Focus Group ‘Production of protein crops under climate change’

Berlin, Germany
20-21 November 2024

Legume Generation and more

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Independent consultant, Germany

Focus Group 'Production of protein crops under climate change' 1st meeting | Berlin, Germany | 20 November 2024

Legume Generation

Reflections on the development of legume-supported cropping systems

Donal Murphy-Bokern and Christine Watson

Funded by the European Union


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Legume Futures

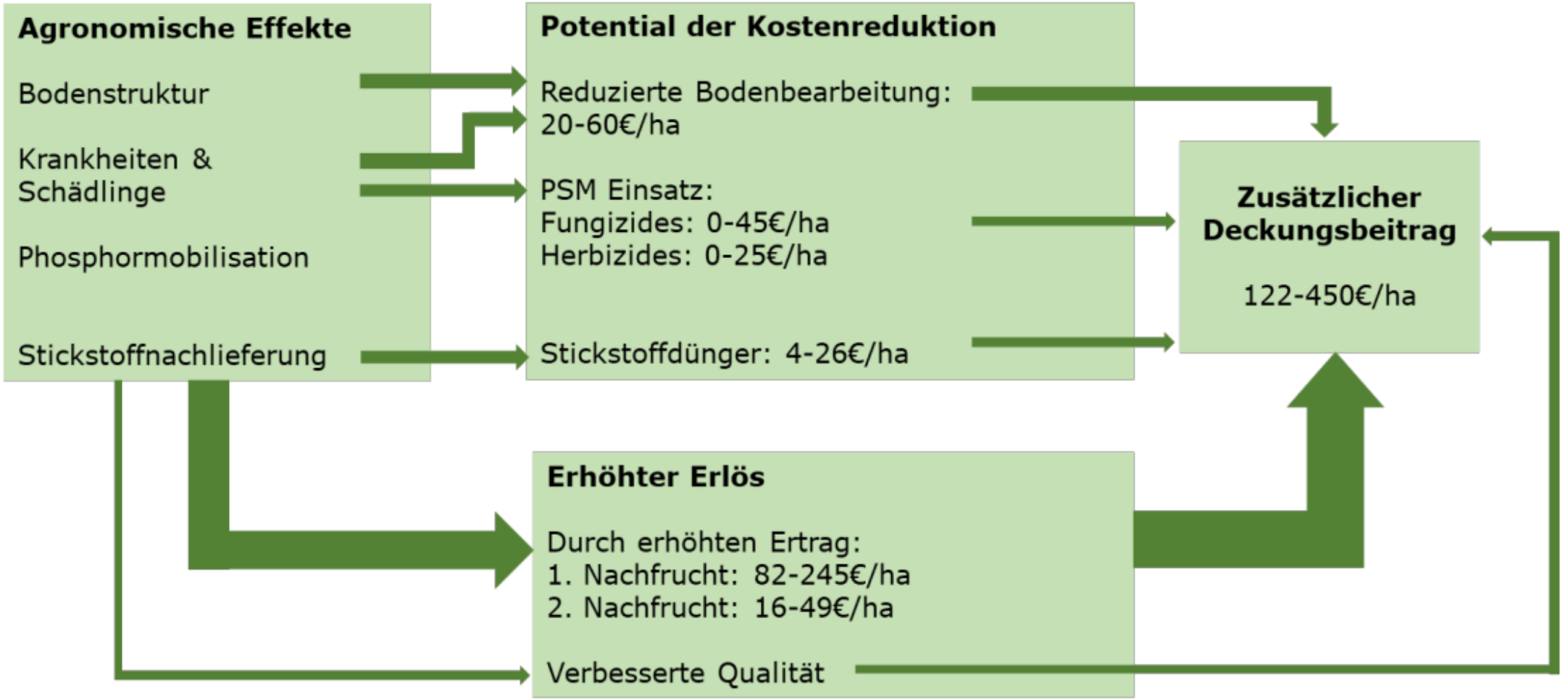
Legume Hub

Legumes Translated

Legume Generation

DIVERSICROP
GROWING DIVERSITY

Vorfruchteffekte: Spanne aus praxisnahen Forschungsergebnissen



Zusätzlicher Deckungsbeitrag durch den Vorfruchteffekt von Körnerleguminosen auf ein nachfolgendes Getreide im Vergleich zu einer Getreide Vorfrucht (Angepasst von Preissel et al. 2015, Alpmann und Schäfer 2014, Preise von 2016-2019 für Weizen 163€/t und N Düngerpreis 0.75 €/kg N, MIO Marktinformation Ost).

