% of EU crop land area)



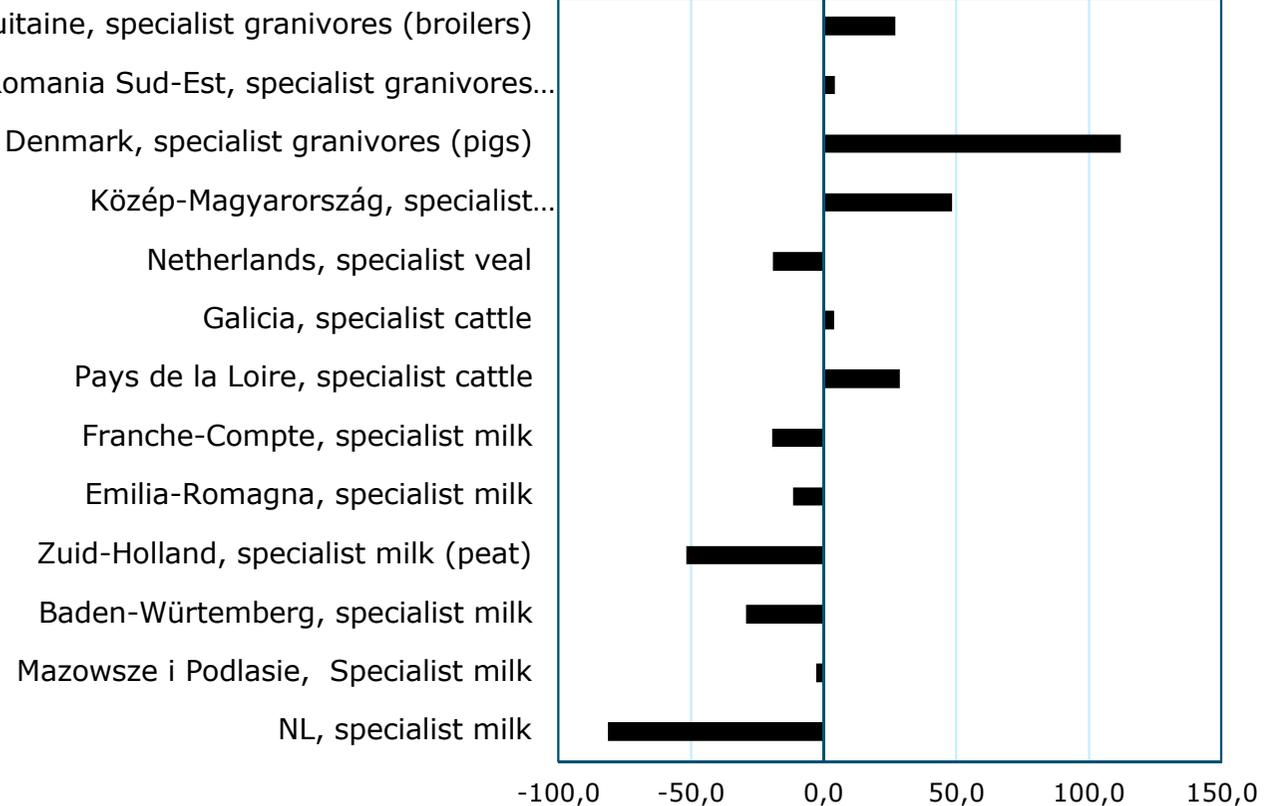
Highlights Wageningen crops study

- Objectives to reduce pesticide use (50%) and nutrient emission (50%) have significant impact on **yield level**. Estimated **yield losses** vary:
 - From 0 to 30% in scenario 1 (reduction pesticide use)
 - From 2 to 25% in scenario 2 (reduction fertilizer use)
 - From 7 to 50% in scenario 4 (scenario 1 + 2 and 10% set aside)
- Impacts of F2F-objectives for **permanent crops** such as grapes, apples, olives, citrus are higher than for annual crops such as oilseed, rapeseed, wheat, maize and sugar beets
- The impacts on **EU trade** are significant and in percentage terms larger than the shocks to production. The general pattern is that EU **imports** (e.g. maize, rapeseed) substantially increase, whereas EU **exports** (e.g. wheat, olives, wine) decline.
- Estimated **indirect land use effect** of assessed crops 2.5 (imp) and 4.4 (exp) million ha (conditional on unchanged EU crop demands for food and feed)

Livestock study: simulated impacts on farm net income for selected farms

- Farms were chosen in such a way to reflect the heterogeneity of EU agriculture with respect to sectors, production systems and soil conditions
- The simulated impacts on net farm income show a large variation between cases
- Pigs and poultry farms cases gain, cattle/beef farm cases gain, but dairy farm cases loose (av -32%)
- Strong regional impacts expected (as effective env. constraints are likely to be regionally differentiated)

