

Production and yield after introduction of ecological focus areas -a rough calculation of the effects

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Summary

For estimating the effects of the introduction of ecological focus areas (EFA) on production and yield of arable crops a rough calculation has been carried out for the winter wheat production in Germany. Following turned out:

- With a progressive greening (10 % EFA) and conservative assumptions (only 2 % landscape features, only set-aside considered without exceptions) there will be only a short term drop of yield by 4.9 %, but until 2020 the yields will be at about 4 % higher than 2013; with some other, more dynamic assumptions the short term drop will only be about 1.1 % and in 2020 the yields will be at about 8 % higher than in 2013.
- This effect of production increase till 2020 with and despite an introduction of 10 % EFA derives from productivity raise in cereal production.
- The annual yield fluctuation is higher than the effects of an EFA-introduction.
- The average yield in the period 2014 - 2020 are about 2 % higher in scenario 1 and about 6 % higher in scenario 2 than the average yield from 2002 - 2010.
- Beside the minimal short term effects of yield drop it must be underlined, that EFA's are the more important the more intensive production is as those EFA's are inevitably important for safeguarding the long term productivity of agricultural landscapes (pollinator services and others).

Thus it can be clearly stated that the introduction of ecological focus areas (EFA) has no longterm negative effects on production and yield of arable crops compared to 2013 and in contrast there is a real need for EFA's from the point of longterm safeguarding the productivity of European agricultural landscapes.

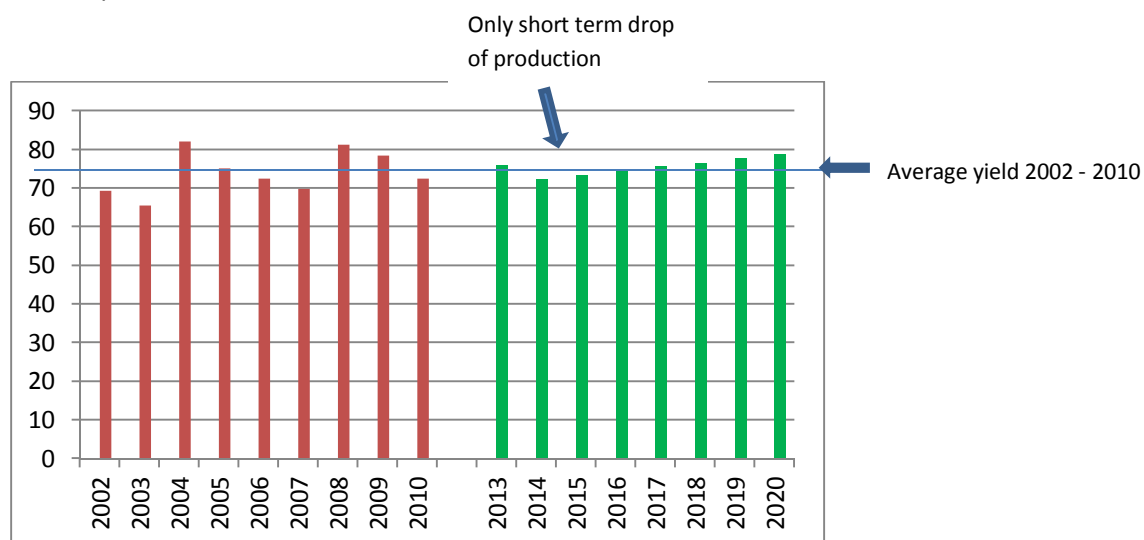


Fig. 1: Scenario 1 - calculation of winter wheat production in dt/ha in Germany considering the introduction of compulsory Ecological Focus Areas (EFA) with an extent of 10 % from 2014 - 2020.

The red columns show the yields of winter wheat in Germany according to statistical data from 2002 - 2010, the green columns show the calculations based on the given assumptions.

Detail calculation

For estimating the effects of the introduction of ecological focus areas (EFA) on production and yield of arable crops a rough calculation has been carried out with the example of the winter wheat production in Germany.

Following assumptions have been taken:

Scenario 1:

- Average yield of winter wheat will be 7.6 t/ha in the year 2013.
- 80 % of the fields produce 8 t/ha, 20 % produce 6 t/ha in 2013 (in sum average 7.6 t/ha)
- 10 % EFA are compulsory from 2014 - 2020 (progressive approach)
- 2 % landscape features are taken as EFA (average in Germany according to a recent study of Fuchs et al. is 4.3 % presence of landscape features in Germany on farmland with differences in nature regions from 2.6 - 6.8 %)
- 8 % of the marginal fields (normal average production was 6 t/ha) are taken as EFA, there is an assumed Zero-production on the EFA's (in the second scenario other assumption of low production on EFA will be assumed)
- No further exceptions are considered (e.g. small farmers and organic agriculture without EFA)
- There is a productivity increase of 1.5 % annually in average (in the past decades it was at an level of about 1.7 - 2.0 % in average, - see DBV 2010 and see figure 3)

Following turned out (Scenario 1):

- Compared to a status quo of 7.6 t/ha in 2013 the production falls in 2014 to a yield of 7.2 t/ha, which is 4.9 % lower than in 2013.
- This short term drop lies within the "normal" annual fluctuation of yields, which differed in the years 2002 - 2010 from 6.6 to 8.2 t/ha (whole country averages according data of the German federal agency for statistics destatis.de, average 7.4 t/ha)
- Until 2020 the yields will raise to an amount of 7.9 t/ha which is about 4.0 % higher than in 2013.
- The average yield in the period 2014 -2020 are about 2 % higher in scenario 1 than the average yield from 2002 - 2010.