Notz & Reckling et al. (2022)

Beispiele von Fruchtfolgen aus Europa

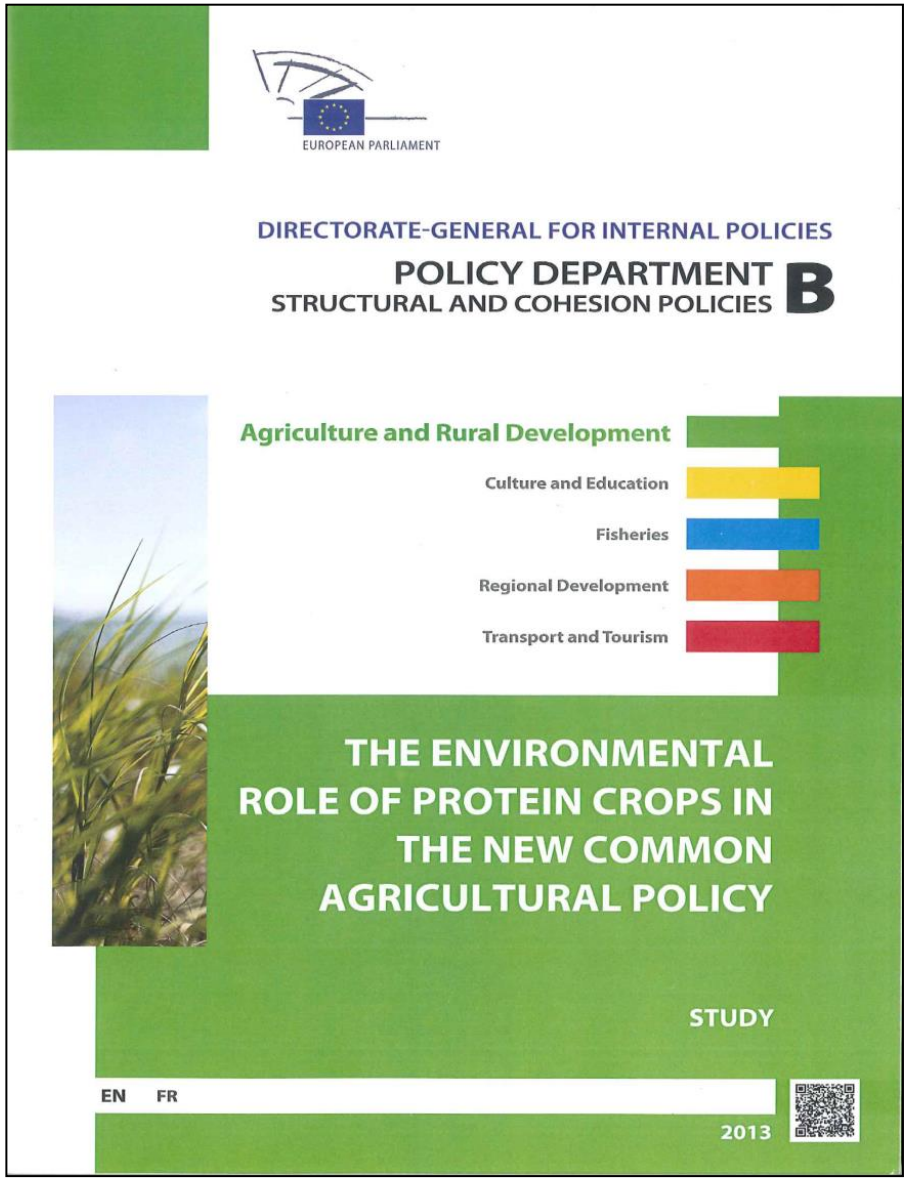
Arable cropping systems

Study area; reference rotation	Rotation with legume	GM (standard)	GM (CO2-tax)	N fertilizer use	N_2O emissions	Nitrate leaching	Protein yield	Energy yield
Central East Europe								
BG, BG 31; WW-GM-SF	BG 31#1: FP-WW-GM-SF	-22%	-22%	-28%	-24%	-16%	+4%	-10%
	BG 31#2: WW-SF-FP-GM	-17%	-15%	-29%	-23%	-11%	+1%	-13%
BG, BG 32; WOR-WW-SF-GM	BG 32#1: SY-WW-SF-WW	-2%	+1%	-54%	-45%	-13%	0%	-25%
BG, BG 33; WOR-WW-SF-GM	BG 33#1: CB-WW-SF-WW	-112%	-118%	-5%	+1%	+84%	-23%	-37%
RO, RO 11; GM-WW	RO 11#1: GM-WW-SY	-4%	+1%	-37%	-31%	-8%	+13%	-16%
RO, RO 21; GM-SF-WW	RO 21#1GM-WW-SY	+12%	+13%	0%	+8%	+21%	+44%	+6%
RS, RS 12; GM-WW	RS 12#1: GM-WW-SY	+70%	+78%	-19%	-7%	-11%	+57%	+8%
UA, Kyiv oblast; GM-SF-WW	UA #1: GM-SY-SF-WW	+5%	+6%	-20%	-12%	+11%	+16%	-11%
Central West Europe								
AT, AT 11; GM-GM-WW	AT 11#1: SY-WW-GM	+56%	+68%	-41%	-31%	-2%	+24%	-19%
AT, AT 12; GM-WW-SF	AT 12#1: GM-WW-SY	+7%	+9%	-16%	-6%	+32%	+39%	-3%
DE, DE 11; WW-WB-WT	DE 11#1: WW-WB-FP-WT	-21%	-19%	-29%	-24%	-12%	-3%	-13%
DE, DE 11; SU-WW-WB-GM	DE 11#2SU-WW-WB-FB	-35%	-36%	-38%	-20%	+79%	0%	-15%