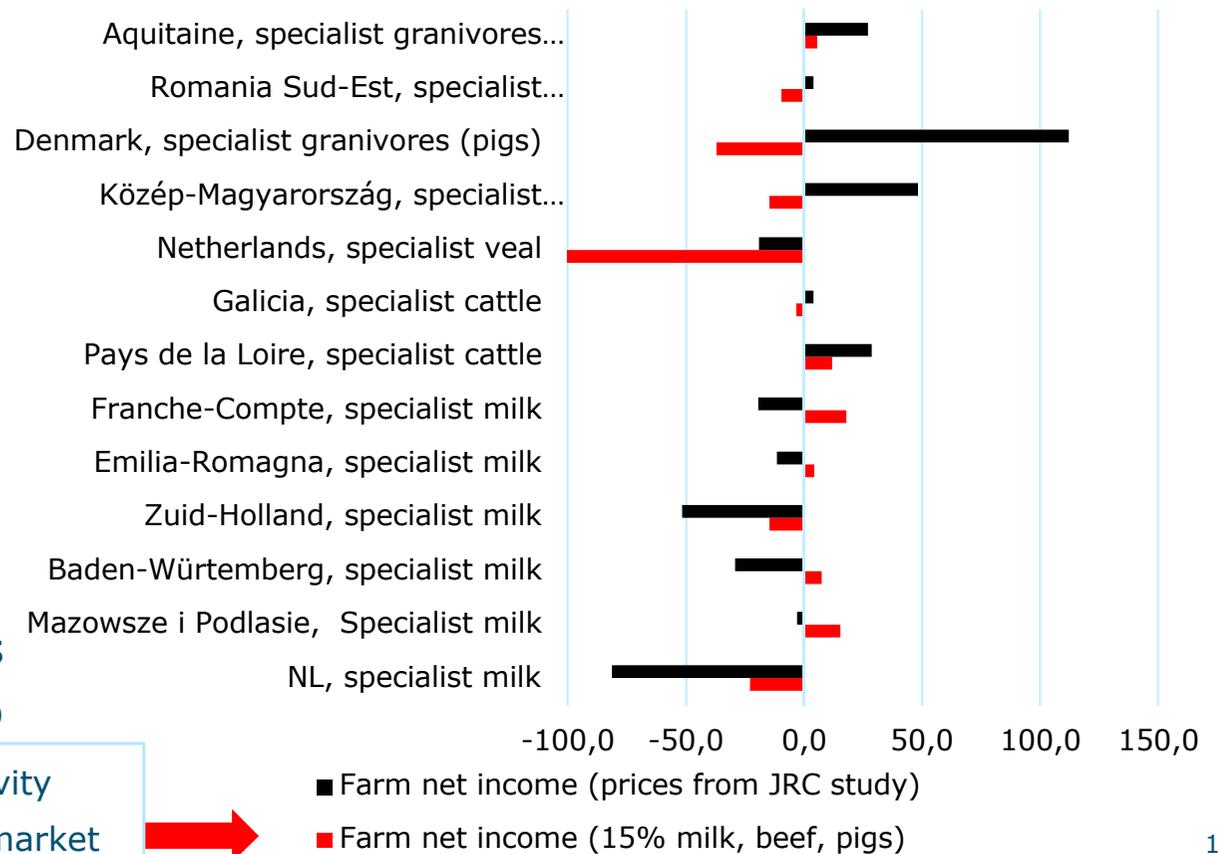
Farm net income effects (% change)



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Farm net income effects (%)



Sensitivity w.r.t. market conditions →

Highlights Wageningen livestock study

- Achieving the EU's Green Deal objectives may lead to a reduction of livestock production in the order of 10 to 15%
- Especially fertilizer/nutrient surplus reduction and climate measures are likely to be/become main constraining factors to EU agricultural production
- The impacts are likely to be regionally differentiated, with relatively strong negative impacts on environmental hotspot areas
- Market impacts are very important in determining the impacts on farm net income, but these are still uncertain and incompletely analysed (e.g. 'missing' consumer side)
- Financial incentives will be needed to ensure a sufficient adoption of environmental and climate measures (in case of voluntary adoption) or (in case of obligatory measures) targeted support will be needed to mitigate negative income effects

Some concluding remarks / observations

- Rationale: The EU food system, including primary production, needs to be re-embedded within social and “planetary” boundaries (local, regional, global)
- Achieving the EU’s Green Deal objectives may lead to a reduction of livestock and crop production in the order of 10 to 15%
- Impacts on farm income are likely to vary (+/-) over sectors as well as regions, providing an argument for tailored and region-specific policy approaches (ceteris paribus market conditions)
- There is an increasing need for innovations (e.g. biocontrol, genetically diversified systems, precision agriculture, new plant breeding techniques) to help reduce/overcome the negative impacts of reduction of pesticides and nutrients, especially for permanent crops.
- F2F/BD strategies create a competitive disadvantage of EU agriculture relative to the baseline (level playing field) as well as ILUC-effects (potential leakage)
- Note that also our assessment is still a partial one (e.g. misses diet, food waste, “origin“-impact)?

Thanks for your attention



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