The calculations details are given in table 1.

In a second calculation following assumptions have been taken:

Scenario 2:

- Average yield winter wheat 7.6 t/ha
- 80 % of the fields produce 8 t/ha, 20 % produce 6 t/ha in 2013 (in sum average 7.6 t/ha)
- 10 % EFA are compulsory from 2014 - 2020 (progressive approach)
- 3.5 % landscape features are taken as EFA (average in Germany according to a recent study of Fuchs et al. is 4.3 % presence of landscape features in Germany on farmland with differences in nature regions from 2.6 - 6.8 %)

- 6.5 % of the marginal fields (normal average production was 6 t/ha) are taken as EFA, - now there is a production of 3 t/ha on the EFA's (extensive cereal production with biodiversity focus: wide seed drills, no fertilizer, no pesticides, species rich field)
- No further exceptions are considered (e.g. small farmers and organic agriculture without EFA)
- There is a productivity increase of 1.5 % annually in average (in the past decades it was at an level of about 1.7 - 2.0 % in average, - see DBV 2010 and see figure 3)

Following turned out (Scenario 2):

- Compared to an status quo of 7.6 t/ha in 2013 the production falls in 2014 to a yield of 7.5 t/ha, which is 1.1 % lower than in 2013.
- This short term drop lies within the "normal" annual fluctuation of yields, which differed in the years 2002 - 2010 from 6.6 to 8.2 t/ha (whole country averages according data of the German federal agency for statistics destatis.de, average 7.4 t/ha)
- Until 2020 the yields will raise to an amount of 8.2 t/ha which is about 8.1 % higher than in 2013.
- The average yield in the period 2014 - 2020 are about 6 % higher in scenario 2 than the average yield from 2002 - 2010.

The calculations details are given in table 1.

Table 1: Details of calculation

Year	Winter wheat Average yield * (WW) in dt/ha	Scenario 1:		Scenario 2:	
		average yield ** (WW) in dt/ha	%-change com- pared to 2013	average yield ** (WW) in dt/ha	%-change com- pared to 2013
2002	69,4				
2003	65,5				
2004	82,1				
2005	75,1				
2006	72,4				
2007	69,9				
2008	81,3				
2009	78,4				
2010	72,5				
Average 2002 - 2010	74,1				
2013		76,0		76,0	
2014		72,3	-4,9%	75,2	-1,1%
2015		73,4	-3,5%	76,3	0,4%
2016		74,5	-2,0%	77,4	1,9%
2017		75,6	-0,6%	78,6	3,4%
2018		76,7	0,9%	79,8	5,0%
2019		77,9	2,4%	81,0	6,5%
2020		79,0	4,0%	82,2	8,1%
Average 2014 - 2020		75,6		78,6	

* Data from Statistisches Bundesamt (Federal Statistical Office, Destatis 2011)