DE, DE 13 (Kies); GM-GM-WW-WOR	DE 13#1: GM-GM-SY-WW-WOR	-13%	-11%	-22%	-19%	-1%	+7%	-11%
DE, DE 13 (Löss); GM-GM-WW-WOR	DE 13#2: GM-GM-SY-WW-WOR	-8%	-7%	-22%	-18%	+2%	+8%	-10%
DE, DE 40 (soil type 2); WW-WB-WOR	DE 40#1: WW-FP-WW-WB-WOR	-14%	-13%	-23%	-19%	-18%	+3%	-13%
	DE 40#2: WW-SY-WW-WB-WOR	-4%	-2%	-23%	-19%	-14%	+12%	-5%
DE, DE 40 (soil type 3); WR-WR-WOR	DE 40#3: WR-FP-WR-WOR	-15%	-14%	-27%	-21%	-17%	+5%	-8%
	DE 40#4: WR-L-WR-WOR	-16%	-15%	-27%	-21%	-15%	+10%	-9%
DE, DE 73; WOR-WW-WW-SB	DE 73#1: WOR-WW-FP-WW-SB	-24%	-25%	-21%	-17%	-16%	+6%	-7%
North-West Europe								
GB, UKM 7; WOR-WB-WO-SB-WB	UKM 7#1: WOR-WB-WO-FP-WB	0%	+2%	-30%	-23%	-24%	+10%	-3%
	UKM 7#2: WOR-WB-WO-FB-SB	+1%	+3%	-26%	-25%	-28%	+16%	-6%
IE, IE 05, IE, 06; WB-WO-WW-WB-WOR-WW	IE 05, 06#1: WB-WO-WW-FB-WW	-7%	-6%	-22%	-19%	-23%	+14%	-2%
IE, IE 05, IE, 06; SMB-SO-SFB-SMB-SMB	IE 05, 06#2: SMB-FB-SO-SFB-SMB	+7%	+10%	-20%	-14%	-8%	+25%	-4%
Southern Europe								
IT, ITH 4; GM-GM-GM	ITH 4#1: GM-SY	+93%	+134%	-54%	-63%	-30%	+35%	-20%

"GM CO_2-tax," a carbon tax of 50€/t $CO_{2\,eq}$ was assumed and levied on the use of all fossil carbon sources within the manufacturing process of mineral N fertilizers in which 5.62 kg $CO_{2\,eq}$/kg N fertilizers were assumed (Kool et al. 2012).

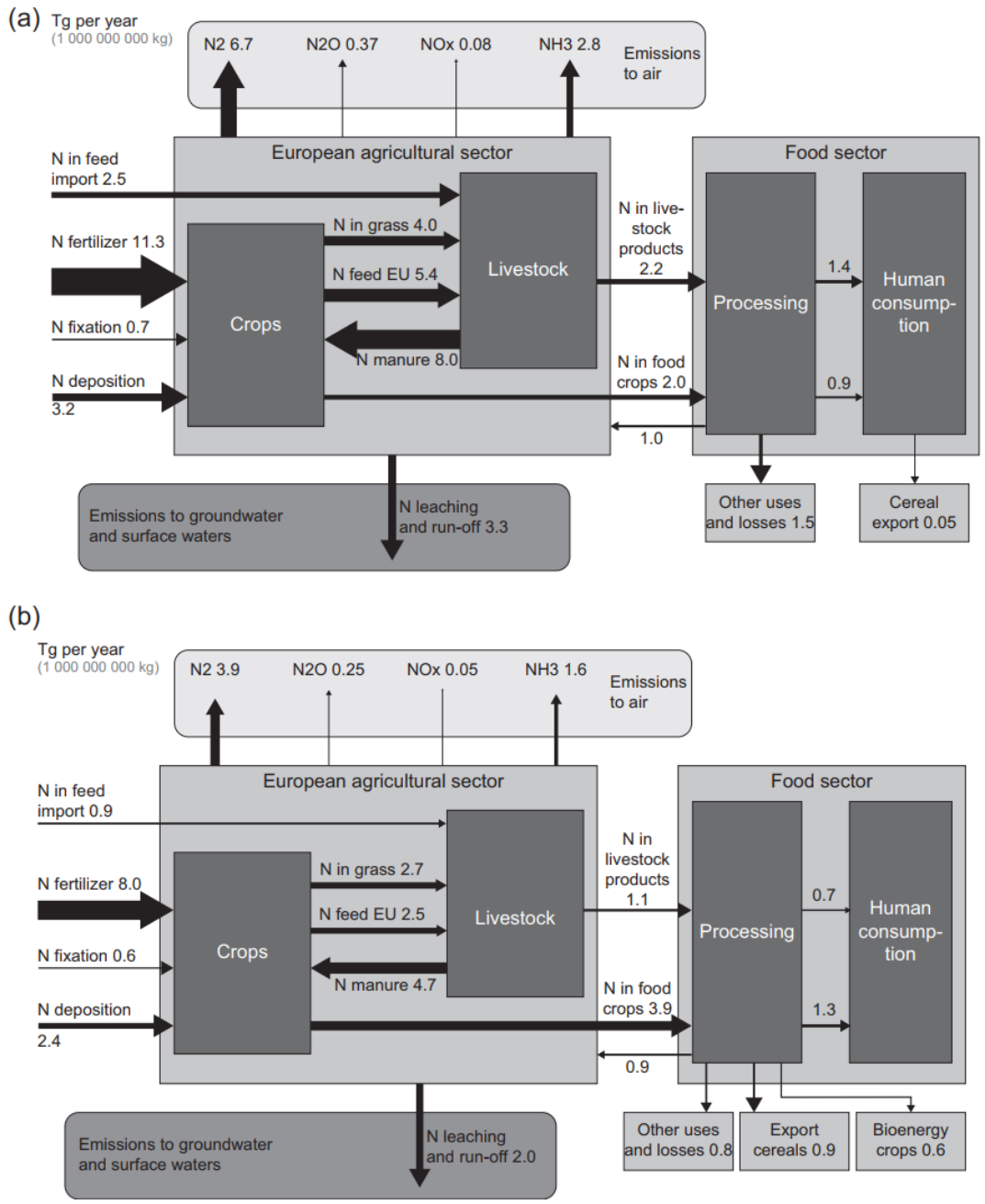
Notz et al. ASD (2023)