** Increase from 2014 - 2020 calculated with 1.5 % annual increase of yield in average

Calculations for 2014 - 2020 done with the assumptions given in the text

Scenario 1

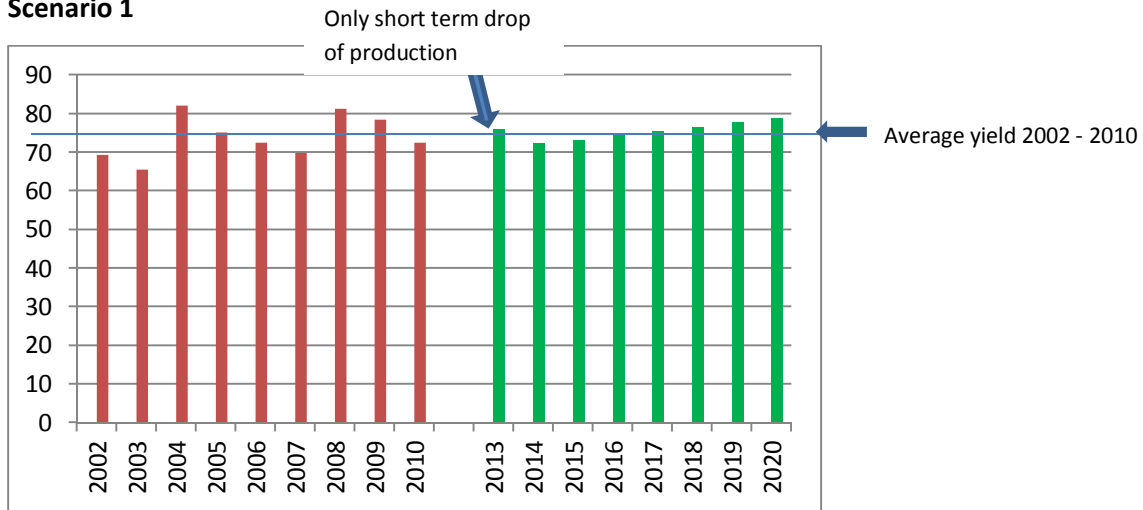


Fig. 2: Scenario 1 - calculation of winter wheat production in dt/ha in Germany considering the introduction of compulsory Ecological Focus Areas (EFA) with an extent of 10 % from 2014 - 2020.

The red columns show the yields of winter wheat in Germany according to statistical data from 2002 - 2010, the green columns show the calculations based on the given assumptions.

Scenario 2

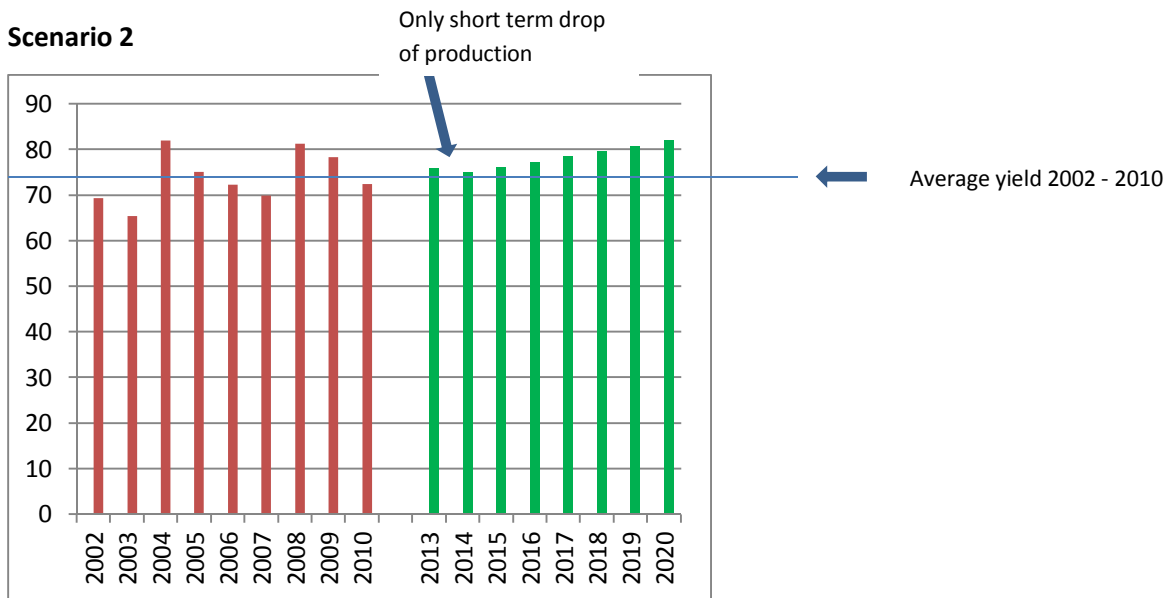


Fig. 2: Scenario 2 - calculation of winter wheat production in dt/ha in Germany considering the introduction of compulsory Ecological Focus Areas (EFA) with an extent of 10 % from 2014 - 2020.

The red columns show the yields of winter wheat in Germany according to statistical data from 2002 - 2010, the green columns show the calculations based on the given assumptions.

Further aspects

Very important to underline in this respect is, that for keeping and safeguarding the productivity of the agricultural landscape as a whole there is an inevitable need for species rich ecological focus areas with high quality: they are important for example for safeguarding the pollinator services, but also for other ecosystem services and public goods. The last years showed increasingly a lability /weaknesses e.g. of bee populations. One of the several reasons is the food scarcity in agricultural landscapes. Thus the more intensive production is the more necessary and inevitably important are ecological focus areas (EFA) of high ecological quality (not just ecological set-aside, but good managed EFA) for safeguarding the long term productivity of agricultural landscapes.

Literature:

Deutscher Bauernverband (2010): Situationsbericht 2011 - Trends und Fakten zur Landwirtschaft. Download under: www.situationsbericht.de . Berlin, 263 pages.

Fuchs, D., Oppermann, R. & Krismann, A. (2011): Umsetzung des High Nature Value Farmland – Indikators in Deutschland. → Download project report High nature value farmland Indicator BFN (2010): UFOPLAN FKZ 3508 89 0400: http://www.bfn.de/0315_hnv.html

Statistisches Bundesamt (Federal Statistical Office, Destatis 2011): Daten zu Land- und Forstwirtschaft, Fischerei - Wachstum und Ernte - Feldfrüchte: Fachserie 3, Reihe 3.2.1 vom 07.07.2011: Artikelnummer 2030321107164. www.destatis.de Wiesbaden.

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