Report for European Parliament 2013



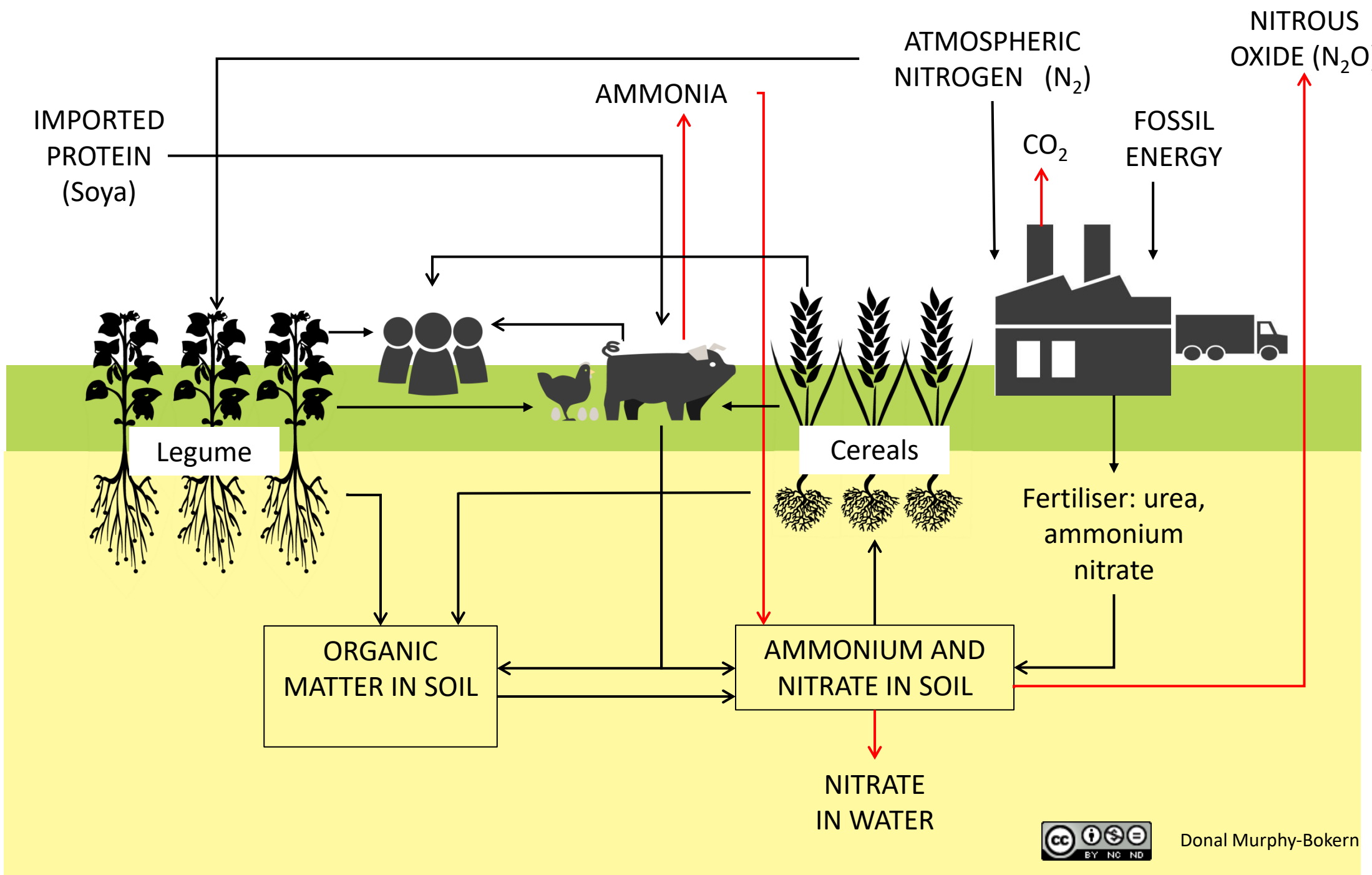
Com Agri April 2013, Brussels

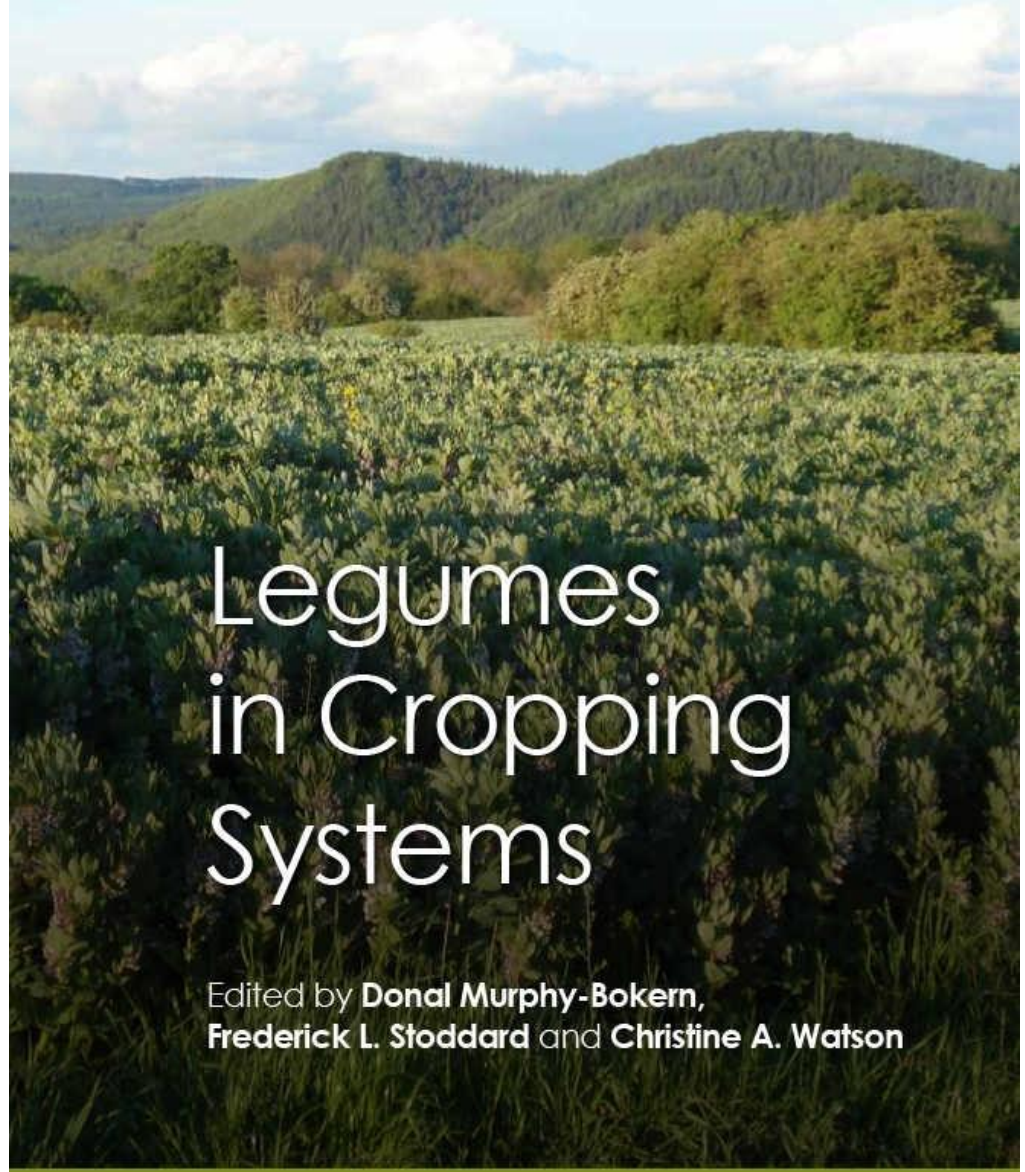
Report at http://www.legumefutures.de/legumefuturesnews/30052013brussels.html



Westhoek, Murphy-Bokern et al., 2014 Global Env. Change 26

Fig. 3. Nitrogen flows (in Tg yr^{-1}) in the EU agricultural and food systems, under the reference scenario for 2004 (a) and in the case of the alternative diet with a 50% reduction in the consumption of meat, dairy and eggs, under the *Greening land-use* scenario (b).





Legumes in Cropping Systems

Edited by **Donal Murphy-Bokern**, **Frederick L. Stoddard** and **Christine A. Watson**

CABI

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Sowing time for soybean

Timely sowing is important for successful soybean production. Timely sowing gives the best combination of cultivar, the length of daylight (latitude and calendar date), and soil temperature and moisture at planting depth. This enables rapid development and growth of young plants before floral induction, providing the foundatio...

Leopold Rittler, Olga Bykova

Feeding quality of pea for poultry

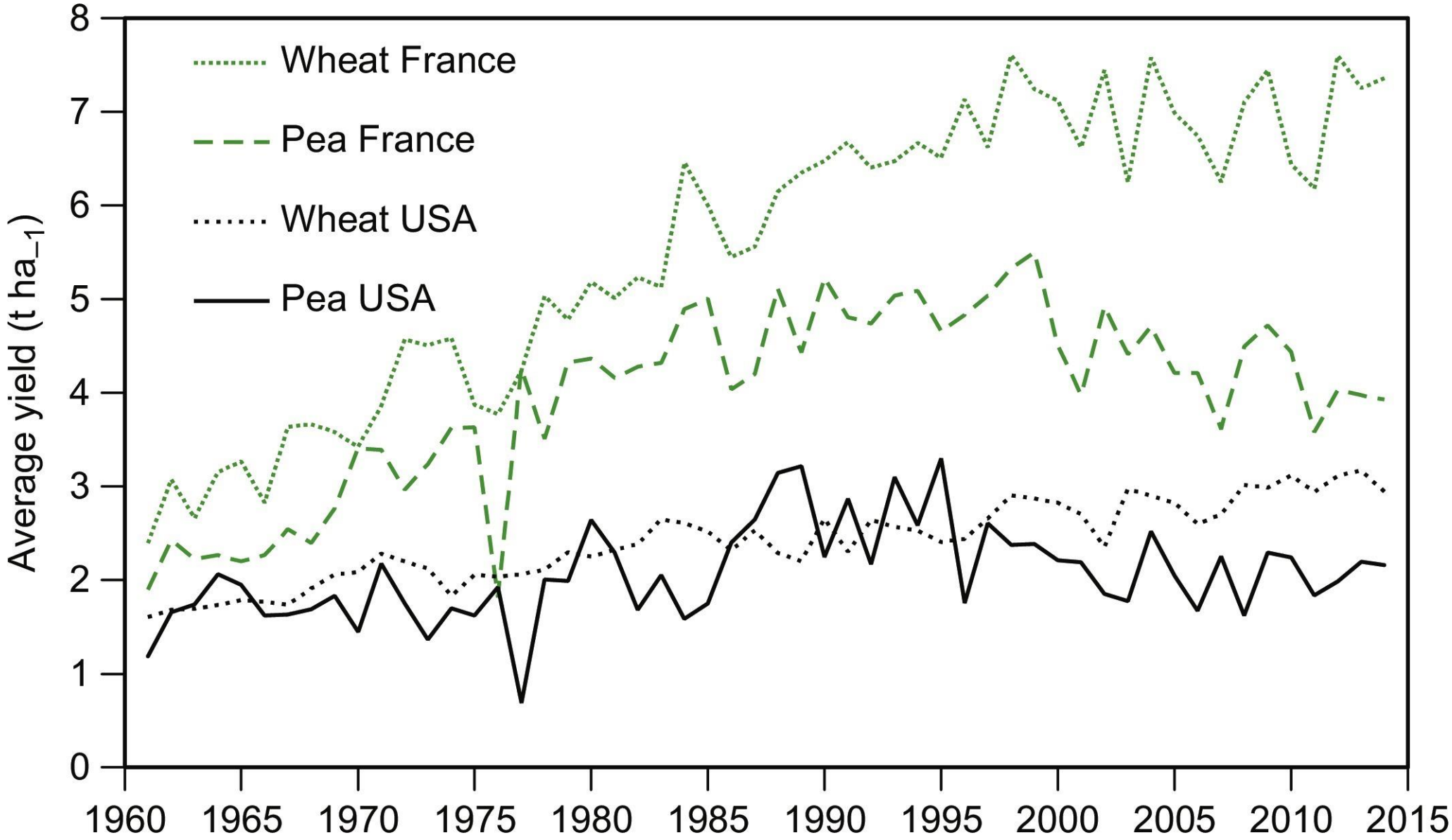
This note gives an overview of the components and feed value of field pea. Pea (*Pisum sativum* L.) is rich in protein and energy. Pea complements cereal in the feed ration because of the high content of lysine. The feed value of pea for poultry is determined by the metabolisable energy for poultry and the digestibility of the amino acids. Depending o...

Ulrich Quendt

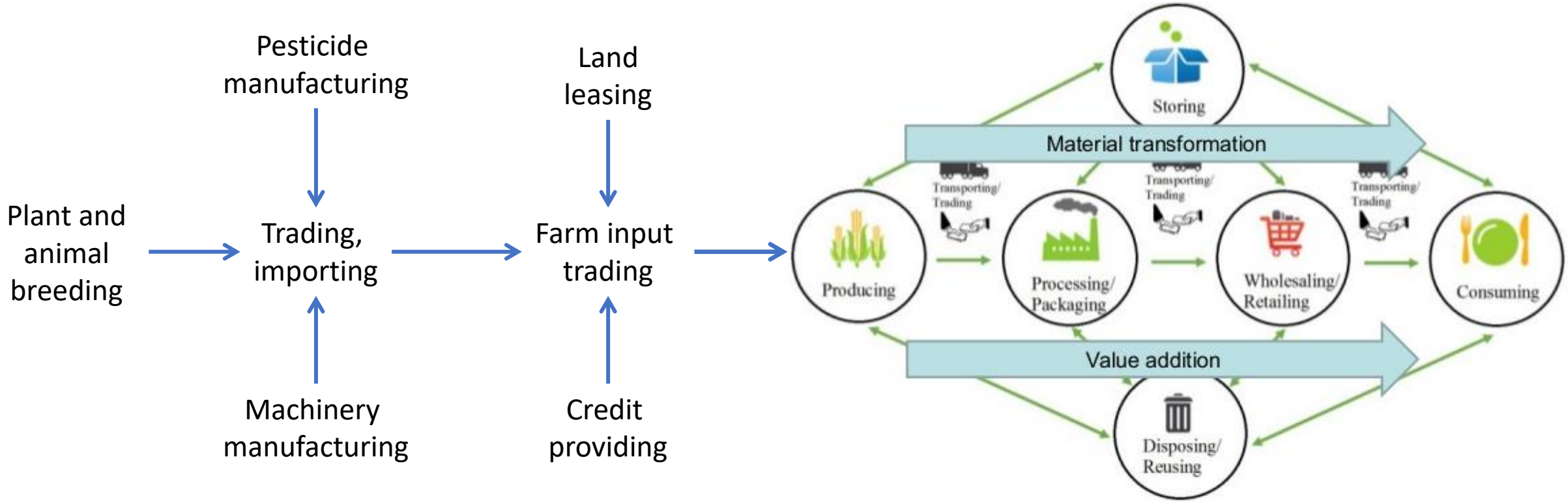
Cultivation of white lupin

White lupin *(Lupinus albus)* is a different botanical species to narrow-leaved or „blue" lupin *(Lupinus angustifolius)*. It tolerates heavier soil and has a higher yield potential, but does not ripen until August/September. Important cultivation practices include the use of healthy, certified seed, sowing as early as possible and using the right ...

Christine Arncken, Matthias Klaiss, Marina Wendling and Monika Messmer


Wheat France
Pea France
Wheat USA
Pea USA
Average yield (t ha_-1)
0
1
2
3
4
5
6
7
8
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015

Food value chains are usually long: lots of actors do“ing“ things



Adapted from John Ingram, University of Oxford

PCGIN

The Pulse Crop Genetic Improvement Network (PCGIN) works towards legume crop improvement in the UK

About the Pulse Crop Genetic Improvement Network

The Pulse Crop Genetic Improvement Network (PCGIN) is managed by the John Innes Centre, in collaboration with NIAB, University of Reading, Aberystwyth University, AHDB, PGRO and Defra and with input provided by the commercial sector

Read about about the pulse crop genetic improvement network

Genetic Resources

Genetic Resources available to the Pulse Crop Genetic Improvement Network community

Read about genetic resources

PCGIN Reports

The annual reports from the PCGIN project, back to 2005-2009's final report

Read about pcgin reports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focused
project
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grain
lentil
clover
lupin
crop
pea
adaptation
major
value
within
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innovation
cost
well
chains
crops
yield
widely
cultivars
legume
groups
work
goal
using
turn
across
supported
multi
focus
will
increase
protein
quality
species
six
Europe
also
drive
feed
competitive
improvement
taking
improve
genomic
actor
community
phaseolus
specific
genetic
communities
diversity
novel
white
strong
traditional
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despite
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phenotyping
germplasm
base
programmes
sustainable
outcomes

OPINION

Annals of Applied Biology
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Developing legume-supported cropping systems in Europe: Have we overlooked something?

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Abstract

Why are legume crops rare in Europe even though they grow well there? This opinion paper brings together concepts from crop physiology, classical economics and sociotechnical theory to address this question. It argues for increased focus on research and innovation on crop performance. The starting point is that trade policy no longer explains the marginalisation of legumes. A more recent premise that mutually supporting social, technical and agricultural factors have combined over time to establish and maintain the current cropping systems is also incomplete. However, these propositions have led to significant investment in research on niche value chains in the hope that these will combine within transition pathways to break through system incumbency that "locks out" legumes. It is argued here that this approach is incomplete for crops because the scaling up and agglomeration of niche processing and marketing activities does not improve the fundamental crop resource capture and conversion processes in the field upon which farm productivity depends. Reconsideration of some economic and crop physiological basics is required. Farmers aim to make rational decisions and to focus on what they do best. The principles behind international trade described in the 19th century and the fundamental biophysical crop-level processes that were elucidated in the 1960s together explain the cropping choices many European farmers make. We need more focus on raising the on-farm performance and competitiveness of the legume crops themselves and the farming systems in which they are grown. Efficient, productive legume crops are important also if we are to avoid a trade-off between environmental gains in Europe and disbenefits elsewhere because of effects on global trade.

KEYWORDS

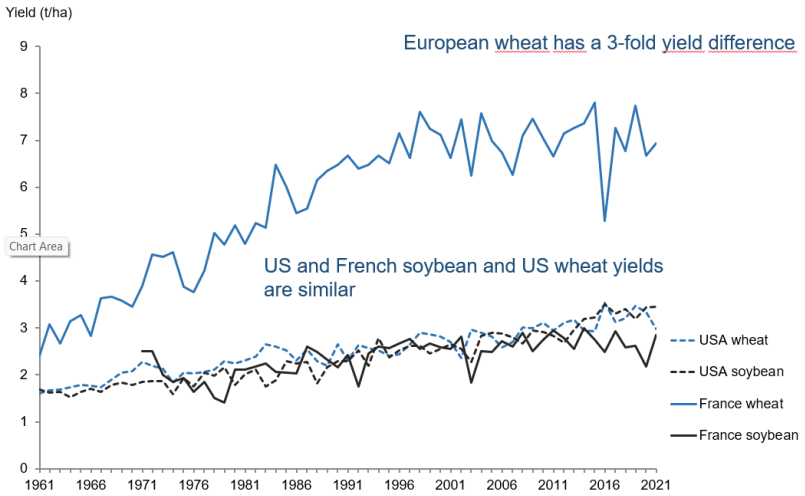
faba bean, ideotype, legume, multi-level perspective, pea, protein crop, research policy, soya bean, transition theory

If a crop is not profitable, why should a farmer grow it?

Protein and ‘proteins’

Legume Generation (Boosting innovation in breeding for the next generation of legume crops for Europe) has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No.101081329. It also receives support from the governments of the United Kingdom, Switzerland and New Zealand.


6 dansk
SECRETARIAT DES COMMISSIONS
PRESENTATION


Yield (t/ha)
European wheat has a 3-fold yield difference
US and French soybean and US wheat yields are similar
Chart Area
9
8
7
6
5
4
3
2
1
0
1961
1966
1971
1976
1981
1986
1991
1996
2001
2006
2011
2016
2021
USA wheat
USA soybean
France wheat
France soybean

EU CAP Network Focus Group
‘Production of protein crops under climate change’

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All information on the Focus Group is available on the webpage:
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